PROMISED

Co-funded by the European Union

TOO LATE TO CLEAN PLASTIC UP?

UNIVERSIDAD DE BURGOS

This work is part of the scientific studies carried out within the framework of the PROMISED project (Promoting twin transition through Integrated STEAM in bilingual Secondary Education). PROMISED is funded under the Erasmus+ Programme, Key Action 2: Cooperation Partnerships in School Education (Reference: 2023-1-ES01-KA220-SCH-000157221). The project is coordinated by the University of Burgos (Spain) and involves the following partners: Senior Europa S.L. (Kveloce, Spain), the Teacher Training and Educational Innovation Centre of Burgos (CFIE, Spain), Matej Bel University (UMB, Slovakia), Howest University of Applied Sciences (Belgium), and the University of Granada (Spain).

This project has been funded with support from the European Commission. This website and the factsheets, reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Co-funded by the European Union

Authors:
Esther Sanz de la Cal
Ileana M. Greca
Almudena Alonso-Centeno
Alicia Martínez González
David Ruiz Hidalgo
Marta Miguel Borge

Edition and revision:
Susana Mata Torres

Graphic design and layout:
Lara Lester

Cover and back-cover images taken from freepik

Edita: Servicio de Publicaciones e Imagen Institucional
UNIVERSIDAD DE BURGOS
Edificio de Administración y Servicios
C/ Don Juan de Austria, 1, 09001 BURGOS - ESPAÑA

ISBN: 979-13-87585-18-1
DOI: https://doi.org/10.36443/9791387585181

TABLE OF CON-TENTS

6

14

58

96

120

THEORETICAL FRAMEWORK

WHAT IS PROMISED?

PROMISED *(**PROM**oting twin transition through Integrated STEAM in bilingual Secondary **ED**ucation)* is a European project funded by Erasmus+ (2023-1-ES01-KA220-SCH-000157221) that aims to transform teaching practices in secondary education by integrating:

- ***STEAM education*** (Science, Technology, Engineering, Arts and Mathematics),
- ***CLIL*** (Content and Language Integrated Learning),
- and real-world challenges related to the ***twin transition***:
  - ***Green transition*** (sustainability, environmental awareness),
  - ***Digital transition*** (technological innovation, digital literacy).

The PROMISED framework, developed by Universidad de Burgos (Spain), Universidad de Granada (Spain), CFIE Burgos (Spain), Matej Bel University (Slovakia), and Howest University of Applied Sciences (Belgium), supports teachers in designing learning experiences that are interdisciplinary, plurilingual and competence-based, aligning with the priorities of the European Green Deal and the Digital Education Action Plan.

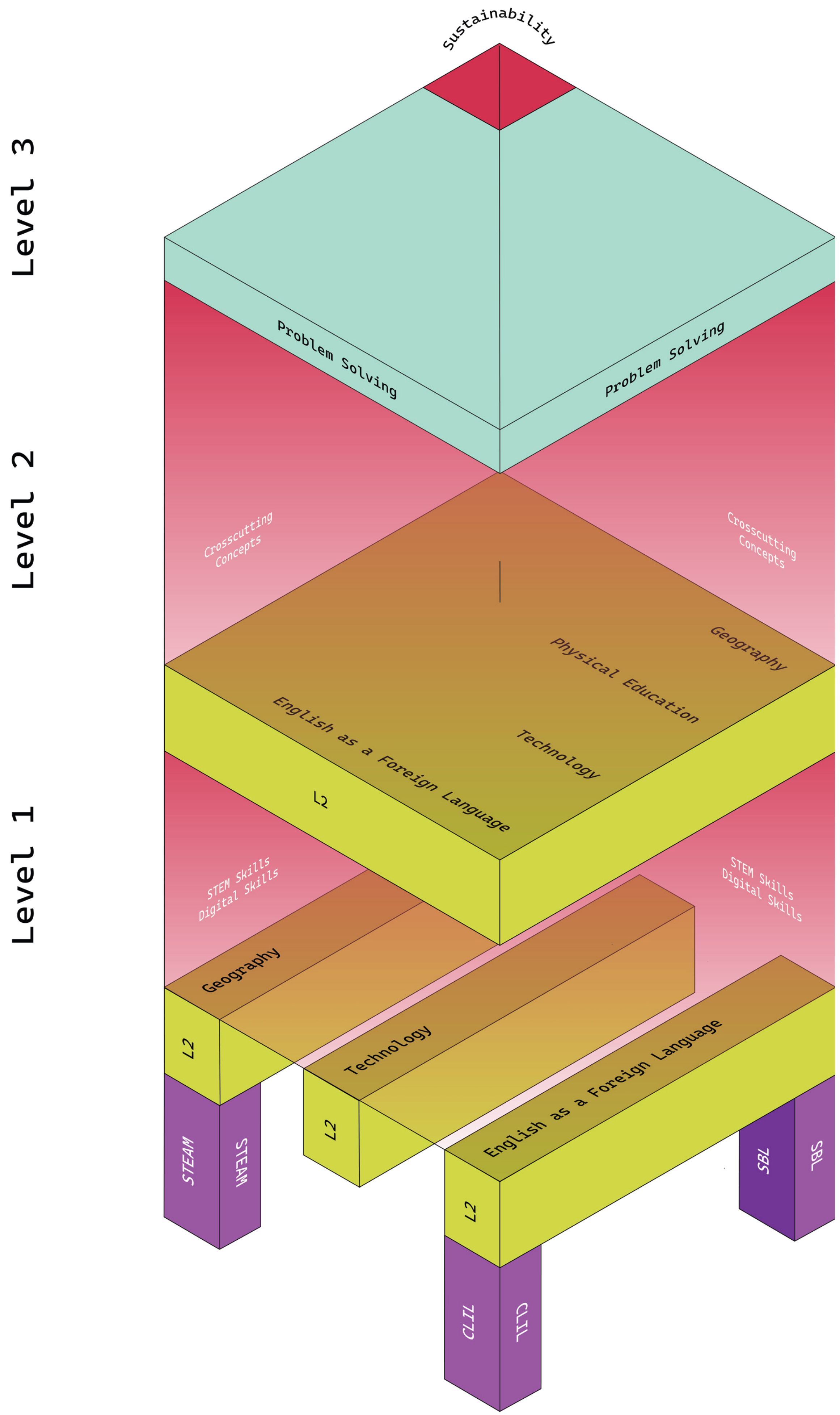
MAIN GOALS OF PROMISED

a. ***To support the development of students' key competences*** related to sustainability, digital literacy, scientific thinking and linguistic skills.
b. ***To encourage the use of interdisciplinary, project-based and inquiry-based approaches*** that make learning more engaging and meaningful.
c. ***To promote the use of a foreign language (L2)*** as a tool for learning across content areas.
d. ***To foster teacher collaboration*** through co-design, co-implementation and co-assessment of learning sequences.

HOW DOES THE PROMISED FRAMEWORK WORK?

The PROMISED framework is designed to be flexible and adaptable. It offers three levels of implementation, allowing schools to progressively integrate bilingual, interdisciplinary teaching, starting from a single subject and moving towards fully collaborative, cross-curricular projects. Each level involves the use of a foreign language, as a vehicle for learning.

a. ***Level 1: One subject + L2:*** development of ***STEAM and digital skills*** within a single subject taught through a foreign language (L2).
b. L***evel 2: Two subjects + L2:*** connection of two or more subjects through ***cross-cutting concepts***, maintaining disciplinary boundaries while fostering curricular integration.
c. ***Level 3: Fully integrated project + L2:*** holistic learning through ***fully integrated projects*** centred on ***sustainability skills*** and complex problem solving.


Level 3
Level 2
Level 1
Sustainability
Problem Solving
Problem Solving
Crosscutting Concepts
Crosscutting Concepts
Geography
Physical Education
Technology
English as a Foreign Language
L2
STEM Skills
Digital Skills
STEM Skills
Digital Skills
Geography
L2
Technology
L2
English as a Foreign Language
L2
STEAM
STEAM
SBL
SBL
CLIL
CLIL

METHODOLOGICAL FRAMEWORK

At the heart of the PROMISED framework lies a simple but powerful idea: students learn best when they work on real problems that matter. Each unit starts from a challenge that feels relevant, meaningful and connected to the world around them. These are not imaginary or abstract topics, they are based on real-life situations, such as energy poverty, pollution, or the loss of biodiversity. When students feel that what they are doing in the classroom has a purpose beyond school, they become more engaged, more curious, and more motivated to learn.

All these challenges are explored through the lens of what we call the Twin Transition, the two big changes shaping our societies today:

- the green transition, focused on sustainability and environmental responsibility, and aligned with the United Nations Sustainable Development Goals (SDGs);
- the digital transition, which brings technology, data and innovation into everyday life, and involves the development of digital skills in a functional and responsible way.

These two themes are always present in PROMISED units, helping students understand how their learning connects to the bigger picture. Whether they are designing a simple prototype, reading a story, or discussing a global issue, they are also thinking about how to make the world more sustainable and how to use technology in smart, ethical ways.

To make this kind of learning possible, PROMISED brings together three main teaching approaches that work hand in hand in every unit:

a. STEAM: this stands for Science (Natural and Social), Technology, Engineering, the Arts and Mathematics. In our framework, we consider STEAM as an integrated educational approach that connects these subjects instead of teaching them separately. In PROMISED, students use ideas and skills from different areas to explore real problems and find creative solutions. The goal is to help them see how knowledge works together in real life.
b. CLIL (Content and Language Integrated Learning): CLIL means teaching subject content through a foreign language. The goal is not just to learn the language, but to use it as a tool to understand and communicate ideas. From this approach, students achieve an optimal level of cultural understanding, linguistic diversity is considered, and it is an attempt to overcome the limitations of traditional teaching by integrating the curriculum. According to Coyle et al. (2010), one of the most basic considerations is that there should be a balanced treatment among four key areas, which are: a) content, b) communication, c) cognition, and d) culture (see Figure 1). In PROMISED, students build subject knowledge while developing their communication skills through what is known as the language triptych, which includes language for learning, language of learning, and language through learning (see Figure 2).
c. Storytelling: serving as the starting point of each unit, storytelling introduces meaningful connections through a graphic novel or comic. Instead of starting with abstract explanations, students begin by reading a visual story that presents a relatable situation connected to the central challenge. This narrative trigger helps them understand why the topic matters, creates emotional engagement and supports comprehension. The story acts as a unifying thread that connects inquiry, language development and subject content throughout the unit, giving coherence and purpose to the entire learning process.

All of these general approaches are combined with active methodologies that guide how content is explored in each unit, such as inquiry-based science education (IBSE), the teaching of social knowledge and history through a problem-oriented and action-based approach, modelling, engineering design methodology, design thinking, and

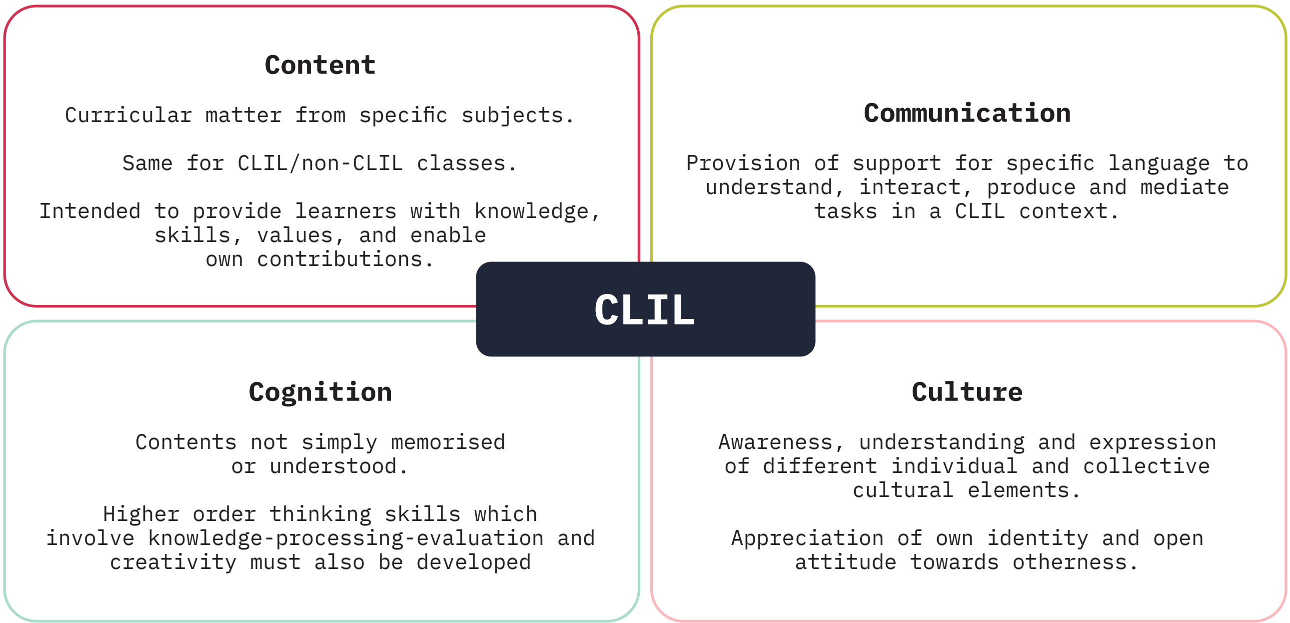


Figure 1
Foundations of CLIL and the 4Cs Model

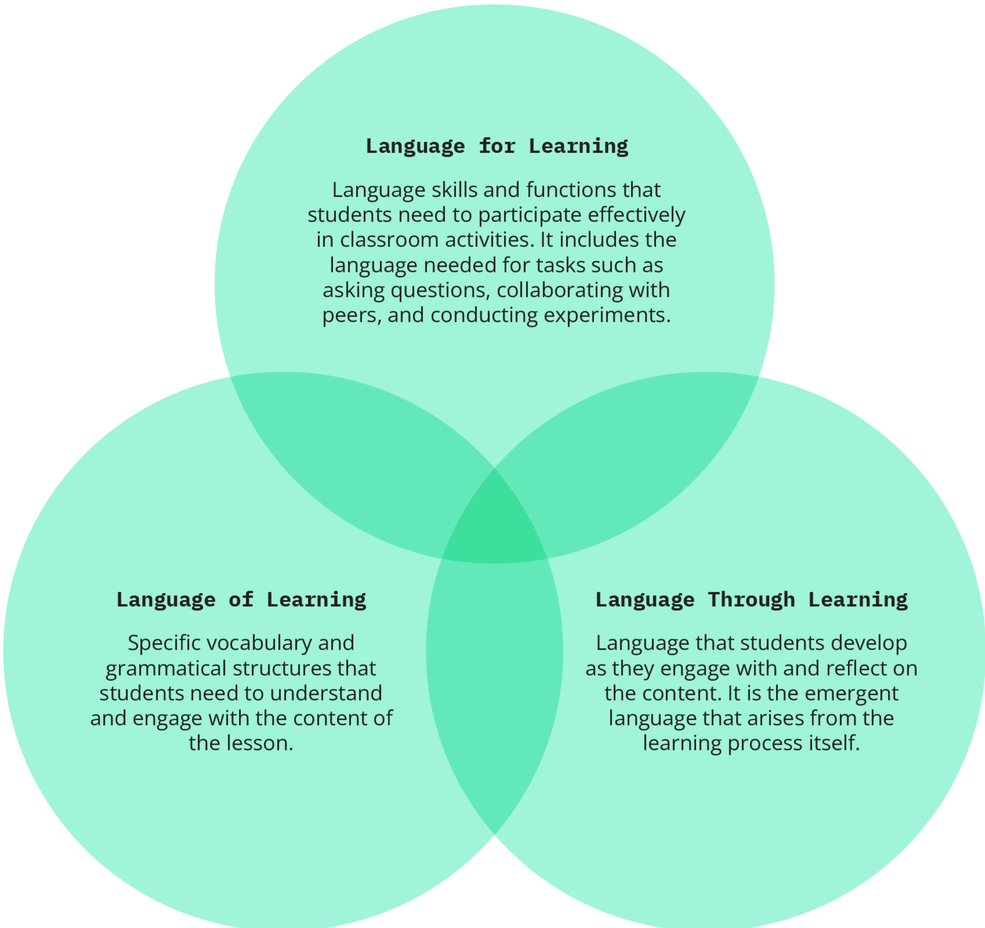


Figure 2
Language triptych: language of, for and through learning.

coding. These methodologies are integrated into the learning process to foster autonomy, engagement and interdisciplinary thinking.

In addition, PROMISED integrates a set of cross-cutting concepts that help students connect knowledge across disciplines, especially within STEAM and the social sciences. These concepts encourage learners to identify patterns, understand causes, analyse systems and think critically. The core concepts include: patterns, cause and effect, scale, proportion and quantity, systems and system models, energy-matter flows, structure and function, and stability and change.

For a full description of each methodology and the cross-cutting concepts, see PROMISED Pedagogical Framework.

CORE RECOMMENDATIONS

All the elements presented in this unit are intended as flexible guidelines, not fixed prescriptions. Teachers are not expected to follow every step exactly as written. Instead, the activities, materials and structure are designed to be adapted to the specific needs of each group, school context and teaching style. The proposals serve as a framework to inspire meaningful teaching and learning and can and should be adjusted as necessary. What truly matters is that the core principles (interdisciplinary work, active methodologies, and real-world relevance) remain central. To ensure effective integration, it is essential that all participating teachers reach a shared agreement on objectives, key contents, and timing. Without coordination, there is a risk of teaching each subject in isolation and simply combining outcomes at the end. True curricular integration happens when all disciplines contribute in a coherent, connected way throughout the process.

This integration includes joint evaluation, which is not done separately in each subject but designed collaboratively. Teachers agree on common assessment criteria and tools, making sure that students are evaluated on what they produce and learn across the whole project—not just in one area. This allows for a more holistic understanding of student progress and reinforces the idea that the work is genuinely interdisciplinary.

THE ANATOMY OF PLASTIC

LVL 1

1. SUBJECTS

Level 1 unit with the integration of:

Natural Science

L2

Graphic Novel: *I'm not a plastic bag* by Rachel Hope Allison, inspired by the real-life phenomenon of the Great Pacific Garbage Patch.

This unit is originally designed for students aged 14 to 16, as it aligns well with their curricular content and competency level. However, if the chemistry component is simplified, particularly by removing more abstract concepts or complex calculations, it could also be implemented with younger students aged 12 to 13. Similarly, by expanding or deepening some of the activities, it could be adapted for older students. In this sense, the proposal is flexible and can be tailored to different educational levels depending on the intended level of complexity.

2. PROJECT GOALS AND LEARNING OBJECTIVES

Scientific and environmental understanding

- To relate the polymer composition and properties.
- To understand the role of plastic in our world.
- To understand the real situation about global pollution.
- To reflect on the importance of environmental conservation and our role in the process.

Information gathering and analysis

- To develop independent lab research.
- To develop STEM skills:
    - To ask scientific or technological questions.
    - To design and carry out simple experiments or investigations using appropriate tools and methods.
    - To examine collected data to identify patterns, make predictions, and explain findings using graphs, charts, or written conclusions.
    - To construct and defend a position or solution using scientific evidence and logical reasoning.
    - To gather information from reliable sources, evaluate its relevance, and present findings clearly through oral presentations, reports or visual displays.

L2 skills: Listening, reading, speaking, writing and mediation (L2 goals)

- To be able to correctly express scientific information.
- To make scientific hypotheses.
- To understand scientific texts.
- To write a laboratory report.
- To make an oral presentation about the results of their investigation.
- To discuss topics related to polymer, chemical composition, plastics, pollution, etc. in an L2.
- To understand general and specific infor-

mation in oral and written texts related to the story.

- To understand a graphic novel and its inner structure.
- To summarise and explain in English the key ideas from a group discussion, a text or any other resource, making the content understandable for others.

Artistic and creative expression

- To develop artistic skills:
  - Storyboarding
  - Scriptwriting
  - Sound recording
  - Video editing

Digital competence

- To share information and content through digital technologies.
- To cooperate and collaborate through digital technologies.
- To browse, search and filter data and information through AI.
- To evaluate data and information obtained through AI.
- To protect personal data and privacy.

Critical thinking and reflection

- To develop critical thinking.

Cooperative learning goals

- To collaborate with peers to improve language skills, by participating in group discussions, co-writing texts, and preparing shared presentations.
- To contribute actively to teamwork, by exchanging ideas, offering support, and giving and receiving constructive feedback.
- To engage in cooperative tasks with motivation, by participating in hands-on projects and joint research connected to real-world environmental issues.
- To express ideas confidently in group settings, by speaking clearly, presenting shared results, and interacting respectfully with peers.

Final Products

Option 1: Social media campaign in L2 offering alternatives to plastic use in daily life.

Option 2: Short comparative video on structure/function of natural polymer vs synthetic plastic.

3. SDGs

This unit is related to the following SGGs:

Discover the SDG:

4. CROSSCUTTING CONCEPTS

Patterns:
Students explore how polymers are composed of repeating units called monomers, forming distinct and often predictable structures. By identifying patterns in the arrangement of these building blocks, they understand how similar chemical backbones can lead to very different material properties. This concept also supports the recognition of recurring uses of plastic in daily life and patterns in plastic waste generation globally.

Structure and Function:
The project emphasizes how the structure of a material—whether at the molecular level (e.g., linear vs. cross-linked polymers) or at the macroscopic level (e.g., rigid vs. flexible packaging), determines its function. Students compare natural and synthetic polymers, analysing how their structural characteristics affect properties such as strength, flexibility, transparency, or biodegradability, and how these traits define their applications in society.

Stability and Change:
Through lab experiments, case studies, and visual materials, students examine how different plastics behave over time. Some are designed for single use yet persist in the environment for centuries, while others are engineered to degrade under specific conditions. This concept fosters reflection on the environmental impact of plastics and highlights the need for innovation in materials science to ensure a balance between stability (durability) and ecological responsibility (biodegradability).

5. SKILLS

Throughout this unit, students develop a wide range of competencies that go beyond subject-specific knowledge. The following subsections describe the key skill areas integrated into the learning process.

5.1 STEAM SKILLS

This project plan integrates STEAM (Science, Technology, Engineering, Arts, and Mathematics) skills to develop students' critical thinking, problem-solving, and innovation. By engaging in inquiry-based learning and hands-on projects, students develop the following STEAM competencies:

- ***Asking meaningful questions and identifying real-world problems:*** students investigate the properties of plastics as well as the reason for their widespread use in our society.
- ***Planning and conducting scientific research:*** learners design and carry out research activities, collecting and analysing data to understand the composition and properties of plastics.
- ***Interpreting data and making predictions:*** students use scientific reasoning and critical thinking to assess the environmental impact of plastics due to their properties.
- ***Constructing evidence-based arguments:*** students support their findings with research and data, presenting logical arguments about the properties of plastics and how they mimic the properties of natural polymers.
- ***Communicating scientific and technological information effectively:*** students present their findings through various formats, including presentations, posters, videos, or digital content, ensuring their ideas are accessible and engaging for a wider audience.

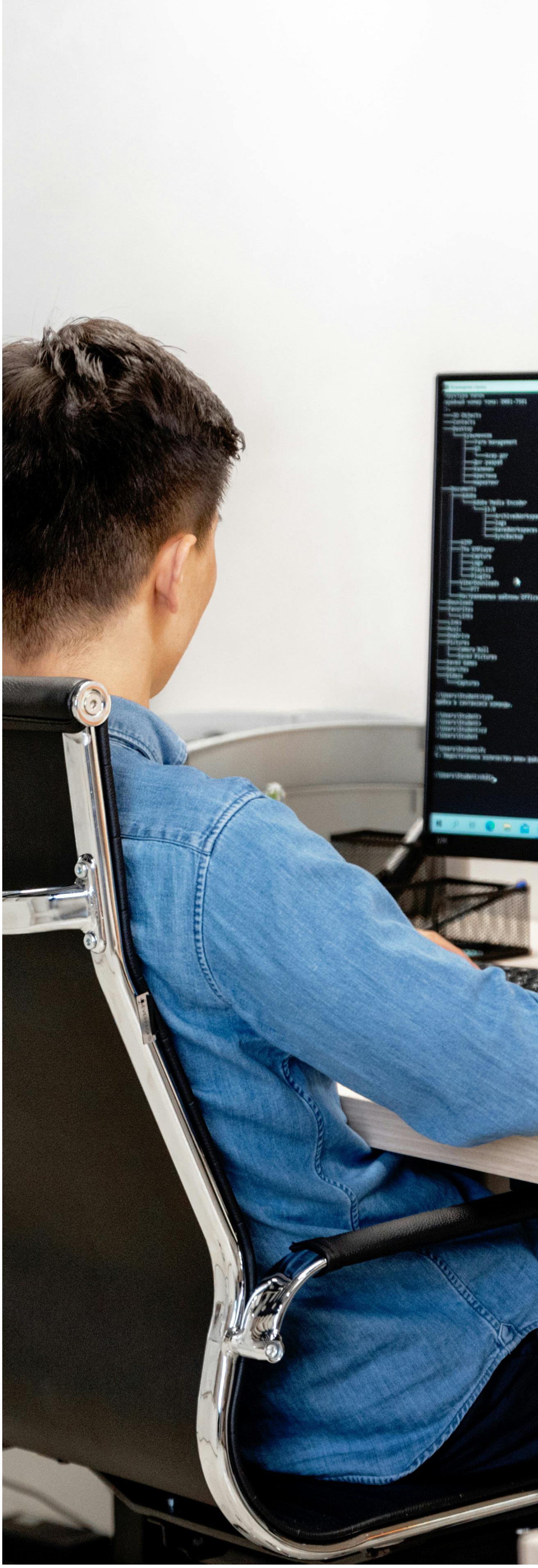
By developing these STEAM skills, students enhance their scientific knowledge while fostering creativity, collaboration, and problem-solving abilities, essential for addressing real-world environmental challenges.

5.2 DIGITAL SKILLS

In today's digital age, technology plays a key role in research, collaboration, and communication. This unit incorporates essential digital skills to support students in their learning and project work.

- ***Information and data literacy:*** students search, evaluate, and interpret scientific sources, datasets, and online articles on polymers and plastics, ensuring they use reliable and credible information.
- ***Digital communication and collaboration:*** learners use online platforms, collaborative tools, and digital discussion boards to share research findings, give peer feedback, and co-create project materials.
- ***Digital content creation:*** students design infographics, presentations, videos, and digital posters to communicate their research on plastic properties, engaging wider audiences through storytelling and visuals.
- ***Cybersecurity and responsible digital use:*** students learn about data protection, privacy, and ethical considerations when working online, ensuring they apply safe digital practices when conducting research or sharing content.
- ***Problem-solving with digital tools:*** learners use AI tools and online simulations to help them relate chemical structure to properties.

These digital skills empower students to navigate, analyze, and contribute to global conversations on environmental sustainability, preparing them for responsible and effective digital engagement.



6.1. CLIL FRAMEWORK

6.1. 4C'S OF CLIL

TIPS FOR TEACHERS

CONTENT
- Use real plastic items to connect theory with daily life.
- Provide visual models to show structure–function links.
- Connect lab findings with images from the graphic novel.

COGNITION
- Ask "why/how" questions to guide critical thinking.
- Scaffold hypothesis writing with simple frames.
- Use charts or Venn diagrams for comparisons.

COMMUNICATION
- Model key grammar (comparatives, passive voice) in context.
- Provide sentence starters for debates and reports.
- Use multimodal outputs: posters, videos, podcasts.

CULTURE
- Show global campaigns reducing plastic waste.
- Compare local and international recycling practices.
- Interpret the "plastic monster" through cultural symbols.

4C	DESCRIPTION
CONTENT	• Explore the environmental impact of plastics and polymers. • Understand the structure-function relationship in natural and synthetic materials. • Learn key scientific concepts: polymerization, biodegradability, material properties. • Apply the scientific method through inquiry-based lab activities.
COGNITION	• Develop critical thinking through experimentation and problem-solving. • Analyze, compare, and interpret data. • Formulate hypotheses and evidence-based arguments. • Reflect on sustainability and global challenges.
COMMUNICATION	• Use English (L2) to describe, debate, and present scientific ideas. • Practice key grammar: comparatives, conditionals, passive voice, relative clauses. • Produce posters, videos, lab reports, and oral presentations using content-specific language.
CULTURE	• Connect the project to SDGs and global environmental awareness. • Interpret the plastic monster as a metaphor for human behavior. • Compare global and local plastic use policies. • Reflect on cultural perceptions of waste and sustainability.

6.1. THE LANGUAGE TRIPTYCH

Language of Learning (Vocabulary)

Students need to understand key vocabulary to access lesson content. In this lesson, vocabulary includes:

- ***Polymers and Composition:*** macromolecule, monomer, polymer, homopolymer, copolymer (random, alternating, block), natural polymers, artificial polymers, linear, branched, cross-linked.
- ***Processes:*** polymerization, addition, condensation.
- ***Plastics:*** thermoplastics, thermosets, elastomers, polycarbonate (PC), polypropylene (PP), polyethylene (PE), polyethylene terephthalate (PET), polyvinyl chloride (PVC), bakelite, polystyrene, vinyl, acrylics, nylon.
- ***Properties and Characteristics:*** synthetic, biodegradable, malleable, molded, flexible, durable, nonrenewable, single-use, cost-effective, convenient.
- ***Lab Equipment:*** beaker, Erlenmeyer flask, pipette, test tube, graduated cylinder, thermometer, buret, Bunsen burner, safety goggles.
- ***Graphic Novel Terminology:*** pictorial technique, vignette layout, visual metaphor, perspective, narrative structure (introduction, development, outcome), keywords such as garbage, monster, and loneliness.

Language for Learning (Processes)

This is the language students use to learn, collaborate, and complete tasks:

- ***Expressing opinions:*** "In my opinion…", "Compared to…", "This is supported by…"
- ***Collaborating:*** asking questions, giving feedback, agreeing/disagreeing respectfully
- ***Academic structures:*** hypotheses, lab reports, oral presentations, timelines

Language through Learning (Incidental Language)

As students work on projects and solve problems, they pick up new language naturally.

- New expressions from reading, videos, or classmates
- Exposure to idioms, collocations, and more advanced grammar
- Skills developed: researching, presenting, revising language, engaging in discussion

TIPS FOR TEACHERS

- Create a **visual word wall** or use **Canva templates** to show terms in context.
- Use images or icons alongside terms to reinforce meaning.
- Ask students to create **personal glossaries** with definitions and drawings.

- Use **sentence starters** and **scaffolded writing frames.**
- Display **anchor charts** for key expressions and question types.
- Use **role-play** to practice real classroom interactions or science discussions.

- Use **project-based learning** (e.g., making posters, creating a short graphic story about polymer pollution).
- Ask students to **reflect** in a language journal: "What new words did I learn today? How did they help me understand the topic?"
- Support with **digital tools** like online dictionaries, voice notes, and feedback forms.

7. UDL

Applying Universal Design for Learning (UDL) to a CLIL project involves creating a flexible learning environment that meets the diverse needs of all students, ensuring that all learners can engage with the content, express their understanding, and stay motivated. To ensure full inclusion and promote active participation, it is essential to adapt tasks and instructions to different learning profiles. The following suggestions can help maximise engagement and accessibility during the implementation of this level:

- Use ***multisensory strategies*** whenever possible. For example, combine visual storytelling with sound effects or physical gestures to reinforce meaning and support comprehension of the comic.
- Offer ***clear visual supports*** for all key vocabulary and emotions. Use flashcards, pictograms, or real objects to help students connect words with concepts more easily.
- Provide ***sentence starters and modelled examples*** for speaking activities. Many students at this level benefit from hearing and repeating simple language structures before trying them independently.
- Encourage ***cooperative learning*** by pairing students with complementary strengths. For instance, a more verbal student can be paired with someone who prefers drawing or movement-based tasks.
- Allow ***alternative ways to express understanding***, such as drawing, miming, choosing images, or assembling word cards, instead of relying solely on writing or speaking.

In addition, you may consider these concrete activities to extend or support classroom work:

- Create a simple ***"Plastic or Not?" sorting game,*** using printed pictures of everyday objects. Students can work in pairs to place them on two coloured mats or posters. Add labels like plastic / not plastic, or use smiley and sad faces to indicate environmental impact.
- Organise a ***"Feelings Walk"*** in the classroom: place large images representing emotions from the comic on the walls (e.g. lonely, surprised, worried). After re-reading a page or watching a short animated clip, ask students to walk to the emotion that matches how the character feels, then share in pairs using a guided frame: *He feels __ because __*.

8. MAIN TEACHING METHODOLOGIES

This unit is primarily based on Inquiry-Based Science Education and the Engineering Design Methodology

9. ASSESSMENT

Assessment in this unit is carried out continuously and flexibly, adapting to the needs and characteristics of each group. It focuses on both the learning process and the final outcomes, evaluating content mastery, use of the target language, and the development of transversal skills. The following strategies and tools are proposed:

The following strategies are proposed as general recommendations and can be adapted to suit the specific context of each classroom:

- ***Systematic observation:*** teachers are encouraged to observe student performance throughout the unit, paying attention to task completion, work organisation, participation in group activities, and the use of English in context. This informal observation provides valuable insights into students' engagement, autonomy, and collaboration.

- ***Rubric-based evaluation of final products:*** rubrics can be used to assess students' final outputs, focusing on scientific accuracy, clarity of communication, feasibility of solutions, and effective use of L2 (including language accuracy, task-appropriate structures, and subject-specific vocabulary). It is advisable to share the rubrics with students in advance (see Appendix B).
- ***Self-assessment:*** students reflect on their own learning, identifying strengths and areas for improvement in collaboration, language use, and task completion. Tools such as reflection sheets or digital prompts may support this process (see Appendix C).
- ***Peer assessment:*** each student evaluates their own participation and that of their teammates using a shared rubric focused on collaboration, commitment, and indi vidual accountability. This strategy promo tes responsibility, empathy, and critical thinking, while helping to ensure a fair distribution of tasks (see Appendix D).

TIPS FOR TEACHERS

- Before starting the unit, it is essential that the **teachers involved** (e.g., Natural Science and English) **meet to coordinate** the sequencing of activities, the division of responsibilities, and the role of each subject in the assessment process. Clarifying **who will lead each task** and agreeing on shared goals helps ensure coherence and smooth implementation. When possible, applying a **co-teaching approach** (whether through joint sessions or complementary lessons) will foster consistency, mutual support, and richer interdisciplinary learning.

10. PRE-READING ACTIVITIES

The table below presents the structure of the didactic sequence, organised into three main phases: pre-reading, while-reading, and post-reading. These phases are separated visually by thick vertical lines.

Each activity includes an estimated duration and specifies the subject area(s) involved. Colour coding is used for clarity:

Natural Science activities are marked in teal.

L2 (English) activities are marked in green.

Activities that involve both subjects show both colours in their corresponding row.

Activities	**1**	**2.1**	**2.2**	**3**	**4**	**5**	**6**	**7**	**8.1**	**8.2**	**9.1**
Duration (mins)	*10-15*	*35-45*	*10-15*	*30-35*	*40-50*	*20-25*	*45-60*	*25-35*	*45*	*35-40*	*30-35*
Natural Science	■							■	■	■	■
L2	■	■	■	■	■	■	■	■		■	■

- These guidelines are fully flexible and should be adapted to the specific needs and pace of each group. Teachers can select and prioritize the activities that best suit their students, choosing as many or as few as necessary or convenient.

- Throughout the sequence of activities, you will find some that are interdisciplinary in nature, integrating both Natural Science and L2 (Foreign Language). These activities can therefore be approached from either or both subjects, depending on your teaching goals and curricular requirements. When this is the case, the bottom section of each activity explicitly specifies how to concretely implement it from each discipline, clarifying the objectives, content, or language aspects you should emphasise.

- The final projects (**FP1** and **FP2**) are **optional and interchangeable.** Teachers may choose to implement only one of them or allow students to select between both. Although presented as final tasks, these projects can be developed progressively (ongoing) and introduced at any point in the unit, depending on classroom dynamics. Their main function is to **reinforce key concepts** and provide meaningful, applied learning outcomes.

- At the beginning of the unit, teachers can explain that students will investigate the role of plastics in everyday life. To support this, students should collect and bring to class different types of clean plastic waste from home (e.g., cups, packaging, wrappers, bottle caps, toy parts). This material will be used throughout the unit for observation, classification, and creative reuse in some of the proposed activities. Teachers should ensure the plastic is clean and stored safely.

9.2	**10.1**	**10.2**	**10.3**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**FP1**	**FP2**
20-25	*50-60*	*50-60*	*50-60*	*45-60*	*40-50*	*45-50*	*υ*	*35-40*	*45-50*	*30-35*	---	---

11.1. PRE-READING ACTIVITIES

10-15’

ACTIVITY 1

MATERIALS

- Sticky notes or coloured paper for brainstorming
- Projector or screen (optional)
- Word cloud generator
- Markers or pens Large poster paper or whiteboard
- Printed or digital vocabulary support (likes and dislikes, environmental problems)
- Sentence starters display (e.g., “I think…”, “In my opinion…”)

TIPS FOR TEACHERS

Questions can be asked to guide students toward pollution and plastics using low & high-order thinking questions.

What is pollution?
Can you name some types of pollution? (e.g., air, water, noise, light)

What kinds of waste do we throw away every day?
What materials are the most common in our trash?

What are plastics used for in our daily lives?
Where do you often see plastic waste in your environment?

Is plastic harmful to the environment? Why or why not?

What happens to plastic after we throw it away?

STEPS

Living in a global world

Students explore the topic of pollution in their local environment through a cooperative brainstorming process.

Working in pairs or small groups, students discuss their hometown or village by considering its advantages and disadvantages, expressing likes and dislikes, and weighing pros and cons. Ideas and feelings are shared freely, and each group creates a word cloud to visually summarise their reflections. Real-life examples may be introduced to prompt deeper reflection.

The process follows these cooperative brainstorming steps:

- The topic is introduced clearly, and students understand the objective of the activity. Groups are formed and the classroom atmosphere supports open, relaxed participation.
- Students take 3–5 minutes to think individually and write down their ideas on sticky notes or paper.

- Notes are placed on the board or wall. Students review the ideas collectively, clarify any doubts, and respond to questions posed by peers. The focus remains on understanding all contributions without judging them.
- In their groups, students identify the most important or interesting ideas. They work toward consensus, and vote if necessary.
- Final ideas are prioritised and organised visually or by theme. Each group uses them to build a word cloud representing their shared understanding of local pollution issues.

TIPS FOR TEACHERS

STE(A)M skills
- Asking questions and defining problems
- Collecting, evaluating and communicating information

Sustainability skills
- Systems thinking

Digital skills
- Digital content creation

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

Natural Science Focus: Students explore environmental issues and types of pollution in their local context. They identify and categorise different pollutants, analyse the role of plastics in everyday life, and discuss the consequences of plastic pollution on ecosystems. This activity promotes environmental awareness and encourages critical thinking about local and global environmental problems.

L2 Focus: Students practise vocabulary related to the environment and pollution (e.g., air, water, noise, waste, plastics). They engage in collaborative discussions, expressing opinions clearly and using appropriate language structures for comparing and contrasting ideas (advantages vs disadvantages, likes vs dislikes). The activity provides opportunities to practise fluency, develop communicative strategies for consensus building, and use language authentically in cooperative tasks.

30-35′

ACTIVITY 2

MATERIALS

- Book cover of I'm not a plastic bag (with the title hidden)
- Projector or screen (optional)
- Visual support or anchor chart
- Printed or digital version of the guiding questions
- Sentence starters (e.g., "I think...", "In my opinion...")
- Student notebooks or worksheets
- Markers or coloured pens
- Printed graphic organizers (optional)

STEPS

Students observe the book cover without the title and examine it carefully. In pairs or small groups, they discuss and respond to the following questions:

- What do the images on the cover suggest to you?
- What kind of story do you think this book might tell?
- What emotions does the cover convey to you?
- Which elements of the cover catch your attention the most, and why?
- Who do you think the main character of this story is?
- Where do you think the story takes place?
- Based on the cover alone, would this book interest you? Why or why not?
- If you had to invent a title for this book based only on the cover, what would it be?
- Students first share their ideas orally within their groups and then write down their answers collaboratively. Ideas are supported with reasoning and respectful discussion.

Explaining the title (10-15′)

Learners explain the real title of the book and reflect on its meaning. They compare it with the titles they invented and discuss which one they find most suitable and why.

TIPS FOR TEACHERS

The teacher can focus on the key structures and vocabulary needed for the activity and model how they are used in context. Use anchor charts, graphic organizers… Use the material you can find here:

- *I think/I believe… Personally, I think that…*
- *I feel… I know…*
- *In my opinion… It seems to me that…*
- *As I see it… The way I see it is that…*
- *From my point of view… Firstly/Secondly/ To sum up…*

Sustainability skills
- Values thinking

Language & CLIL (4Cs) skills
- Communication
- Cognition

ACTIVITY 3

30-35'

MATERIALS

The book *I Am Not a Plastic Bag* (physical copy or digital version)

Whiteboard or projector (optional)

STEPS

I am not a plastic bag

Learners reflect on the book's title and explore its possible meanings and connections to environmental issues.

Working in pairs or small groups, participants discuss and respond to the following guiding questions:

- What does the title suggest to you?
- What do you think this book will say about plastic and the environment?
- How does the title "I Am Not a Plastic Bag" connect to the story? What does it mean by "it is not a plastic bag"?
- Why do you think the author chose this title for the book?
- What environmental problems do you think might be highlighted in this story?
- Do you know what plastic is?
- What is its impact on nature?
- What solutions or actions might the book suggest in dealing with plastic pollution?

Each group collaborates to write down their answers, ensuring all voices are heard. If different opinions arise, group members explain their reasoning and try to reach a shared understanding. After the discussion, each team shares one or two key ideas with the class. A brief whole-class reflection follows, using prompts such as: ***What do you think we can do to reduce plastic use? How does the story's title relate to the environmental issue of plastic pollution?***

TIPS FOR TEACHERS

- Encourage the use of the present simple tense to describe facts and general truths when students explain scien tific concepts (e.g., "Plastics are made of polymers").
- Apply cooperative learning strategies to promote engagement, peer interaction, and colla-borative discussion. These techniques can include think-pair-sha-re, jigsaw activities, or structured group roles.

STE(A)M skills

- Asking questions and defining problems

Sustainability skills

- Critical thinking
- Values thinking

Language & CLIL (4Cs) skills

- Content
- Communication
- Cognition

40-50′

ACTIVITY 4

MATERIALS

- Video
- Devices for group work (Quizizz, Kahoot, timeline tools)
- Note-taking sheets or notebooks
- Timeline creation tool (Tiki-Toki, Timetoast, Creately, Lucidchart or Piktochart)
- Printed vocabulary list (optional)
- Clean plastic objects collect-ed by students (ongoing)

STEPS

A brief history of plastic

Students watch a short video introducing the history of plastic. While watching, they take notes and pay attention to key dates and events.

Once the video ends, participants work in small groups to complete two follow-up tasks:

a. Each group creates a few comprehension questions based on the video. Using tools like Quizizz or Kahoot, they turn their questions into interactive quizzes. Links are then shared so classmates can play and compare results.
b. Group members design a digital timeline to visualise the evolution of plastic. They can use digital tools such as Tiki-Toki, Timetoast, Creately, Lucidchart, or Piktochart to present key milestones and discoveries.

At this stage, the book has not been introduced yet. The activity helps build background knowledge before reading. If individuals explore further content online, they are encouraged to evaluate sources critically and choose reliable information.

TIPS FOR TEACHERS

STE(A)M skills
- Collecting, evaluating and communicating information
- Planning and executing research

Sustainability skills
- Futures thinking

Digital skills
- Digital content creation
- Information and data literacy
- Communication and collaboration

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

11.2 WHILE READING ACTIVITIES

ACTIVITY 5

15-20'

MATERIALS

- Book *I'm Not a Plastic Bag*
- Projector or screen (optional)
- Video version of the book

STEPS

Reading the book:
The picture book *I'm Not a Plastic Bag* is explored as a visual story. Instead of reading written text, students co-construct the narrative by interpreting the illustrations together.

As the book is shown page by page, the class observes the images carefully and shares ideas about what is happening, what the characters might be feeling, and how the environment changes. At key moments, participants are invited to:

- Predict what could happen next
- Describe actions, emotions, and settings
- Invent dialogue or internal thoughts for the characters
- Explore the possible messages behind each scene

Students express their interpretations through spoken contributions, building the story collectively. Individual responses and group suggestions help shape a shared understanding of the visual narrative.

TIPS FOR TEACHERS

The following video can be used as optional visual support to revisit or extend the storytelling experience:

Sustainability skills
- Futures thinking
- Values thinking

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

45-50'

ACTIVITY 6

MATERIALS

- Printed or projected **image** from the book I'm Not a Plastic Bag (the creature on the surface of the sea)
- A4 paper or digital tools (e.g., Canva, Pixton) for **optional comic strips**

STEPS

"Am I a monster? I'm not a plastic bag anymore!"

Students examine a ***double-page illustration*** from I'm Not a Plastic Bag (Chapter 1), showing the ***island of rubbish with the "HELLO" message.***

They begin by observing the image and describing what they see, activating prior knowledge and personal interpretations through a ***visual thinking routine.***

In small groups, they respond to two warm-up questions:

a. Who is the main character of the graphic novel I'm Not a Plastic Bag?
b. How does the author bring this creature to life? What physical features or familiar objects can they identify?

After the discussion, each group reflects on the ***overall message*** of the story. They write a short moral or ***life lesson*** they believe the book conveys and prepare to share it with the class.

Groups present their reflections, compare interpretations and discuss different perspectives on the story's environmental message. developing writing and comprehension skills through literary analysis.

TIPS FOR TEACHERS

See more *cooperative learning strategies:*

As an optional extension, groups can create a short comic strip that visually represents the moral they developed.

Sustainability skills
- Values thinking
- Critical thinking

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition
- Culture

ACTIVITY 7

25-30’

MATERIALS

- Graphic novel *I’m Not a Plastic Bag*
- Optional: Anchor chart with comparative structures and vocabulary
- Selected illustrations (printed or digital)
- Optional: projector or screen to display the images

STEPS

Plastics characteristics

Students work in pairs or small groups to examine the illustrations from Chapter 1, pages 4–5 *(double-page spread where a boat carries floating waste and various plastic items appear scattered across the sea and land, followed by a four-column layout with close-up images of objects).*

They respond to the following questions:

- What does the boat carry in the first image?
- How many different plastic objects can be identified? What are they made of?
- Are all plastics the same?
- What characteristics do the different plastics show? (e.g., rigid, soft, shiny, transparent)
- How can these plastics be compared?

Group members describe and compare the objects using appropriate ***comparative structures*** (e.g., more flexible than, less transparent, the most rigid). Observations are shared through oral discussion and/or brief written reflections.

TIPS FOR TEACHERS

Use the illustrations from the book to highlight different plastic characteristics and encourage students to describe them using comparative structures (e.g. The bottle is more transparent than the bag).

Support students with anchor charts, which serve as visual reference posters in the classroom. Include sentence structures (e.g. X is more... than Y), key vocabulary (e.g. flexible, rigid, transparent), and clear examples.

Practise comparative forms using this grammar resource:

STE(A)M skills
- Analyzing, predicting and interpreting data
- Collecting, evaluating and communicating information

Sustainability skills
- Systems thinking

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

Natural Science Focus: Students identify and classify materials based on observable physical properties (e.g., flexibility, transparency, hardness). This helps them understand key scientific concepts about plastics and their environmental impact.

L2 Focus: Students practise material-related vocabulary and comparative structures in context. Scaffolding strategies (e.g., word banks, sentence frames) support oral fluency and group collaboration.

Example phrases:

The plastic bag is softer than the bottle.
This object is the most resistant.
Both are made of plastic, but one floats and the other sinks.

ACTIVITY 8

ACTIVITY 8.1

45′

MATERIALS

- Real samples of items made from plastics and polymers (e.g., plastic containers, nylon fabric, rubber gloves, silicone tools, cotton gloves, paper, etc.)
- Comparison chart template for each group
- Printed sentence starters or anchor charts for relative clauses
- Access to the BPF link if digital devices are used
- Labels for classification (optional)

STEPS

Is it a plastic or a polymer?

Students begin by reflecting on two key concepts: ***plastics and polymers.*** In a short whole-class discussion, they consider the questions: *What are plastics and polymers? Are they the same or different?*

Students learn that ***polymers*** are large molecules made of repeating units called ***monomers***, and that these can be ***natural*** or ***synthetic. Plastics*** are one kind of synthetic polymer — lightweight, moldable, and widely used in everyday objects.

Next, students work in small groups to analyse a variety of everyday items. Each group receives a selection of objects, some made of ***polymers or plastics*** (e.g. rubber gloves, nylon clothes, silicone bakeware, cotton gloves, biodegradable plastic, plastic bottles), and others that are ***not polymers*** (e.g. sugar, metal, or salt crystals).

Participants:

- Complete a ***comparison chart*** to classify the items.
- Use ***relative clauses*** to describe their findings. (e.g. *"This is an object which is made of natural polymer" or "It is a material that cannot be moulded"***)***

Students may cnsult this site to learn more about plastic applications:

TIPS FOR TEACHERS

Grammar focus: Relative clauses

SKILLS ACTIVITY 8 (8.1 + 8.2):

STE(A)M skills
- Developing and using models
- Collecting, evaluating and communicating information
- Analyzing, predicting and interpreting data
- Building statements and designing solutions

Sustainability skills
- Systems thinking
- Critical thinking

Digital skills
- Digital content creation
- Communication and collaboration
- Information and data literacy

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition
- Culture

35-40’

ACTIVITY 8.2

MATERIALS

- Poster paper or infographic templates
- Markers, colouring tools, glue, scissors (if analog)
- Access to digital infographic tools (optional)
- Printed or projected comparison keywords (support material)

STEPS

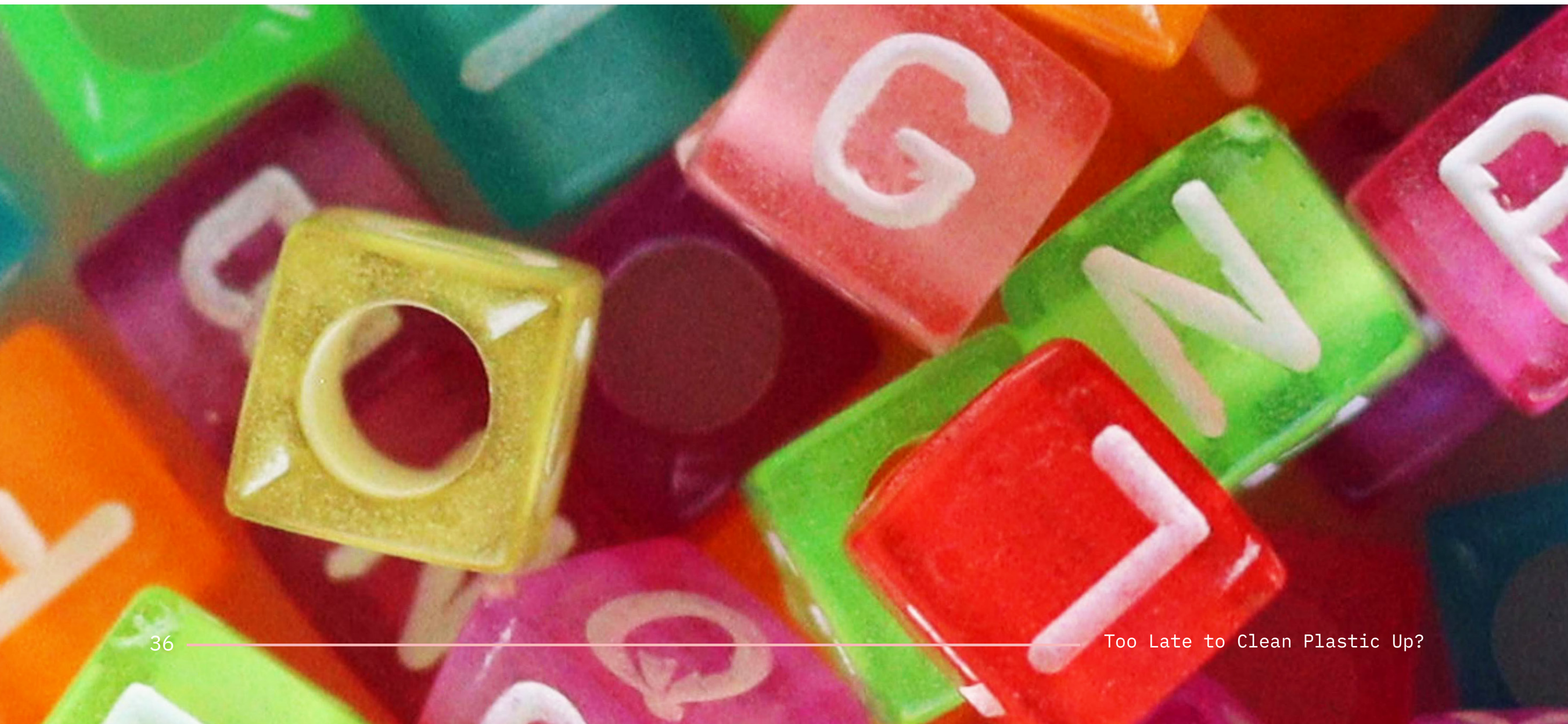
Students work individually or in pairs to create a visual comparison between plastics and polymers. They choose between an infographic or a Venn diagram to illustrate key similarities and differences using clear visuals, concise text, and appropriate scientific vocabulary.

Once completed, participants present their work to the class, explaining the distinctions and overlaps. Each explanation includes both scientific content and visual elements.

- The session concludes with a whole-class reflection using the following guiding questions:
    - Why is it important to know the difference between plastics and polymers?
    - How can understanding polymers help us make better environmental choices?

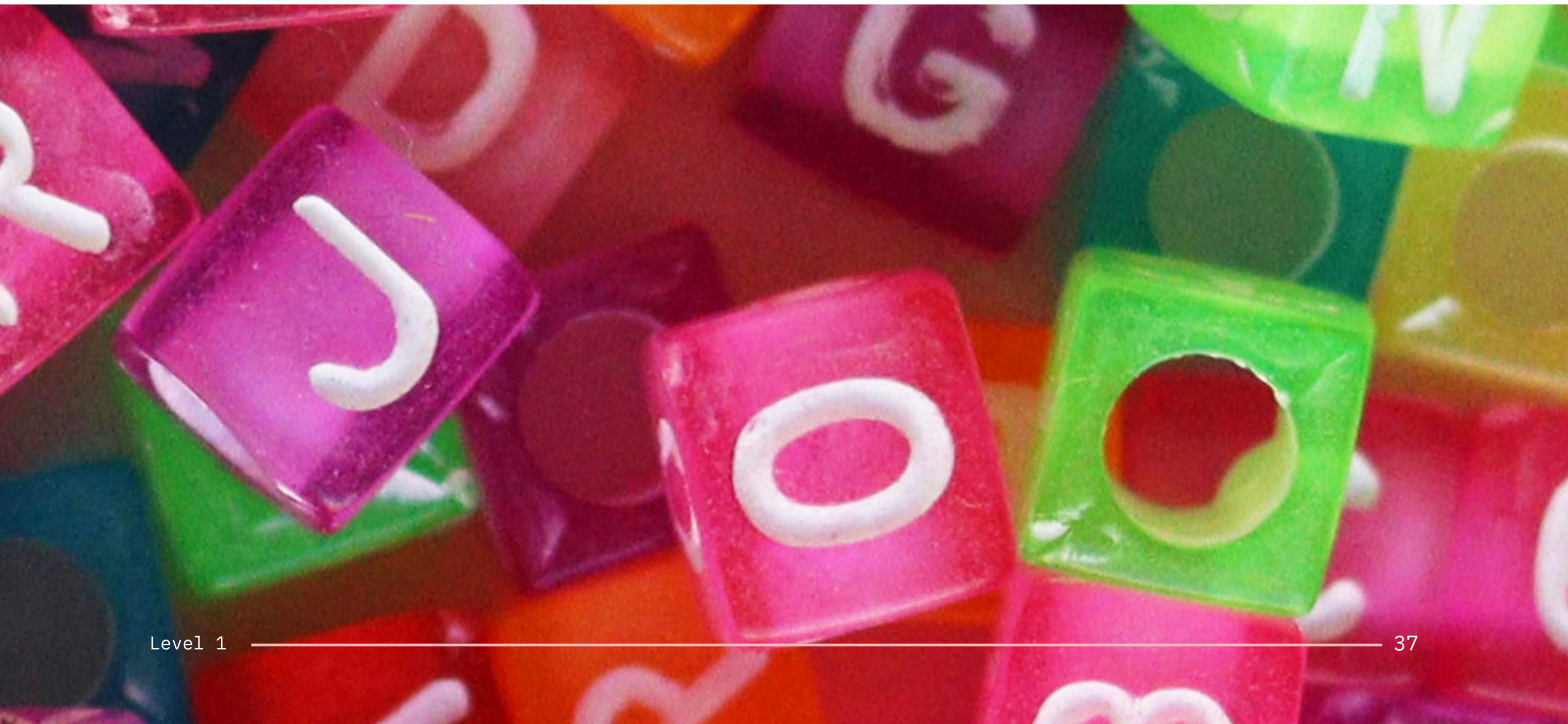
TIPS FOR TEACHERS

Remind students to use key vocabulary and definitions introduced in previous sessions when explaining their posters.



Natural Science approach: students deepen their understanding of polymers as large molecules made of repeating units, and of plastics as a specific type of synthetic polymer. As they complete the task, they apply scientific concepts such as monomers, polymerisation, and the structural differences between natural and synthetic polymers. They use simplified molecular diagrams or short explanations to support the accuracy of their infographics or diagrams. This activity helps them connect scientific vocabulary with content from chemistry and material science, building a clearer foundation for future discussions about environmental impact.

L2 approach: students practise content-related vocabulary while focusing on the correct use of comparatives (more resistant, less biodegradable, as flexible as, etc.) and cohesive devices (however, whereas, both, on the other hand). The presentation stage promotes oral production and interaction, while the written part of the infographic supports written language development. Scaffolding tools like word banks or comparison templates may help learners organise their ideas effectively.



ACTIVITY 9

30-35’

ACTIVITY 9.1

MATERIALS

- Images or flashcards of lab equipment (digital or printed)
- Devices with internet access (1 per group)
- Access to Canva or similar digital tool

TIPS FOR TEACHERS

SKILLS ACTIVITY 9 (9.1 +9.2):

STE(A)M skills
Developing and using models
- Collecting, evaluating and communicating information

Sustainability skills
- Values thinking
- Critical thinking

Digital skills
- Digital content creation

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

STEPS

Designing vocabulary posters for the lab
Students create a ***vocabulary poster*** to compare and contrast ***plastics*** and ***polymers***. Working individually or in pairs, they design a visual display that includes:

- Key ***similarities and differences***
- Examples of materials
- Physical and chemical ***properties***
- Everyday ***uses***

Posters include ***scientific vocabulary*** and ***clear visuals*** (drawings, diagrams or photos). Students organise the information using ***comparative and contrastive expressions.***

Once completed, each participant or pair ***presents their poster*** to the class, explaining the distinctions and connections they have identified between plastics and polymers.

The session ends with a whole-class discussion guided by these questions:

- How are plastics and polymers related?
- What makes a plastic different from a polymer?
- Are all plastics polymers? Are all polymers plastics?
- Why is it useful to understand this difference?

Natural Science approach: Students clarify the distinction between plastics and polymers, recognising that plastics are synthetic polymers, while polymers can also be natural. They include structural features (e.g. monomers, polymerisation), common uses, and environmental impact. Visual elements such as simplified molecular diagrams help reinforce chemistry and material science concepts.

L2 approach: students practise ***material-related vocabulary*** and use comparative structures (e.g., more resistant, less flexible, both..., unlike...). They develop written expression through the infographic and improve oral fluency through their presentations. Support may include sentence starters, word banks, or model phrases to guide comparison.

20-25’

ACTIVITY 9.2

MATERIALS

- Access to the video
- Access to Canva
- Devices with internet connection

TIPS FOR TEACHERS

See skills activity 9 (9.1 +9.2):

STEPS

Students watch a short video about basic ***laboratory safety rules:***

After watching, they work in pairs or small groups to design a ***digital safety poster.*** Each group selects one ***lab safety rule*** from the video and creates a poster that includes:

- A ***modal verb*** to express the rule (e.g., *You must wear goggles, You should not eat in the lab, You have to tie your hair back)*
- A ***clear visual design***, using a ***Canva template*** or similar tool
- Optional images, icons, or safety symbols to enhance communication

When the posters are ready, each group shares their design with the class and explains the rule they focused on.

Natural Science approach: Students reinforce their understanding of essential ***lab safety rules***, exploring the ***purpose*** behind each one and the risks of not following them. They identify ***safety symbols,*** colour codes, and good or bad practices based on real-life examples. The activity contributes to scientific literacy and responsible lab behaviour.

L2 approach: Students practise using ***modal verbs*** (e.g., must, should, mustn’t, have to) to express ***obligation, advice, and prohibition.*** The task promotes both ***written accuracy*** and spoken fluency through group collaboration and short presentations. Word banks or sentence starters may be used to support language production.

ACTIVITY 10

ACTIVITY 10.1

45-50’

MATERIALS

- Set of plastic samples for initial exploration (not for testing yet)
- List of the 7 most common plastic types and short description

STEPS

Investigating plastic properties: hypothesis and experimental design

Students work in small groups to explore the question: ***What properties of plastics make them so widely used in everyday life?***

Each group focuses on ***two physical properties*** of plastics, choosing from: *melting point, corrosion resistance, combustion, density, flexibility, hardness, strength, insulation.*

Participants:

- Formulate a ***testable hypothesis*** about the role of the selected properties in the everyday use of plastics.
- Design an ***experimental setup*** to test their hypothesis.
- Define clearly what is being measured, why it matters, how data will be collected, and how results will be analysed.
- Use a ***shared document or template*** to organise their inquiry, record observations, and justify their conclusions.

Before starting any practical work, groups ***review their plan*** to ensure their approach is safe, coherent, and scientifically valid, making sure the students:

- Compare results with theoretical or known values.
- Reflect on possible experimental limitations.
- Suggest improvements or further investigations.

TIPS FOR TEACHERS

- Integrate conditional clauses in both hypotheses formulation and conclusions: *“If the plastic burns easily, then...”* or *“This would be true if...”*.
- Teach students how to check the accuracy of known values and experimental settings found online. Discuss criteria such as the credibility of sources, academic reputation, and cross-checking with multiple references.

SKILLS ACTIVITY 10 (10.1 +10.2 +10.3:

STE(A)M skills
- Asking questions and defining problems
- Planning and executing research
- Analyzing, predicting and interpreting data
- Collecting, evaluating and communicating information
- Building statements and designing solutions

Sustainability skills
- Systems thinking
- Critical thinking

Digital skills
- Information and data literacy
- Communication and collaboration
- Digital content creation
- Problem solving

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

ACTIVITY 10.2

45-50’

MATERIALS

- Plastic samples (7 common types + bioplastics)
- Lab equipment: balance, containers, water, thermometers, weights, etc.
- Shared digital document or printed recording sheets

STEPS

Testing plastic properties and analysing results

Students carry out the experimental plan developed in the previous session to investigate the properties of different plastics.

Each group receives a set of plastic samples (e.g., PMMA, PC, PE, PP, PET, PVC, ABS, and bioplastics if available) and focuses on two selected properties, such as: *melting point, corrosion resistance, combustion, density, flexibility, hardness, strength, or insulation.*

Participants:

- Prepare and set up their materials following the steps defined in their plan.
- Conduct the experiment safely, ensuring accuracy and consistency in their actions.
- Record all data systematically in a ***shared document*** (digital table, collaborative worksheet, etc.).
- Reflect on what they are measuring, why it matters, and how the results support or challenge their hypothesis.
- Collaborate to organise the results and begin preparing a brief summary of initial findings.

The focus remains on careful observation, teamwork, and clarity in data collection.

TIPS FOR TEACHERS

See skills activity 10 (10.1 +10.2 +10.3)

ACTIVITY 10.3

10-15′

MATERIALS

- Access to presentation tools (paper, markers or ICT devices)
- Projector or display space for student presentations

STEPS

Analysing results and drawing conclusions

Students interpret the data collected in the previous experiment and compare their results with available scientific reference values.

In small groups, participants:

- Analyse their findings and connect the ***data to theoretical knowledge.***
- Evaluate the ***accuracy*** of their results and reflect on possible sources of error.
- Prepare a short ***oral presentation*** supported by a ***visual aid*** (poster, slide, or infographic).
- Use ***scientific vocabulary*** to explain their conclusions clearly.
- Identify possible ***limitations*** of their experiment and suggest ways to improve the design.

Each group shares their presentation with the class, contributing to a shared understanding of plastic properties and the scientific method.

TIPS FOR TEACHERS

See skills activity 10 (10.1 +10.2 +10.3)

45-60'

ACTIVITY 11

MATERIALS

- Sample lab reports or posters (printed or digital)
- Lab results or data collected in previous sessions (Activities 9.2 and 9.3)
- A writing template (digital or printed) for lab reports or poster layouts (if desired)

TIPS FOR TEACHERS

Grammar: Present/Past/Future tense/Conditionals/Passive voice/Modals of probability/Superlatives

High-quality lab reports or posters can be shown as examples. This **Monash University webpage** includes annotated samples, definitions, and useful explanations that will help students organise and present their findings effectively , such as the one shown below.

STEPS

Make It Clear, Make It Count

Students present the conclusions of their inquiry activity by writing a ***scientific report***, choosing between two formats: a ***poster*** or an ***essay.***

Before writing, they examine examples of both formats and review clear ***guidelines*** provided by the teacher. Once familiar with the structure, they begin drafting their report.

Each report includes the following elements:

- ***Hypothesis***
- ***Methods***
- ***Results***
- ***Discussion***
- ***Conclusion***

Participants apply formal scientific language, organise their ideas logically, and ensure that all conclusions are supported by the data they collected. This final task helps them consolidate their understanding of the scientific process and communicate their findings effectively.

Natural Science approach: Students consolidate their understanding of the scientific method by applying it to their final report. They use a structured format to communicate their inquiry, focusing on clarity, precision and evidence-based conclusions. As they organise their findings, they strengthen their ability to think scientifically and explain results using standard scientific conventions. Through either a poster or an essay, they reflect on the entire research process and present it using appropriate tools and formats.

L2 approach: Students develop their academic writing skills in L2 by using formal structures such as the passive voice, sequencing markers, and cause–effect connectors (e.g., as a result, therefore, this suggests that...). They use model texts, writing frames and language banks to support their writing. If they choose to present a poster, they also practise spoken academic language, using precise vocabulary and clear pronunciation in a meaningful, content-rich context.

TIPS FOR TEACHERS

STE(A)M skills
- Argumentation based on data/evidence
- Collecting, evaluating and communicating information

Sustainability skills
- Strategic thinking
- Integrated problem-solving
- Futures thinking

Digital skills
- Digital content creation
- Communication an collaboration
- Information and data literacy

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

45-60'

ACTIVITY 12

MATERIALS

- Devices with internet access (one per group)
- Venn diagram templates (digital or printed)

STEPS

Comparing plastics with a Venn diagram

Students work in small groups to compare different types of plastics using a ***Venn diagram***. Before starting, the purpose and structure of the diagram is introduced with an example.

Each group selects ***two or more plastic type***s (e.g. PET, PVC, PE, PP) and investigates:

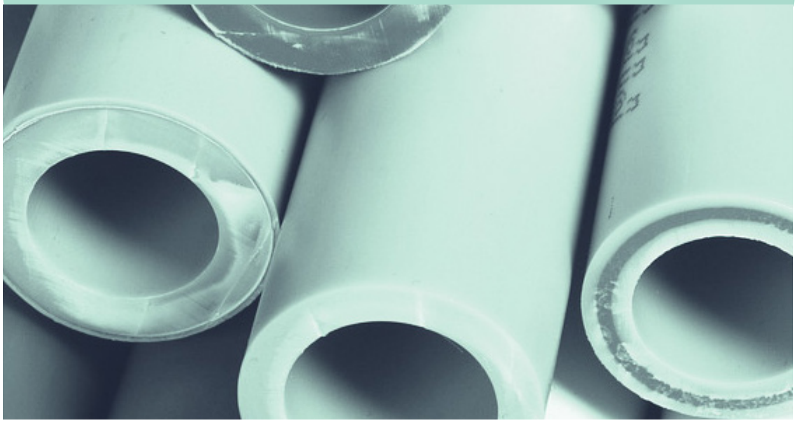
- ***Main properties***
- ***Everyday uses***
- ***Advantages and disadvantages***
- ***Environmental impact***
- ***Possible ecological alternatives***

Using the information gathered, group members create a ***Venn diagram*** to visually represent ***similarities and differences.*** Once completed, they present their findings to the class, explaining their comparisons clearly.

TIPS FOR TEACHERS

- Use cooperative learning strategies to foster teamwork and ensure all group members contribute to the task.
- This activity promotes collaboration, critical thinking about the environmental impact of plastics, and the development of oral presentation skills.
- Support students with sentence starters to compare and contrast (e.g., ***whereas, unlike, similarly, both... and, althoug***h).
- Remind students to use clear scientific vocabulary when presenting their findings.

Natural Science approach: Students reinforce their knowledge of plastics and polymers by describing ***scientific properties, functions, and recyclability.*** They connect material types with real-world uses, improving both classification skills and understanding of sustainability. The task supports retention of technical vocabulary and precise communication of scientific content.



L2 approach: Students practise grammar structures (e.g., relative clauses, passive voice) and content-specific vocabulary in both written and oral contexts. The flashcard format provides natural scaffolding for sentence building, while the final game supports spontaneous language use. Visuals and sentence frames help ensure fluency and accuracy during the challenge.

TIPS FOR TEACHERS

STE(A)M skills

- Collecting, evaluating and communicating information
- Analyzing, predicting and interpreting data

Sustainability skills

- Systems thinking
- Critical thinking

Digital skills

- Digital content creation
- Communication and collaboration
- Information and data literacy

Language & CLIL (4Cs) skills

- Content
- Communication
- Cognition

45-50’

ACTIVITY 13

MATERIALS

- Laptops or tablets with internet access
- Examples of scientific posters and lab reports (digital or printed)

TIPS FOR TEACHERS

Grammar focus: Verb tenses and relative clauses.

STEPS

Students work in small groups to design a set of vocabulary flashcards related to plastics and polymers. Each flashcard includes:

- Side A: the name of the plastic, its definition, main properties, whether it is recyclable, and one example sentence using correct grammar (e.g., relative clauses).
- Side B: a visual representation of the object made with that plastic — it can be a comic-style character or a realistic object.

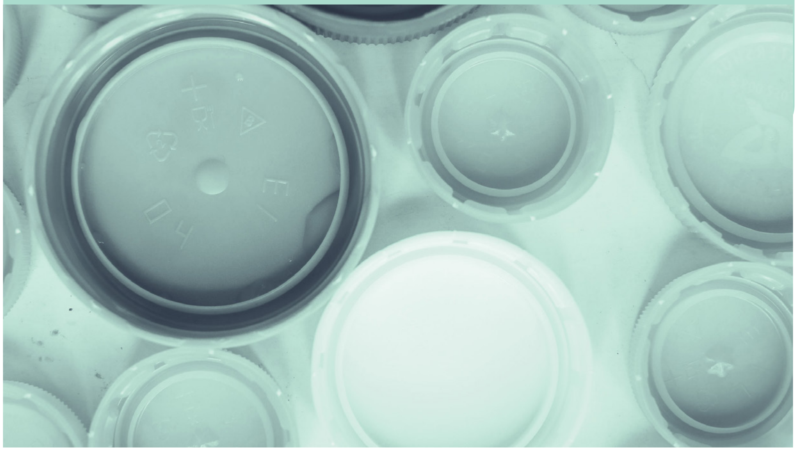
Participants choose whether to create the cards by hand or using digital tools such as Canva or Quizlet, which allows collaborative creation of interactive decks.

Once each group has completed around 10–15 cards, the full deck is gathered and used in a Team Vocabulary Challenge. In this game, teams take turns describing a plastic or polymer to their teammates without saying the word, using:

- Properties
- Everyday uses
- Scientific vocabulary
- Where possible, relative clauses

This cooperative task promotes creativity, language production, and active recall in a dynamic setting.

Natural Science approach: Students explore the ***diversity of plastic materials***, analysing composition, durability, recyclability and other relevant properties. They use ***scientific vocabulary*** to compare and contrast materials and reflect on s***ustainability and ecological impact.*** The task supports informed decision-making and critical thinking about material choices.



TIPS FOR TEACHERS

STE(A)M skills

- Building statements (for science) and designing solutions (for engineering)

Sustainability skills

- Values thinking
- Collaboration

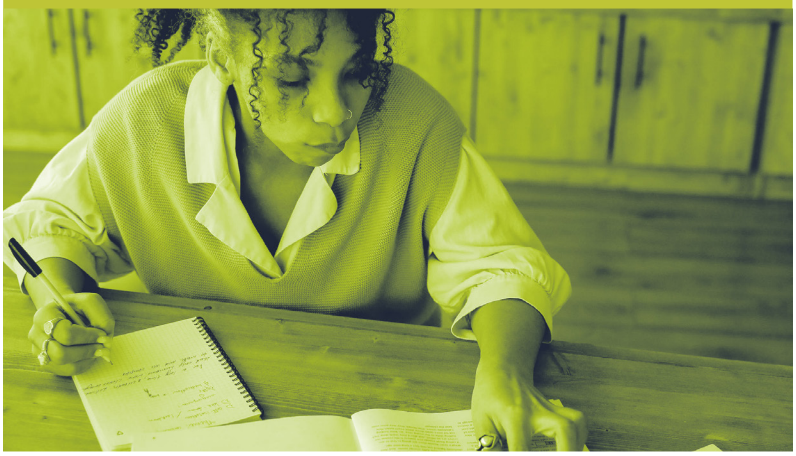
Digital skills

- Digital content creation
- Communication and collaboration

Language & CLIL (4Cs) skills

- Content
- Communication
- Cognition
- Culture

L2 approach: Students practise ***comparison structures and subject-specific vocabulary*** in a purposeful context. They use expressions such as *both plastics are..., unlike PVC, PET is..., they differ in....* The diagram serves as a ***visual scaffold*** for writing and speaking. Language support includes ***sentence frames, glossaries, or model phrases*** for effective communication.



10-15’

ACTIVITY 14

MATERIALS

- Crossword design tool
- Devices with internet access (laptops or tablets)
- Printed copies of teacher-created crosswords (if not working digitally)

STEPS

Vocabulary Checkpoint

Students consolidate content vocabulary by designing a ***crossword puzzle*** using key terms from previous lessons. The activity can be done individually or in pairs.

Participants:

- Select 10–15 key words related to plastics, polymers, lab equipment, or physical properties
- Write short, clear definitions or clues for each word
- Create the crossword using a digital tool (e.g. ***Puzzle-Maker, WordMint***) or draw it by hand
- Exchange their crossword with another pair or group and solve each other’s puzzles

Alternatively, students may complete a ***teacher-created crossword*** as a guided revision task.

The final version is submitted digitally or on paper and may be displayed or added to a class review resource.

TIPS FOR TEACHERS

- You can create your own crosswords using The Teacher’s Corner or select a pre-made one from platforms like WordMint.

- Alternatively, students can design interactive vocabulary games or crosswords using Wordwall. This platform fosters creativity and reinforces vocabulary in a more dynamic format.

Digital skills

- Digital content creation *(crossword with digital tools)*

Language & CLIL (4Cs) skills

- Content

ACTIVITY 15

30-40′

MATERIALS

- Printed or digital version of the **monster chart template**
- Internet-connected devices

STEPS

Which Monster am I?

Students collaborate in small groups to explore ***mythical monsters*** from different cultures and compare them to the ***Plastic Island creature*** from *I'm Not a Plastic Bag.*

Each group begins by completing a ***comparison chart*** featuring the following monsters:

- Kraken – Ryujin – Hydra – Plastic Island (using this Canva template or creating their own)

For each creature, students investigate:

- The ***culture or mythology*** it belongs to (e.g., Greek, Japanese, Scandinavian...)
- The ***type of monster*** (sea, land, air...)
- ***Physical characteristics*** (e.g., limbs, scales, body shape)
- Powers or abilities (e.g., fire-breathing, poison, cruelty...)

Once the chart is completed, groups reflect on the question:
"Did you find any real monsters?"

This leads to a discussion on whether ***Plastic Island*** can be considered a ***modern monster*** created by human actions, and what that means in terms of ***cultural perception*** and ***environmental impact.***

To finish, each student writes a ***short paragraph*** comparing ***two monsters*** from the chart, using:

- ***Past tenses***
- ***Descriptive language***

TIPS FOR TEACHERS

- This activity can include collaboration with the Social Science teacher. They can support students in exploring the cultural and mythological background of each creature, helping them understand the historical and geographical context. This makes it easier to compare traditional monsters with the Plastic Island creature and to discuss its cultural and environmental meaning.
- Grammar focus: past simple and past continuous
- Explore the different monster cultures. Surf the internet to look for information.

Sustainability skills

- Values thinking
- Systems thinking

Language & CLIL (4Cs) skills

- Content
- Communication
- Cognition
- Culture

45-50'

ACTIVITY 16

MATERIALS

Student field notebooks or portfolios

STEPS

Scientists study the plastic monster!

Students work in groups as if they were ***scientists*** observing and analysing the ***plastic monster*** from *I'm Not a Plastic Bag* (focus on pages 16–17, and extended observation from pages 14 to 35).

Each group creates a ***field notebook*** compiling detailed observations, visual elements, and interpretations. Their task includes both written and visual documentation.

Students observe and take notes on:

- ***Physical description:*** visible parts of the creature, types of plastic it's made from
- ***Size and proportions:*** inferred from surrounding elements in the images
- ***Habitat:*** where it grows, what surrounds it, and how the environment changes
- ***Interactions:*** with marine animals, people, or human-made objects
- ***Use of colour and atmosphere:*** how the author uses shadows, clouds, and light to suggest emotion, movement or symbolism (e.g., loneliness, transformation, danger)

Each team includes ***drawings*** and ***annotated sketches*** in their notebook. They also reflect on the ***symbolic role*** of ***wind, currents, and other atmospheric elements*** in shaping the monster's form and presence.

This activity encourages close reading of images, metaphorical thinking and collaborative environmental storytelling.

TIPS FOR TEACHERS

Grammar: Verb tenses/ Relatives

Encourage the use of a student portfolio or field notebook to help learners organise their thoughts and structure the information gathered throughout the activity. This tool allows them to document their observations systematically, promoting reflection and accountability. Students can work in pairs or small groups, and share their field notebooks digitally using platforms like Padlet, facilitating peer learning and visual comparison of findings.

STE(A)M skills
- Collecting, evaluating and communicating information

Sustainability skills
- Values thinking
- Systems thinking

Language & CLIL (4Cs) skills
- Content
- Cognition
- Culture

11.3 POST-READING ACTIVITIES

ACTIVITY 17

30-35'

MATERIALS

Devices with internet access (tablets, laptops or smartphones)

Access to **Padlet** (app or browser)

Optional: projector/screen for collective Padlet viewing

STEPS

Avoiding plastic is our challenge!
In small groups, students reflect on the ***message of the book*** *I'm Not a Plastic Bag* and brainstorm ***realistic alternatives*** to plastic use in everyday life.

Participants:

- Explore concrete ways to reduce plastic consumption, improve recycling, or promote sustainable habits in their community
- Share their ideas by posting them on a shared ***Padlet wall***
- Read each other's proposals and vote for the most innovative or feasible solution

After the group work, the class engages in a shared discussion about the ***moral message*** of the story. While the book portrays the dangers of plastic pollution, it also ends with a hopeful tone. Students are encouraged to express their views and connect the narrative to real-world environmental action.

TIPS FOR TEACHERS

- **Global perspective:** encourage students to explore what is being done in other countries (e.g. EU regulations, bans on single-use plastics, biodegradable packaging initiatives).
- **Cross-curricular link:** connect with geography and civic education by having students research local and international plastic policies.
- **Critical thinking:** ask students to compare international efforts with local practices and propose realistic actions for their context.
- **Use of Padlet:** promote participation, especially from quieter students, by using Padlet to collect and vote on ideas.

TIPS FOR TEACHERS

STE(A)M skills
Building statements and designing solutions

Sustainability skills
- Responsibility and agency
- Collective action
- Critical thinking

Digital skills
- Communication and collaboration
- Digital content creation

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition
- Culture

Natural Science approach: Students apply their knowledge about plastic pollution to ***propose evidence-based solutions.*** They classify plastics (biodegradable vs non-biodegradable), consider the ***environmental footprint*** of materials, and use ***systems thinking*** to analyse possible outcomes. Some groups may include ***diagrams or infographics*** to support their ideas with data or visual reasoning (e.g., kg of waste saved per year, effects on biodiversity).

L2 approach: Students practise expressing opinions, comparing alternatives (*more sustainable than...*), and using cause-effect and modal structures (*if we reduce..., this might help...*). Teachers can model useful language for writing on Padlet (e.g., linking devices, persuasive phrases, topic sentences). The class discussion and group presentations offer meaningful opportunities for spoken interaction, focusing on fluency, clarity and argumentation. A short oral pitch before voting can further enhance speaking skills.

FINAL PROJECT 1

MATERIALS

- Computers or tablets with internet access
- Canva or similar poster-design software
- Recycled plastic items collected throughout the unit
- QR code generator
- A designated school space for the final display (hallway, entrance, etc.)
- Optional: screen or projector for in-class viewing

STEPS

FINAL PROJECT 1: NO MORE PLASTICS! SAVE OUR "ISLAND"

Students design and implement a full awareness campaign to promote alternatives to plastic and raise environmental awareness within their school community.

Working in groups, participants:

- Record a ***short video*** presenting one or more types of ***polymers*** and suggesting realistic, well-reasoned solutions to reduce the use of harmful plastics.
- Create ***awareness posters*** using Canva. These posters include persuasive messages, key data, and a ***QR code*** that links to their group's video. The posters are displayed throughout the school or shared via social media.
- Build a ***"plastic island"*** or ***"plastic monster"*** using plastic waste collected during the unit. This symbolic sculpture is installed in a visible school space as a long-term reminder of the environmental message.

This final task combines ***creativity, public speaking, collaborative planning, visual literacy, and digital communication.***

TIPS FOR TEACHERS

Video option

- **Topic:** harmful effects of plastics + sustainable alternatives
- **Format:** short video (Canva or similar tool)
- **Resources:** visuals, graphics, interviews
- **Students will embed the video via QR code on the poster**

Podcast option

- **Topic:** environmental impact of plastics + practical solutions
- **Format:** audio with sound effects or interviews
- **Goal:** clear and engaging communication
- **Students will embed the podcast via QR code on the poster**

Shared goals

- Promote creativity, digital literacy, and environmental awareness

STE(A)M skills

- Building statements and designing solutions
- Collecting, evaluating and communicating information

Sustainability skills

- Responsibility and agency
- Collective action
- Values thinking

Digital skills

- Digital content creation
- Communication and collaboration

Language & CLIL (4Cs) skills

- Content
- Communication
- Cognition
- Culture

FINAL PROJECT 2

TIPS FOR TEACHERS

- Encourage precise and evidence-based explanations.
- Remind students not to share personal information (faces, names, locations).
- Promote ethical communication: use copyright-free visuals and respectful language.

STE(A)M skills
- Developing and using models
- Analyzing, predicting and interpreting data

Building statements and designing solutions
- Sustainability skills
- Systems thinking
- Strategic thinking
- Digital skills
- Digital content creation
- Communication and collaboration

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition
- Culture

MATERIALS

- Notebooks or sheets for planning and note-taking
- Camera or phone to record videos
- Devices with internet access (tablets, computers or phones)
- Samples or printed images of plastics or polymers (optional)
- QR code generator

STEPS

FINAL PROJECT 2: STRUCTURE DETERMINES FUNCTION!

Students create a ***short video*** to explore the crosscutting concept: ***Structure determines function.***

Working individually or in pairs, participants:

- Choose a ***material or polymer*** studied in class (e.g., PET, PVC, polyethylene)
- Identify a ***natural structure*** with a similar function (e.g., plant cell wall, mollusk shell, insect wing)
- Explain how the ***structure of each material*** allows it to fulfil its function
- Present ***real-world applications*** of both materials

In the video, students describe the ***structure-function relationship*** clearly and use ***visuals, models or animations*** to illustrate their ideas. Scientific vocabulary is used appropriately, and comparisons are well-justified.

Example:

- ***Nature:*** Cellulose in plant cell walls is made of long glucose chains linked by β(1-->4) glycosidic bonds, forming microfibrils. Extensive hydrogen bonding provides strength and partial flexibility.
- ***Plastic:*** Polyethylene (PE) consists of long chains of —$(CH_2—CH_2)n$— that slide over each other, giving it flexibility.
- ***Function:*** Both materials are used in flexible packaging thanks to their molecular structure.
- ***Application:*** Paperboard and PE are used in wrapping, bags, and containers—one biodegradable, the other durable.

SEEING THE UNSEEN: TRACING MICROPLASTICS AROUND US

LVL 2

1. SUBJECTS

Social Science

L2

Maths

Graphic Novel: *I'm not a plastic bag* by Rachel Hope Allison, inspired by the real-life phenomenon of the Great Pacific Garbage Patch.

This unit is originally designed for students aged 14 to 16, as it integrates scientific, geographical and linguistic content typically addressed in the last years of lower secondary education. However, by simplifying the mathematical reasoning tasks, reducing the digital design component, and offering additional language scaffolding, it can be successfully adapted for younger learners aged 12 to 13. Conversely, by deepening the data analysis, increasing the level of autonomy, or incorporating further interdisciplinary links, the unit could be implemented with older students. In this sense, the proposal is flexible and can be adjusted to suit different age groups and competency levels, depending on the desired level of complexity and curricular alignment.

2. PROJECT GOALS AND LEARNING OBJECTIVES

Environmental Understanding

- To understand the role of plastic in our world.
- To understand the problems associated with microplastics for the planet and our health.
- To understand the real situation of global pollution.
- To reflect on the importance of environ mental conservation and our role in the process.

Geographical and Mathematical Skills (STEAM)

- To understand and use coordinates, cardinal points and map language to describe locations.
- To extract and organise quantitative information from oral and written sources (videos, websites, maps).
- To describe and compare sizes, distances and proportions using appropriate mathematical structures.
- To apply measurement and scale to represent geographical areas and data visually.
- To interpret and estimate data in real-world environmental contexts.
- To calculate dimensions, surface areas or speeds based on environmental data.

Oral and Written Comprehension and Production (L2 goals)

- To use geographical, environmental and scientific vocabulary in oral and written tasks.
- To formulate and answer data-based questions orally and in writing.
- To explain coordinates and locations orally using map-based language.
- To read and analyse a graphic novel, extracting relevant information.
- To reflect critically on the story's environmental message through rereading.
- To create informative and persuasive posters and infographics using clear written language.
- To present ideas orally in front of others, using visual and digital support.
- To collaborate in short presentations describing processes, data, or environmental solutions.
- To understand general and specific information in oral and written texts related to the story.
- To understand a graphic novel and its inner structure.

Artistic and Creative Expression

- To express ideas creatively through both traditional and digital media.
- To explore the connection between art and environmental awareness.

Digital Competence

- To share information and content through digital technologies.
- To cooperate and collaborate through digital technologies.
- To protect personal data and privacy.

Critical Thinking and Reflection

- To develop critical thinking.

Final Product

A graphic novel about an imaginary situation in which the use of plastic has been banned in the world.

3. SDGs

4. CROSSCUTTING CONCEPTS

Cause and effect

Students explore how specific causes (such as applying force, increasing tension, or changing materials) result in observable effects on objects and systems. For example, they investigate how increasing the force on a spring or elastic material increases the energy stored and leads to greater movement or deformation. They also analyse how altering material properties affects energy transfer and system responses.

Scale, proportion and quantity

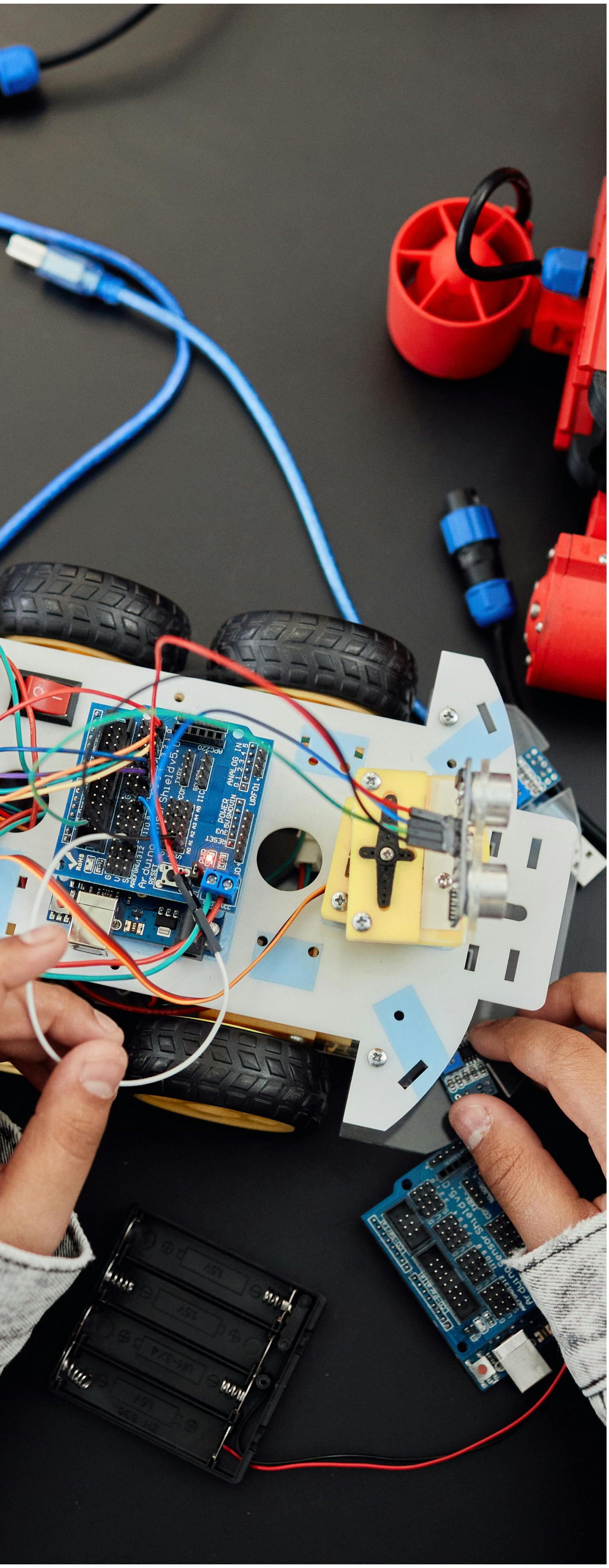
Students examine how the size, quantity, and proportion of materials or components impact the behaviour of systems involving energy and matter. For instance, they explore how the amount of mass or the scale of an object affects the force needed to move it, or how the proportional relationships between components (such as the length of a lever arm or the diameter of a wheel) influence energy efficiency and mechanical advantage.

Energy, matter and object flows

Students investigate how energy and matter flow within and between systems. This includes tracking how energy is transferred (e.g., from chemical to kinetic energy) and how matter moves through systems (e.g., water in a cycle, or electricity in a circuit). They also analyse the efficiency of these flows, identifying where energy is conserved or lost, and how materials facilitate or hinder these processes.

Stability and change

Students analyse how systems maintain stability or undergo change due to interactions between energy, matter, and objects. For example, they explore how energy inputs can disrupt equilibrium (such as adding heat to a system) or how systems adapt over time to maintain balance (such as temperature regulation or structural adjustments under repeated stress). They also study how small changes in system design or environmental conditions can lead to significant transformations or improvements.



5. SKILLS

Throughout this unit, students develop a wide range of competencies that go beyond subject-specific knowledge. The following subsections describe the key skill areas integrated into the learning process.

5.1 STEAM Skills

This project plan integrates STEAM (Science, Technology, Engineering, Arts, and Mathematics) skills to develop the following STEAM competencies:

- Asking questions and defining problems
- Planning and executing research
- Analysing, predicting and interpretating data
- Mathematical reasoning and algorithmic thinking
- Developing and using models
- Argumentation based on data / evidence
- Building statements (for science) and designing solutions (for engineering)
- Collecting, evaluating and communicating information

5.2 Digital Skills

In today's digital age, technology plays a key role in research, collaboration, and communication. This unit incorporates essential digital skills to support students in their learning and project work.

- Information and data literacy
- Communication and collaboration
- Digital content creation
- Safety
- Problem solving

6. CLIL FRAMEWORK

6.1 4C's of CLIL

4C	DESCRIPTION
CONTENT	• Understand the impact of plastic and microplastics on marine ecosystems and human health. • Use map language, coordinates, and measurement to explore real-world geography and pollution data. • Analyse environmental data using mathematical reasoning. • Create a graphic novel imagining a world without plastic.
COGNITION	• Apply scientific inquiry and experimentation. • Solve real-world problems using data analysis and prediction. • Estimate and interpret measurements and large-scale environmental impact. • Develop creative solutions and visual storytelling through a design thinking approach.
COMMUNICATION	• Use English (L2) to express opinions, describe data, explain phenomena, and present ideas. • Practice key grammar: comparatives, superlatives, conditionals, cause/effect structures. • Collaborate in discussions, group presentations, and poster/video creation.
CULTURE	• Raise awareness of plastic use and waste policies around the world. - Connect learning to the Sustainable Development Goals (SDGs). • Reflect on global vs. local responsibility and the concept of "Aloha" as an environmental ethic. • Explore environmental activism through music, art, and media.

TIPS FOR TEACHERS

CONTENT
- Use maps, graphs and visuals to support data interpretation.
- Bring real samples or images of microplastics to connect with reality.
- Link mathematical reasoning tasks to concrete environmental data.

COGNITION
- Guide students with "what if/why" questions to foster prediction.
- Use scaffolds (charts, frames) for interpreting large-scale data.
- Encourage creative outputs (graphic novel panels, infographics) to apply design thinking.

COMMUNICATION
- Provide sentence starters for explaining data and giving opinions.
- Model cause/effect and conditional structures before tasks.
- Use group roles (presenter, designer, researcher) in posters or videos.

CULTURE
- Show global vs. local plastic policies and ask students to compare.
- Connect to the concept of Aloha and other cultural values.
- Use songs, art, or media as entry points for activism and reflection.

TIPS FOR TEACHERS

- Create a visual vocabulary list or word wall where these terms are displayed with images, definitions, and example sentences.
- Use matching exercises, crosswords, and interactive games where students link terms to definitions, images, or contexts.
- Include flashcards (digital or paper) and quiz games (like Kahoot or Quizlet) to reinforce retention.
- Embed new words in short reading tasks or mini dialogues so students see them used in authentic contexts.

- Provide **sentence starters** and useful phrases on anchor charts or posters in the class room.
- Use videos or role-model dialogues to show functional language in action.
- Include **role-play exercises** where students practice giving opinions, asking follow-up questions, or presenting arguments on an environmental topic.
- Create **collaboration scripts:** short guides students can follow to practice polite disagreement, proposing solutions, or summarizing group decisions.

6.2 The Language Triptych

Language of Learning

- Environmental vocabulary: pollution, waste, plastic, biodegradable, ocean, marine life, sustainability, ecosystem, conservation, carbon footprint, renewable, emissions.
- Graphic novel terminology: illustration, panel, speech bubble, frame, narrative, sequence, visual metaphor, dialogue, caption, onomatopoeia.
- Mathematical terms (if applicable): chance, unlikely, rarely, coordinates, squared kilometre, tons, billion, percentage, probability, data.

Language for Learning

- ***Expressing opinions:*** I believe that… / In my opinion… / I think it's important because…
- ***Comparing and contrasting:*** On the one hand… on the other hand… / Unlike… / Similarly…
- ***Explaining and analysing:*** This shows that… / The reason for this is… / As a result…
- ***Collaborating and negotiating:*** What do you think? / Could we try…? / Let's agree on… / How about if we…?

Language through Learning

- ***New expressions or idiomatic language*** (e.g., a drop in the ocean, tip of the iceberg, make waves).
- ***Complex structures*** they notice in texts, like conditional sentences (If we don't act now, marine life will suffer) or persuasive language (We must reduce plastic use to save our oceans!).
- ***Technical terms*** or ***academic language*** used in articles, videos, or infographics.

7. UDL

Applying Universal Design for Learning (UDL) to Level 2 of this unit means providing multiple means of representation, action and expression, and engagement—while supporting students as they transition to more abstract thinking and data-driven analysis. The aim is to ensure that all learners, regardless of their learning profile, can access complex information, process it meaningfully, and communicate their understanding confidently.

The following strategies are suggested to support accessibility and inclusion:

- ***Support the interpretation of visual materials and task instructions*** by breaking them into manageable steps. For example, ***when working with bar graphs*** that represent the number of microplastic particles by colour or location, use ***colour-coded legends, highlighted axes, and guiding questions*** (e.g. Which bar is the tallest? What does it represent? / How many more in the bin area than the playground?) to help students interpret and compare results more easily.
- ***Provide writing and speaking scaffolds,*** like sentence starters and vocabulary boxes. During a maths task, offer frames such as “The highest number is...” or “We found ___ pieces in area ___.” For social studies: “This place is more polluted because...”
- ***Use visual thinking tools,*** like graphic organisers or thinking routines (e.g. “I see – I think – I wonder”) to help students structure their ideas before writing or discussing.
- ***Integrate movement and manipulatives*** when analysing plastic samples or simulating particle behaviour. Hands-on exploration benefits students who struggle with purely verbal or written tasks.
- ***Provide options for task output:*** students may express findings through infographics, oral explanations, illustrated diagrams or structured digital slides, depending on their preferred mode of expression.

Some additional concrete ideas include:

- In mathematics, support bar chart creation by first letting students ***group and count physical tokens*** representing microplastic particles. Then, help them transfer that data into a chart using a guided template.
- In social studies, organise a ***map-based task*** where students place dots or icons on a local map to indicate areas where plastic pollution is found (e.g. near bins, drains, playground). Provide scaffolded prompts to help them describe patterns or suggest reasons.
- Offer a ***choice board*** with tasks of different formats: one student may prefer to write a short report, another may create a drawing with captions, and another may record a short video message describing what they discovered.

TIPS FOR TEACHERS

- **Include reflection tasks:** Ask students to keep a learning journal where they note new words or expressions they encounter and explain how these helped them understand the topic.
- Design **group projects** where students create their own presentations, podcasts, posters, or graphic novel panels — allowing them to apply and experiment with new language in context.
- Give students **space for peer teaching**, let them explain newly learned words or phrases to each other in small groups.

8. MAIN TEACHING METHODOLOGY

This unit is primarily based on scientific inquiry, engineering design, and modelling as core components of the learning process (see more in the theoretical framework).

9. ASSESSMENT

Assessment in this unit is carried out continuously and flexibly, adapting to the needs and characteristics of each group. It focuses on both the learning process and the final outcomes, evaluating content mastery, use of the target language, and the development of transversal skills. The following strategies and tools are proposed:

The following strategies are proposed as general recommendations and can be adapted to suit the specific context of each classroom:

- ***Systematic observation:*** teachers are encouraged to observe student performance throughout the unit, paying attention to task completion, work organisation, participation in group activities, and the use of English in context. This informal observation provides valuable insights into students' engagement, autonomy, and collaboration.
- ***Rubric-based evaluation of final products:*** rubrics can be used to assess students' final outputs, focusing on scientific accuracy, clarity of communication, feasibility of solutions, and effective use of L2 (including language accuracy, task-appropriate structures, and subject-specific vocabulary). It is advisable to share the rubrics with students in advance (see Appendix B).
- ***Self-assessment:*** students reflect on their own learning, identifying strengths and areas for improvement in collaboration, language use, and task completion. Tools such as reflection sheets or digital prompts may support this process (see Appendix C).
- ***Peer assessment:*** each student evaluates their own participation and that of their teammates using a shared rubric focused on collaboration, commitment, and individual accountability. This strategy promotes responsibility, empathy, and critical thinking, while helping to ensure a fair distribution of tasks (see Appendix D).

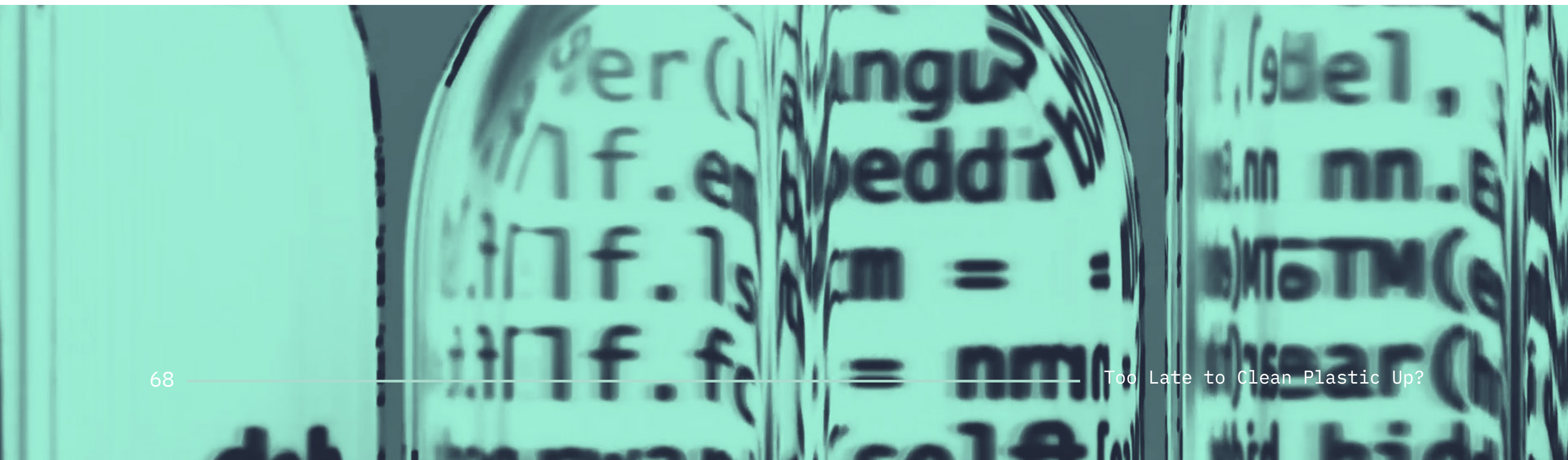
10. DESCRIPTION OF THE SEQUENCE OF ACTIVITIES

The table below presents the structure of the didactic sequence, organised into three main phases: pre-reading, while-reading, and post-reading. These phases are separated visually by thick vertical lines.

Each activity includes an estimated duration and specifies the subject area(s) involved. Colour coding is used for clarity:

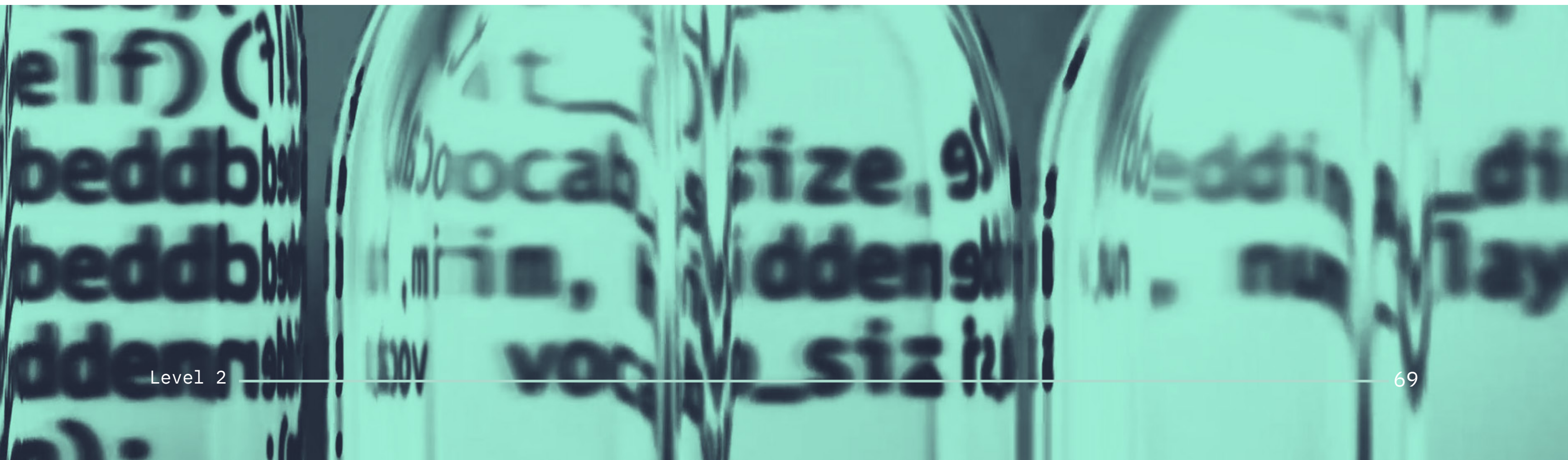
- ***L2 (English)*** activities are marked in green.
- ***Social Science*** activities are marked in pink.
- ***Maths*** activities are marked in red.

Activities	1	2	3	4	5	6	7
Duration (mins)	10-15	30-35	45-50	35-40	35-40	50-55	45-50
L2							
Social Science							
Maths							



- Before starting the unit, it is essential that the teachers involved (e.g., Natural Science, Maths and English) meet to coordinate the sequencing of activities, the division of responsibilities, and the role of each subject in the assessment process. Clarifying who will lead each task and agreeing on shared goals helps ensure coherence and smooth implementation. When possible, applying a co-teaching approach (whether through joint sessions or complementary lessons) will foster consistency, mutual support, and richer interdisciplinary learning.
- These guidelines are fully flexible and should be adapted to the specific needs and pace of each group. Teachers can select and prioritize the activities that best suit their students, choosing as many or as few as necessary or convenient.

8	9	10.1	10.2	10.3	11	12	FP
60-90	40-45	50-65	55-65	50-60	50-60	50-65	3 LESSONS



11.1. PRE-READING ACTIVITIES

10-15’

ACTIVITY 1

MATERIALS

Images of different islands (paradisiacal, volcanic, plastic island)

Word cloud tool (optional: Mentimeter, WordArt, etc.)

STEPS

What Is an Island?

Students explore the concept of “island” through observation, discussion and personal reflection.

They begin by brainstorming individually or as a class:

a. “What comes to your mind when you hear the word ‘island’?”

b. Words are shared orally or added to a collaborative space (e.g., whiteboard, digital board).

c. They examine three contrasting images:
- A tropical beach island
- A volcanic island (e.g., Iceland or Tonga)
- A plastic island (ocean pollution)

d. Students discuss in small groups:
- Which one surprises you the most? Why?
- Do you think all islands are like this? Why or why not?

e. In pairs, they respond to the following prompts:
- Have you ever been to an island?
- Would you like to live on one? Why or why not?

TIPS FOR TEACHERS

- Pre-teach or display essential vocabulary: sand, volcano, floating, remote, polluted, uninhabited
- Keep it dynamic and oral: this is not for deep thinking, just connection-building
- If time allows, students can vote: “Which island would you choose to visit and why?”

Students work in pairs to share personal experiences:

Social Science approach: Students activate prior knowledge and explore different types of islands. They discuss physical and human features (e.g., formation, ecosystems, population, pollution). Misconceptions are addressed through comparison and guided questioning, encouraging a wider geographical perspective.

L2 approach: Students practise vocabulary related to geography, nature, and the environment. Oral interaction is promoted through pair and group discussion. Language production includes expressing opinions, using connectors (because, but, however), and descriptive adjectives (polluted, remote, artificial).

TIPS FOR TEACHERS

STE(A)M skills
- Asking questions (for science) and defining problems (for engineering)
- Collecting, evaluating and communicating information

Sustainability skills
- Systems thinking
- Values thinking
- Digital skills
- Information and data literacy
- Communication and collaboration

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition
- Culture

30-35′ **ACTIVITY 2**

MATERIALS

- Whiteboard or projector
- Digital tools (Excel, GeoGebra, Numbers) – optional
- Student notebooks or worksheets
- Website

STEPS

From Guess to Graph

Students explore the concept of estimation and representation of data by predicting the number of islands in the world and analysing real statistics.

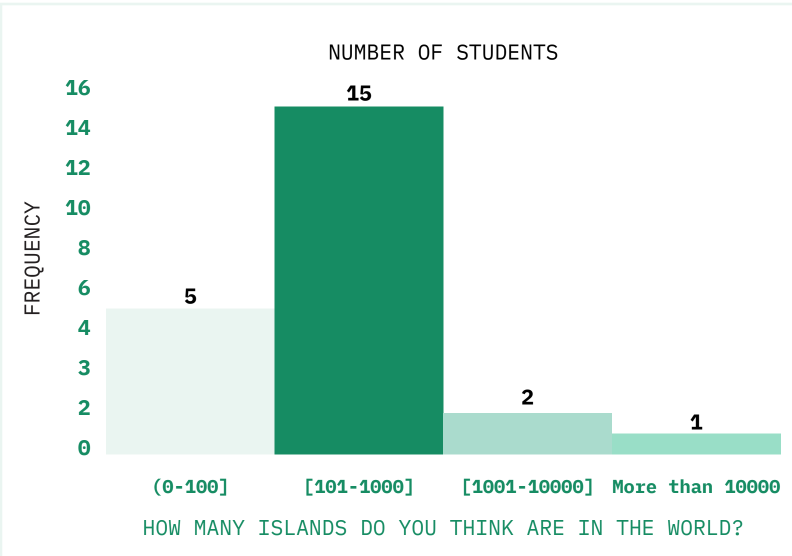
a. Learners reflect on the question: "How many islands do you think there are in the world?"

b. Students choose one of the following intervals:
   - (0–100]
   - [101–1000]
   - [1001–10000]
   - More than 10000

c. Results are collected (manually or digitally) and organised into a frequency table.

d. Students use paper or a digital tool (Excel, GeoGebra, Numbers, etc.) to ***create a histogram*** showing their class results.

	Number of students
(0-100]	
[101-1000]	
[1001-10000]	
More than 10000	



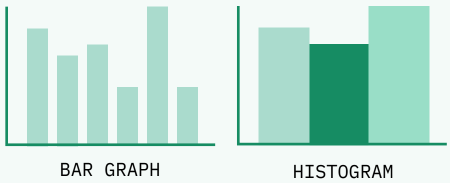
e. Once the graphs are complete, the actual number of islands (900,000 - 16,000 inhabited) is revealed. Students discuss the outcome:

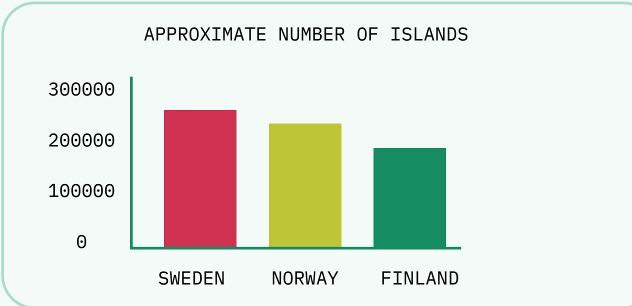
- *"Did the real number surprise you?"*
- *"Why are most islands uninhabited?"*

Optionally, the class can visit this website to read more about global island distribution.

- Encourage students to pay attention to the use of brackets and parentheses when writing intervals. Ask: *"Does the interval (0–100] include the number 100? Why?"*

- This is a great moment to explain the difference between a histogram and a bar graph. Use visual support to show that:
  - In a bar graph, there are gaps between the bars.
  - In a histogram, the bars are adjacent with no spaces.
- To practise bar graphs, you can use the approximate number of islands in countries like Sweden, Norway and Finland. Remind students that in some cases the exact data is unknown, so approximations are acceptable and realistic in geography.
- Take this opportunity to review how to read and pronounce large numbers in English (e.g. one hundred thousand, three hundred thousand). Ask students to compare the numbers using phrases like *"Sweden has more islands than Finland."* or *"Norway has almost as many islands as Sweden."*





STE(A)M skills
- Asking questions (for science) and defining problems (for engineering)
- Analyzing, predicting and interpreting data
- Mathematical reasoning and algorithmic thinking
- Collecting, evaluating and communicating information

Sustainability skills
- Systems thinking
- Futures thinking
- Digital skills

Information and data literacy
- Digital content creation
- Problem solving

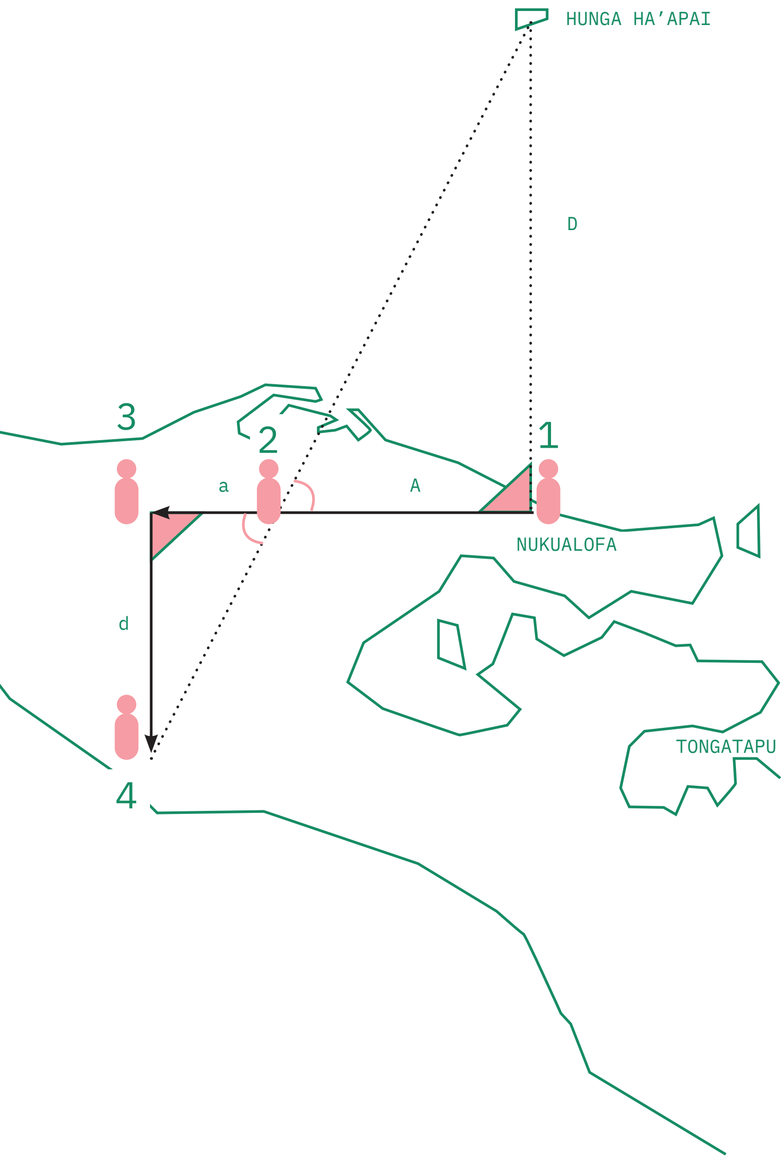
Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

40-50′ **ACTIVITY 3**

MATERIALS

- Projected map of Tonga (Hunga Tonga-Hunga Ha′apai eruption context)
- Paper, pencils, rulers, coloured pencils
- Scissors (optional, for triangle manipulation)
- Digital tools (optional): GeoGebra Thales tool

STEPS



No GPS, Just Geometry

Students apply their knowledge of similar triangles to estimate distances using only geometric reasoning, inspired by a real volcanic event in Tonga.

a. ***Students explore a real-world scenario:*** *"In 2014, a volcanic eruption in Tonga gave birth to a new island. It formed more than 50 km north of the main island, close to the capital, Nukualofa."*

b. ***Students visualise the problem:*** They are introduced to a local resident who estimates the distance to the island without any GPS or technology—only by walking and applying triangle similarity. She:
   - Walks 30 km from point 1 to point 2
   - Continues 20 km in the same direction to point 3
   - Then turns 90° and walks to point 4 until the island is aligned

c. ***Students represent the situation:***
   - They ***draw both triangles and label the sides*** using the data (A = 30 km, a = 20 km, D = 50 km)
   - They ***highlight the equal angles*** to demonstrate similarity
   - Optionally, they ***cut and manipulate*** the triangles to place them in Thales' position and check proportionality

No GPS, Just Geometry

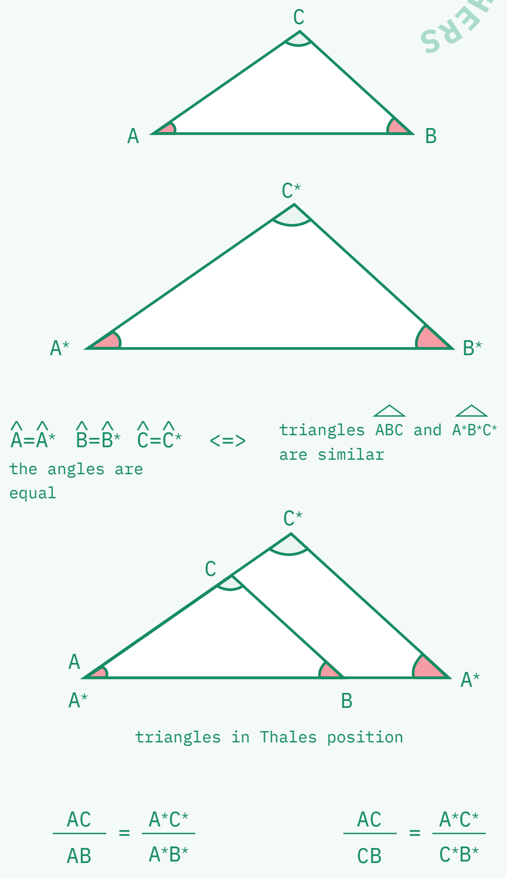
Students apply their knowledge of similar triangles to estimate distances using only geometric reasoning, inspired by a real volcanic event in Tonga.

$$\frac{D}{A} = \frac{d}{a} \Longrightarrow d = \frac{D*a}{A} = \frac{50*20}{30} = 33{,}33km$$

TIPS FOR TEACHERS

- This activity prepares students to understand and apply key geometry concepts:
  - Congruence and similarity in plane figures
  - Triangle similarity criteria
  - Thales Theorem
  - Proportional reasoning and scale relationships
  - The fact that the sum of the interior angles of any triangle is always 180°
- If possible, allow students to manipulate triangles physically or digitally. They can use GeoGebra - Similar Triangles Tool to visualise how triangles maintain proportionality.
- For students who need extra support, you can explain the values explicitly:
  - D=50 km (large triangle base)
  - A=30 km (larger triangle horizontal side)
  - a=20 km (smaller triangle horizontal side)
- Then clarify:

$$\frac{D}{A} = \frac{d}{a} \Longrightarrow d = \frac{D*a}{A} = \frac{50*20}{30} = 33{,}33km$$



STE(A)M skills
- Mathematical reasoning and algorithmic thinking
- Developing and using models

Sustainability skills
- Strategic thinking

Digital skills
- Information and data literacy

Language & CLIL (4Cs) skills
- Content
- Cognition

35-40'

ACTIVITY 4

TIPS FOR TEACHERS

Focus on key vocabulary and sentence structures used for **comparing and contrasting**, such as:

- *"Both islands…"*, *"However…"*, *"Unlike…"*, *"While the natural island is…, the plastic one…"*
- Encourage expressions of opinion: *"I think…, because…"*, *"In my opinion…"*

Use **visual scaffolding** to support learners:

- Anchor chart: Compare and Contrast Anchor Chart – TeacherSPayTeachers
- Optional video introduction: Compare and Contrast – Mind Blooming

Adapt the **level of questioning** to your students:

- Use **lower-order questions** to ensure comprehension of basic concepts.
- Use h**igher-order questions** to promote critical thinking and problem-solving.
- Mix both levels depending on your group's familiarity with the topic.

Offer students the option to answer in different formats:

- Drawing
- Writing short answers
- Speaking in pairs or small groups

Motivate students by using **digital tools** like Padlet to share ideas and responses visually or collaboratively.

MATERIALS

- Two contrasting images (paradise island vs. plastic island)
- Projector or digital screen
- Board or visual organiser
- Video: Plastic Island – The Reality of Ocean Pollution

STEPS

When Trash Becomes Land

Students analyse the phenomenon of plastic islands, using video input and guided comparison to reflect on human impact, biodiversity and the future of the oceans.

a. Students activate prior knowledge: They recall the three types of islands introduced in the first activity. Prompt: *"What do you remember about plastic islands?"*

b. Students watch and interpret a short video: They view this video to understand how floating plastic can form island-like masses and to visualise the problem in real-world terms.

c. Students work in groups to answer and discuss the following guiding questions, moving from description to analysis:

- Low-order thinking (comprehension and comparison):
    - What is a plastic island?
    - How are the ecosystems of a plastic island and a natural island different?
    - How are the materials that make up a plastic island different from those of a natural island?
    - What are some similarities between plastic and natural islands?
- Higher-order thinking (reasoning and predicting):
    - Can humans live on a plastic island in the same way they do on a natural island? Why or why not?
    - What are the environmental impacts of a plastic island compared to a natural one?
    - How does biodiversity differ between natural islands and areas surrounding plastic islands?
    - How might the expansion of plastic islands affect oceans in the next 50 years if no action is taken?

Social Science focus: Students investigate plastic islands as a growing environmental issue. By comparing them to natural islands, they develop their understanding of human impact on ecosystems, materials and biodiversity. The activity fosters awareness of global change and sustainability challenges.

L2 approach: Students develop their spoken interaction and reasoning in English. They use comparative structures (*more than, less than, as... as*), conditional sentences (*If no action is taken...*), and topic-specific vocabulary (*ecosystem, marine life, artificial, pollution*). The task promotes cooperative discussion and argumentation.

TIPS FOR TEACHERS

STE(A)M skills

- Asking questions (for science) and defining problems (for engineering)
- Argumentation based on data/evidence

Sustainability skills

- Systems thinking
- Futures thinking

Digital skills

- Information and data literacy
- Communication and collaboration

Language & CLIL (4Cs) skills

- Communication

30-40’

ACTIVITY 5

MATERIALS

- Song: Plastic Island by Tavana
- Lyrics worksheet (gap-fill version) or lyric strips
- Video: The Meaning of Aloha

STEPS

TIPS FOR TEACHERS

Introducing this topic with music can engage and motivate students to be close to the topic and the plot of the graphic novel in a fun way.

It can be done in collaboration with the music teacher

Singing for the Sea

Students connect music, culture and environmental awareness through an artistic video that combines stop motion and real microplastics collected from Hawaiian shores. Before watching the full song ***“Plastic Island” by Tavana***, learners explore its visual context in pairs, identifying materials, places and elements of nature. They predict what the song might be about and activate vocabulary related to pollution and marine ecosystems.

Once predictions are shared, learners engage with the lyrics through an interactive task. They might reconstruct the song using strips, complete a gap-fill version, or match lines to visuals. After this initial listening, students sing the song together, practising pronunciation, rhythm and intonation while deepening their emotional connection with the message.

Afterwards, students reflect in small groups: How did the plastic island form? Is it real? Who is responsible for it? Do we have similar issues in our sea? What emotions or ideas does the song transmit? They also identify cultural and natural references and discuss the symbolic meaning of “Aloha” as introduced in the video.

To broaden the reflection, learners watch ***a short video explaining the concept of Aloha*** and compare it with values or words in their own culture. They consider how this spirit could inspire concrete environmental action and propose realistic changes in their own context.

Additional activity: Discover Tavana on Instagram.

In small groups, they will write a thoughtful message (150–200 words) addressed to the artist.
The aim of the message is to reflect on the impact of plastic pollution and to connect personally with the environmental message of the song.

The message should include:

- A friendly greeting and short personal introduction (name, age, where they are from)
- A sentence explaining why the group is interested in his cause
- One or two thoughtful questions about his work or plastic pollution
- Words of admiration and encouragement, using positive and respectful language
- A polite closing

Before writing, the meaning of the Hawaiian word Aloha can be discussed, focusing on its emotional, cultural and environmental connotations. The video may be replayed to support understanding of the cultural references and values shown.

TIPS FOR TEACHERS

STE(A)M skills
- Asking questions (for science) and defining problems (for engineering)

Sustainability skills
- Values thinking
- Collaboration

Digital skills
- Communication and collaboration
- Digital content creation

Language & CLIL (4Cs) skills
- Communication
- Culture

Social Science focus: Students explore the intersection between art and activism, reflecting on the cultural meaning of "Aloha" and the emotional power of music to inspire environmental awareness. The activity fosters empathy, global citizenship and critical reflection on human impact on nature.

L2 approach: Students practise listening, pronunciation, oral fluency and reflective speaking using vocabulary on environmental issues, emotions and cultural identity. Structures include comparatives, conditionals and expressions of opinion. The task promotes both linguistic accuracy and expressive use of English.

50-55′

ACTIVITY 6

MATERIALS

- Printed or digital cover image of *I'm not a plastic bag*
- Projector
- Devices: tablets or computers

STEPS

- ***Students observe*** the cover of I'm Not a Plastic Bag by Rachel Hope Allison and ***share their first impressions.*** Working in pairs or small groups, they ***discuss*** questions such as:
  - What do you think this book is going to be about?
  - What mood or message does the illustration suggest?
  - What visual details or symbols stand out, and why might they be important?
- With teacher support, students ***explore the concept of a graphic novel.*** They ***watch a short video*** introducing graphic novels and ***discuss key features*** (e.g., dialogue bubbles, thought boxes, onomatopoeia).
- In small groups, students ***share their previous experiences*** with graphic novels in L1 or L2. They ***compare titles, styles and favourite authors.***
- Each group ***designs a poster or digital infographic*** explaining the main features of graphic novels. Tools such as Canva can be used. Groups ***present their posters*** and collaborate to ***create a shared classroom display.***
- If necessary, the teacher provides a ***visual anchor chart*** to guide students on ***how to read a graphic novel***, especially for those less familiar with the format.
- Students ***read the foreword*** by Jeff Corwin in pairs. After reading, they ***reflect and respond*** to guiding questions:
  - Can you name five words to describe the waste we produce?
  - How much trash do we create each year?
  - What message or warning does the foreword try to convey

TIPS FOR TEACHERS

- Encourage students to align the **visual design** of their posters with the **content and message** they want to convey. Layout, colour, and image choice should support the narrative – If possible, it is advised to work in collaboration with the **Art teacher** to enhance the visual impact and coherence of the posters.
- Provide clear guidelines or examples on **what makes an effective poster.** Key aspects include clarity, conciseness, correct grammar, use of visuals, and balanced composition.
- Reassure students that during the ***first reading of a text***, it is not necessary to understand every single word. The goal is to capture the main idea and gradually deepen comprehension.
- Use **partner reading** as a cooperative strategy: one student reads while the other listens and supports. This ensures that all students are engaged, promotes fluency, and allows peer scaffolding—especially useful when working with texts in L2.

STE(A)M skills
- Collecting, evaluating and communicating information

Sustainability skills
- Values thinking

Digital skills
- Communication and collaboration
- Digital content creation

Language & CLIL (4Cs) skills
- Communication
- Content
- Cognition

11.2. WHILE READING ACTIVITIES

ACTIVITY 7

45-50′

MATERIALS

- Book: *I'm Not a Plastic Bag* by Rachel Hope Allison
- Video (optional)
- Speakers + projector or similar audiovisual setup (if using the video)

STEPS

Students start by observing and describing a few key images or visual clues (e.g., ocean, plastic, bag, floating). They predict the topic of the story, linking it to what they have learned in previous lessons. This warm-up activates prior knowledge and prepares them for deeper engagement.

Working collaboratively in pairs or small groups, students take turns narrating the story using the illustrations as their main guide. They co-construct the narrative by interpreting visual details, making predictions, and sharing their ideas with peers. Learners support one another and are encouraged to share ideas like: *What do you think will happen next? What details in the image support your idea? What are the characters feeling? What message might the author be communicating?*

The teacher intervenes only when needed — to model pronunciation, clarify new vocabulary, or offer guiding questions — but the storytelling remains student-led.

Optionally, the animated version of the book may be played. Students ***compare the video to their reading experience***, reflecting on similarities and differences between their imagined version and the animated one.

To close the activity, pairs create a s***hort oral summary*** using three key words from the story. Some volunteers may share their reflections aloud. The session ends with the guiding question: *What did you learn from this story?*

TIPS FOR TEACHERS

STE(A)M skills
- Asking questions (for science) and defining problems (for engineering)

Sustainability skills
- Values thinking

Digital skills
- Information and data literacy

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

11.3. POST-READING ACTIVITIES

60-90’

ACTIVITY 8

MATERIALS

- Computers/tablets with internet access
- World map or printable coordinate maps
- Calculator and ruler
- Speakers + projector or similar
- Videos

STEPS

Unseen but Real: Mapping the Plastic Patch

1. Discovering the issue

Students begin by connecting the story to reality. After watching a short video from The Ocean Cleanup, they explore the official website and gather basic facts about the Garbage Patch.

Each group completes an information sheet using the materials provided. They find:

- the location (latitude and longitude)
- the surface area (compared to France)
- when and how it was discovered
- the presence of other plastic islands
- its environmental impact
- the composition and weight of the island

They are encouraged to take note of mathematical expressions such as: *trillion pieces, 1.6 million km², eight thousand tons, 92% of the mass, increasing exponentially.*

2. Analysing real data

- Students watch the video again and work in pairs to answer the following questions:
- How long have scientists been studying these areas?
- In what season of 2015 was the mega-expedition held?
- How many boats were used?
- How many plastic samples were collected?

TIPS FOR TEACHERS

To help students internalise key mathematical and geographical vocabulary (e.g. trillion, million, tons, square kilometre, increasing exponentially, percentage, longitude, latitude, scale, coordinates...), prepare warm-up or reinforcement games such as:

- Word search (e.g. Super-Teacher Word Search Generator)
- Crossword puzzles (Crossword Creator)
- Vocabulary bingo (Bingo Card Generator)
- Flashcards or matching activities

- What two criteria were used to classify the samples?
- How long did the classification take?
- How many times larger was the required area compared to the expedition?
- How big is the patch and what country is it three times bigger than?
- How many pieces of plastic are estimated?
- How much plastic per person on Earth?
- What's the total weight of all plastics combined?
- How much heavier is that than previous estimates?
- What percentage of the plastic mass is made up of large objects?
- How long does it take for large plastics to become micro plastics?

3. Working with coordinates and maps

Students use a world map to identify and mark the approximate coordinates of the Garbage Patch. Then, they use Google Earth to verify the location by typing in the coordinates.

They reflect on:

- What countries are near the Garbage Patch?
- Why is it located there?
- How are plastic islands formed?
- What role do ocean currents play?
- Can it be seen on Google Earth? Why or why not?

Optional support video

GREAT PACIFIC GARBAGE PATCH
INFORMATION SHEET

- LOCATION (COORDINATES)
    - LONGITUDE (E-W):
    - LATITUDE (N-S):
- EXTENSION (HOW MANY TIMES BIGGER THAN FRANCE?):
- ARE THERE MORE PLASTIC ISLANDS? (WHERE?):
- WHO DISCOVERED IT AND HOW?:
- HOW DOES IT AFFECT OUR DAILY LIVES?:
- WHAT IS THE AMOUNT OF PLASTIC THAT MAKES UP THE ISLAND?:

TIPS FOR TEACHERS

- Offer word games at different difficulty levels (basic/intermediate/advanced), depending on your students' level of English and prior knowledge.
- Before discussing surface measures like square kilometres, lead a brief class discussion or drawing activity: ask groups to sketch a square of 1 km², or compare it to other shapes (e.g. a rectangle of 0.5 km × 2 km, or a circle with radius 0.56 km) to visualise shape.
- Use a short explanatory video to help students understand large numbers like million, billion, trillion, especially if they struggle with abstract quantities.

Did you know?
In English, a dot (.) is used to separate decimals (for example, 3.5), while a comma (,) is used to separate thousands (for example, 1,000). In Spanish and many other languages, it's the opposite. Learn more: Rules for Writing Numbers - The Blue Book of Grammar and Punctuation

TIPS FOR TEACHERS

- You can also suggest the graphic novel How Much is a Billion? by David M. Schwartz (illustrated by Steven Kellog) for independent reading or library extension time.
- Introduce key concepts related to geographical coordinates (longitude, latitude, cardinal points, units like degrees, minutes, seconds) with visual support and hands-on tasks using maps or digital tools.
- Explain why the island is not visible: Let students know that the Plastic Island is not visible in Google Earth because:
  - The image resolution of the oceans is not precise enough.
  - The plastic moves constantly due to tides and ocean currents.
  - Many plastic pieces are extremely small—some as tiny as a grain of rice.

STE(A)M skills
- Analyzing, predicting and interpreting data
- Mathematical reasoning and algorithmic thinking
- Collecting, evaluating and communicating information

Sustainability skills
- Systems thinking
- Strategic thinking
- Integrated problem-solving

Digital skills
- Information and data literacy
- Problem solving

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

4. Working with coordinates and maps

Students to locate the approximate coordinates of the Garbage Patch on a world map. They should:

- Identify latitude and longitude
- Mark the location
- Verify it using Google Earth by typing the coordinates
- Discuss:
  - Which countries are nearby?
  - Why is it located there?
  - How are plastic islands formed?
  - What role do ocean currents play?
  - Can it be seen in Google Earth? Why or why not?

5. Mathematical reasoning

Students represent the Garbage Patch as a geometric figure and draw it to scale. Use these guiding questions:

- If the patch were a square, what would be the side?
  - *Approx. 1,265 km*
- If it were a circle, what would be the radius?
  - *Approx. 710 km*
- If it were a rectangle, what possible dimensions could it have?
  - *E.g. 1 km × 1.6 million km*

They choose a scale (e.g., 1 cm = 100 km) and draw the shape accurately on a map.

6. Discussion (whole-class)

After verifying their map, students reflect and discuss the phenomenon. They revisit the final video and answer:

- What did you learn that surprised you?
- Why is the patch located in that part of the ocean?
- What do ocean currents have to do with it?
- Why can't we see it from satellites?
- What does this tell us about invisible environmental damage?

ACTIVITY 9

45-55'

MATERIALS

- 2 transparent glasses
- 1 jug of hot water
- 1 jug of cold water
- 1 large transparent container (e.g. tray or dish)
- Red food colouring
- Blue food colouring

STEPS

Currents in Motion: Where Does Plastic Go?

Ocean currents play a crucial role in the formation and movement of plastic islands, such as the one depicted in I Am Not a Plastic Bag. In this activity, students work in groups to carry out a hands-on experiment that models the interaction between warm and cold water, helping them understand how currents transport plastic waste across the oceans. The activity follows the logical sequence of a scientific inquiry:

1. Research question

Each group formulates its own research question, for example: how do ocean currents move, and how can they carry plastic waste over long distances until they form plastic islands?

2. Identification of variables

- Independent variable: water temperature (warm versus cold).
- Dependent variable: the movement and direction of the coloured water.
- Control variables: size of the container, volume of water, amount of colouring, classroom conditions.

3. Initial predictions (hypotheses)

Students propose hypotheses about how warm and cold water will move and how these movements can represent real ocean currents. They can use the structure "If…, then…" to express their predictions clearly.

TIPS FOR TEACHERS

STE(A)M skills
- Developing and using models
- Analyzing, predicting and interpreting data
- Building statements (for science) and designing solutions (for engineering)

Sustainability skills
- Systems thinking
- Integrated problem-solving

Digital skills
- Problem solving

Language & CLIL (4Cs) skills
- Content
- Cognition

4. Planning the investigation

Students organise the steps they will follow:

- which experiment they will carry ou.
- the sequence of actions
- how they will pour the water to prevent it from mixing too quickl
- how they will collect and record the results (for example, observation tables, labelled diagrams, short descriptions, photographs or videos if allowed)
- which indicators they will observe, such as direction, speed or colour stratification

5. Carrying out the experiment and collecting data

Working in groups, students conduct the experiment and gather written or visual observations.

6. Theoretical explanation (optional)

If necessary, the teacher provides a brief explanation to help students interpret what they have observed. To connect what happens in the container with the real movement of ocean currents, three key ideas are clarified:

- warm water is less dense and tends to rise
- cold water is denser and tends to sink
- these density differences generate movements within the water that behave like small currents

7. Analysis of results and conclusions

Each group analyses its findings and formulates its own conclusions, confirming or rejecting the initial hypotheses. Students also reflect on what the movement of the coloured water shows about real ocean currents and respond to questions such as:

- How do ocean currents transport plastic waste from different locations until plastic islands form?
- How does the fragmentation of plastic into microplastics influence its movement through the ocean?
- How could this knowledge help reduce the accumulation of plastic in the sea?

8. Communication of results (optional)

Students may conclude the activity by giving a short presentation.

TIPS FOR TEACHERS

- **Example of an experiment students can carry out:** students fill one glass with warm water and add a few drops of red colouring. They fill the other glass with cold water and add blue colouring. They then carefully pour both into the large transparent container. Students observe how the warm water rises and the cold water sinks, creating movements that represent currents. This visual effect helps them understand how bodies of water can carry plastic waste and transport it over long distances across the ocean.

ACTIVITY 10

ACTIVITY 10.1

50-65’

MATERIALS

- Projector and audio system
- Student notebooks or research templates
- Internet connection
- World map (physical or digital)
- Access to videos and Google Maps or Google Earth
- Calculator (for average speed estimations)
- Devices for online research (1 per group)

STEPS

Mapping a Greener World Tour

1. Revisit the story and expand geographical understanding

In I *Am Not a Plastic Bag*, geographical knowledge—such as coordinates, meridians, and global positioning systems—helps understand the location of the Plastic Island. Students now apply this knowledge in a new literary and scientific context: Around the World in 80 Days by Jules Verne.

Students begin by watching two short scenes from the animated adaptation of the novel, focusing on a pivotal moment in the story. They pay attention to details about time, direction, and global positioning.

Video clips:

Video 1: From minute 5:00 to 7:15

Video 2: From minute 9:10 to 13:20

After watching, students reflect and discuss the following questions:

- Why did Phileas Fogg win the bet?
- Could he make the same journey today?
- What differences would there be if he used only sustainable means of transport?

TIPS FOR TEACHERS

- **Introduce the task by linking it to the novel** *I Am Not a Plastic Bag.* Remind students that understanding how coordinates, time zones and meridians work was essential to locate the Plastic Island. Explain that now, they will apply that same knowledge to plan a new journey around the world.
- ***Use the animated adaptation of Verne’s novel*** to engage students. Before playing the clips, briefly summarise the context. Pause when needed to clarify the plot, vocabulary or key ideas. After watching, lead a short discussion: Why did Phileas Fogg win the bet? How did time zones play a role?
- ***Help students visualise what “sustainable transport”*** means. Show images of sustainable vehicles or modes of travel that existed in the past and those available today ***(→ insert image of past and present sustainable transport).*** Encourage critical thinking by asking: Would Fogg be able to complete the journey today using only sustainable transport?
- ***Support students while they plan their route.*** Provide a world map, access to Google Maps or Google Earth, and a route planning sheet where they can record the stages of the journey, types of transport, distances and estimated duration. Remind them that the whole route must be completed in less than 80 days.

TIPS FOR TEACHERS

- ***Guide the group work process*** by circulating through the classroom and helping students estimate the average speed of their chosen transports, calculate approximate travel time and decide how to compensate for stopovers or vehicle changes.
- ***Encourage geographical reasoning*** by discussing the real implications of travelling across continents and oceans sustainably. Ask questions like: Which regions would be harder to cross? Which transport would reduce emissions the most?

STE(A)M skills
- Mathematical reasoning and algorithmic thinking
- Building statements (for science) and designing solutions (for engineering)
- Collecting, evaluating and communicating information

Sustainability skills
- Futures thinking
- Strategic thinking
- Integrated problem-solving

Digital skills
- Digital content creation
- Information and data literacy

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition
- Communication

2. Redesign Fogg's journey using sustainable transport

Students now take on a challenge: to reimagine Fogg's journey around the world using sustainable transport methods. Working in small groups, they:

- ***Choose two types of transport:*** one for water travel and one for land travel. These can be inspired by 19th-century technology or modern sustainable alternatives (e.g. sailing ships, electric trains, etc.).
- ***Design the route:*** They create a full journey starting and ending in London. Using digital tools such as Google Maps or Google Earth, they calculate the total distance and consider time zones and global coordinates.
- ***Estimate travel times:*** They research the average speed of each selected mode of transport and estimate the total travel time. They include realistic stops for refuelling, waiting times, and any necessary changes in logistics.
- ***Respect the 80-day limit:*** The journey must be completed within the original timeframe. Groups analyse how speed, efficiency and sustainability influence their route and decisions.

ACTIVITY 10.2

50-60′

MATERIALS

- Devices with internet access (1 per group)
- Access to TinkerCad
- Grid paper or whiteboards (optional for rough geometrical planning)
- Headphones (optional, if groups work with tutorial videos)
- Optional: 3D printer (if you wish to physically print one model per group later)

STEPS

After completing their route in the previous lesson, students now move from planning to visual representation. In this phase, they apply their knowledge of geometry, scale, and digital tools to imagine a sustainable vehicle fit for a journey around the world.

Each group focuses on their chosen water transport. They begin by sketching a first draft of the vehicle, thinking about realistic features (propulsion, materials, energy source) and how these would have worked in the past—or could work today. Creativity is encouraged, but scientific plausibility remains essential.

Students then use TinkerCad to build a 3D digital prototype of their design. This intuitive online tool helps them:

- Translate sketches into scale-based models.
- Experiment with shapes and dimensions.
- Visualise the final design from multiple angles.

Finally, they name the vehicle, provide a short description of its features, and include an estimation of its maximum speed and environmental impact.

TIPS FOR TEACHERS

- **Review the basic functions of TinkerCad** before the class or prepare a quick tutorial. TinkerCad enables students to develop spatial rea soning and represent 3D ideas in a concrete form. If needed, let them begin with a paper sketch before jumping into digital design.
- **Allow students to choose** whether they want to design a historical sustainable vehicle or a modern one. This flexibility increases engagement and gives room for differentiation.
- **Foster cross-curricular thinking:** ask students to integrate elements from history (means of transport used in the past), technology (sustainable innovation), and mathematics (dimensions, projections, scale).

ACTIVITY 10.3

50-60'

MATERIALS

- 3D prototypes (digital or printed)
- Projector or digital screen

TIPS FOR TEACHERS

- **Prepare a quick visual aid** or **anchor chart** with useful expressions and structures for oral presentations (e.g. *We decided to choose... because, Our vehicle includes..., We think this is sustainable because...*). You can also show this video tutorial on how to present to model effective communication.

- **Use discussion scaffolds** to help students comment on each other's ideas after the presentations. Phrases such as *I agree with you because..., Have you considered..., or That's interesting, but what if...* may help them move beyond basic answers.

STEPS

Present and evaluate proposals

Once all models are completed, each group will prepare a short ***oral presentation***. In their talk, students should:

- Show their ***3D model*** (or a printed version, if available).
- Explain the route they designed and justify the selection of each transport method.
- Discuss how sustainability was integrated into both their journey and their vehicle design.

You may provide a simple template or checklist to help them structure their presentations.

After all groups have presented, lead a whole-class discussion to compare proposals. Encourage peer feedback and ask students to reflect on:

- Which journey was the most ***realistic***?
- Which route was the most ***environmentally friendly***?
- Which vehicle design was the most ***innovative*** or ***efficient***?

Finally, as a class, decide which group's proposal best meets the challenge of ***completing a round-the-world trip in 80 days using sustainable methods.***

Social Science focus: Students explain and justify their transport and route choices based on geography, sustainability, and environmental impact. They engage in critical thinking and comparison of real-world implications, considering aspects such as feasibility, ecological footprint, and global awareness.

L2 approach: Students develop their speaking and listening skills through structured oral presentations. They practise specific vocabulary (transport, environment, sustainability), use functional language for describing, comparing and justifying, and apply strategies for effective oral communication (clarity, pronunciation, interaction). Peer feedback reinforces comprehension and fluency.

ACTIVITY 11

50-60'

MATERIALS

- Speakers or audio device
- Access to video editing apps (e.g., CapCut, InShot, KineMaster)
- Mobile phones, tablets or computers for video recording and editing

STEPS

Sing Out for the Oceans

Students revisit the song Plastic Island by Tavana and listen to it again in class. Then, working in small groups, they write their own song about ocean pollution. They may choose to:

- Create new lyrics using the same melody
- Modify the original lyrics
- Compose a completely new song inspired by the same topic

Once the lyrics are ready, they are encouraged to produce a short videoclip that communicates their message through music and visuals. The aim is to be clear, creative and impactful.

To create the videos, students can use free, user-friendly apps such as:

CapCut

InShot

KineMaster

TIPS FOR TEACHERS

This activity can be carried out in collaboration with the Music teacher, who can support students in adapting melodies, working on rhythm and vocal performance, and enhancing the musical quality of their video productions. Interdisciplinary collaboration can enrich the final outcome and increase student engagement.

STE(A)M skills
- Planning and executing research
- Building statements (for science) and designing solutions (for engineering)

Sustainability skills
- Values thinking
- Collaboration

Digital skills
- Digital content creation
- Communication and collaboration

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

50-55′

ACTIVITY 12

MATERIALS

- Printed or digital versions of the four news headlines
- Interactive tool: Probability Washing Line
- Access to internet-connected devices (for research and probability activity)
- Access to BBC article, WasteShark video, and Ocean Cleanup video
- Poster creation materials (paper, markers, scissors, glue) or digital tools (e.g. Canva)
- Optional: projector or large screen to share posters at the end

TIPS FOR TEACHERS

- If there are not enough laptops or tablets to use the interactive version of the probability activity, you can prepare 12 physical cards, one per probabilistic term (e.g. might, may, hardly ever, impossible…). Write the term on one side and its correct place in the probability line on the other side. This will allow students to self-correct after ordering them.
- Alternatively, you can create a large class-room version of the line using string and pegs or collaborate with the art or language teacher to develop a more visual or linguistic version.
- Encourage students to use the key vocabulary when discussing probabilities (e.g. *"I think it's highly likely because…", "It's impossible due to…")*.
- Revise what makes an effective poster before the final task. You may use the following video:

STEPS

Fake or real? Analysing plastic-related news and raising awareness

Students begin by recalling that in I Am Not a Plastic Bag, the plastic monster is not imaginary—it is made of real human actions. Today, they explore how media, science and misinformation shape our understanding of the plastic crisis.

1. Investigating Headlines

- Working in small groups, students receive four environmental news headlines and are asked to:
- Identify the fake one, supporting their choice with arguments and prior knowledge
- Select the most inspiring or environmentally positive headline and justify their choice
  - News Headlines:
    - WasteShark is an aquatic drone that "eats" plastics and other debris from the surface of the water.
    - A 17-year-old boy invents a system to capture ocean trash, called Ocean Clean Up.
    - The United States and most European countries have passed a United Nations law that will ban the use of plastic starting in 2026.
    - An Israeli chemist has invented a new type of plastic that is biodegradable in water.

To verify their answers, students explore reliable online sources:

BBC Article

WasteShark Video

Boyan Salt & Ocean Clean Up

2. From Truth to Probability

Next, the class explores how language can influence perception. Students learn that vague or modal expressions (might, probably, always, never) are often used in fake news to make ideas sound plausible.

- In pairs, they explore the Probability Washing Line to sort modal verbs from least to most likely.
- Then, each student creates four statements related to plastic pollution:
  - One that is impossible
  - One that is unlikely
  - One that is likely
  - One that is certain

Students compare and discuss their ideas within the group, justifying their choices and reflecting on how probability can alter the interpretation of environmental messages.

3. Raise Awareness Through Action

After analysing and discussing, students turn their reflections into action. In groups, they design a poster to raise awareness among the school community.

Each poster must include:

- A powerful slogan
- Key facts or figures from the session
- A call to action that encourages positive change

They may use traditional materials (paper, markers) or digital tools such as Canva.

TIPS FOR TEACHERS

STE(A)M skills
- Analyzing, predicting and interpreting data
- Argumentation based on data/evidence

Sustainability skills
- Values thinking
- Collaboration

Digital skills
- Information and data literacy
- Digital content creation
- Communication and collaboration

Language & CLIL (4Cs) skills
- Content
- Communication
- Cognition

3 SESSIONS

FINAL PROJECT

MATERIALS

- Printed or digital graphic organisers (e.g., character map, story arc, panel planner)
- Paper, pencils, markers, coloured pencils
- Laptops or tablets (if available)
- Access to Canva or Pixton
- Optional: audio recording tools (for creating audio novels)

STEPS

Final project: Beyond Plastic: Crafting Stories for a Sustainable Future

In this final project, students use storytelling to reflect on the environmental impact of plastic and imagine a future without it. Working in small groups, they will create an original graphic novel set in a world where plastic has been banned. Through this creative challenge, students will apply their knowledge of materials, sustainability and narrative structure while practising their English skills.

1. Imagine a Plastic-Free World

Each group begins by exploring a key question:
What would happen if plastic disappeared from our daily lives?

To guide their reflection, students should:

- Identify everyday items that contain plastic and research their functions.
- Consider how society would adapt to the absence of materials like polyethylene or Kevlar.
- Think critically about whether banning plastic is a real solution, and explore alternative materials or strategies for reducing its impact.

Using this input, they will brainstorm the plot of their story, including:

- Main characters: individuals living in this new world
- Challenges: problems that arise due to the lack of plastic
- Solutions: how the characters adapt or find alternatives

They will organise their ideas using a story graphic organiser and define the basic structure: beginning – middle – end.

TIPS FOR TEACHERS

- If possible, consider inviting collaboration from Art and Music teachers. Their support can enrich the creative process, helping students with aspects such as melody, rhythm, visual design, or audiovisual composition. This inter disciplinary approach can enhance student engagement and the overall quality of the final products.
- Encourage students to structure their ideas before writing. Graphic organisers are useful tools to help them organise characters, conflicts, and plot development. You can find editable templates here:
- Make sure students understand the significance of Kevlar and how its invention—by chemist Stephanie Kwolek—has impacted modern life. Highlight the use of synthetic fibres in sportswear, tyres, sails, and life-saving equipment like bulletproof vests.
- This is an excellent opportunity to highlight scientific contributions made by women, promoting inclusive and inspiring role models by encouraging students to exchange their graphic novels with other groups and suggest improvements before presenting their final version.
- You may invite the art teacher to collaborate, either in reviewing students' visual storytelling or guiding them through layout, design, and illustration techniques.

2. Write and Design the Graphic Novel

Once the storyline is clear, students will write the script for their graphic novel, including:

- Narration: brief texts describing what happens in each scene
- Dialogue: realistic conversations between characters
- Sound effects: where needed, to enhance the story (e.g., clang, splash)

Students should pay attention to accuracy, coherence and clarity of language. Then, they will move on to the visual phase, creating their comic using simple drawings or digital tools.
They can use paper and pencils or work digitally with tools like:

Pixton: to build comics using characters and templates

Canva: to create visually appealing digital layouts

The final product must include:

- A clear sequence of panels
- Visual storytelling that matches the written script
- Text in English (dialogues and narration)

Students are encouraged to be creative but also realistic in their representations.

3. Review and Present

Before presenting their graphic novel, each group:

- Reviews spelling, grammar and narrative flow
- Ensures the story communicates a clear environmental message
- Checks that all members have contributed to the final product

Each group will then present their comic to the class, explaining:

- The storyline and its main message
- The process they followed
- What they learned about plastic and sustainability

To close the project, guide a class discussion using questions such as:

- What was the most surprising thing you discovered?
- What would be the advantages and disadvantages of living without plastic?
- How can storytelling help raise awareness?

TIPS FOR TEACHERS

- Remind students that artistic ability is not the main focus—creativity, clarity and message are more important. Simple drawings or digital tools can be equally effective.
- Foster peer feedback by encouraging students to exchange their graphic novels with other groups and suggest improvements before presenting their final version.
- As an optional extension, students may turn their stories into audio novels, giving voice to their characters and working on pronunciation, intonation and oral fluency.

STE(A)M skills

- Asking questions (for science) and defining problems (for engineering)
- Planning and executing research
- Argumentation based on data/evidence
- Building statements (for science) and designing solutions (for engineering)

Sustainability skills

- Systems thinking
- Values thinking
- Collaboration
- Integrated problem-solving

Digital skills

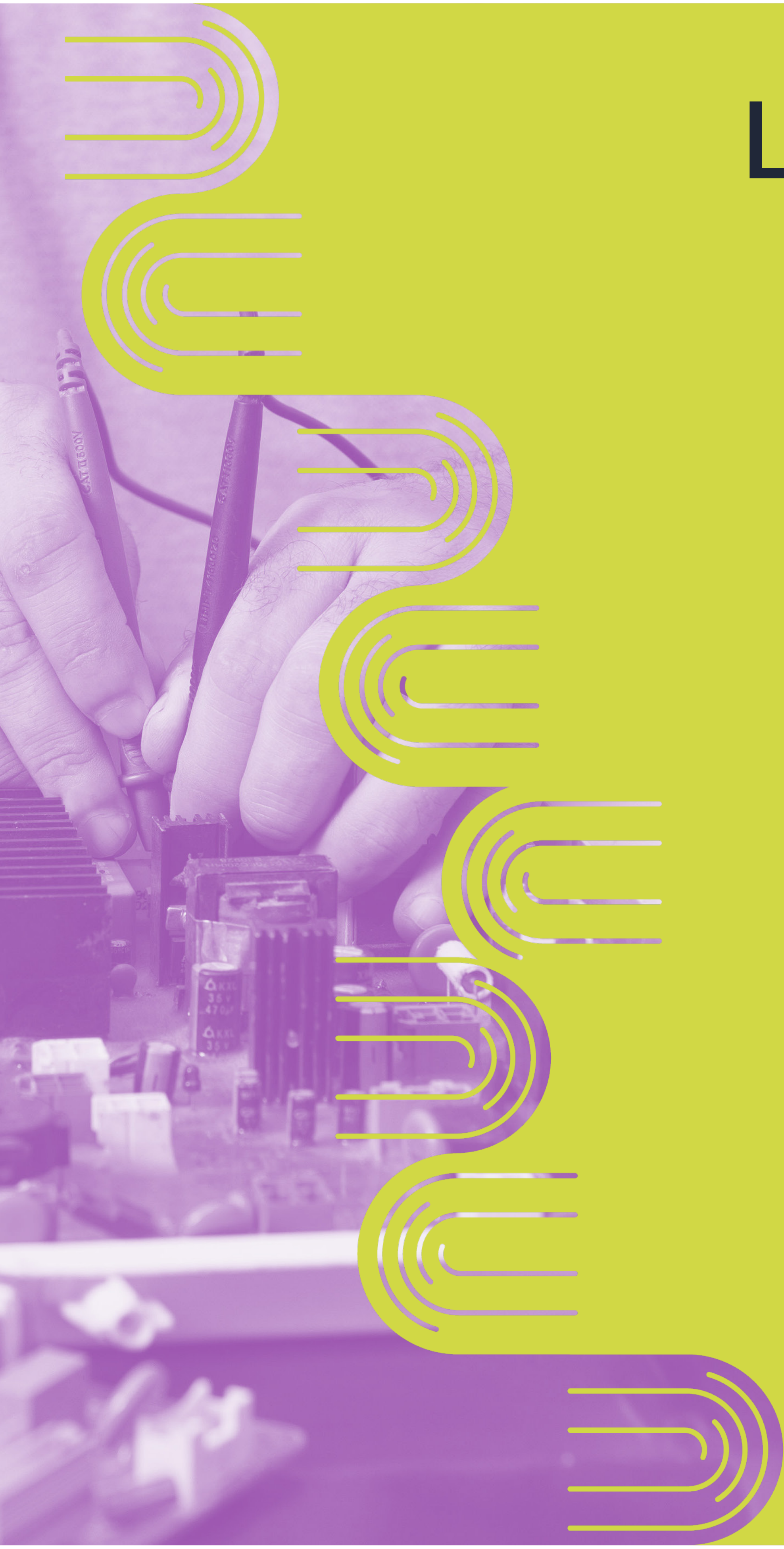
- Digital content creation
- Communication and collaboration

Language & CLIL (4Cs) skills

- Content
- Communication
- Cognition
- Culture

BLUEPRINTS FOR CHANGE: PROTOTYPING A CLEANER FUTURE

LVL 3



1. SUBJECTS

Level 3 unit with full subject integration and the graphic novel I'm not a plastic bag by Rachel Hope Allison, inspired by the real-life phenomenon of the Great Pacific Garbage Patch.

This unit is recommended for students aged 14 to 16, as it aligns well with the curricular content and competence level typically found in their educational programmes. However, it can also be implemented with younger or less advanced students, provided that sufficient scaffolding is offered (such as simplified texts, visual aids, guided discussions, and flexible grouping). Similarly, the unit remains appropriate for older students or higher levels if activities are expanded or deepened to match their academic needs.

2. PROJECT GOALS AND LEARNING OBJECTIVES

Scientific and Environmental Understanding

- To understand the role of plastic in our world.
- To understand the problems associated with microplastics for the planet and our health.
- To understand the real situation of global pollution.
- To reflect on the importance of environmental conservation and our role in the process.

Research and Inquiry Skills (STEAM)

- To develop independent research.
- To develop innovative projects by applying design and engineering processes.

Oral and Written Comprehension and Production (L2 goals)

- To use environmental and scientific vocabulary in oral and written tasks.
- To plan and conduct structured interviews on environmental topic.
- To deliver well-organised presentations using subject-specific language and visual support.
- To read and analyse a graphic novel, extracting relevant information.
- To reflect critically on the story's environmental message through rereading.
- To write a persuasive text with coherent arguments and supporting evidence.
- To express and defend opinions clearly in discussions about plastic pollution.

Artistic and Creative Expression

- To express ideas creatively through both traditional and digital media.
- To explore the connection between art and environmental awareness.

Digital Competence

- To share information and content through digital technologies.
- To cooperate and collaborate through digital technologies.
- To browse, search, and filter data and information through AI.
- To protect personal data and privacy.

Critical Thinking and Reflection

- To develop critical thinking.

Cooperative Learning Goals

- To engage in meaningful discussions, written tasks, and presentations in order to develop subject-specific and communicative language skills.
- To interact with peers and contribute to teamwork, fostering collaboration and the exchange of ideas.
- To express ideas confidently and develop social skills through respectful communication and effective presentation.

Final Products

Microplastic-Related Prototypes & Science and Technology Fair

3. SDGs

This unit is related to the following SDGs:

4. CROSSCUTTING CONCEPTS

Patterns:
Students identify and analyse repeated structures and behaviours associated with plastic production and consumption. By observing demographic trends, seasonal variations in plastic use, or recurring types of litter (e.g., bags, bottles), learners develop a deeper understanding of how patterns shape global waste distribution. They also explore symmetry in nature and the design of artificial materials to contrast natural cycles with anthropogenic patterns of accumulation.

Cause and Effect:
Students investigate how specific actions—such as increasing plastic production or implementing bans on single-use items—lead to measurable environmental and social consequences. By analysing examples like the effect of plastic particles on marine organisms or the link between minimum wage and consumption patterns, learners build cause-effect chains that explain both ecological and economic phenomena related to plastic pollution. This concept supports critical thinking about responsibility and policy impact.

Scale, Proportion and Quantity:
This concept help students interpret how plastic pollution varies across local, national and global scales. They use maps, atlases, and data sets to examine distribution patterns and calculate quantities of plastic waste. Activities such as creating scale models (e.g., magnifying microplastics or building enlarged representations of cells affected by toxins) reinforce proportional reasoning and highlight the invisible magnitude of microplastic accumulation in natural systems.

5. SKILLS

Throughout this unit, students develop a wide range of competencies that go beyond subject-specific knowledge. The following subsections describe the key skill areas integrated into the learning process.

5.1 STEAM Skills

This project integrates ***STEAM (Science, Technology, Engineering, Arts, and Mathematics)*** skills to develop students' ***critical thinking, problem-solving, and innovation.*** By engaging in inquiry-based learning and hands-on projects, students develop the following STEAM competencies:

- ***Asking meaningful questions and identifying real-world problems:*** Students investigate the impact of microplastics on ecosystems, human health, and water pollution, formulating research questions to guide their inquiry.
- ***Planning and conducting scientific research:*** Learners design and carry out research activities, collecting and analyzing data to under-

stand the composition, sources, and effects of microplastics.

- ***Interpreting data and making predictions:*** Students use ***scientific reasoning and critical thinking*** to assess environmental data, predict the impact of microplastics, and evaluate proposed solutions.
- ***Applying mathematical reasoning and computational thinking*** – Learners use ***mathematical models, measurements, and calculations*** to quantify pollution levels, interpret scientific data, and assess the effectiveness of cleanup solutions.
- ***Developing and testing models:*** Through ***engineering design,*** students prototype and test filtration systems or other technological solutions to remove microplastics from water.
- ***Constructing evidence-based arguments:*** Students ***support their findings*** with research and data, presenting logical arguments about pollution reduction strategies and policy recommendations.
- ***Designing creative solutions using engineering and the arts:*** Learners apply ***design thinking and artistic creativity*** to visualize data, communicate research findings, and propose innovative environmental solutions.
- ***Communicating scientific and technological information effectively:*** Students present their findings through various formats, including ***presentations, posters, videos, or digital content,*** ensuring their ideas are accessible and engaging for a wider audience.

5.2 Digital Skills

In today's digital age, ***technology plays a key role in research, collaboration, and communication.*** This unit plan incorporates ***essential digital skills*** to support students in their learning and project work.

- ***Information and data literacy:*** Students ***search, evaluate, and interpret*** scientific sources, datasets, and online articles on microplastics, ensuring they use reliable and credible information.
- ***Digital communication and collaboration:*** Learners use ***online platforms, collaborative tools, and digital discussion boards*** to share research findings, give peer feedback, and co-create project materials.
- ***Digital content creation:*** Students design ***infographics, presentations, videos, and digital posters*** to communicate their research on plastic pollution, engaging wider audiences through storytelling and visuals.
- ***Cybersecurity and responsible digital use:*** Students learn about ***data protection, privacy, and ethical considerations*** when working online, ensuring they apply safe digital practices when conducting research or sharing content.
- ***Problem-solving with digital tools:*** Learners use ***AI tools, data visualization software, and online simulations*** to analyze pollution trends, generate solutions, and assess the environmental impact of different policies.

5.2 Sustainability Skills

This unit offers different opportunities for students to develop sustainability skills as they engage with the complex issue of microplastic pollution through inquiry, design, and critical reflection. By combining scientific investigation, ethical debate, and real-world problem-solving, learners are encouraged to think systemically, act collaboratively, and envision sustainable futures. The following sustainability competences are addressed across the learning sequence:

- ***Systems thinking:*** Students explore the connections between plastic production, environmental degradation, and human health, identifying how actions in one area (e.g. industrial use of plastics) generate cascading effects across ecosystems and societies.
- ***Futures thinking:*** Through persuasive video messages and prototype development, learners imagine future scenarios and propose concrete actions to reduce plastic pollution, addressing long-term environmental challenges.

- ***Values thinking:*** The unit invites students to reflect on the ethical implications of plastic use and environmental neglect, encouraging discussions about justice, responsibility, and the values that should guide our decisions.
- ***Strategic thinking:*** During the design and evaluation of microplastic-removal prototypes, students consider real-world constraints (economic, social, environmental) and assess the feasibility and scalability of their solutions.
- ***Collaboration:*** Group tasks such as research presentations, interviews, prototype building and the final fair foster active teamwork, shared decision-making, and mutual support in problem-solving contexts.
- ***Integrated problem-solving:*** By combining knowledge from science, technology, language, and the arts, students co-create interdisciplinary responses to the complex issue of microplastics, applying diverse strategies to analyse, design and communicate solutions.

6. CLIL FRAMEWORK

6.1 4C's of CLIL

TIPS FOR TEACHERS

CONTENT

- Use real-life case studies and prototypes to link theory with practice.
- Provide visual organizers to explain plastic decomposition and pollution patterns.
- Connect SDG-based inquiry tasks to local environmental issues.

COGNITION

- Guide students with "why/how" prompts during prototype design.
- Use charts and structured frames to analyse cause-effect in pollution and policy.
- Include short ethical debates linking data to social justice.

COMMUNICATION

- Model persuasive structures and connectors before writing.
- Provide sentence starters for interviews, debates, and campaigns.
- Use multimodal outputs (posters, prototypes, videos) to share findings.

CULTURE

- Compare international policies on plastics through student-led research.
- Use cultural traditions or values (e.g., Aloha) to discuss environmental ethics.
- Encourage youth-led campaigns linking local practices

4C	DESCRIPTION
CONTENT	• Understanding the role of plastics and microplastics in environmental and human health. • Learning about plastic composition, decomposition, and pollution patterns. • Exploring solutions: engineering prototypes, scientific research, and policy analysis. • Investigating real-world issues through SDG-based inquiry.
COGNITION	• Developing higher-order thinking through problem-solving and prototype design. • Analysing cause-effect relationships in pollution and policy outcomes. • Evaluating scientific data, interpreting articles, and proposing solutions. • Engaging in reflection on ethics, social justice, and environmental responsibility.
COMMUNICATION	• Using L2 to participate in interviews, discussions, and persuasive campaigns. • Producing multimodal texts: posters, prototypes, infographics, and videos. • Applying academic language: cause-effect connectors, persuasive structures, conditionals. • Engaging in oral presentations and collaborative writing using scientific vocabulary.
CULTURE	• Raise awareness of plastic use and waste policies around the world. - Connect learning to the Sustainable Development Goals (SDGs). • Reflect on global vs. local responsibility and the concept of "Aloha" as an environmental ethic. • Explore environmental activism through music, art, and media.

6.2. The Language Triptych

Language of Learning (Vocabulary)

Students ***explicitly learn and use*** subject-specific vocabulary required to understand and discuss microplastics and related environmental issues:

Core Vocabulary: microplastics, single-use plastics, plastic decomposition, environmental impact, marine organisms, chemical additives, toxic chemicals, microfibers, fishing nets, sun radiation, ocean waves, littering, water runoff, waste management, regulatory measures, best available technologies, extended producer responsibility, standardized testing method.

TIPS FOR TEACHERS

Use visual glossaries, matching activities, and real-life case studies to embed the vocabulary in authentic contexts. Create vocabulary walls or anchor charts for reference throughout the project.

Language for Learning (Processes)

To actively engage in discussions, debates, and collaborative tasks, students need scaffolding to use ***academic and collaborative language*** effectively.

Sentence Starters and Functional Language Examples:

- *In my opinion, the most dangerous aspect of microplastics is...*
- *Compared to single-use plastics, fishing nets cause...*
- *I agree with you because... / I disagree, since...*
- *The evidence suggests that...*
- *If we implemented extended producer responsibility, then...*
- *How do you explain the effect of sun radiation on plastic decomposition?*

- Use **role-play** scenarios (e.g., environmental summit, news interview).
- Set up **structured debates** on regulatory measures.
- Provide **scaffolded speaking frames and group collaboration checklists.**

Structures for Skills Practice:

- Expressing opinions
- Making comparisons
- Explaining causes and effects
- Evaluating solutions
- Asking clarification questions

Language through Learning (Incidental Language)

As students explore the topic through research, presentations, and discussion, they naturally encounter and begin to use ***new academic and idiomatic language.***

Encourage metacognitive reflection. Ask students to keep a “Language Discovery Journal” where they collect and reflect on new expressions.

Activities that promote this:

- Research using academic articles and eco-documentaries
- Creating podcasts or videos explaining environmental problems
- Peer feedback sessions using a shared feedback vocabulary (e.g., “You could clarify this by...”)
- Guided writing reflections after presentations
- Learning logs or journals: *“Today I learned the word ‘runoff’ which helped me understand...”*

7. UDL

Applying Universal Design for Learning (UDL) to a CLIL project on I Am Not a Plastic Bag involves creating a flexible learning environment that meets the diverse needs of all students, ensuring that all learners can engage with the content, express their understanding, and stay motivated. UDL is based on three key principles: Multiple Means of Engagement, Multiple Means of Representation, and Multiple Means of Action and Expression.

8. MAIN TEACHING METHODOLOGIES

This unit is primarily based on Inquiry-Based Science Education and the Engineering Design Methodology (see more in the theoretical framework).

9. ASSESSMENT

Assessment in this unit is carried out continuously and flexibly, adapting to the needs and characteristics of each group. It focuses on both the learning process and the final outcomes, evaluating content mastery, use of the target language, and the development of transversal skills. The following strategies and tools are proposed:

The following strategies are proposed as general recommendations and can be adapted to suit the specific context of each classroom:

- ***Systematic observation:*** teachers are encouraged to observe student performance throughout the unit, paying attention to task completion, work organisation, participation in group activities, and the use of English in context. This informal observation provides valuable insights into students' engagement, autonomy, and collaboration.

- ***Rubric-based evaluation of final products:*** rubrics can be used to assess students' final outputs, focusing on scientific accuracy, clarity of communication, feasibility of solutions, and effective use of L2 (including language accuracy, task-appropriate structures, and subject-specific vocabulary). It is advisable to share the rubrics with students in advance (see Appendix B).
- ***Self-assessment:*** students reflect on their own learning, identifying strengths and areas for improvement in collaboration, language use, and task completion. Tools such as reflection sheets or digital prompts may support this process (see Appendix C).
- ***Peer assessment:*** each student evaluates their own participation and that of their teammates using a shared rubric focused on collaboration, commitment, and individual accountability. This strategy promotes responsibility, empathy, and critical thinking, while helping to ensure a fair distribution of tasks (see Appendix D).

10. DESCRIPTION OF THE SEQUENCE OF ACTIVITIES

- Before starting the unit, it is essential that the ***teachers involved meet to coordinate*** the sequencing of activities, the division of responsibilities, and the role of each subject in the assessment process. Clarifying ***who will lead each task*** and agreeing on shared goals helps ensure coherence and smooth implementation. When possible, applying a ***co-teaching approach*** (whether through joint sessions or complementary lessons) will foster consistency, mutual support, and richer interdisciplinary learning.
- These guidelines are fully flexible and should be adapted to the specific needs and pace of each group. Teachers can select and prioritize the activities that best suit their students, choosing as many or as few as necessary or convenient.

30′

ACTIVITY 1

MATERIALS

- Printed copy or digital projection of the text (see below or use the National Geographic version)
- Projector or screen (optional)
- Whiteboard or large poster paper
- Sticky notes or markers for group work

STEPS

Tiny Plastics, Big Trouble

Students explore the issue of microplastics—tiny plastic particles less than 5 mm long that appear in oceans, soil, animals, and even inside the human body. They start by reading a short informative text in class (or the version from National Geographic: https://education.

Text for classroom use:

Plastic pollution in the ocean is a major environmental issue. At the first UN Environment Conference in 2014, it was identified as one of the ten most serious global environmental problems. One of the biggest concerns is microplastics—tiny plastic particles smaller than 5 mm. These particles come from two main sources:

- ***Primary microplastics:*** *small plastic particles that are intentionally manufactured and released into the environment, such as microbeads in beauty and personal care products.*
- ***Secondary microplastics:*** *fragments that break off from larger plastic items (bags, bottles, fishing nets) due to sunlight, waves or physical abrasion over time.*

Microplastics are now found in the most remote parts of the world—including the Arctic and Antarctic—and are present in water, soil, animals and even the human body. Because of their small size and large surface area, they can absorb toxic pollutants from the environment. These chemicals then enter the food chain when marine organisms mistake microplastics for food. As a result, humans may also be exposed when consuming seafood, which raises serious concerns about health.

TIPS FOR TEACHERS

STE(A)M Skills
- Asking questions (for science) and defining problems (for engineering)
- Planning and executing research
- Collecting, evaluating and communicating information

Sustainability Skills
- Systems thinking
- Values thinking
- Collaboration

Digital Skills
- Information and data literacy
- Communication and collaboration

Language & CLIL (4Cs) Skills
- Content
- Communication
- Cognition

Scientists and citizens are becoming more aware of the risks microplastics pose to ecosystems and public health. However, once released, these particles are extremely difficult to remove. Since they are entirely human-made, raising awareness is essential to reduce plastic pollution before it worsens.

Brainstorming activity:
After the reading, students work in pairs or ***small groups*** to reflect on what they already know and to connect ideas across disciplines. They respond to guiding questions such as:
- What do you already know about microplastics?
- Where do you think they come from?
- How do they affect animals and people?
- Have you seen any images or videos of plastic in the oceans?
- Can we do anything to stop this problem?

They write their ideas on sticky notes or post them on a shared board. The aim is to encourage open discussion, allow students to express opinions, and identify questions or concerns they want to investigate further.

30-40′

ACTIVITY 2

MATERIALS

- News article: EarthDay.org – What You Need to Know About the Impact of Plastics on Human Health
- Printed copies of the article (optional)
- Whiteboard or digital screen

STEPS

Tiny Threats: Microplastics and Our Bodies

Students explore how microplastics affect human health using the news article provided or another reliable source. After reviewing what microplastics are and how they enter the environment, learners focus on what happens when these particles enter the human body and the effects they may cause.

They read the article individually, in pairs or small groups, and highlight or annotate sections that mention health impacts and specific diseases or conditions linked to plastic exposure (e.g. hormonal disruption, cancer, infertility, immune disorders). The focus remains on extracting and understanding scientific information from the text, using key vocabulary accurately and critically engaging with the content.

Discussion and analysis

In small groups, students carry out the following analysis:

a. Identify and list the diseases or health conditions mentioned in the article.
b. Classify them (e.g. short-term vs long-term effects, systems affected: respiratory, digestive, reproductive, etc.).
c. Evaluate the level of risk according to the article. What evidence is provided? Are the effects proven or still under investigation?
d. Discuss the ethical and political implications: Who is most affected? What role do industries, governments and consumers play?

Students are encouraged to use scientific terms from the article and support their answers with direct references. The activity ends with a class-wide discussion, where each group shares their conclusions and compares perspectives.

TIPS FOR TEACHERS

- Motivate students to **reread the graphic novel** to establish links between the topic *How do microplastics harm us?* and the storyline. Encourage them to reflect on scenes or situations in the book that show the **consequences of environmental neglect or human responsibility.** Help them connect the emotional or social aspects of the story with the scientific information presented in the article. Remind them that this is not the first time they engage with the book, and that previous units have prepared them to deepen their understanding.
- Remind students that during **extensive reading of the articles**, the goal is not to understand every single word, but to focus on grasping the **main ideas**, key arguments and overall message of the text. Support them with reading strategies, such as scanning for keywords or identifying topic sentences.
- If the text proves too linguistically challenging for the group's L2 level, consider using **artificial intelligence tools** to generate a **simplified or adapted version.** This can help maintain content richness while supporting language accessibility. Make sure to verify the adaptation for accuracy before using it in class.

STE(A)M Skills
- Asking questions (for science) and defining problems (for engineering)
- Analyzing, predicting and interpreting data
- Argumentation based on data/evidence
- Collecting, evaluating and communicating information

Sustainability Skills
- Values thinking
- Strategic thinking
- Collaboration

Digital Skills
- Information and data literacy
- Communication and collaboration

Language & CLIL (4Cs) Skills
- Content
- Communication
- Cognition

50-60′

ACTIVITY 3

MATERIALS

- Internet access or printed articles/case studies
- Devices for research (tablets, laptops, etc.)
- Poster paper, markers or digital tools (Google Slides, Canva, etc.)
- Projector or screen

STEPS

Plastic Pollution: Lifestyle and Culture

Students explore how marine plastic pollution affects people's lifestyles, mental health and cultural heritage. Working in small groups, they investigate a specific area of impact and prepare a short oral presentation to share their findings with the class.

Each group focuses on one of the following areas:

- • Lifestyle changes
- • Mental health effects
- • Cultural and heritage loss

(Alternative topics may include: economic impact or intergenerational consequences)

Task and structure

Groups conduct research and prepare a 4–5 minute oral presentation using visual support (e.g. posters, digital slides). The presentation includes:

a. ***Introduction (30″–1′)***
   - Definition of marine plastic pollution.
   - Introduction of the chosen focus area.
   - Explanation of why this area is relevant.

b. ***Main content (3′–4′)***
   - Detailed explanation of how plastic pollution affects the assigned area.
     - Use of concrete examples, such as:
       - *Lifestyle changes:* access to seafood, changes in daily habits, waste management.
       - *Mental health effects:* eco-anxiety, environmental grief, stress.
       - *Cultural loss:* erosion of traditions, threats to rituals or historical coastal sites.

TIPS FOR TEACHERS

STE(A)M Skills
- Asking questions (for science) and defining problems (for engineering)
- Planning and executing research
- Collecting, evaluating and communicating information

Sustainability Skills
- Values thinking
- Strategic thinking
- Collaboration

Digital Skills
- Communication and collaboration
- Digital content creation

Language & CLIL (4Cs) Skills
- Content
- Communication
- Cognition
- Culture

- *Economic impact (optional):* tourism or fishing decline.
- *Intergenerational consequences (optional):* effects on youth, loss of cultural memory.

c. ***Case study (1′)***
- A real-world example illustrating the social or cultural impact described.

d. ***Conclusion (30″–1′)***
- Summary of key points.
- Final reflection on why this issue matters and how it connects to our own lives and values.

Working process

Students take on specific roles within the group (researcher, note-taker, designer, presenter) and collaborate during a 25–30 minute preparation phase. Presentations are followed by a 5–10 minute whole-class reflection to compare areas and discuss cross-cutting themes.

TIPS FOR TEACHERS

- Motivate students to **reread the graphic novel** to reflect on how plastic pollution affects people and culture. Encourage them to make connections between the environmental and social themes of the story and the real-world examples explored in this activity. Remind them that the book has already been studied in previous units and can now be used to interpret more complex global issues.
- If possible, invite students to go beyond desk research by conducting **interviews** with people who may be affected by marine plastic pollution. Suitable interviewees could include:
  - Residents of countries with high plastic production
  - Fishermen or coastal community members
  - Environmental activists or scientists
  - People living in tourist areas
  -
- Students may record their interviews as a **podcast**, either individually or in pairs/groups. Support them throughout the process with the following guidance:
  - **Research the interviewee:** Encourage students to gather basic background information about the person to prepare relevant and meaningful questions.
- **Use open-ended questions:** Help students formulate thoughtful questions that encourage longer and more reflective answers. Practice some of these in class beforehand to boost their confidence.
- **Active listening:** Teach students to pay close attention to the interviewee's answers, reacting naturally and adapting follow-up questions accordingly. Listening is as important as asking.
- **Respect and preparation:** Remind students to be polite, show interest, and create a comfortable environment. If recording, they must ask for permission and check that the recording device is working correctly.
- **Be flexible:** While a list of prepared questions is helpful, students should be ready to follow the flow of the conversation and ask spontaneous questions when appropriate.
- **Closure:** Encourage students to end the interview by thanking the interviewee and asking if they have anything else they'd like to share or any final advice.

10-15′

ACTIVITY 4

MATERIALS

- OECD document
- Whiteboard or screen

STEPS

Microplastics: Policies and Prevention

Microplastics are nearly impossible to remove once they enter natural environments. For this reason, prevention becomes essential. In this activity, students explore current policies aimed at reducing microplastic pollution by focusing on real recommendations from the OECD related to textiles and tyres — two major sources of microplastic emissions.

Working in small groups, students read a short excerpt from the OECD document (provided digitally or in print) and analyse the proposed strategies. As they explore the text, they highlight key actions such as:

- Bans on microbeads in cosmetics
- Improved waste management
- Sustainable alternatives in industry
- Reduction of single-use plastics
- Recycling and responsible consumption

Each group focuses on either textiles or tyres and answers the following questions:

a. What specific solutions are proposed?
b. What are their expected benefits or environmental impacts?
c. What challenges or limitations might arise?
d. What barriers could hinder implementation (economic, technological, political, social)?

After completing the analysis, students present their findings through a short oral report or a visual infographic. They are also encouraged to propose their own policy ideas or suggest improvements based on critical reflection.

- If the OECD document is too complex for your students' L2 level, consider using **AI tools** to adapt or simplify the content. Make sure the adapted version preserves the core ideas and vocabulary needed to complete the task.
- This activity supports the development of **critical thinking skills.** Invite students to go beyond the policies themselves and reflect on broader questions, such as: *Is it enough to have environmental policies in place? Or do we also need to rethink our consumption habits and production systems?*
- To help students analyse the recommendations in a structured way, introduce the **SWOT analysis** (Strengths, Weaknesses, Opportunities, Threats). You can provide a simple table or use it as a thinking routine in group discussion.
- **Guide the SWOT analysis with these questions:**
- Strengths (Positive aspects):*What benefits or advantages does the policy offer?*
    - Example: *"Banning single-use plastics could greatly reduce ocean pollution and protect marine life."*
- Weaknesses (Limitations):*What challenges or difficulties could affect the policy's effectiveness?*
    - Example: *"There may be resistance from industries that depend on low-cost plastic materials."*
- Opportunities (New possibilities):*What positive changes could result from the successful implementation?*
    - Example: *"It could create new markets for sustainable product design."*
- Threats (Risks or unintended effects):*What negative consequences might appear if the policy is not well designed or enforced?*
    - Example: *"Without strict monitoring, the policy could have little real impact."*
- Encourage students to compare the textile and tyre recommendations, identifying similarities and differences in feasibility, scope and potential outcomes.

STE(A)M Skills
- Planning and executing research
- Analyzing, predicting and interpreting data
- Argumentation based on data/evidence
- Collecting, evaluating and communicating information

Sustainability Skills
- Values thinking
- Strategic thinking
- Collaboration

Digital Skills
- Information and data literacy
- Communication and collaboration
- Digital content creation

Language & CLIL (4Cs) Skills
- Content
- Communication
- Cognition

30-40’

ACTIVITY 5

MATERIALS

- Video of Greta Thunberg’s 2019 speech at the UN
- Devices with video recording capability (smartphones, tablets, laptops)

STEPS

Speak Up for the Oceans

Students take action by creating a personal or collective video message to raise awareness about marine plastic pollution and demand change from those in power.

After exploring different policy responses in previous activities, learners now express their own views by recording a ***1-minute public message.*** The video may be addressed to political leaders, companies, or society at large—any stakeholder they believe plays a role in the problem.

Learners work individually, in pairs or small groups. Before filming, they write and rehearse their message to ensure clarity and impact.

Their message should:

- Express genuine concern about plastic pollution and its consequences
- Include at least one concrete demand or solution (e.g. banning single-use plastics, improving waste management, regulating industries)
- Use persuasive and emotional language to connect with the audience
- Remain respectful, direct and impactful
- Be adapted to a real-world public format (e.g. for TikTok, Instagram, or a school campaign)

The final products may be shared in class or used in a collective awareness campaign within the school or community.

Optional: Learners may watch excerpts from Greta Thunberg’s UN speech (2019) as a source of inspiration, identifying features that make it powerful and effective.

TIPS FOR TEACHERS

- After watching Greta Thunberg's UN speech, guide a short discussion to identify its most **powerful rhetorical elements**. Help students reflect on the techniques she uses to deliver a compelling message.
- Highlight the following key features, which can serve as a model for students' own messages:
    - **Presentation of the problem** in a direct and urgent way
    - **Criticism of passivity and lack of action** from leaders and institutions
    - Passionate tone and strong emotional involvement
    - **Connection to the future** and how decisions affect younger generations
    - **Clear and straightforward language,** free of technical jargon
    - **Moral appeal,** calling for justice and responsibility
- Encourage students to use these elements when drafting their video message. Remind them that effective communication often combines **facts, emotion, and a call to action.**
- Support students in writing and rehearsing their script before recording. Remind them to keep it short (maximum one minute), focused, and adapted to a real audience.
- If needed, allow students to film multiple takes and edit their video for clarity and impact.

STE(A)M Skills
- Asking questions (for science) and defining problems (for engineering)
- Planning and executing research
- Building statements (for science) and designing solutions (for engineering)

Sustainability Skills
- Values thinking
- Strategic thinking
- Collaboration

Digital Skills
- Communication and collaboration
- Digital content creation

Language & CLIL (4Cs) Skills
- Content
- Communication
- Cognition
- Culture

3-4 LESSONS

FINAL PROJECT 1

MATERIALS

- Recycled or low-cost materials (plastic bottles, mesh, fabric, tubing, etc.)
- Basic tools (scissors, glue, tape, containers, etc.)
- Access to water samples (tap water, rainwater or simulated samples with visible particles)
- Devices for documenting the process (camera, tablet, etc.)

STEPS

Microplastic Solutions Challenge

Students design and prototype a simple solution to detect, capture, or reduce microplastics in water, following the engineering design process outlined in the PROMISED model. This hands-on activity fosters creativity, scientific thinking, collaboration, and the practical application of environmental knowledge to real-world challenges.

Engineering Design Process

1. Ask / Identify the problem

Students begin by reflecting and discussing:

- Why is it difficult to remove microplastics from water?
- What kind of solutions already exist?

Each team chooses a specific problem to address:

- Detecting microplastics in water
- Filtering visible plastic particles
- Preventing microplastic release at the source (e.g. from clothes or tyres)

2. Research the background

Working in small teams, students explore existing solutions or technologies using previously analysed articles or new sources. They define clear success criteria:

- What should the solution achieve?
- Under what conditions should it work?

TIPS FOR TEACHERS

- Suggested timing:
  - **Session 1:** Identify the problem + research + initial planning
  - **Session 2:** Detailed design + building the prototype
  - **Session 3:** Testing + evaluation + redesign (if time allows)
  - **Session 4:** Preparation of presentations + exhibition or gallery walk
- To **inspire creativity**, share examples of real inventions developed by young people to address plastic pollution. These case studies show that innovation can come from students themselves and help make the challenge feel achievable. Suggested examples:
  - *Meet the teen science star using magnetic liquid to remove microplastics from water – World Economic Forum*
  - *Irish teen wins award for microplastic removal method – ABC News*
  - *Boyan Slat and The Ocean Cleanup project*
- Use these examples at the beginning of the activity to trigger discussion and help students think beyond simple filters or containers. Ask: *What kind of ideas did these young inventors have? What made their inventions successful or realistic?*

3. Plan the design

Each team creates a detailed design plan including:

- A labelled drawing of the prototype
- A list of needed materials
- A clear explanation of how the solution works
- The expected outcome

4. Build the prototype

Using recycled or accessible materials, students build their model. The prototype may be functional or conceptual, depending on resources and feasibility.

5. Test and observe

Teams test their prototypes using water with visible particles (e.g. glitter, rice, coffee grounds). They observe and record:

- Does it remove or trap the particles?
- Is the result consistent in repeated trials?
- Does the structure remain stable and functional?
- Is it easy to build and operate?

6. Evaluate and communicate

Students assess their design by answering:

- What worked well and what didn't?
- What could be improved?
- How realistic is it to scale this solution?
- What limitations or challenges would it face in real life (economic, environmental, technical)?

7. Redesign (optional)

If time allows, students sketch or rebuild an improved version based on the evaluation.

Final outcome

Each group presents their solution using a **poster, slideshow** or **short video**, explaining:

- The problem addressed
- Their proposed solution
- The design process
- Test results and key reflections

TIPS FOR TEACHERS

- If the articles are too complex for your students' L2 level, use **AI tools to simplify or summarise** them. Select the most relevant paragraphs, adapt the vocabulary, or convert them into visual summaries to ensure comprehension.
- Encourage students to **document each step of their process** using photos, drawings or short notes. This will help them reflect on their progress and communicate their design effectively.
- Remind students that **not all prototypes need to be fully functional.** Conceptual models are also valid as long as they clearly show the idea and how it could work in real life.

STE(A)M Skills

- Asking questions (for science) and defining problems (for engineering)
- Planning and executing research
- Developing and using models
- Building statements (for science) and designing solutions (for engineering)
- Collecting, evaluating and communicating information

Sustainability Skills

- Systems thinking
- Strategic thinking
- Collaboration
- Integrated problem-solving

Digital Skills

- Communication and collaboration
- Digital content creation
- Problem solving

Language & CLIL (4Cs) Skills

- Content
- Communication
- Cognition

50-60’

FINAL PROJECT 2

MATERIALS

- Students’ improved prototypes
- Posters, slides or visual displays prepared by each group
- Tables or stands for presenting the projects
- Badges or labels for group names, themes, etc.
- Evaluation sheets (optional, for peer or teacher feedback)
- Camera or phone to document the event (optional)

STEPS

STEM Fair: Microplastics Challenge

Students showcase their final prototypes in a Science & Technology Fair, presenting their microplastic-related solutions to classmates, teachers, and even families. This event marks the culmination of their engineering project and highlights their creativity, communication skills, and environmental commitment.

Each team sets up a stand that includes:

- Their final prototype (improved version, functional or conceptual)
- A visual explanation using a poster, slideshow, or infographic, clearly showing:
  - The specific problem tackled
  - The engineering process followed
  - Materials used
  - Strengths and limitations of their solution
  - Suggested improvements or next steps
- Optional extras: handouts or QR codes linking to video demos or podcasts created by the team

Students prepare in advance how to explain their project clearly and effectively. They may write key phrases or short scripts to support their oral presentation. Throughout the fair, they use English to interact with visitors, answer questions, and raise awareness about microplastic pollution.

TIPS FOR TEACHERS

- Present the fair as a **celebration of learning**, not a competition. Emphasise the value of creativity, problem-solving, collaboration and commitment to sustainability.
- Help students organise their **presentation spaces**. Encourage them to think visually: use posters, labelled diagrams, models, photos of the process, or QR codes linking to short videos, podcasts or digital booklets.
- Provide **support phrases in English** for welcoming visitors, explaining their project, answering questions and concluding. For example: *Welcome to our stand. Our project is about… This is our prototype. We designed it to… One of the challenges we faced was… If we had more time, we would improve…*
- Invite **visitors** from other classes or teachers from different departments (science, technology, languages) to engage with the students and ask questions. If possible, involve families or external guests related to environmental fields.
- Prepare **feedback forms** or use a simple peer evaluation method such as *"Two stars and one wish"* (each student or visitor gives two positive comments about the project (the "stars") and one suggestion for improvement (the "wish"); this encourages reflective and constructive feedback in a supportive tone).Take photos or short videos of the stands to document the event. These materials can be used later for a class reflection, school blog, newsletter or project portfolio.
- If time allows, end the fair with a **whole-group debrief:**
  - *What did you learn from other teams?*
  - *What would you improve in your own process?*
  - *What surprised you the most?*
  - *Why do you think these types of solutions are needed in the real world?*

STE(A)M Skills
- Building statements (for science) and designing solutions (for engineering)
- Collecting, evaluating and communicating information
- Collaboration

Sustainability Skills
- Values thinking
- Strategic thinking
- Collaboration

Digital Skills
- Communication and collaboration
- Digital content creation

Language & CLIL (4Cs) Skills
- Content
- Communication
- Culture

APPENDICES

APPENDIX A SUGGESTED READING MATERIALS BY CEFR LEVEL

To support the development of each student and adapt reading materials to different language proficiency levels, the following list of recommended books is organised according to the CEFR scale:

- ***A2 level:*** *A Planet Full of Plastic* by Layton, N. (2019). Wren & Rook. A visually engaging book that introduces the topic of plastic pollution in simple, accessible language, ideal for early secondary learners.
- ***B1 level:*** *Plasticus Maritimus: An Invasive Species* by Pego, A., Carvalho, B. P., & Minhós Martins, I. (2020). Greystone Kids. A semi-narrative, informative text that raises awareness and encourages personal reflection through clear language and real-life connections.
- ***B2 level:*** *What a Waste: Trash, Recycling, and Protecting Our Planet* by French, J. (2019). DK Children. A comprehensive resource that explores environmental challenges with rich vocabulary, infographics, and explanatory content suitable for upper-intermediate learners.
- ***C1 level:*** *Plastic Soup: An Atlas of Ocean Pollution* by Roscam Abbing, M. (2018). Island Press. An advanced text combining scientific data, global case studies, and persuasive arguments, ideal for learners developing academic reading and critical analysis skills.

APPENDIX B RELATION WITH OTHER SUBJECTS

Throughout the different levels of the project, various subject areas have already been explicitly addressed. The following list outlines additional possible connections with other curricular subjects that may be relevant to this unit. These are not proposed activities, but rather suggestions intended to inspire further interdisciplinary integration where appropriate. Teachers are free to adapt or incorporate these ideas according to their context and objectives. Their inclusion is entirely optional and meant to support flexible implementation of the project.

1. Artistic Expression area

Possible connections:

- Work on visual storytelling and comic design through the final product.
- Use colour and composition to express emotions and contrasts between nature and pollution.
- Create 3D sculptures using plastic waste, developing volume and symbolism.
- Explore how different cultures represent nature and reinterpret traditional styles to address pollution.

2. Music

Possible connections:

- Use environmental songs to reflect on the theme of pollution.
- Create original lyrics or soundtracks inspired by the comic.
- Develop body percussion or performance pieces based on the plastic monster.
- Connect traditional musical expressions from coastal or island cultures with environmental awareness.

3. Physical Education area

Possible connections:

- Organise physical activities that involve collecting and sorting waste outdoors.

- Promote reflection on emotional well-being and eco-anxiety through movement.
- Design choreographies inspired by ocean currents and marine life.
- Link traditional games or sports from island regions with environmental action.

4. Technology and Digitalisation area

Possible connections:

- Apply the engineering design process to build a prototype that filters or collects microplastics from water, using low-cost or recycled materials.
- Investigate how material properties (flexibility, resistance, density) affect the design and function of plastic-based objects and alternatives.
- Design and simulate sustainable transport or packaging systems to replace single-use plastics, working with scale models and physical constraints.
- Analyse technological innovation in environmental protection (e.g., biodegradable materials, ocean-cleaning devices, smart waste systems) and propose improvements.
- Integrate technical drawing and sketching to communicate ideas clearly, followed by digital 3D design (e.g. using Tinkercad or similar platforms).
- Explore the environmental impact of industrial production and product lifecycle, connecting it to responsible consumption and circular economy principles.

APPENDIX C ASSESSMENT RUBRIC OF FINAL PRODUCTS

The following rubric is provided as a flexible and optional tool to support the evaluation of student projects. It is designed to guide assessment through clear, observable criteria while allowing teachers to adapt it to their specific context or needs.

Scan here to download the interactive rubric. You can enter scores directly into the file, and the total will be calculated automatically out of 10.

This resource is intended to simplify assessment, enhance transparency, and encourage consistency. However, its use is not mandatory: teachers are free to adjust the criteria, scoring scale, or final weighting, or to use a different tool altogether, depending on the goals of the project and the characteristics of their classroom.

	CRITERIA	EXCELLENT (4)
STESM skills	**1. Problem identification and model-based thinking**	The product is based on a clearly formulated and relevant real-world problem or question. It includes one or more models (visual, conceptual, physical or symbolic) that effectively represent core concepts or systems and help explain the problem or solution.
	2. Reasoning, planning and structured problem-solving	The product shows a clearly structured approach to problem-solving. Reasoning is logical and well-sequenced, and the proposed solution addresses the problem effectively with justified steps, mechanisms or principles.
	3. Evidence-based argumentation and data interpretation	The product integrates specific data, factual information, or observed evidence to support decisions or claims. Interpretation is accurate and shows clear understanding of relationships, causes or consequences.
	4. Information management and scientific communication	Information is relevant, accurate and well organised. Scientific content is communicated clearly, using appropriate formats (labels, captions, diagrams, visual hierarchies, etc.) and adapted to the intended audience and goal.
	5. Creative and artistic expression	Artistic or design elements are used purposefully to enhance meaning, engagement and communication. Composition, colour, symbolism or other visual resources reflect clear creative intention and coherence.
L2	**6. Accuracy and range of language**	The product demonstrates consistent accuracy in grammar, spelling, punctuation and word choice. A wide range of vocabulary and structures is used appropriately to express meaning with precision and fluency.
	7. Clarity and coherence of message	The message is logically organised and easy to follow. Ideas are clearly connected through effective transitions and the overall structure supports comprehension.

GOOD (3)	SATISFACTORY (2)	NEEDS IMPROVEMENT (1)
The product presents a mostly relevant problem or question, with a model or visual representation that contributes to understanding but may lack precision or completeness.	The problem is present but is poorly defined, generic or only loosely linked to real-world issues. The model is simplistic, underdeveloped or not clearly linked to the problem.	The product lacks a defined problem or guiding question. No meaningful model is used, or the representation is disconnected, unclear or decorative only.
The product includes a mostly logical sequence, with a solution that is appropriate and functional, though not deeply justified or partially disconnected from the problem.	The reasoning or planning is partially evident, but the steps taken are disorganised, oversimplified or contain inconsistencies. The solution is incomplete or vague.	The product lacks visible reasoning or planning. The solution is missing, irrelevant or incoherent in relation to the problem.
The product includes data or information, with basic explanation or justification of its relevance. Interpretation is present but lacks depth or detail.	Limited or superficial use of evidence. Connections between information and conclusions are unclear or weakly reasoned.	No use of data or observable evidence. The product relies on opinions or assumptions without justification.
Information is generally relevant and understandable, though some ideas may lack clarity or structure. Formatting and visual organisation support the message adequately.	Content includes inaccuracies, vague phrasing or lacks coherence. The message is partly understandable, but the structure or design hinders comprehension.	The product is disorganised or contains significant errors. Scientific content is poorly presented, confusing or inappropriate for the audience.
The product includes appropriate and mostly effective artistic or creative elements. Visuals or design contribute to the message, though they may be conventional or uneven.	Some aesthetic elements are present but are poorly developed, unbalanced or lack integration with the message. Creative intent is limited.	Visual or artistic resources are absent, minimal or irrelevant. The product shows little creative effort or visual coherence.
Language is mostly accurate with only occasional minor errors that do not affect understacabulary and structures show some variety and are appropriate to the topic.	Frequent grammatical or lexical errors that occasionally interfere with meaning. Limited range of structures or repetitive vocabulary.	Persistent errors in grammar or vocabulary that significantly hinder comprehension. Very limited or inappropriate use of English.
The message is generally clear and coherent. Some minor lapses in organisation or flow, but the main ideas are still understandable.	The message is unevenly structured or contains unclear sections. Transitions may be missing or poorly used, affecting comprehension.	The message is difficult to follow due to poor organisation, unclear sentence structure or lack of logical progression.

	8. Adequacy to format and audience	The language used is fully appropriate to the type of product (e.g., comic, campaign, report, script) and adapted to its intended audience in tone, register and purpose.
	9. Oral and/or written fluency	Written texts are fluent and natural-sounding, with good rhythm and readability. Oral performance (if present) is confident, intelligible and expressive, with accurate pronunciation and appropriate intonation.
Digital Skills	**10. Purposeful use of digital tools**	Digital tools are used appropriately and effectively to enhance the creation, organisation and/or communication of the product. Tool selection shows autonomy, accuracy and relevance to the task.
	11. Quality of the digital product	The product is technically well-executed: sound, image, layout, transitions and design elements (e.g., fonts, colours, spacing) are coherent, attractive and professional. No technical flaws are present.
Sustainability/ ODS	**12. Understanding of the sustainability issue**	The product demonstrates a deep and accurate understanding of the environmental or social issue addressed. Causes, consequences and connections to the selected SDG are clearly explained or represented.
	13. Proposed action, solution or awareness strategy	The product includes a realistic, well-argued and contextually relevant proposal to address the issue. The action or message is creative, feasible and shows strong commitment to sustainability.
Other	**14. Critical thinking and transfer**	The product demonstrates the ability to apply concepts, methods or content from different areas in a new or real-world context. The ideas show thoughtful reflection, analysis and clear relevance.
	15. Adequacy to product format and purpose	The product fully respects the structural, visual and communicative conventions of the chosen format (e.g., comic, campaign, presentation). It is well adapted to the intended audience and purpose.

The language fits the format and audience in general terms, though some inconsistencies in tone or formality may appear.	The use of English only partially matches the conventions of the format or the expectations of the audience. Inconsistent tone or awkward phrasing.	Language is inappropriate for the format or audience. The tone, formality or structure do not match the task.
Written or spoken English is mostly fluent and understandable. Some hesitation, mispronunciation or unnatural phrasing, but communication is not seriously affected.	Limited fluency with noticeable pauses, mispronunciations or awkward phrasing. Some sections are difficult to follow.	Lack of fluency. Written text is fragmented or confusing. Oral delivery (if applicable) is unclear, monotonous or hard to understand.
Digital tools are used adequately and contribute to the product. Tool choice is mostly appropriate, though not fully optimised or creatively exploited.	Some digital tools are used, but their integration is limited or basic. Tool selection may be partially relevant or show signs of dependency.	Little or no use of digital tools, or tools are misused or irrelevant to the product. Digital integration is weak or absent.
The product is mostly correct in technical terms, with minor flaws (e.g., layout inconsistencies, timing issues, audio clarity) that do not affect overall impact.	The product contains technical issues (e.g., resolution problems, unreadable text, disjointed visuals) that reduce quality or clarity.	The product is technically poor. Major issues in format, visuals, audio or navigation hinder comprehension or presentation.
The product shows a solid understanding of the issue. The SDG is relevant and mostly well linked, though some aspects (causes, impacts, scope) may lack development.	The issue is present but only partially understood. The SDG is included but superficially treated or loosely connected to the content.	The problem is unclear, misunderstood or missing. There is no evident link to an SDG or the reference is incorrect or irrelevant.
A proposal or awareness message is present and relevant, though general, partially developed or lacking in originality or depth.	The proposed action is vague, unrealistic or only loosely connected to the issue. Impact or feasibility is limited or unclear.	No clear proposal or message is included, or the solution is unrelated, impractical or missing entirely.
Evidence of application and reflection is present, with reasonable connections to new contexts. Critical thinking is present but not consistently deep.	Some attempt to apply prior knowledge or reflect on implications, though ideas may be generic, underdeveloped or only partially connected.	No clear evidence of transfer or critical thinking. Ideas are repeated, disconnected or lacking in relevance or depth.
The product mostly fits the chosen format and communicates its purpose clearly, with some minor deviations or inconsistencies.	The product loosely follows the format, but issues in structure, tone or design reduce its effectiveness or clarity.	The product does not respect the basic conventions of the format or fails to convey its purpose effectively. It may appear unfinished or incoherent.

APPENDIX D
SELF-ASSESSMENT

BLOCK	I CAN...
1. Science content	I can explain concepts and ideas related to science, technology, engineering, arts, or maths when relevant I can apply the concepts and ideas worked in the unit to design, test, or improve a product or solution I can connect what I have learned to real-world challenges and reflect on the results
2. English (L2)	I can use English to express my ideas clearly when writing or speaking I can use vocabulary and structures appropriate for the topic and task I can communicate effectively in English during group work and presentations
3. Critical thinking & creativity	I can suggest original or useful ideas to solve a problem or improve a product I can analyse a situation and make thoughtful decisions I can use creative strategies to share what I have learned
4. Teamwork & attitude	I can collaborate with others, listening and contributing respectfully I can stay organised and meet deadlines during the project I can show commitment and a positive attitude throughout the process
5. Digital skills	I can use digital tools to explore, create, or present content I can produce digital materials that are clear, well-designed and adapted to the purpose I can combine different media (text, image, sound...) to improve communication.
6. Sustainability	I can recognise the impact of human actions on the environment and society I can reflect on my role and make choices that promote sustainability I can take part in actions or solutions that contribute to a better future

Score	Description
1 – Strongly disagree	I don't know how to do this yet or I had a lot of trouble
2 – Disagree	I can do it a bit, but I still need help or get confused
3 – Neutral	I can do it sometimes, but I'm not very sure or confident
4 – Agree	I can usually do it well and I feel quite confident
5 – Strongly agree	I can do it very well and feel confident in different situations

APPENDIX E
PEER-ASSESSMENT

I think my teammate(s)/I...	A1	A2	A3	A4	(Myself)
worked well with others and helped the group.					
shared ideas clearly and listened to the group.					
completed their part of the work on time.					
gave original and useful ideas to improve the project.					
had a positive attitude and encouraged others.					
respected other opinions and worked with everyone.					

*Write the name of each group member (including yourself) above A1–A5. Give a score from ***1*** *(Strongly disagree)* to **5** *(Strongly agree)* for each item.

APPENDIX D IMPLEMENTATION ASSESSMENT

Nº	INDICATOR	1	2	3	4	5
1	The project implementation is consistent combining CLIL, STEAM and storytelling in a coherent and integrated way.					
2	Activities foster active student participation and engagement throughout the learning process.					
3	Classroom management is effective, maintaining a positive and inclusive learning environment.					
4	Time is managed efficiently, allowing the planned activities to be completed within the available sessions.					
5	Unexpected challenges are addressed with flexible, reflective, and goal-aligned decisions.					
6	All students are actively involved, and individual needs are recognised and supported.					
7	The project encourages interdisciplinary connections and integrates different subjects in a meaningful and functional way.					
8	Co-teaching or interdisciplinary coordination (if applicable) is well-organised and contributes to the success of the project.					
9	Ongoing assessment is integrated into the project using varied tools and includes student self-reflection.					
10	The use of the L2 (if applicable) is consistent and functional across the project, supporting both communication and content learning.					
11	A final reflection is carried out, identifying achievements, challenges, and realistic adjustments for future implementations.					
TOTAL IMPLEMENTATION SCORE: .... /55						

Note:

Use the following scale to evaluate each indicator:

1 – Strongly disagree 2 – Disagree 3 – Neither agree nor disagree 4 – Agree 5 – Strongly agree

LOOKING AT SUSTAINABILITY IN A NEW WAY!

Too late to clean plastics up? guides students through an interdisciplinary journey to understand the environmental impact of plastic. Inspired by Rachel Hope Allison's graphic novel, this didactical material combines reading, discussion, and hands-on activities to help learners explore key questions about pollution, ecosystems, and human responsibility.

Through both individual and collaborative tasks, as well as creative projects, students investigate the causes and consequences of plastic waste, analyse its effect on marine life and communities, and propose innovative solutions. Step by step, they develop essential skills in critical literacy, scientific inquiry, creativity, and social awareness, while strengthening their English communication skills.

This booklet, which includes three units and is designed within the PROMISED model, provides teachers with a ready-to-use and flexible framework that connects literature, STEAM education, and global citizenship. The material is adaptable to different teaching contexts. It can be implemented not only in English but also through other languages, offering a versatile resource that supports innovation in bilingual and multilingual classrooms. It includes practical activities, digital resources, and assessment tools, all aligned with global sustainability challenges.

ABOUT THE PROJECT

PROMISED is an Erasmus+ project led by the University of Burgos in collaboration with Howest University, Matej Bel University, the University of Granada, the CFIE of Burgos, and Kveloce. Its goal is to design and implement an innovative didactic model that integrates STEAM education, bilingual learning (CLIL), sustainability, and digital skills in secondary schools, promoting both the green and digital transitions in education across Europe, to address the needs of 21st-century learners and support schools in facing today's educational challenges.




ISBN 979-13-87585-18-1