

A3.1 PARCCE Toolkit - Guide for Educators



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Augmented Reality and Gamification for Climate Change Education

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Συντομογραφίες

AR	Augmented Reality	Επαυξημένη Πραγματικότητα	ΕΠ
CCE	Climate Change Education	Εκπαίδευση για την Κλιματική Αλλαγή	ΕΚΑ
EE	Environmental Education	Περιβαλλοντική Εκπαίδευση	
ESD	Education for Sustainable Development	Εκπαίδευση για την Βιώσιμη Ανάπτυξη	ΕΒΑ
ICTs	Information and Communication Technologies	Τεχνολογίες Πληροφορίας και Επικοινωνιών	ΤΠΕ
IE	Inclusive Education	Συμπεριληπτική Εκπαίδευση	ΣΕ
TEM	Traditional Educational Material	Παραδοσιακό Εκπαιδευτικό Υλικό	ΠΕΥ
WIA	Whole Institution Approach	Ολιστική Προσέγγιση Ιδρύματος	ΟΠΙ
WSA	Whole School Approach	Ολιστική Προσέγγιση Σχολείου	ΟΠΣ

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Part A. Pedagogical and ICT Support for Climate Education

1. Introduction to the PARCCE Toolkit

The PARCCE Toolkit has been developed to support educators in teaching climate change effectively within pedagogical frameworks and through advanced ICT tools. By leveraging advanced digital ICT techniques, including Augmented Reality (AR) and Gamification within Environmental and Outdoor Education, the Toolkit draws on principles of Education for Sustainable Development, the Whole-School Approach, and Inclusive education, providing practical guidance to foster meaningful, engaging, and holistic learning experiences.

The Toolkit is an essential resource for teachers, as it provides structured and pedagogically sound materials to address climate change education through the use of advanced ICT tools:

1. Bridging Pedagogy and Technology

The PARCCE Toolkit supports teachers in overcoming the challenges of presenting environmental concepts in engaging classroom experiences. By integrating ICT tools, including Augmented Reality and Gamification, it helps foster experiential learning and promote active, student-centered learning.

2. Enhancing Student Motivation and Engagement

Advanced ICT tools make learning more engaging and meaningful. Augmented Reality tools and game-based applications can captivate students' attention, foster curiosity, and encourage deeper exploration, both in the classroom and in outdoor education settings.

3. Supporting an Inclusive and Whole-School Approach

Advanced ICT tools provide multiple ways for students to interact with environmental concepts, enabling learners with different abilities, learning styles, or prior knowledge to engage meaningfully. AR tools and gamification features, support diverse learning styles (visual, auditory, and kinesthetic), while enhancing student engagement, interest, and motivation, and can be implemented as part of a whole-school approach to foster consistent, inclusive, and innovative learning experiences.

The Toolkit offers ready-to-use ICT-integrated learning scenarios and structured worksheets, in full alignment with the PARCCE educational framework, ensuring pedagogical consistency and seamless integration into existing teaching practices.

2. Augmented Reality: Definition and Core Principles

This section introduces teachers to the concept of Augmented Reality, exploring how it integrates digital content into real-world environments to enhance learning, engagement, and creative exploration.

One of the most widely cited and comprehensive definitions of AR is provided by Azuma et al. (2001), who deliberately avoid restricting the concept to specific technologies. According to their framework, a system qualifies as AR if it satisfies three fundamental criteria:

- The combination of real and digital elements within a real environment;
- The provision of interactive experiences in real time;
- Accurate alignment (registration) between real and digital objects (Azuma, 1997, p. 356).

Based on this definition, AR is not intended to replace reality but to enhance it by integrating digital elements into the physical world.

Unlike other immersive technologies, such as Virtual Reality (VR), which fully immerse users in synthetic environments, AR preserves the user's connection with the real world while overlaying additional digital information (Azuma, 1997; Azuma et al., 2001).

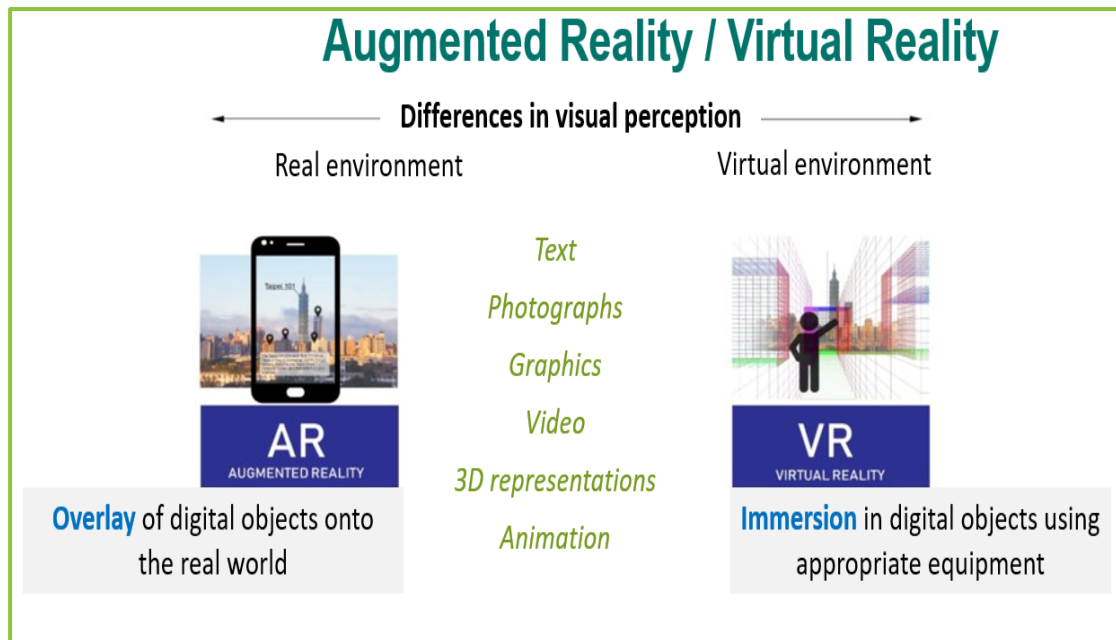


Image 1. *Augmented and Virtual Reality: Key Features and Visual Perception Differences*

Building on this foundational view, Billinghurst (2002) describes AR as the capability to superimpose computer-generated graphics onto real-world environments. This integration enhances the user’s perception of the physical world while preserving continuity with it, in contrast to interactions mediated solely through a screen.

In line with this perspective, Chang, Morreale, and Medicherla (2010) argue that AR effectively bridges the gap between real and digital spaces by embedding digital content—such as explanatory graphics, animations, or video—directly into the user’s physical surroundings. This technology has considerable potential to engage users by overlaying digital content, like text, images, or 3D models, onto real-world contexts and providing tools for creatively exploring content through the design and navigation of game-based experiences.



*By overlaying digital creatures onto real-world environments through mobile devices, the **Pokémon Go** game demonstrated the potential of AR applications on a global scale, making the technology visible and accessible to all users.*

Image 2. *Pokémon Go is a 2016 AR mobile game that gained worldwide popularity and is credited with introducing AR technology to mainstream audiences.*

Expanding on these conceptualizations, Klopfer and Sheldon (2010) emphasize that AR possesses significant potential to engage students by situating information within meaningful contexts and by providing a platform for creatively exploring content through the design and enactment of game-based scenarios. They further argue that AR games uniquely balance location specificity and portability, functioning both as site-dependent experiences and as transferable activities across diverse settings.

By situating exploration and interaction within students' own environments, AR fosters motivation and engagement while simultaneously promoting authentic and contextually meaningful learning. Crucially, the strength of AR lies in its ability to augment the physical environment with digital objects that encourage playful engagement with real-world issues.

3. Augmented Reality Tools in Education

This section introduces a range of accessible Augmented Reality tools that educators can use to enhance teaching and learning through interactive, technology-supported experiences. Augmented Reality tools make use of devices that most schools already have available, such as tablets, smartphones, laptops with webcams, and - in some cases VR controllers and mobile AR headsets. Since most schools possess devices such as tablets, smartphones, and laptops with webcams, they are well-positioned to implement Augmented Reality activities. This accessibility renders Augmented Reality a cost-effective and inclusive educational tool, especially in contexts with constrained

technological infrastructure. This approach is particularly important for schools with limited access to advanced digital infrastructure, as it ensures equitable access to innovative, technology-enhanced learning opportunities.

Below is a selection of some of the most widely used Augmented Reality tools, ranging from mobile apps to advanced, subscription-based platforms. Each tool is designed for different educational contexts and budget levels, enabling teachers to select the options that best match their instructional goals, available technology, and financial resources.

- Blippar: A versatile AR creation platform that allows teachers and students to design engaging AR posters or learning materials. <https://www.blippar.com/>
- Actionbound: A web-based gamification platform that combines AR, quizzes, and location-based activities to create interactive learning adventures. Ideal for project-based learning and outdoor educational experiences. <https://en.actionbound.com/>
- Merge CUBE EDU – Provides hands-on AR learning experiences using physical cubes and mobile devices. <https://mergeedu.com/?cr=0852>
- Zapper AR and XR. Browser-based and mobile platform for creating and viewing interactive media. Compatible with iOS, Android, and desktop browsers, <https://www.zappar.com/>
- Assemblr: Enables students to act as both creators and explorers of AR content, promoting creativity and project-based learning. <https://edu.assemblrworld.com/>
- Delightex VR and AR. Build and explore interactive 3D environments in the classroom. Cross-platform <https://www.delightex.com/ar-vr>
- CleverBooks Augmented Classroom. Offers prebuilt interactive AR lessons for various subjects. <https://augmented-classroom.com/>
- ARLOOPA. An AR platform that allows students and teachers to create and view 3D augmented reality scenes without coding. <https://arloopa.com/>
- Microsoft HoloLens 2. A dedicated mixed-reality headset for advanced AR simulation and training. Windows-only [Microsoft HoloLens | Microsoft Learn](#)

There is no universal approach to choosing Augmented Reality tools for schools. Some classrooms may only need a lightweight mobile app, while others might be ready for

advanced platforms that support full-scale simulations and interactive learning environments. The best choice depends on educational goals, budget, and the level of IT support available at school. For many teachers, starting with mobile-based AR apps—such as Blippar or Actionbound—offers an easy, low-cost entry point that still delivers meaningful, immersive learning experiences.

As confidence and technical capacity grow, schools can explore more advanced Augmented Reality tools and platforms that integrate with Learning Management Systems (LMS) or enable the creation of AR content to support project-based learning. However, such tools and platforms typically require additional investment in software licenses, devices, and technical support, making budget planning an essential factor in their successful implementation.

4. Classifying Augmented Reality: Marker-Based and Location-Based Applications

This section examines the primary categories of Augmented Reality (AR) technologies, highlighting how different modes of activation shape user interaction and support specific educational objectives. Throughout the development of AR technology, researchers have proposed numerous frameworks to investigate its technological and pedagogical dimensions. Among these, a widely acknowledged taxonomy categorizes AR experiences according to their mode of activation, identifying distinct types that reflect how users engage with and interact within augmented environments. In this context, the primary categories of AR include **Marker-based AR** and **Location-based AR**, which are distinguished by the way the AR experience is triggered and delivered to the user.

4.1 Marker-Based Augmented Reality

Marker-based AR relies on physical markers, such as QR codes, images, or printed symbols, to trigger the display of digital content within the user's real-world environment. Scanning is typically carried out with a camera that is typically present in today's mobile devices (smartphones, tablets). The digital content can include

multimedia elements such as 2D and 3D images, animations, video, text, narration, and sound effects.



Marker-based AR synthesizes real-world objects with digital elements—such as text, images, photographs, 3D models, and animations—by utilizing visual markers (e.g., QR codes or printed patterns) to trigger and anchor digital content within the physical environment.

Image 3. *Marker-Based AR enables precise alignment between tangible objects and digital overlays.*

Marker-based AR allows for precise and reliable activation of digital overlays, making it particularly suitable for structured educational activities where specific content needs to be delivered at predetermined points. In pedagogical settings, marker-based AR can enhance learning by providing interactive explanations, visualizations, or simulations directly linked to tangible objects, supporting both comprehension and retention of complex concepts.

4.2 Location-Based Augmented Reality

Location-based AR applications do not rely on markers to initiate the augmented experience. Instead, digital content is triggered when users approach predefined points of interest (POIs) in the real world. To accurately detect user location, these applications typically employ real-time positioning systems, such as GPS sensors. With the help of the user's smartphone location services, rather than depending on the visual identification QR codes, it produces the experience in the camera's field of view.



By leveraging GPS data, location-based AR overlays digitally modeled information onto the physical environment, enabling contextually relevant experiences without the need for visual markers.

By distinguishing between these modes of activation, educators and designers can make informed decisions about the selection and implementation of AR tools. This classification framework supports the alignment of AR applications with specific pedagogical objectives, enhancing learner engagement, interactivity, and the overall effectiveness of AR-mediated educational experiences.

AR Type	Mode of Activation	Educational Applications
Marker -Based AR	Physical markers (QR codes, images, symbols)	Structured in-class activities; enhancing comprehension of abstract concepts; exploration
Location-Based AR	Geographic coordinates (GPS)	Outdoor learning, environmental studies, community projects, gamified mapping, or tracking

5. Augmented Reality in Education: Pedagogical Considerations

This section explores the pedagogical foundations and applications of Augmented Reality, highlighting how AR-based activities transform learning by bridging abstract concepts with real-world experiences both inside and outside the classroom. The pedagogical rationale underlying AR-based activities extends beyond the mere supplementation of conventional teaching, as it seeks to reframe the learning process in ways that are visualized and transformative. Rooted in constructivist and student-centered theories, AR provides a powerful means of bridging the gap between abstract concepts and real-world experiences, both within classroom instruction and through out-of-classroom, experiential learning opportunities.

5.1 Augmented Reality in Classroom-Based Learning

In classroom settings, AR has the capacity to revitalize static lessons by enabling students to interact with two-dimensional visualizations, three-dimensional objects, and animations, thereby facilitating the real-time exploration of complex scientific processes, structures, or events. Such interactive experiences not only make abstract concepts more tangible but also allow for an enriched and immersive representation of information.



AR integrates real-world objects with digital elements such as text, images, photographs, three-dimensional models, and animations. These digital components are rendered in two-dimensional visualizations or three-dimensional objects.

Image 3. *Synthesizing Real-World and Digital Elements Through Augmented Reality*

By overlaying digital information onto tangible objects or spaces, AR supports deeper understanding, facilitates contextualized knowledge acquisition, and bridges the gap between theoretical content and real-world application. From a pedagogical perspective, this synthesis of physical and digital representations allows learners to visualize abstract concepts, interact with complex structures, and engage in experiential learning activities. Through its ability to enhance engagement and motivation, the educational value of AR applications lies in its capacity to enrich multiple dimensions of the learning process:

- AR enhances engagement and motivation by engaging students in dynamic environments that transform abstract content into stimulating experiences, thereby sustaining attention and strengthening knowledge retention.

- AR supports experiential learning through multi-dimensional models that bridge the gap between theoretical constructs and practical applications, enabling learners to internalize knowledge through active exploration.
- AR fosters inquiry-based learning by encouraging students to formulate questions, test hypotheses, and engage in evidence-based reasoning, thus cultivating critical thinking and problem-solving skills essential for lifelong learning.
- AR personalizes learning by providing adaptive pathways that promote autonomy and inclusivity.
- AR facilitates contextualized understanding by embedding academic content into real-world settings and supporting the transfer of knowledge across disciplines.

5.2 Augmented Reality in Outdoor Learning Activities

Beyond the classroom, AR extends learning into out-of-school contexts such as field trips and community-based projects, where students can access contextualized information overlaid onto real-world locations and objects. These applications are particularly valuable for enhancing outdoor learning experiences, as they embed academic content within authentic environments and promote direct interaction with the user's environment.



Image 4. AR outdoor approach bridges formal and informal educational contexts, extending learning beyond the classroom

The pedagogical potential of AR aligns closely with several key learning theories that have shaped informal and outdoor education. From the perspective of situated learning, AR situates knowledge within meaningful contexts, allowing learners to acquire skills and understanding in relation to real-world practices. In line with place-based education, AR emphasizes the role of location and environment in shaping learning experiences, encouraging students to develop deeper connections with their surroundings.

Similarly, through its capacity to transform abstract ideas into tangible, interactive experiences, AR embodies the principles of experiential learning, where knowledge emerges from direct action and reflection. Finally, by encouraging learners to observe, investigate, and draw conclusions based on digital information embedded in real-world settings, AR supports inquiry-based learning, fostering curiosity, critical thinking, and problem-solving skills.

Taken together, these connections highlight AR's potential to bridge formal and informal education, enriching both classroom instruction and outdoor, experiential engagement.

6. Augmented Reality and Gamification Framework

In this section, we examine how Augmented Reality and gamification are integrated across classroom and outdoor learning, supporting inclusive, adaptive, and culturally responsive education within the PARCCE framework. In the PARCCE project, advanced technologies, including AR and gamification are integrated into a whole school by linking classroom-based IEM with outdoor gamified tasks, teacher training, and community engagement, creating a cohesive ecosystem of learning that extends beyond the classroom. Within the PARCCE framework, advanced technologies, most notably AR and gamification, are embedded in learning activities to empower both educators and students as active agents of the climate transition. This framework is realized through the following components: Interactive Educational Material (IEM) and Outdoor gamification tasks.

6.1 Diverse Educational Material

Digital tools such as Augmented Reality play an increasingly important role in supporting diverse pedagogical approaches. Augmented Reality platforms like Blippar and Actionbound can facilitate equitable participation by offering multimodal, interactive, and accessible learning environments that adapt to diverse learning preferences and abilities. These tools allow educators to visualize abstract concepts, personalize instruction, and create immersive experiences that engage all students—regardless of linguistic, physical, or socioeconomic differences.

Selected content activities have been re-envisioned as digital learning experiences, enriched with Augmented Reality and other advanced technological tools. These materials are designed not only to spark engagement and curiosity but also to deepen students' understanding of climate-related concepts through multimodal learning approaches. By leveraging technologies such as multimedia presentations, animations, videos, and interactive simulations, the enriched content provides diverse representations of climate topics, supporting different learning styles and abilities.

Integrating diverse teaching practices with adaptive digital technologies thus strengthens the school's role as a hub of diversity, where both teachers and students actively contribute to a culture of respect, equity, and shared learning. By embracing diversity not only among students but also within the teaching profession, schools can move closer to achieving the vision of Education for Sustainable Development (ESD) and inclusive quality education for all.

Representation of Cultural Diversity and Intercultural Understanding
Blippar's AR storytelling capabilities make it possible to embed diverse cultural narratives, imagery, and symbols into learning materials, promoting intercultural awareness and representation. Students can even co-create AR content that reflects their own cultural identities—turning learning into an inclusive, participatory experience. Similarly, Actionbound enables educators to design location-based experiences that explore local communities, traditions, and environmental or social themes—connecting classroom learning with real-world cultural diversity. This supports UNESCO's (2020) call for teaching materials that include diverse cultural perspectives and foster global citizenship competencies.

6.2 Inclusive Educational Material

Through the integration of Augmented Reality and mobile-based applications such as Blippar, students gain the opportunity to explore otherwise inaccessible places, concepts, and environmental phenomena, thereby overcoming physical, economic, and geographical barriers to learning. These AR-enhanced activities promote a culture of inclusion, collaboration, and active engagement, empowering students to take ownership of their learning while deepening their understanding of sustainability, diversity, and global interdependence. Within this inclusive pedagogical framework, three key dimensions characterize the educational value of AR-supported learning:

- **Multimodal Learning:** AR integrates visual, auditory, and interactive elements to accommodate diverse learning preferences. By engaging multiple sensory channels, it enhances conceptual understanding and supports differentiated instruction.
- **Equitable Experimentation:** Digital simulations enable students to safely explore complex, hazardous, or resource-intensive experiments, ensuring equitable and inclusive access to scientific inquiry and experiential learning.
- **Low Barrier to Entry:** Mobile-friendly AR platforms such as Blippar eliminate the need for advanced technical expertise or costly infrastructure. Both teachers and students can create and interact with AR content using only a smartphone or tablet, making immersive learning experiences accessible across diverse educational contexts, including schools with limited digital resources.

6.3 Innovative and Adaptive Learning Environments

Advance technological tools such as Blippar and Actionbound enables multisensory engagement and customizable learning experiences. Blippar and Actionbound both promote diversity and inclusion for students with disabilities:

- Blippar allows educators to design Augmented Reality content that combines text, images, audio, and video—supporting students with visual, auditory, or cognitive differences through multiple modes of representation. This aligns with

Universal Design for Learning (UDL) principles, giving every student alternative pathways to access and process information.

- Actionbound, through its gamified and mobile-friendly interface, enables teachers to create interactive quests that can be adapted for students with mobility challenges (e.g., using QR codes accessible from a desk) or cognitive differences (e.g., by simplifying navigation or adjusting task complexity).

Both Blippar and Actionbound support linguistic inclusion by allowing the integration of multilingual content, audiovisual prompts, and context-based learning activities. Educators can design tasks and materials that incorporate multiple languages, voice narration, and visual cues, enabling students from diverse linguistic backgrounds to access, understand, and engage with the content more effectively. These tools also promote language development through interaction, as students collaborate, interpret multimodal information, and connect learning to real-world cultural contexts:

- Educators can use Blippar to overlay AR scenes with multilingual captions, voice recordings, or cultural references, helping non-native speakers access content more easily.
- Actionbound supports tasks and instructions in multiple languages, allowing students from diverse linguistic backgrounds to participate collaboratively in digital scavenger hunts or project-based activities.

Both Blippar and Actionbound align with the European Commission's (2020) recommendation for integrating digital technologies that enhance interactivity and personalization. They provide low-barrier, mobile-based access, making them viable even for schools with limited IT infrastructure. Teachers can differentiate learning paths by designing AR or gamified experiences with varying difficulty levels, formats (visual/audio/text), or accessibility features. Students can learn at their own pace, revisit content, and engage through the modality that best suits their needs and preferences.

6.4 Integrating Sustainability and Whole-School Approach through AR and Gamification

Through the co-design of learning activities with teachers and students across disciplines, sustainability concepts are seamlessly embedded into the curriculum,

fostering a school-wide culture of environmental awareness and responsibility. The approach encourages cross-school and cross-cultural collaboration, as projects can be shared among different schools or countries, promoting global perspectives, empathy, and intercultural understanding. By leveraging devices that most schools already possess—smartphones and tablets—digital tools such as Blippar and Actionbound democratize access to innovative learning experiences.

These platforms transform traditional lessons into interactive, multimodal explorations, ensuring that all learners, regardless of ability, language, or background, can participate meaningfully in the educational process:

- **Location-based Learning:** By employing location-aware technological applications, students connect climate education directly to their immediate environment, making learning experiences tangible and contextually relevant.
- **Gamification and Experiential Learning:** Integrating gamified tasks enhances motivation, supports active engagement, and reinforces experiential learning, allowing students to explore sustainability concepts in an interactive manner.
- **Whole-School Approach:** Sustainability education is strengthened through a cohesive ecosystem linking classroom-based inquiry, outdoor gamified activities, teacher training, and community engagement. This holistic approach ensures that learning extends beyond individual lessons, fostering continuous environmental stewardship across the school community.

7. Inclusive and Diverse Strategies for Student Engagement with Worksheets

This section outlines strategies for designing inclusive and diverse learning experiences using AR-enhanced worksheets and Actionbound gamified activities, ensuring equitable participation and engagement for all students. It also details inclusive and diverse strategies for AR and gamified learning activities, demonstrating how digital tools can enhance engagement, accessibility, and meaningful participation across varied student populations.

7.1 Inclusive and Diverse Classroom Activities Using AR Activities and Student Worksheets

To ensure accessibility and equitable participation, the following strategies address the diverse needs of learners in in- classrooms activities:

1. Visual Support:

- Clear, high-contrast images and symbols (e.g., 🌞 , ☁ , 🦋 , ✨) are used to enhance understanding.
- Icons, color coding, and visual cues highlight key information and steps.
- AR-enhanced images or interactive visual prompts via Blippar for better concept visualization

2. Auditory Learners

- Videos and augmented reality (AR) visuals are used to reinforce understanding and make abstract concepts more concrete and engaging.
- Students are encouraged to discuss their ideas in pairs or small groups before completing written sections.

3. Kinesthetic Learners

- Students interact with content through physical tasks such as scanning AR markers, completing worksheets and hands-on activities.
- Students are encouraged to conduct experiments, or manipulate materials that connect directly to worksheet topics, fostering deeper understanding through tactile exploration.

4. Students with Linguistic or Cultural Differences

- Use visual icons, buttons, and prompts within the worksheets or AR interfaces.
- Activities include drawing, coloring, matching, and singing to cater to different learning styles

- Worksheets include simple sentence structures, word banks, and visual prompts help all students participate.
- Students can respond through writing, drawing, or discussion, allowing for personalized expression.
- Gifted or advanced are encouraged to complete tasks, such as designing new AR scenes in Blippar.

7.2 Inclusive and Diverse Strategies for Gamified Learning Activities

Gamified learning incorporates interactive elements and playful design make learning more approachable for students with different needs and attention spans. This section outlines how Actionbound activities can be designed to support all learners through visual aids, choice-based tasks, language accessibility, and collaborative planning. These strategies ensure that every student can participate meaningfully and confidently in interactive, field-based learning experiences:

1. Differentiated Learning Paths:

- Students can progress at their own pace, revisit content, and choose paths that suit their interests or abilities.
- Tasks can be tailored to different skill levels, ensuring that no student is left behind.

2. Multimodal Engagement

- Combines text, audio, video, and images—supporting visual, auditory, and kinesthetic learners.
- Ideal for neurodiverse students or those with learning disabilities who benefit from varied input formats.

3. Collaborative & Social Learning

- Encourages teamwork through group challenges and peer feedback.
- Builds empathy and communication skills, especially in mixed-ability classrooms.

4. Real-World Relevance

- GPS-based tasks connect learning to local environments, making it culturally and contextually relevant.
- Students can explore climate change, history, or biodiversity in their own communities—bridging classroom and world.

5. Empowerment & Motivation

- Game elements like points, badges, and progress bars boost motivation and confidence.
- Learners feel ownership over their journey, which is especially empowering for marginalized or disengaged students.

6. Low Barrier to Entry

- ActionBound is mobile-friendly and doesn't require advanced tech skills.
- Teachers and pupils can create Bounds without coding, and students only need a smartphone or tablet.

Together, these strategies illustrate how AR and gamified technologies, when integrated with inclusive and interdisciplinary pedagogy, can empower students, strengthen engagement, and cultivate a culture of sustainability that permeates both classroom and community contexts.

Accompanying the IEM, the outdoor learning approach fosters creativity, collaboration, and ownership of learning, while enhancing pedagogy and making climate change education interactive, inclusive, and impactful.

8. Methodological Guidelines for PARCEE IEM, AR and Gamification Activities

The implementation of Interactive Educational Materials (IEM) relies on a series of activities that integrate innovative technological applications into teaching practices, ensuring not only effective climate change education but also alignment with the framework's core principles of innovation, inclusion, and the Whole School Approach.

8.1 Educational Methodology

The educational methodology underpinning the technological supported activities, including AR and gamification, is grounded in an interdisciplinary model, whereby a topic, issue, or environmental problem is selected and approached holistically, cross-curriculum, and from multiple disciplinary perspectives. This approach ensures that learning is contextualized and meaningful, connecting theoretical knowledge with real-world applications.

The pedagogical approaches supporting IEM activities are primarily grounded in the constructivist approach and follow a structured process: students' interest is first engaged, their initial ideas are elicited, and then they are encouraged to test, expand, and revise these ideas to align with scientifically accepted knowledge. These activities integrate both digital and traditional educational tools, including AR-supported content, video lectures, digital materials, and interactive tasks accessible via devices or interactive whiteboards, while promoting collaborative engagement with teachers, peers, and learning resources through printed or digital worksheets.

The pedagogical approaches supporting gamification tasks are grounded in Project-Based Learning, which provides a structured framework for collaborative teaching designed and implemented jointly by teachers and students. The process typically involves several stages: selecting a topic or issue, defining clear learning objectives, planning the project by identifying subtopics, methods, and tools, assigning and completing tasks, analyzing results, and producing a final product.

Students are actively involved in the learning process, completing small projects that integrate AR and gamification tasks, applying newly acquired knowledge to their subject area, and presenting the outcomes as digital artifacts to facilitate sharing and dissemination. Gamification elements, including challenges, rewards, and interactive tasks, further enhance engagement, motivation, collaboration, and problem-solving, especially in outdoor and experiential contexts.

The overall program design follows international best practices, aiming to create a user-friendly interface, enhance interaction, promote active engagement and enjoyment, and strengthen students' intrinsic motivation and interest.

8.2 Augmented Reality in IEM with Blippar AR

Blippar is an AR tool that provides teachers and students with learning experiences, where digital elements—including images, videos, 3D objects, and informational overlays—integrate seamlessly with the real world. These experiences leverage Blippar’s capabilities to enhance realism, encourage interaction, and sustain engagement by dynamically responding to the physical environment. Through the Blippar application, students interact with augmented reality scenes that visually illustrate critical ideas, thereby enhancing comprehension through hands-on, experiential learning.

Within the objectives of the IEM, the design of these AR activities is grounded in three interrelated components that collectively enrich the educational experience:

- **Visualization:** AR facilitates the visualization of concepts by overlaying digital content—such as files, links, or diagrams—onto physical objects. These 2D overlays provide supplementary information that supports students’ understanding and retention of essential ideas.
- **Representation:** The incorporation of 3D models and simulations allows students to explore complex or abstract phenomena interactively. This immersive approach transforms intangible or theoretical concepts into tangible, comprehensible representations, promoting deeper conceptual understanding.
- **Interaction:** Students actively engage with AR content by manipulating digital objects, zooming, or triggering animations. This interactivity fosters cognitive engagement and supports active learning, making the educational experience both meaningful and memorable.

Access to Blippar (<https://www.blippar.com/>) and possibility to publish their AR activities is provided to all Partner and Associated Partner Teachers and Partner NGO Educators attending the IOTC free of charge by the eLearning Lab UoC. For end users (those viewing a Blipp):

- A smartphone or tablet with a rear-facing camera.
- A good internet connection / enough DATA to download content and perform detection tasks (preferably 5G).

- For WebAR experiences, a modern mobile browser like the latest version of Chrome (Android) or Safari (iOS) is needed.

8.3 Outdoor Learning Tasks with Action Bound (Gamification)

The web-based Actionbound platform was employed to design game-based activities, thereby creating a multimedia-rich, interactive mobile learning environment. Actionbound can be deployed as an application (app) on both smartphones and tablets, providing students with a flexible and engaging way to explore educational content. The design of these Actionbound activities is grounded in three interrelated components that collectively enhance the learning experience:

- **Project-Based Learning Framework:** The pedagogical approaches underpinning Actionbound gamification tasks are rooted in Project-Based Learning (PBL), which offers a structured framework for collaborative teaching and learning, co-designed and implemented by both teachers and students. This framework typically involves several stages: selecting a topic or issue, defining clear learning objectives, planning the project by identifying subtopics, methods, and tools, assigning and completing tasks, analyzing results, and producing a final product.
- **Active Student Engagement:** Students are actively involved in the learning process by completing small-scale projects that integrate AR and gamification tasks. Through this process, learners apply newly acquired knowledge to their subject area, while generating and presenting outcomes as digital artifacts, facilitating both sharing and dissemination of their work.
- **Gamification Elements:** Incorporating challenges, rewards, and interactive tasks, gamification elements further enhance engagement, motivation, collaboration, and problem-solving. These elements are particularly effective in outdoor and experiential learning contexts, where hands-on interaction and real-world problem-solving reinforce conceptual understanding and foster meaningful learning experiences.

Access to ActionBound (<https://en.actionbound.com/>) and possibility to publish their Bounds is provided to all Partner and Associated Partner Teachers and Partner NGO Educators attending the IOTC free of charge by the application.

9. References

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Part B: Activities with the Use of Augmented Reality (AR) and Gamification Tools

1.2 What is a Greenhouse & What is the Greenhouse Effect on Earth

A. Classroom Activity

Activity Overview

The activity titled “1.2_Activity_IEM_EDIVEA” outlines a comprehensive educational scenario designed for students aged 9+, focusing on the greenhouse effect and its connection to climate change, using advanced ICT tools, augmented reality (AR) and gamification tools.

In the below Table the 7 phases of the educational activity 1.2 is summarized, including their specific goals, teaching methods, and tools used.

Introductory Phase: Experimenting with the Greenhouse Effect		
Engage students in exploring the greenhouse effect through hands-on experimentation	Group work	Soil boxes, thermometers, plastic sheet, notebook
1st Phase: Activation / Prior Knowledge Investigation		
Activate prior knowledge, spark curiosity, introduce greenhouse analogy	Individual reflection, pair work, whole-class discussion	Interactive board, projector, Greenhouse Exploration Worksheet
2nd Phase: Exploration		
Explore the greenhouse effect	Group collaboration, whole-class discussion	AR apps, Worksheet 1 & 2
3rd Phase: Concept Introduction / Explanation		
Explore the role of greenhouse gases	Group discussion, whole-class sharing	Poster with QR codes (Marker Images 3 & 4), AR objects
4th Phase: Analyze Experimental Data (Application/Elaboration		

Analyze temperature data and relate findings to greenhouse effect	Group collaboration, data analysis, class discussion	Excel, PowerPoint, temperature data table
5th Phase: Exploring and Reflecting Data		
Evaluate results, connect knowledge with experience, reflect on learning	Group work, data interpretation, class discussion	Interactive board, Our World in Data graphs, Worksheet 3
Extension Phase: From Knowledge to Climate Action Activities		
Apply concepts to create digital climate action materials	Group creation, presentation, multimedia integration	Blippar AR app, custom posters, videos, infographics

Worksheet Correct Answers

Worksheet 1

- Here are the correct labels for the greenhouse diagram. Use them to check your answers or complete the activity:

Sunlight, Greenhouse, Soil, Plants, Heat/Infrared radiation

Worksheet 2

- Here are the correct labels for the greenhouse diagram. Use them to check your answers or complete the activity:

Solar radiation, Atmosphere, Greenhouse gases, Earth's surface, Heat/Infrared radiation

Image Markers and QR Codes (Augmented Reality)

AR Scenes Description Image Marker 1 # QR Code

- **Popup Text**

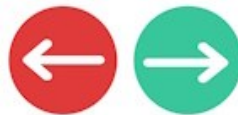
A greenhouse is a framed structure enclosed with glass or plastic that allows sunlight to enter!



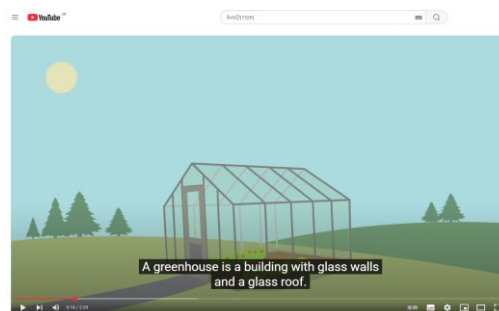
- **Popup Image**



Image URL: https://cdn.pixabay.com/photo/2017/02/24/21/49/greenhouse-2096497_1280.jpg



- **Popup Video:**



Video segment: 0:18–0:33

Video URL: <https://www.youtube.com/watch?v=SN5-DnOHQmE>



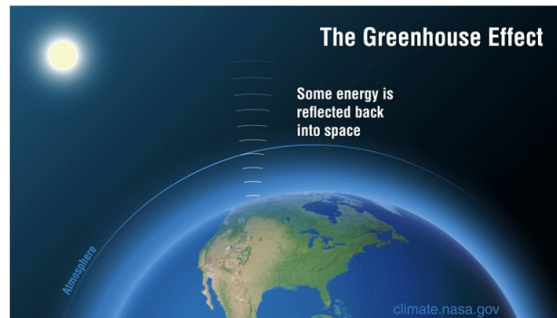
Image Marker 2 # QR Code

- **Popup Text**

The greenhouse effect is a natural process where certain gases in the Earth's atmosphere trap heat, warming the planet and making it habitable



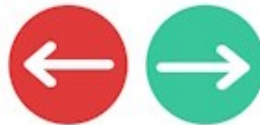
- **Popup Animation**



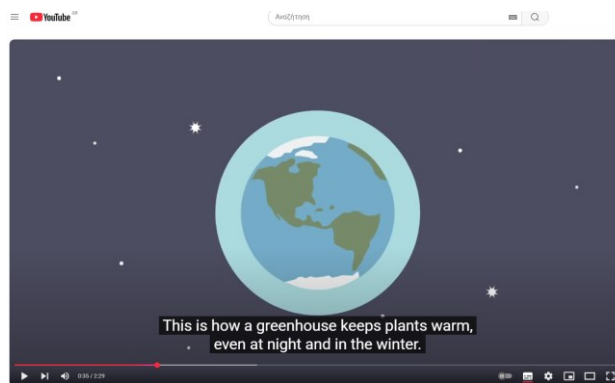
A simplified animation of the greenhouse effect.

Image URL:

https://assets.science.nasa.gov/content/dam/science/esd/climate/internal_resources/2512/A_simplified_animation_of_the_greenhouse_effect.gif?w=768&h=432&fit=clip&crop=faces%2Cfocalpoint



- **Popup Video:**



Video segment: 0:35–1:20

<https://www.youtube.com/watch?v=SN5-DnOHQmE> [from 0.39 to 1.23]



Image Marker 3 # QR Code

- **Popup Text and Image:**

Imagine Earth as your game world: Greenhouse gases are a glowing shield that keeps it warm!



Sources: AI-generated image



- **Popup Text and Image:**

The character shivers and struggles because there's no protective shield!



Sources: AI-generated image



- **Popup Text and Image:**

Earth without greenhouse gases — a cold, icy, and lifeless planet! It is a planet inhospitable to the phenomena of life, as we know it!



Sources: AI-generated image



*Visual materials were generated with [Storyboard](#) through the ChatGPT Image Creator

Image Marker 4 # QR Code

- **Popup Text:**

What Earth might look like without the warming effect of greenhouse gases?



- **Popup Images (array):**



Image URL:

https://cdn.pixabay.com/photo/2023/12/12/16/15/icicles-8445566_1280.jpg



Image URL:

https://cdn.pixabay.com/photo/2022/03/14/10/30/river-7067873_960_720.jpg

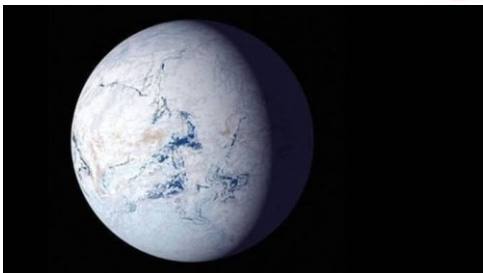


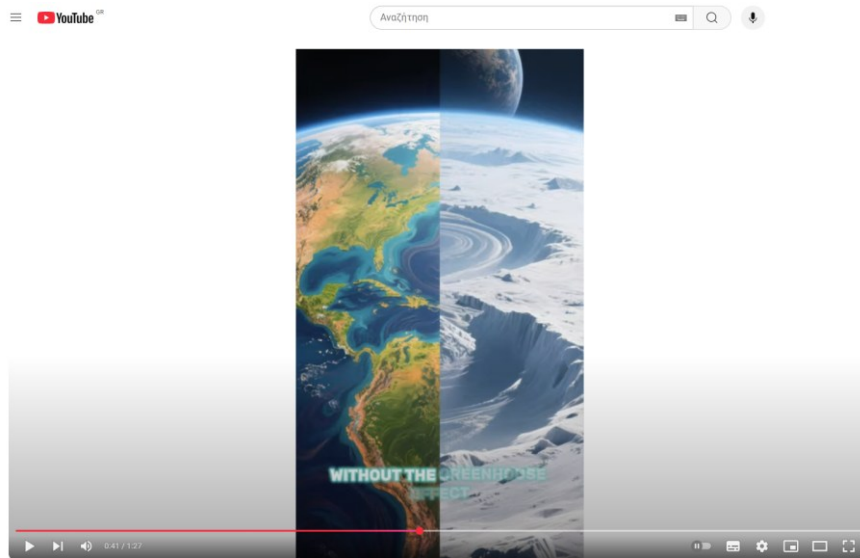
Image URL: Image URL:

<https://www.techexplorist.com/wp-content/uploads/2019/07/frozen-planet-696x392.jpg>



- **Popup Video:**

What Earth might look like without the warming effect of greenhouse gases?



Video segment: 0:40–1:23

Video URL: <https://www.youtube.com/watch?v=QjSHy4Q38To>



B: Action Bound

Flow overview

Starting / Knowing Phase: introduction/ simple explanation of the greenhouse effect and its importance by the hero. Three Checkpoints: each checkpoint focuses on one key idea about the greenhouse effect and contains age-appropriate missions and activities. Ending Phase: wrap-up, reflection activity, and a pledge.

Hero of the Actionbound

Ari the Atmosphere Guardian: a friendly, curious cloud-like character who knows how the Earth stays warm and wants to teach children how to protect the planet.

Roles of the children

Junior Climate Rangers: players join Ari as helpers who have to complete missions to learn how the greenhouse effect works and how to reduce its impact on Earth.

Starting / Knowing Phase

Purpose and learning goals

Introduce Ari the Atmosphere Guardian and the players' role as Junior Climate Rangers; Inform the children on the importance of the greenhouse effect and how it affects the Earth.

Suggested dialog for Ari:

"Hello, Junior Climate Rangers! I'm Ari, the Atmosphere Guardian. The Sun sends us warm light, and our atmosphere keeps some of that warmth—like a cozy "blanket". Lately the blanket is getting thicker, and we need your help to find out why!" Or "Hello, Junior Climate Rangers! I'm Ari, the Atmosphere Guardian. The Sun sends warm light to Earth, and our atmosphere keeps some of that warmth—like a cozy "blanket". But when the "blanket" gets thicker, the Earth is becoming warmer than before. We need your help to find out why the "blanket" is changing and what we can do. Are you ready to begin this journey?"

Missions:

Give the children a small quiz to answer with some of the information Ari gave them (possible quizzes)

1. Multiple choice — "Where does the Earth get most of its heat from?"

1. The Moon
2. The Sun
3. Rocks under the ground

Correct: B

2. True/False — "The atmosphere can act like a "blanket" that holds heat near Earth."

1. True
2. False

Correct: A

(Possible additional activity using paper and pencil) Inform the children to draw what they think is the greenhouse effect after they got the explanation/ information from Ari and then take a picture of that drawing to upload.) By the end, children should be able to describe the greenhouse effect with the “blanket” metaphor.

Checkpoint 1 — What is the greenhouse effect?

Focus and learning goals

Make the greenhouse effect concrete and memorable: Sun warms the Earth, greenhouse gases trap heat. Kids should be able to name at least one greenhouse gas and explain the “blanket” metaphor in their own words. This step can tie with the 1 st and 2 nd blipps (links and markers) activities and Ari can use them to give the information about the greenhouse effect to the children.

Suggested dialog for Ari:

“Think of the Earth wearing a “blanket”. The sunlight warms the Earth during the day. Gases in the air act like a “blanket” and keep some of that warmth near the ground. A thin “blanket” is good, but a very thick “blanket” makes the Earth too hot for plants and creatures to live in. Let’s find out which gases make the “blanket” thicker. Follow the (blip) links and instructions to find out more information!”

Missions:

Which of these is a greenhouse gas?

- A. Oxygen (O₂)
- B. Carbon Dioxide (CO₂)
- C. Helium (He)
- D. Nitrogen (N₂)

Correct answer: B — CO₂ is one of the most common greenhouse gases

After giving all the information needed for the children to understand what the greenhouse effect is, Ari tells them to go to and find an open space with a lot of sunlight. After all the children move to the school yard or generally the space with a lot of sunlight, then they will start a photo hunt. In this mission they will move around the school and they will find one green spot (plants, trees, leaves e.tc) and they will take a photo to upload.

Checkpoint 2 — Why do we need the “blanket”?

Focus and learning goals

Suggested dialog for Ari:

“Great job so far, Junior Climate Rangers. You learned that the greenhouse “blanket” helps keep the Earth warm. Now imagine the Earth with no blanket at all. Some places would be very cold at night and the plants and animals that make Earth lively could not live in such cold conditions. Follow the (blip and markers 3 and 4) links to find out more, then you will be asked to make a surface that would look like a place on Earth without the “blanket” and send me a photo.” This checkpoint could be tied with the 3rd and 4 th blipps of the AR activities and Ari will inform them to click the links and find the markers so they can get the information they need to.

Missions:

With the information they got from the blipps, they have to create a surface as if there was no “blanket” on Earth using the Land Art technique (a surface with no green elements, mostly rocks and dried leaves or sticks) and after they do so, they must take a photo of it to upload.

Checkpoint 3 — Effects of extra warming

Focus and learning goals

At this point Ari will try to explain the children that now that they know what happens if there is no “blanket”, they can compare “no blanket” conditions (too cold) to “very thick blanket” conditions (too hot). Ari links everyday human activities to increased greenhouse gases.

Missions:

Make a quiz asking the students which of the activities increase the greenhouse gasses.

QUIZ: Which of the activities increase the greenhouse gases in the atmosphere?

- A. Driving a car (exhaust fumes)
- B. Using fertilizers and pesticides in farming
- C. Cutting down trees to build houses
- D. All the above

Correct answer: D

Ending phase — How we can help

Focus and learning goals

At the final stage, Ari will try to inform children about simple good practices they can do in everyday life: saving energy, planting trees, walking or biking, recycling, turning off lights. Suggested dialog for Ari: “We can make the “blanket” less thick by doing small things every day. Turning off lights, unplugging chargers, walking short trips, planting a seed, or saving water can all help. To show to me that you are taking this seriously take a pledge that you will try to do your best to help the Earth.”

Missions:

Ari will ask the students to take a pledge that they will do their best to help mitigate the greenhouse effect. (record pledge and upload it). After the last mission, Ari thanks the children for listening to him and for helping him and hopes that with their help and sharing of knowledge to others they will all do their best to protect the Earth!

1.4b Steps to Reduce Your Carbon Footprint in Transport

A. Classroom Activity

Activity Overview

The activity titled “1.4b_ **Steps to Reduce Your Carbon Footprint in Transport**” outlines a comprehensive educational scenario designed for students aged 9+, focusing on empowering students to understand, evaluate, and reduce their personal carbon footprint related to transportation.

In the below Table the 5 phases of the educational activity 1.4b is summarized, including their specific goals, teaching methods, and tools used.

1st Phase: Activation / Prior Knowledge Investigation		
Make greenhouse gas emissions visible and relatable using real data	Individual thinking and whole-class work	Climate TRACE interactive map, projector/interactive board, Worksheet 1
2nd Phase: Exploration		
Analyze global/national emission trends and reflect on personal transport choices	Group collaboration, whole-class discussion	Our World in Data graphs, EDGAR emissions table, Worksheet 2
3rd Phase: Concept Introduction / Explanation		
Compare CO₂ emissions from different transport modes and propose sustainable alternatives	Group discussion, whole-class sharing	Poster with QR codes, AR objects, Worksheet 3
4th Phase: Analyze Experimental Data (Application/Elaboration		
Present research results and propose sustainable transport solutions	Group collaboration, class discussion	CO ₂ emissions simulator, YouTube video
5th Phase: Exploring and Reflecting Data		

Design and build digital AR elements to communicate carbon footprint concepts	Group work, data interpretation, class discussion	Interactive board, Our World in Data graphs, Worksheet 3
Extension Phase: From Knowledge to Climate Action Activities		
Apply concepts to create digital climate action materials	Group creation, presentation, multimedia integration	Blippar AR app, custom posters, multimedia elements

Image Markers and QR Codes (Augmented Reality)

AR Scenes Description
Image Marker 1 # QR Code

- Popup Images :



● Popup Images :



- **Popup Image:**



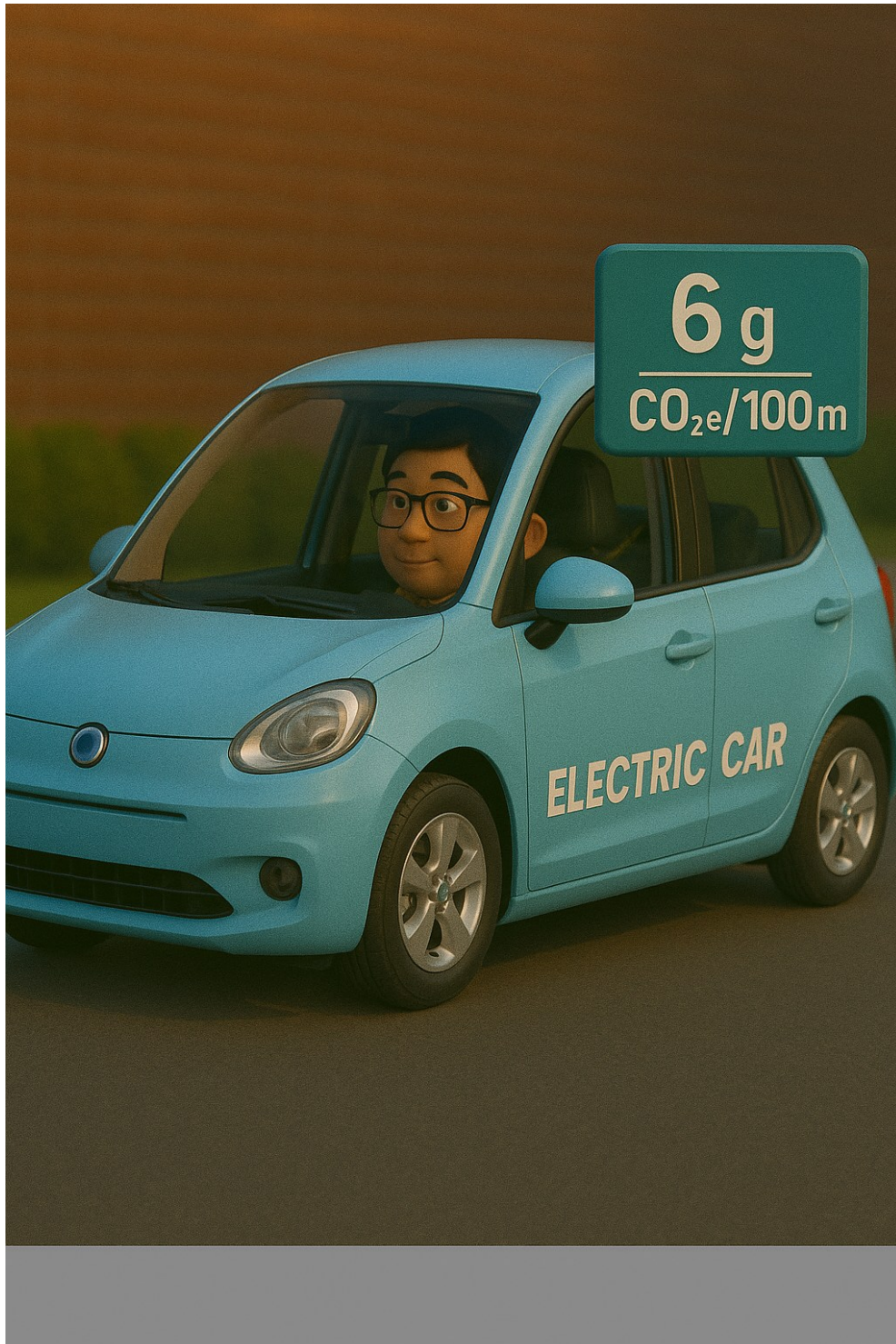
*Visual materials were generated with [Storyboard](#) through the Copilot Image Creator

Image Marker 2 # QR Code

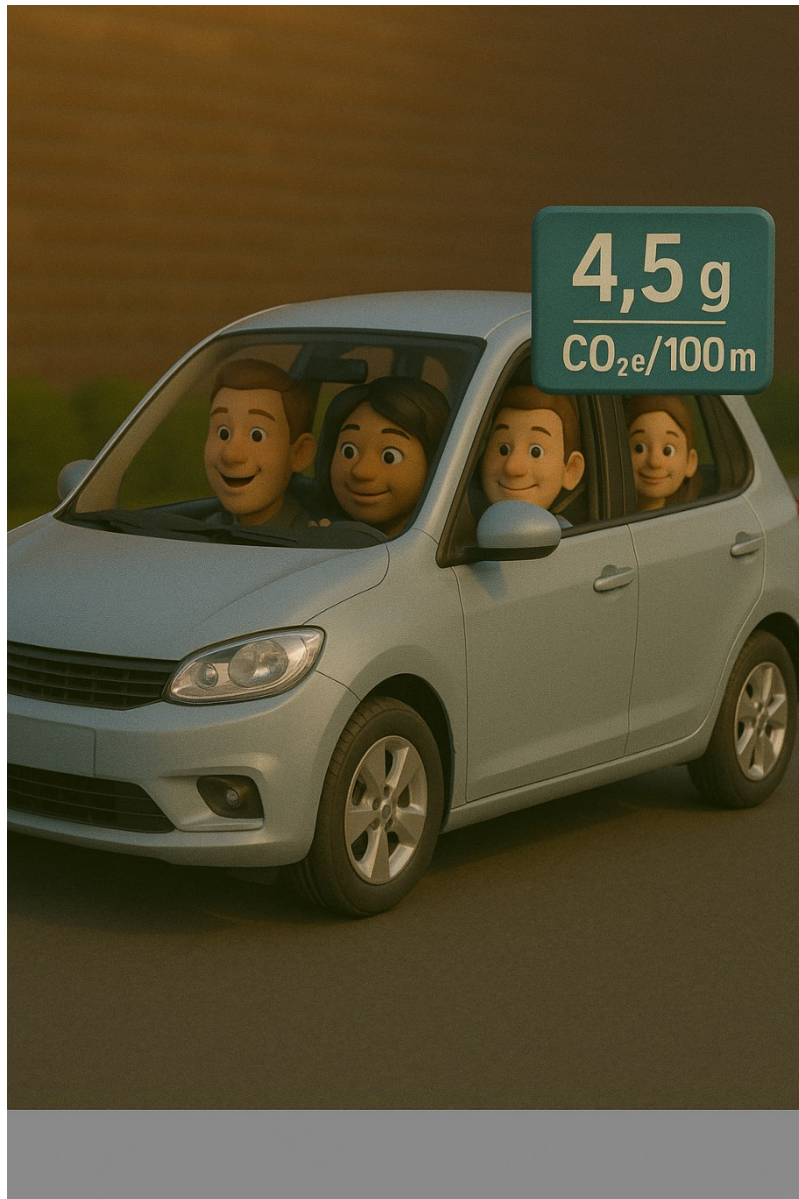
- Popup Image



● Popup Image



- **Popup Image**



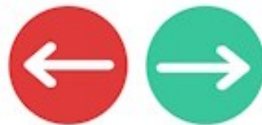
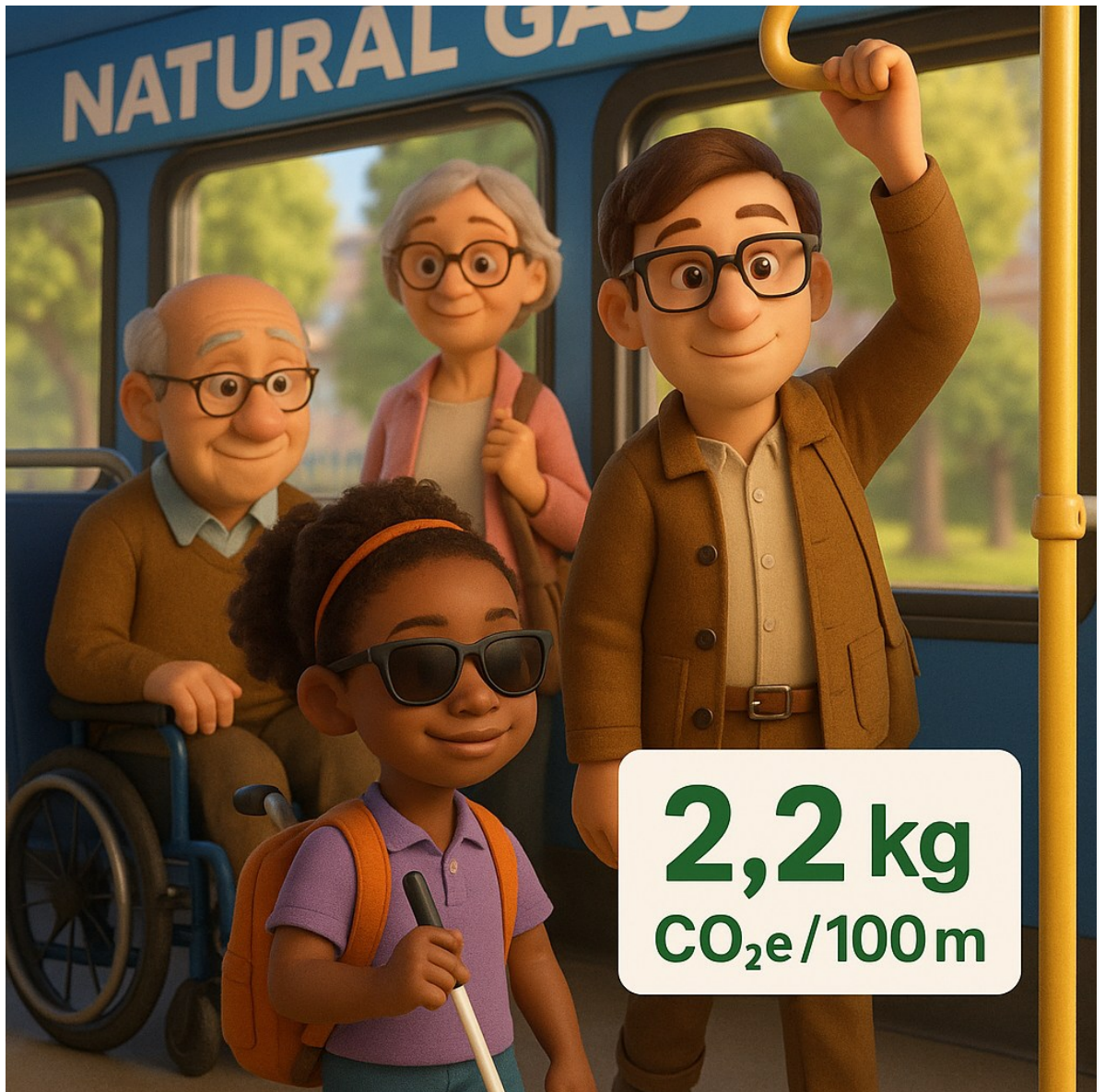
*Visual materials were generated with [Storyboard](#) through the Copilot Image Creator

Image Marker 3 # QR Code

- **Popup Image**



● Popup Image



● Popup Image

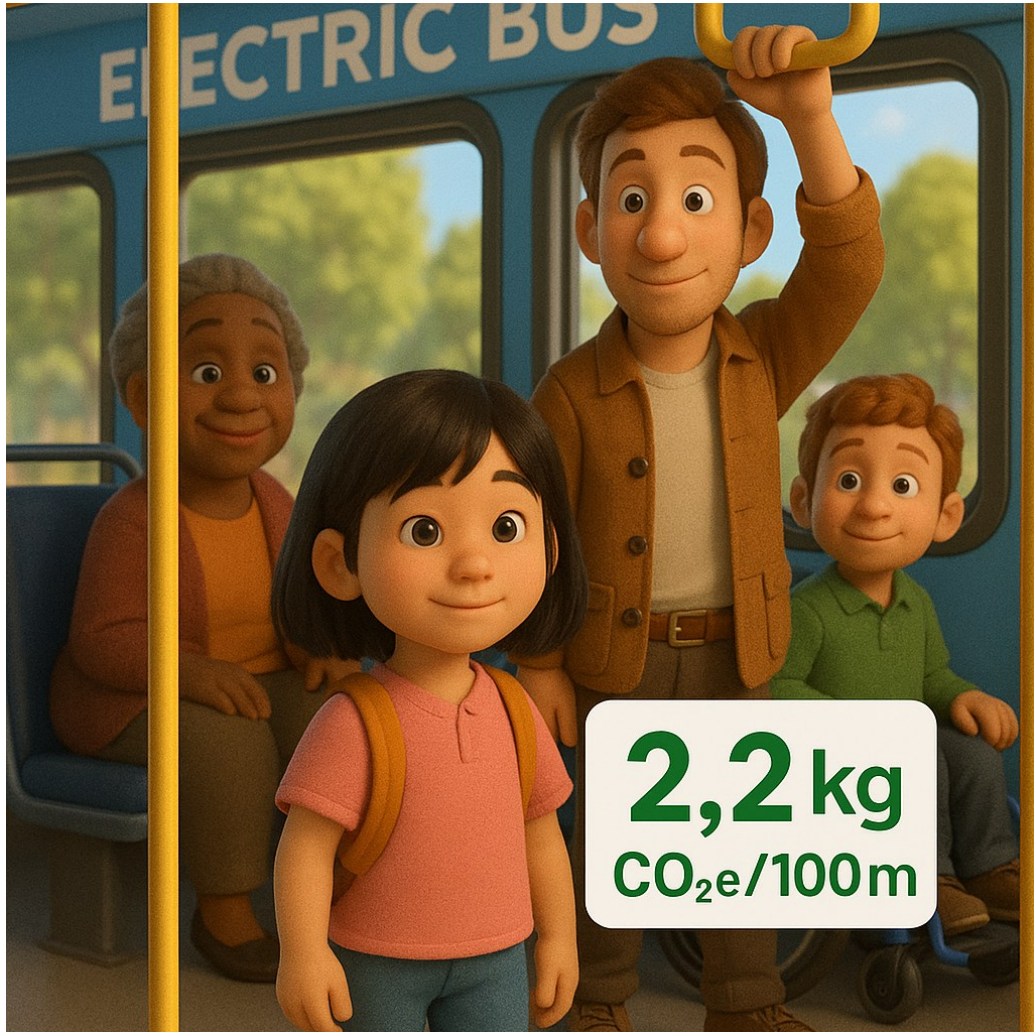


Image Marker 4 # QR Code

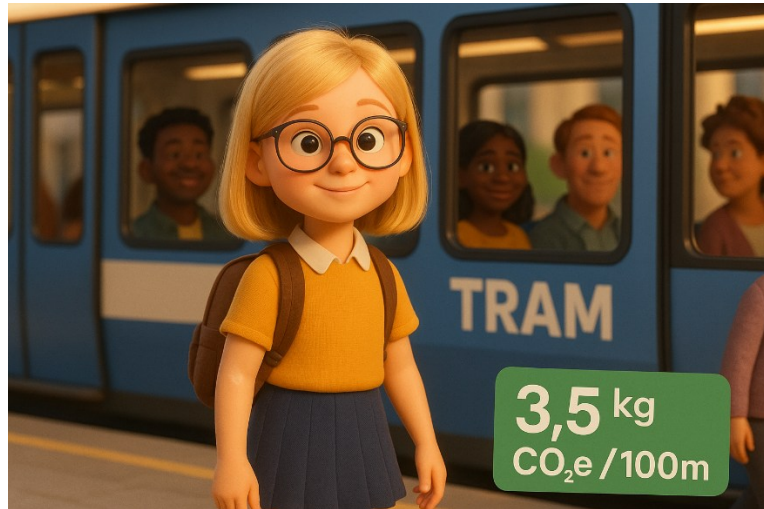
- Popup Image:



- Popup Image:



● **Popup Image:**



B: Action Bound

Flow overview

- Introduction Phase: The hero will introduce herself and will provide the children with roles while explaining why transports could be harmful for the planet and that each one gives a different footprint.
- Three Checkpoints: each checkpoint focuses on one key idea about the CO₂ emissions from means of transport and ways to reduce it and contains age-appropriate missions and activities. (for the 3rd checkpoint they will need to have with them a notepad and pencils)
- Ending Phase: wrap-up, reflection activity, and a simple pledge.

Hero of the Actionbound

Sofia the Eco – Explorer: *Sofia the Eco-Explorer* (friendly, curious, adventurous) and a friend of Ari's, came on a mission, which is to help kids become "*Planet Protectors*" by making smarter transport choices.

Roles of the children

They become her **Eco-Team members**, tasked with solving challenges and advising her on the best choices. We could encourage the children to give an ecofriendly name to their team.

1. Introduction Phase

Introduce our main hero Sofia, and why she came to help the kids learn. (We can make the connection that she learned that the kids want to learn and help from her good friend Ari that they helped in our previous Actionbound.)

Possible Sofia's dialog:

"Hello, Eco-Team! I'm Sofia the Eco-Explorer. I travel around the world to teach children how they can protect our planet. Today, I need your help in your own city!"

She will provide the kids with some general (global) information at first (this can tie in with the global information we provide the children with our 1st phase of the activities from IEM):

- Transport is one of the biggest sources of CO₂ emissions.
- Cars, planes, buses, and bikes all leave different "carbon footprints."
- The more CO₂, the warmer our planet gets — and that changes our climate.

After that we move from global information to more localized information.

Possible Sofia's dialog:

"In your city, many people use cars every day. But there are also buses, trains, bikes, and even walking paths. Together, we'll discover which choices are better for the planet."

This type of dialog is a good way to connect with the following steps.

Missions:

Possible quizzes like:

Multiple choice quiz – What transport is the most harmful for the environment:

1. Cars
2. Busses
3. Bikes
4. Trains

Correct answer: 1

True/ False question – Transport is one of the biggest sources of CO₂ emissions.

Correct answer: True

2. Checkpoint 1: Comparing CO₂ Emissions

After the kids learn how means of transport affect the planet, Sofia tells them to move to the first location of our actionbound which is the parking lot of the school, or where the school busses are.

There, Sofia emphasizes again that different means of transport have different carbon footprints and analyzes/ compares the cars vs busses vs trains. Not only that but informs the kids that even when the transport is of the same category, they still have different co₂ emissions. This blends very well with the 2nd, 3rd and 4th blip from our AR activities.

Possible dialog for Sofia:

“Eco-Team, you made it! Now, let’s compare the different means of transport. Every way of transportation by car, bus, train etc... leave behind something called a *carbon footprint*. That’s the amount of invisible CO₂ gas released into the air. The higher the footprint, the warmer our planet gets. Click the following links (Blipps 2, 3, 4) to find out more information.”

Missions:

Possible dialog for Sofia after the information and the blipps are provided to the kids:

- A. Info: “Eco-Team it’s time to find out **your carbon footprint** every time you come to school from home. Click the google maps link below. Choose the starting point of the route from your house and the destination (your school). Then choose the means of transport you used to arrive to school this morning (on foot, by bike, by car, by bus etc) and find out what the distance from home to school is. You need to convert the kilometres into metres. Close google maps and return to finish the mission.

GOOGLE MAPS:

- B. Mission: you should click the link below to calculate your carbon footprint and come back and write your answer in the box below.

Excel:.....

This mission will include typing the CO2 emissions in the space provided.

3. Checkpoint 2: Choices with very little or no emissions of CO2 at all

After the mission of the previous checkpoint is done, Sofia informs the students that they have to move again, this time they must go to a place in their school that has a lot of green (a big group of trees and bushes possibly in their school premises, or to their bike rack area).

Mission:

This can be a QR mission, when they will reach that area the teacher would have to place somewhere a QR code given by the Actionbound app for the kids to scan.

After they scan the QR code, Sofia tells them that there are other means of transport they can use without creating CO2 emissions at all like walking or using the bikes, or create very few emissions like using a scooter. This ties very well with the 1st blipp of the AR activities.

Possible Sofia dialog after they scan the QR code:

“Eco-Team, you’ve done an amazing job so far! Now let’s talk about the *superheroes* of transport — the ones that don’t leave any CO₂ footprint at all. Can you guess which ones they are? That’s right... walking and cycling! When you walk or ride your bike, you’re moving with the power of your own body. No smoke, no gas, no pollution — just clean air and healthy lungs. Click the following link to find out more information.”

Missions:

Possible dialog for Sofia after they are given the information and the blipp activity:

“Think about a short trip, like going to the park or a friend’s house nearby. Which of the following means of transport would you choose: car, bus, bike, or on foot? Which one is the most environmentally friendly?”

This mission will also include recording like the one before, after the kids are given some time, they must record themselves to answer the question provided above.

4. Checkpoint 3: Sustainable Solutions

Like the checkpoints before, the students are going to be instructed by Sofia to move to a different location like their school yard.

After they reach the yard, Sofia will inform them that she has told them everything she knew to help them understand how CO2 emissions from different means of transport affect our

planet but most importantly that every mean of transport produces its own carbon footprint.

Possible dialog for Sofia:

“Eco-Team, you’ve come so far! I’ve told you everything I could about the problem of CO₂ emissions and how they affect our planet. You now know that every way of travelling: by car, bus, train, bike, even scooter — produces its own carbon footprint. Some carbon footprints are higher, some are lower, and some are almost invisible. But none of them is exactly the same as the other.”

Mission:

Sofia proposes some solutions she could think about reducing the CO₂ emissions from transports like we walk or bike more often, share rides instead of driving alone (parents are driving of course) with the cars or walk to school in groups. After she provides some ideas then she asks the kids, her Eco – teams to share more ideas.

She asks them to draw a way they think it can help reduce the CO₂ emissions like she presented earlier and then take a photo of that picture and share it with her.

Possible dialog for Sofia for the mission:

“You’ve learned so much already, Eco-Team! Now let me share a few ideas I’ve been thinking about ways to reduce CO₂ from transport like walking or biking more often for short trips, sharing rides instead of driving alone — for example, when parents drive, they can take more than one child at a time or walk in groups safely to school powered by your own feet!

These are just some of the ways we can minimize our carbon footprints. But I know you are full of brilliant ideas too. You live here, you know your city, and you can imagine solutions I haven’t even thought of. That’s why I need your help. Eco-Team, I want you to draw a picture of a way *you* think we can reduce CO₂ emissions from transport. It could be like the examples I gave, or something completely new. Be creative — maybe it’s a flying bike, a solar-powered bus, or a super walking team! When you finish, take a photo of your drawing and share it with me.”

5. Ending Phase: Reflection & Pledge

After they take the photo, the students are instructed to go back to their classroom for the final phase of the Actionbound.

Possible dialog for Sofia after they return to the classroom:

“Eco-Team, you’ve done an incredible job today! Together, we discovered how transport choices affect our planet. You learned that every way of traveling leaves its own carbon footprint. Some carbon footprints are higher, some are lower, and some are almost zero. And most importantly, you showed me that *you* can think of smart, creative solutions to make your city/ school eco-friendlier.”

Also to add a reflective note Sofia could say:

“I’ve shared with you all I could about the problem of CO₂ emissions. But the real power is in your hands now. Every step you take, every choice you make, can help protect our planet.”

Misson:

Possible dialog for Sofia:

“Now it’s time for your final mission. I want each of you to make a promise to themselves. Think of one action you can take this week to reduce your carbon footprint. Maybe it’s walking to school twice a week, riding your bike to the park, or reminding your parents to share rides. I want you to record your pledge, then share it with me. This way, your promise becomes part of our Eco-Team’s legacy.”

After the final mission, our character Sofia is going to say goodbye and leave!

Possible Dialog for Sofia:

“Eco-Team, I am so proud of you. You’ve proven that even small steps can lead to big changes. Keep your pledges, inspire others, and never forget that you are Planet Protectors. My journey continues, but I’ll always remember the amazing team I met here today. Until we meet again — goodbye, and keep walking.

2.4 Extreme weather events in the news

A. Classroom Activity

Activity Overview

The activity titled “2.4_Activity_IEM_EDIVEA” aims to help students understand the link between climate change and extreme weather events, and explore their real-world impacts through digital tools and collaborative learning.

In the below Table the 7 phases of the educational activity 2.4 is summarized, including their specific goals, teaching methods, and tools used.

1st Phase: Activation / Prior Knowledge Investigation		
Explore (recent) headlines about extreme weather events, discuss causes and impacts, and reflect on community responses	Individual thinking, whole-class discussion	News articles, projector/interactive board, Worksheet 1
2nd Phase: Exploration		
Introduce the concept of extreme weather events and identify examples and characteristics	Group collaboration, whole-class discussion	Word cloud creation (WordArt), board writing
3rd Phase: Concept Introduction / Explanation		
Understand how climate change intensifies extreme weather events and explore their types	Group work, whole-class exploration	Poster with QR codes , Worksheet 2
4th Phase: Analyze Experimental Data (Application/Elaboration		
Analyze temperature data and relate findings to greenhouse effect	Group collaboration, data analysis, class discussion	Excel, PowerPoint, temperature data table

5th Phase: Exploring and Reflecting Data			
Examine images of extreme weather aftermath and reflect on human and animal impacts	Group work, data interpretation, class discussion	Padlet platform, images, online sharing tools	
Extension Phase: From Knowledge to Climate Action Activities			
Design and build digital AR elements to communicate concepts related to extreme weather	Group creation, presentation, multimedia integration	Blippar AR app, custom posters, videos, infographics	

Instructional Support Tables

The Table below summarizes the countries referenced in the headlines and articles, along with the nature of the event mentioned in the “1st Phase: Activation / Prior Knowledge Investigation”.

Country	Event / Climate-Hazard Mentioned	Source headline
Greece Turkey Bulgaria	Record rainfall and flash floods linked to trend across Mediterranean	Greece's record rainfall and flash floods are part of a trend – across the Mediterranean, the weather is becoming more dangerous
North African & Mediterranean countries (Region) Libya	Rising threat of “medicanes” (Mediterranean hurricanes) Libya severely impacted	Greenly – “Medicanes: the dangerous storms in the Mediterranean
Egypt	Extreme heat in the Mediterranean region including Egypt	Climate Central – “Middle East, Mediterranean, and North Africa experiencing climate-induced extreme heat”
Czech republic Hungary Romania Slovakia	Extreme storm floods it the central Europe region	Catastrophe of epic proportions
Croatia Portugal	Wildfires across nine countries including Croatia and Portugal	Mediterranean on fire as blazes spread across nine countries

Italy Tunisia Algeria Greece America	North	Extreme weather throughout July has caused havoc in Southern Europe, North Africa and across the world.	Soaring Mediterranean temperatures bring death and destruction
--	-------	---	--

Vocabulary Table

Word	Type of Phenomenon	Synonyms / Related Words	Brief description (in students' own language)
Flood	Extreme rainfall	overflow, water, river	Πλημμύρα: Όταν βρέχει πολύ και τα νερά καλύπτουν το έδαφος
Drought	Lack of rain	dry, no water, sun	Ξηρασία: Όταν δεν βρέχει για πολύ καιρό
Heatwave	High temperature	hot, sun, summer	Καύσωνα: Πολύ υψηλές θερμοκρασίες για πολλές μέρες
Storm	Strong wind and rain	thunder, lightning	Καταιγίδα: Έντονη βροχή

Table with additional internet sources from Greece, Italy, France and Cyprus on extreme weather events

Country	Event & Link
Greece	Greece is facing “successive bad weather systems” with heavy rainfall and thunderstorms
Greece	Storms in late March/early April made storms “up to 15 % wetter” and more destructive in Greece
Cyprus	Wildfire emissions soared in 2025; Cyprus referenced among countries already seeing record wildfire emissions
Italy	Heavy storms swept northern Italy in September 2025, triggering floods and landslides
France	Southern France hit by record-breaking heatwave and wildfires in 2025
Italy/France	Italy and France hit by severe flooding after heavy rain

Image Markers and QR Codes (Augmented Reality)

Image Marker 1 # QR Code

- **Popup text:** “Weather Events - Italy flooding the toll”
- **Popup Video:** [Weather Events - Italy flooding the toll - BBC - 20th May 2023 \(3\)](https://www.youtube.com/watch?v=z6oalGMpwdA)



Weather Events - Italy flooding the toll - BBC - 20th May 2023 (3)

Video Semgent [From 0.21 to 1.00]

Video Source: <https://www.youtube.com/watch?v=z6oalGMpwdA>



- **Popup text:** “Facing the Consequences of Climate Change”
- **Popup Video:** [Weather Events - Italy flooding the toll - BBC - 20th May 2023 \(3\)](https://www.youtube.com/watch?v=z6oalGMpwdA)



Weather Events - Italy flooding the toll - BBC - 20th May 2023 (3)

Video Semgent [From 1.29 to 2.33]

Video Source: <https://www.youtube.com/watch?v=z6oalGMpwdA>



- **Popup image and Link:**



- **Popup image**



[Image Link](#)

- **Link**

[Torrential rain lashes northern Italy, killing at least two people | Reuters](#)



Image Marker 2 # QR Code

- **Popup text:** Wildfires in Greece's Evia Island: A Tragedy of the Climate Age
- **Popup video:**



Video Segment [From 0.01 to 0.43]

Video Source: https://www.youtube.com/watch?v=dCtX02XN_Hs



- **Popup text:** "Forests Burn, Villages Threatened: Greece Faces Massive Wildfires"
- **Popup video:**



Evia island engulfed in flames as Greek wildfires cut a path of destruction for sixth day | ABC News

ABC News (Australia) © 2:46 on Evia island engulfed in flames

Video Segment [From 1.29 to 2.33]

Video Source: https://www.youtube.com/watch?v=dCtX02XN_Hs



- **Popup image and Link:**



- **Popup image**



[Image Link](#)

- **Link**

[Greeks fear megafires could be new normal for Med](#)

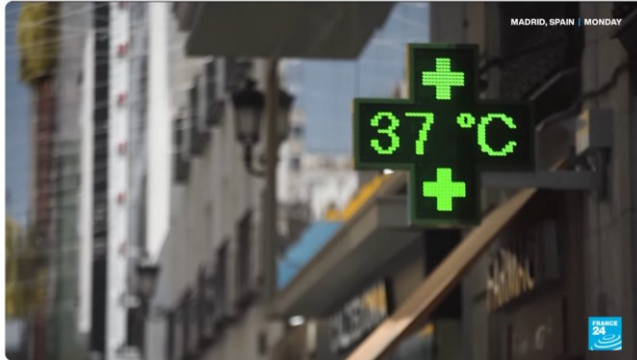


Image Marker 3 # QR Code

- **Popup text:**

Record Temperatures Strain Europe's
People and Infrastructure

- **Popup Video:**



Video Segment [ολόκληρο το video]

Video Source: <https://www.youtube.com/watch?v=P3Fc1jkws38>



- **Popup text:**

Europe: The fastest warming
continent

- **Popup video:**



Video Segment [FROM 0.00 to 3.40]

Video Source: <https://www.youtube.com/watch?v=560S27Cb1eI>



- **Popup text**



- **Popup image**



[Image Link](#)

- **Link**

<https://www.dw.com/en/europe-heat-wave-extreme-weather-heat-exhaustion-stroke-climate-change-v2/g-73094104#:~:text=Scorching%20days%2C%20sticky%20nights%3A%20Europe%20is%20suffering%20in,and%20Spain%20have%20reported%20their%20first%20heat-related%20deaths.>



Image Marker 4 # QR Code

- **Popup text**

IANOS: the dangerous storms in the Mediterranean

- **Popup Video:**



Video Semgent [Start 0.41 μέχρι το τέλος]

Video Source: <https://www.youtube.com/watch?v=zp9J-joMmzE>



- **Popup Image :**

medicane' damage in Greece



Video Semgent [Ολόκληρο το video]

Video Source: <https://www.youtube.com/watch?v=LPDxGQ-QGL8>



- **Popup text**



- **Popup image**



[Image Link](#)

- **Link**

[**Medicane Ianos turns towards Crete after sweeping across Greece**](#)



B: Action Bound

Flow overview

Introduction

Checkpoint 1: What is extreme weather?

Checkpoint 2: How climate change makes it worse

Checkpoint 3: Consequences for ecosystems, economies, societies

Ending: Pledge to Nik and goodbye

Hero of the Actionbound

Hero: Nik the Storm Keeper, a curious, brave young scientist who notices weather behaving oddly and asks the players to help investigate and protect their community.

Roles of the Children

They become Storm Keeper Agents, an investigator who observes, reports, and proposes actions. (this role can be composed as a team of they can be solo).

1. Introduction Phase

We introduce our hero, Nik and the reason why he came all the way here to find our players so they can work together.

Possible dialog for Nik:

“Hello, my friends, I’m Nik the Storm keeper. I am a scientist that watches storm patterns in Europe. First, I want to thank you for answering my call, I know that most of you have a busy schedule like me but this is very important and we have to act. Lately the weather has been acting strangely, I noticed that storms are going to occur with heavy rain and strong winds, but also summers feel extra hot, and some places dry up faster than before, these are extreme weather effects. I want to investigate these phenomena even more but I cannot leave my post in Laboratory because I might miss important changes happening. So, I need curious, kind Agents to investigate how these changes affect animals, people, and our towns while I am working in my laboratory.”

Mission:

At this stage Nik will ask the kids to describe the latest example of extreme weather effect they heard about.

This mission will include a recording, after the kids are given some time, they must record themselves to answer the question provided above.

2. Checkpoint 1 – What is Extreme weather

After the kids have provided their examples, Nik explains in detail what extreme weather is and he gives more examples to show them that extreme weather comes in many forms.

Here Nik will draw his information from the Blipps to show the kids examples of extreme weather in Europe.

Possible dialog for Nik:

“Common weather includes rain and sunshine. But what is the thing that makes extreme weather more dangerous? Extreme weather is when a phenomenon is much stronger and lasts much longer than it should! This can happen in all types of weather! Here are some examples of extreme weather, press the links below to find out more information about extreme weather phenomena!”

BLIPPS 1-4

Missions:

After the information from the blipps, Nick asks the kids to find something (maybe a dried leaf) in their school premise that could represent a drought, after they do find it, they must scan the QR code that is next to it.

This mission is a scan the QR code mission, the teacher has to choose an object in their

school premises that represents the extreme heat or drought and place next to it the QR code for the kids to scan after they find the object.

After the 1st QR code mission, Nik asks the kids to find the next item or place that represents a flood in the school premises, (this place could be the drinking water area of the school). After they find that place or item, they must again scan the next QR code they will find near it.

Like in the first mission, this mission is also a scan the QR code mission, the teacher has to choose again an object in their school premises that represents the floods and place next to it the QR code for the kids to scan after they find the object.

3. Checkpoint 2 – How Climate Change Makes Extreme Weather Worse

After the previous missions are done, Nik will inform the kids they now have to move to a location in the school where it has a lot of sunlight.

When they reach the destination, Nik will explain to the kids how the climate change affects extreme weather.

Possible dialog for Nik:

“Now that we know what extreme weather is and why it is different from normal weather, we must understand why this is happening. The answer my agents is Climate Change! Now I will share with you everything I have seen in my laboratory about the weather so you can understand too. Firstly, we have heavier rainfalls because when the air is warmer it can hold more water. That means when a storm comes, it can drop more rain in a short time and cause floods! Also, hot places or hotter sea can make storms stronger. That’s why we get very hot summers or why warm seas help storms grow bigger and wilder. Last but not least, since the climate is getting hotter, the ice from the poles is melting in the sea, that causes the sea to slowly rise. When a big storm comes, coasts flood more easily and the islands are slowing sinking!”

Missions:

At this point Nik will ask the children what surprised them the most from what they heard and if they had also noticed any of the information he provided.

This mission will include a recording, after the kids are given some time, they must record themselves to answer the question provided above.

4. Checkpoint 3 – Consequences for Ecosystems, Economies, Societies

For our third and final checkpoint the children have to move to an indoor spot, for example, a library in the school premises, Nik will inform them to do that before the checkpoint 3 begins.

For this checkpoint our hero will focus on the impact extreme weather has on our society, our economies but also to the ecosystem. (that is why on this step we prepared 3 small missions, each for one main consequence)

The first one is going to be the ecosystems, here Nik will explain how extreme weather can affect an ecosystem.

Possible dialog for Nik:

“Extreme weather changes habitats. For example, drought can mean fewer flowers, fewer bees, and then less fruit on trees.”

Mission:

- A. Here Nik will ask the kids possible other ways they think extreme weather affects the ecosystems.

This mission will include a recording, after the kids are given some time, they must record themselves to answer the question provided above. They can look up information in the school library or online (find a book that informs the kids about the change in ecosystems from extreme weather- perhaps the teacher could already have found 3-4 books about the topic and provide them to the kids) and after a small reading session of that book tell Nik

about it on the recording.

Mission:

- B. After that, Nik will speak for the second sector which is affected by extreme weather and that is the economy.

Possible dialog for Nik:

“When farms lose crops or shops close after a storm, people can lose income and food can become scarce and more expensive.”

Here Nik will ask the kids to answer a few multiple choice questions about the topic using the knowledge they have gained and critical thinking skills.

What happens to farmers when a drought lasts a long time?

They may lose crops

They earn more money

They grow more food

They get free water

How can floods affect shops and businesses?

They make shopping easier

They can damage buildings and goods

They lower prices

They bring more customers

Why might extreme weather increase food prices?

Because people eat less

Because food tastes better

Because crops are harder to grow

Because shops want more profit

What happens to tourism when a hurricane hits a holiday area?

Tourists cancel trips

Airports get busier

More tourists arrive

Hotels get cheaper

How can governments help after extreme weather damages the economy?

Ignore the problem

Give support and money to rebuild

Stop selling food

Make the weather change

Mission:

- C. Lastly Nik will focus on the consequences extreme weather has on societies. In more detail, tell the kids how extreme weather affects daily lives, safety, and services.

Possible dialog for Nik:

“Extreme events can close schools, block roads, or make it hard for ambulances and deliveries to reach people. Families and communities must make plans to stay safe.”

Missions:

Here we can present the students TRUE/FALSE quizzes.

Question: After a flood, a family should try to go back into the flooded house right away.

Correct answer: FALSE

Feedback if correct answer is chosen(FALSE): “Yes — safety first. Check people and pets, then move somewhere safe if needed.”

Feedback if incorrect answer is chosen (TRUE) : “Not the best choice. First make sure everyone is safe. Other actions come after safety is checked.”

Question: A big storm can stop ambulances and delivery trucks from reaching some neighborhoods.

True or False.

Correct answer: True

Feedback if true: “Correct. Blocked roads or flooded streets can slow or stop important services.”

Feedback if false: “Actually, major storms can block roads and make it hard for services to reach people.”

Question: True or False: Neighborhood volunteers and local authorities are the groups most likely to organize shelters and coordinate help after a big storm.

Correct Answer: True

Feedback if correct: “Right — neighbors and local authorities usually organize safe places and help.”

Feedback if incorrect: “Not quite. In emergencies, neighbors and local services coordinate shelters and support.”

5. Ending Phase – Pledge/ Promise to Nik

After the end of the third checkpoint Nik will tell the kids that it is time for him to process all the data they have collected but he is leaving them in charge of continuing his investigation and inform him of what they found when they contact each other.

Possible dialog for Nik:

“Storm keeper Agent (s), it’s time for me to return to put all the data in my computer and start processing them to study what we have discovered. I’m leaving the investigation in your hands. Keep observing plants, animals, places, and people’s needs at school and in your neighborhood. When I come back, I want a short report of what you found. Promise to watch carefully and tell me when we meet again.”

Missions:

1st mission: The kids give a pledge/ Promise to Nik that they will continue observing the extreme weather and they will try to think of solutions that could help reduce this. Also, that they will try to share their ideas with other people because this has to be a global effort! This mission will include a recording, after the kids are given some time, they must record themselves giving a pledge to Nik.

2nd mission: Nik asks the kids what made the biggest impression on them about the extreme weather and its effects and that they should share it with their other classmates and talk about it together.

This mission will include a recording, after the kids are given some time, they must record themselves giving their answer to Nik.

After the mission is over Nik says his goodbye to the kids and hopes they will keep their pledge until they meet again!

Possible dialog for Nik:

“Storm keeper Agent, you did an amazing job. Thank you for helping me investigate the extreme weather conditions. I want to remind you of the promise you made. Keep your pledge for the next days, small actions really add up. Thank you for being responsible and kind to nature and your neighbors. Keep being curious and helpful, the investigation is in your hands now!

2.8a Unwelcome guests: threats to biodiversity and ecosystems

A. Classroom Activity

Activity Overview

The activity aims to help students understand how climate change and human activities contribute to the spread of invasive (alien) species and how this phenomenon threatens biodiversity and ecosystems, particularly in the Mediterranean region. Through inquiry-based learning, digital tools, and Augmented Reality (AR), students explore real-world ecological data, analyze impacts on marine ecosystems, and design awareness-oriented digital artifacts.

The table below summarizes the phases of the educational activity, including their specific goals, teaching methods, and tools used, based on the full activity design.

1st Phase: Activation / Prior Knowledge Investigation		
Explore students' prior knowledge about alien species and understand why the Mediterranean Sea is particularly vulnerable to biological invasions linked to climate change and human activities	Group work, guided questioning, whole-class discussion	Educational video, projector/interactive board, Worksheet 1
2nd Phase: Exploration		
Distinguish between native, non-native, and invasive species and address common	Collaborative group work, conceptual discussion, teacher-led clarification	Infographic, interactive board, Worksheet 2

misconceptions related to alien species.		
3rd Phase: Concept Introduction / Explanation		
Recognize and describe common invasive species in the Mediterranean Sea using spatial and visual information	Group investigation, AR-supported exploration, whole-class discussion	Poster with QR codes and AR markers, Blippar AR app, Worksheet 3
4th Phase: Analyze Experimental Data (Application/Elaboration)		
Explain how climate change and human activities accelerate species migration and analyze their impacts on marine ecosystems	Group collaboration, data interpretation, guided class discussion	Data tables of invasive species, projector/interactive board
5th Phase: Exploring and Reflecting Data		
Apply acquired knowledge to design and develop original AR digital content that communicates messages about invasive species and biodiversity protection	Project-based group work, presentation, reflective discussion, peer assessment	Blippar AR app, student-designed posters, multimedia elements, Worksheet 4

Worksheet Correct Answers

Worksheet 1

Correct Answer: A-4, B-1, C-3, D-5, E-2 - * Included in the Toolkit

Worksheet 2

Correct Answer: 1. native, 2. non-native, 3. Invasive, 4. native, 5. invasive) *
Included in the Toolkit

Worksheet 3

Correct Answer: 1. B), 2. C), 3.B), 4.B), 5.A), 6.C), 7. B), 8.C) * Included in the Toolkit

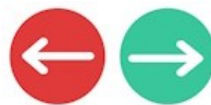
Image Markers and QR Codes (Augmented Reality)

AR Scenes Description Image Marker 1 # QR Code

• Popup text:	Lagocephalus scleratus
• Popup Image:	 https://elnais.hcmr.gr/wp-content/uploads/2023/10/Lagocephalus_scleratus-768x512-1.jpg



• Popup text:	Bat-shaped body. Reaches sizes of ≈100 cm, but the common length is ≈50 cm. Mouth with fused jaw teeth which are very sharp. A characteristic silver band runs along the sides. Back silvery-grey with black dots of nearly equal size, belly white.
Popup Video: Video Semgent [Ολοκληρω το video]	https://www.youtube.com/watch?v=ILzivSbgGBw&t=3s



• Popup text:	Sites where <i>Lagocephalus scleratus</i> has been recorded in the East Mediterranean Sea
Popup Link:	Lagocephalus scleratus - Google My Maps



Image Marker 2 # QR Code

• Popup text:	Pterois miles
• Popup Image:	 https://elnais.hcmr.gr/wp-content/uploads/2023/09/LS.jpg



• Popup text:	Body and fins banded with alternating wide dark brown/black, white and red bands. Anal and caudal fins ornamented with dark spots. Small individuals, with a lighter coloration. Dorsal fin appears feathery, whereas pectoral fins wing-like.
Popup Video: Video Segment [Ολοκληρω το video]	https://www.youtube.com/watch?v=zf58zmuT_Wc



• Popup text:	Sites where Pterois miles has been recorded in the East Mediterranean Sea
Popup Link:	https://www.google.com/maps/d/u/0/viewer?mid=1t9MEo10rASAZWxc7e92RQrOZCO5nGVE&femb=1



Image Marker 3 # QR Code

● Popup text:	Callinectes sapidus
● Popup Image:	 https://elnais.hcmr.gr/wp-content/uploads/2023/10/C_sapidus.jpg



● Popup text:	Body almost twice as wide than long, ornamented with teeth in the front and two prominent lateral spines. Claws elongated. Two last segments of the fifth legs are flattened to paddles. Colour greyish, bluish to brownish green, with lighter coloured to pinkish tints.
Popup Video: Video Semgent [Από 0.17 έως 0.43]	Siri-azul, <i>Callinectes sapidus</i>  Malacostraca, Decapoda, Portunidae



● Popup text:	Sites where Callinectes sapidus has been recorded in the East Mediterranean Sea
Popup Link:	https://www.google.com/maps/d/u/0/viewer?mid=1IMdZukORie4m5oq3lrc23tXGc8pE-3s&femb=1



Image Marker 4 # QR Code

● Popup text:	Rhopilema nomadica
● Popup Image:	 https://elnais.hcmr.gr/wp-content/uploads/2023/10/R_nomadica.jpg



● Popup text:	It is a marine bivalve with a thick, strongly ribbed shell. The hinge line bears numerous teeth, arranged in a line on both valves. Both valves have prominent beaks which are set close to the anterior end and curved inward.
Popup Video: Video Semgent [Ολοκληρω το video]	Rhopilema nomadica, the nomad jellyfish



● Popup text:	Sites where Womersleyella setacea has been recorded in the East Mediterranean Sea
Popup Link:	https://www.google.com/maps/d/viewer?mid=1U5Q-B4xzQFiR9ZYGpZ_vqqlfc9uLaWI&femb=1



B: Action Bound

Flow overview

- **Introduction Phase:** The hero will introduce himself and will provide the children with roles while explaining why the Mediterranean is a hotspot for alien species.
- **Checkpoint 1:** Students understand the difference between species that belong to the Mediterranean (native), those that arrive from elsewhere (non-native), and those that cause harm (invasive).
- **Checkpoint 2:** Students will actually meet some of these invaders, and they get familiar with them.
- **Checkpoint 3:** Students learn how climate change and human activities drive species migration, and understand the impact on marine ecosystems. (for the 3rd checkpoint they will need to have with them a notepad and pencils)
- **Ending Phase:** wrap-up, reflection activity, and a promise.

Hero of the Action bound

Maris the Guardian of the Mediterranean: A young explorer who protects local ecosystems from “*unwelcome guests*.”

Roles of the children

They become *Wave Watchers*, tasked with helping Maris investigate alien species, uncover threats, and protect biodiversity.

1. Introduction Phase

We start with Maris introducing himself to the kids and asks a question to find out their prior knowledge about the subject.

Possible dialog for Maris:

"Hello, friends! My name is Maris, Guardian of the Mediterranean. I watch over our seas, coasts, and all the creatures that live there. But lately, I've noticed some unwelcome guests, alien species arriving from far away. Some sneak in on ships, others find our waters warmer because of climate change. I can't protect the Mediterranean alone... that's why I need you! As Wave Watchers, you'll help me uncover the secrets of these newcomers and defend our ecosystems. Let's begin by sharing what you already know about why the Mediterranean attracts so many species from other places."

Mission:

The question posed is a Survey

What species do you think have invaded the Mediterranean Sea in the last years?

Options (Survey, choose more than 1 option):

1. fish
2. jellyfish
3. lions and tigers
4. The many islands and coasts create opportunities for species to spread.

Correct Answers:

Option 1 and / or Option 2

Playful Wrong Answer:

- Option 3 adds humor and keeps kids engaged.

This way, students can guess, laugh at the playful option, and still learn the real invasive species in the Mediterranean.

After the question Maris tells the students why he is here and makes an introduction about the unwelcome guests in the Mediterranean. After some information is given, he is leading the students to press the video link to find out more information about the guests. (Here we will insert the video given in phase one of the 2.8a Educational AR activity -

https://www.youtube.com/watch?v=7W00u_ugd2k.

Possible dialog for Maris:

"You've learned that ships, warming waters, and human activities bring new species into the Mediterranean. But who are these unwelcome guests? Some are tiny, some are huge, and all of them can change our ecosystems in surprising ways. To meet them face-to-face, press the video link and discover more about the visitors arriving in our seas."

Mission:

After Maris gives all the information and he also provides the video, he asks the kids to record their voice answering what they would do if they do if an alien species arrived in the Mediterranean.

Possible dialog for Maris:

"You have made your first step to becoming Wave Watchers! Before we continue our journey, I want to hear your ideas. Imagine an alien species arriving in the Mediterranean. How would you welcome or protect our ecosystems from this newcomer? Record your answer and share it with the team."

This mission will include a recording, after the kids are given some time, they must record themselves to answer the question provided above.

2. Checkpoint 1

In this checkpoint the goal is for Maris to explain to the students the difference of native, non-native and invasive species.

Possible dialog for Maris:

"Wave Watchers, you've already discovered why the Mediterranean Sea attracts so many newcomers: warm waters, busy ships, and human activities. But not all newcomers are the same. Some belong here naturally, some arrive from far away, and some cause real harm to our ecosystems. To continue our adventure, you must learn to tell them apart. I've hidden a QR code around this area, scan it to uncover the three categories because knowledge makes us powerful!"

Mission:

This mission is a QR code hunting mission, during this mission the teacher must have placed around the classroom/ playground 1 QR code for the kids to find, after they discover and scan the QR code, they gain access to the information about each category: native, alien/ non-native and invasive species. (Practically this is 1 QR mission)

Possible dialog for Maris:

"Wave Watchers, I have an important mission for you! You need to look for, find and scan a QR code. If you succeed, you will have access to useful information that all wave watchers must have. You must learn the difference among native, non-native / alien, and invasive species because sometimes these terms get mixed up, even grown-ups confuse them! Go ahead, find the hidden QR code."

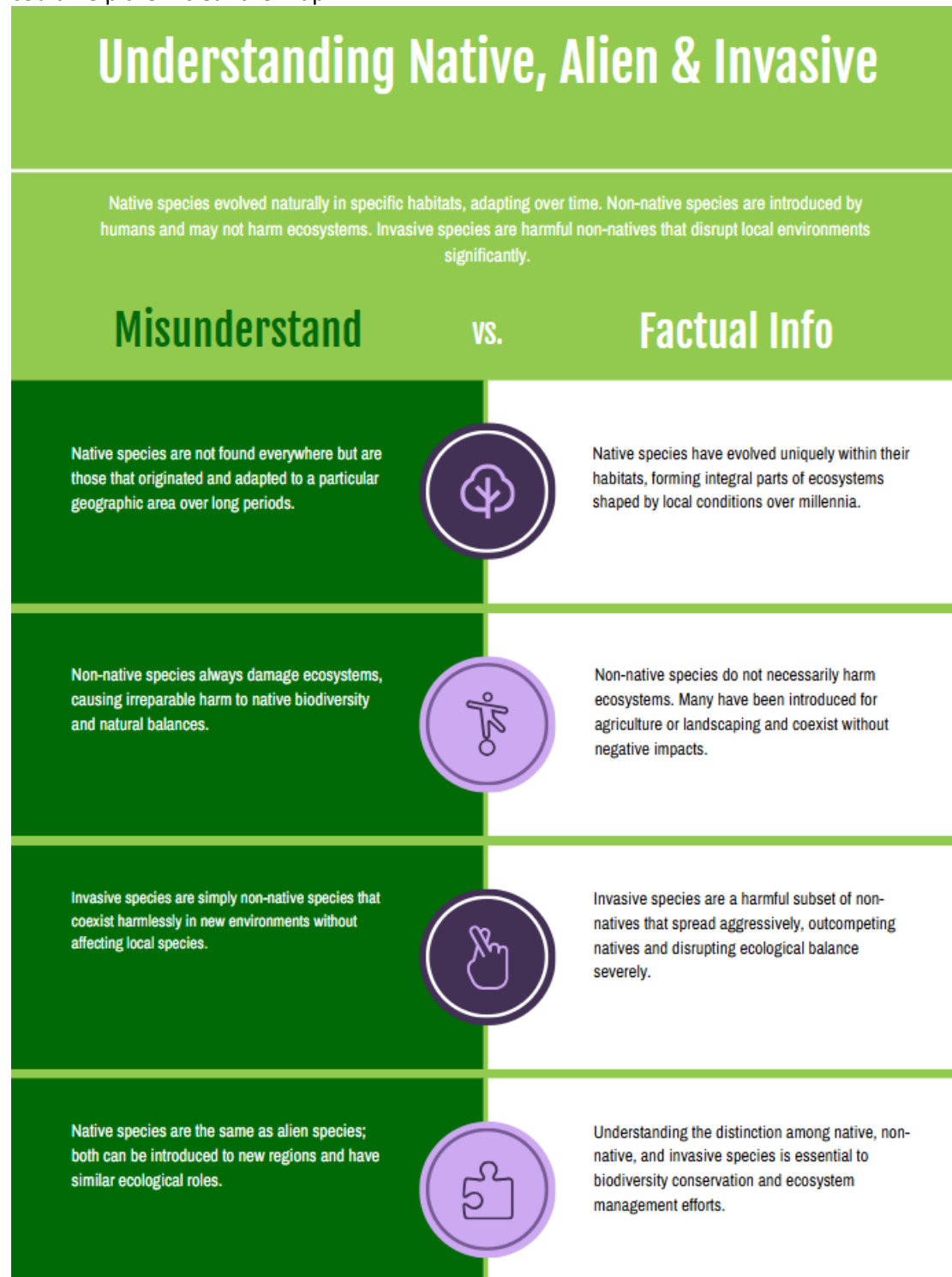
After they have successfully scanned the hidden QR code, Maris gives them access to the information. (At this point Maris will provide the students with an educational infographic, given in phase two of the 2.8a Educational AR activity)

Possible Dialogue for Maris:

"Congratulations! You did it!! I have prepared a special guide for you. It shows what people

often misunderstand... and what's really true about native, non-native / alien, and invasive species. Take a look at this infographic to sharpen your knowledge and become even stronger protectors of the Mediterranean!"

After the information is given Maris will tell the students that people often make misunderstandings and mix them with the actual facts, so he has prepared something that could help them clear them up.



After the students study the infographic carefully, they have to answer 3 multiple choice questions posed by Maris:

1. (Native Species)

"Native species are the ones that _____ here naturally. They've lived in the Mediterranean for thousands of years and form the heart of our ecosystems. Without them, our seas and coasts wouldn't be the same."

- A. visit
- B. belong
- C. don't belong

Correct answer : B

2. (Non-Native Species)

"Non-native species arrive from other regions. Sometimes they come _____ released into the wild. They don't always cause problems, but they don't truly belong here."

- A. in ships, with tourists, or even as pets
- B. by car
- C. by train

Correct answer: A

3. (Invasive Species)

"Invasive species are the real troublemakers. They spread quickly, compete with native species, and can _____. These are the 'unwelcome guests' we must watch out for."

- A. help other species
- B. harmoniously co-exist with native species
- C. harm entire ecosystems

Correct answer: C

3. Checkpoint 2

At this checkpoint, the students will actually meet some of these invaders, and they will become familiar with them. They will learn about four invasive species that have invaded the Mediterranean by using the blipps.

Possible dialog for Maris:

"Wave Watchers, you've mastered the difference between native, non-native, and invasive species. But now it's time to meet the real troublemakers. Four invaders have already spread through the Mediterranean waters: the blue crab, the pufferfish, the lionfish, and the nomadic jellyfish. Each one has its own way of causing harm. Let's uncover their secrets together!"

Mission:

For this mission the teacher will "post" the four pairs of QR codes and markers that are needed for the blips on a school wall or noticeboard outside, (If there is a fountain or a pond in the school yard, the teacher could post the Blips there since the invasive species described in the Blipps have invaded the Mediterranean Sea.)

Possible dialog for Maris:

"Wave Watchers, you need to minimize this application in your mobile phone and use your camera for the next activity. Look around and find the Poster with the 4 pairs of QR codes and Markers in the school yard. Each pair reveals the story of a dangerous invader in the Mediterranean Sea. Your task is to find them, scan them, and learn their secrets. Only then will you understand the challenges our ecosystems face!"

After the students have scanned all four QR codes and have seen the blips, they need to close the camera and go back to the ActionBound. Then, Maris could say:

"You've uncovered the four unwelcome guests of the Mediterranean Sea. Each one is a threat in its own way. Thank you for gathering this knowledge, Wave Watchers now you are ready to face the next challenge!"

4. Checkpoint 3

At this checkpoint, the students will learn how climate change and human activities drive species migration, and understand the impact on marine ecosystems. But before they dive into the activities, Maris makes a survey / question to find out what they already know about the topic.

Possible dialogue by Maris:

"Wave Watchers, you've met the invaders of the Mediterranean Sea. But have you wondered why they come here? Let's have a survey to find out."

Survey Question:

What do you think makes the Mediterranean a hotspot for plants and animals arriving from other parts of the world?

Options (Survey, choose more than 1 option):

1. The Mediterranean's warm climate makes it easier for species to survive.
2. Busy shipping routes and tourism bring species accidentally.
3. Dolphins invite them to join their families.
4. The many islands and coasts create opportunities for species to spread.

Correct Answers:

Option 1 (warm climate)

Option 2 (human activities like shipping/tourism)

Option 4 (geography of islands/coasts)

Playful Wrong Answer:

- Option 3 adds humor and keeps kids engaged.

This way, students can guess, laugh at the playful option, and still learn the real drivers of alien species migration.

After the survey, Maris provides more information

Possible dialog for Maris:

"The truth is, our own actions open the door for them. Ships travel across oceans, carrying tiny creatures in their ballast water or on their hulls. Tourists and trade bring animals and plants from far away. These human activities act like highways for species to move into new places."

"And there's another force at work, climate change. As the Mediterranean Sea is getting warmer, species that once lived in tropical waters now find the Mediterranean warm and comfortable for them to live in. Rising temperatures, changing currents, and even extreme weather events make it easier for them to survive here."

"When these newcomers arrive, the balance of the marine ecosystem can change. Some invaders eat too many native fish, others spread quickly and block out local species, and some even harm people. Every new arrival disturbs the Mediterranean Ecosystem."

"That's why your role as Wave Watchers is so important. By understanding how human activities and climate change drive migration, you can help protect the Mediterranean and keep the existing ecosystems stable."

Mission:

After the information is given to the students, Maris will ask them to use their imagination to draw a picture of a species migrating from another sea to the Mediterranean. After that the students will take a photo of that drawing and upload it to Actionbound.

Possible dialog for Maris before the mission:

"Wave Watchers, you've learned how climate change and human activities open the door for new species to enter our Mediterranean. Now it's your turn to show me what you've understood. Take a moment to imagine and draw a species migrating from far away into the

Mediterranean Sea. When you're done, take a photo and upload it so that I can see your drawing. Your drawings will help us imagine the future of our sea and how we can protect it together!"

Possible dialog for Maris after the mission:

"Wave Watchers, your drawings are amazing! Each one shows potential invasive species in the Mediterranean Sea. By sharing your drawings, you've helped me prepare for future invasive species. This knowledge makes our team stronger.

5. Ending Phase

In the end, students consolidate what they learned, transfer their knowledge to others, and make a personal pledge to continue protecting the Mediterranean.

Possible dialog for Maris:

"Wave Watchers, you learned how to tell native, non-native, and invasive species apart. You met some unwelcome guests of the Mediterranean Sea. You discovered how climate change and human activities drive migration, and how these changes disturb our ecosystems. Now it's time for the most important step: sharing your knowledge and making a promise to continue our mission."

Mission:

Maris asks the students to record a short audio explaining one thing that really impressed them from what they learned today and also pass the knowledge they got to at least 2 friends or family members. Also make a pledge that they will keep gathering information about today's topic and protect the Mediterranean Sea since it is very important for all. This mission will include a recording, after the kids are given some time, they must record themselves to answer the question provided above.

Possible dialog for Maris before the pledge:

"Wave Watchers, it is time to take a pledge to inform as many people as possible about invasive species and promise to protect the Mediterranean Sea. Record your pledge and upload it."

Possible dialog for Maris after the pledge:

"Your voices are powerful. By sharing what you've learned, you help others understand the importance of protecting the Mediterranean Sea. And by making your pledge, you join me as true Guardians of the Sea. Remember: the adventure doesn't end here. Every day, your choices and actions can keep our waters safe. Together, we will watch over the Mediterranean, today, tomorrow, and always."

3.3 Get Inspired About Climate Actions

A. Classroom Activity

Activity Overview

This educational activity aims to foster students' positive attitudes, self-efficacy, and active citizenship by engaging them with inspiring real-world examples of climate and environmental action. Through inquiry-based learning, collaborative reflection, and the use of ICT and Augmented Reality (AR), students explore successful climate action stories, analyze their key characteristics, and design feasible school-based micro-actions that promote sustainability and collective responsibility.

The table below summarizes the phases of the educational activity, including their specific goals, teaching methods, and tools used.

1st Phase: Activation / Prior Knowledge Investigation		
Expose students to inspiring climate action stories and activate emotional, cognitive, and motivational engagement with environmental action	Individual reflection, group discussion, whole-class sharing	Short inspirational videos, projector/interactive board, online climate action platforms
2nd Phase: Exploration		
Identify the key elements that make a climate or environmental action effective and meaningful, emphasizing agency, collaboration, and hope.	Collaborative group work, digital sharing, guided reflection, whole-class discussion	Padlet collaborative wall, images and short videos, online sharing tools

3rd Phase: Concept Introduction / Explanation		
Explore and analyze inspiring case stories of environmental and climate initiatives using multimodal AR representations.	Group investigation, AR-supported exploration, reflective discussion	Poster with QR codes and AR markers, Blippar AR app, Worksheet 1
4th Phase: Analyze Experimental Data (Application/Elaboration		
Synthesize insights from climate action stories and reflections to design a realistic, school-based climate micro-action	Project-based group work, data synthesis, collaborative decision-making	Students' reflective notes, Padlet posts, AR observations, planning templates
5th Phase: Exploring and Reflecting Data		
Design and develop original digital AR experiences that communicate proposed climate actions and inspire collective engagement	Creative group work, multimedia design, presentation, peer feedback	Blippar AR app, student-designed posters, multimedia elements, Worksheet 2

Image Markers and QR Codes (Augmented Reality)

Image Marker 1 # QR Code

• Popup text:	Los Angeles Wildfires
• Popup Image:	 Image Source



• Popup text:	Convoy Helps Communities Following California Fires
Popup Video: Video https://convoyofhope.org/disaster-relief/california-fires-25/	



• Popup text:	The authors of these six books shared some of those compelling stories
Popup Link:	https://convoyofhope.org/disaster-relief/california-fires-25/L



Image Marker 2 # QR Code

● Popup text:	Pacaya Volcano
● Popup Image:	 Image Source



● Popup text:	How One Man Helped a Village Survive a Volcano
Popup Video: Video https://convoyofhope.org/disaster-relief/disaster-preparation-how-one-man-helped-a-village-survive-a-volcano/	



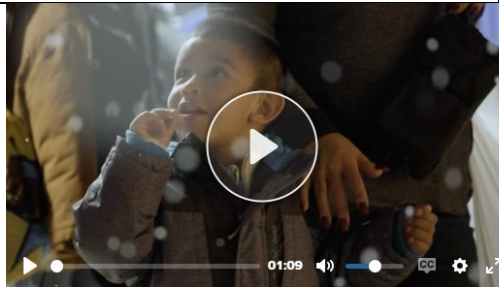
● Popup text:	Disaster preparation has a direct impact on how communities survive and recover
Popup Link:	https://convoyofhope.org/disaster-relief/disaster-preparation-how-one-man-helped-a-village-survive-a-volcano/



Image Marker 3 # QR Code

Popup text:	Hurricanes are some of the most powerful weather systems on Earth.
Popup Image:	 Image Source



Popup text:	Hurricanes Helene & Milton Strike East Coast
Popup Video: Video https://convoyofhope.org/articles/inspirational-stories/	



Popup text:	On September 27, Helene made landfall as the first known Category 4 storm to hit Florida's Big Bend region since records began in 1851
Popup Link:	https://convoyofhope.org/convoy-news/special-report-hurricanes-helene-milton/



Image Marker 4 # QR Code

Popup text:	One of the poorest and most dangerous places in all of Kenya
Popup Image:	 Image Source



Popup text:	Mathare Valley School Flanked by Illegal Alcohol & Poverty Provides Children a Way Forward
Popup Video: Video https://convoyofhope.org/childrens-feeding/school-flanked-by-illegal-alcohol-and-poverty-provides-children-a-way-forward/	



Popup text:	Some are intent on bringing hope to the half a million children living here.
Popup Link:	https://convoyofhope.org/childrens-feeding/school-flanked-by-illegal-alcohol-and-poverty-provides-children-a-way-forward/



B: Action Bound

Flow overview

- **Introduction Phase:** The hero will introduce herself and will provide the children with roles while showing them inspired actions from around the world to make them feel more engaged and encouraged.
- **Checkpoint 1:** Students begin their first real investigation as Nature Detectives. They learn that extreme weather events are becoming more intense due to climate change and they interact with AR “clues”.
- **Checkpoint 2:** This checkpoint turns students into **local Nature Detectives**. They shift from global extreme weather clues (Checkpoint 1) to **real-world clues in their immediate environment**.
- **Checkpoint 3:** In this checkpoint our goal is to help the students interpret their observations, build casual reasoning, connect local issues to climate change and final prepare them for the final micro-action they will think their school could do to help the environment making them more active in the climate change front.
- **Ending Phase:** The final phase is about transforming each student’s personal observations into a concrete, realistic micro-action that can improve their school environment and support nature.

Hero of the Action bound

Liora, the Nature Listener: Liora is a young guardian of the natural world.

Her special ability: she can *hear* the quiet messages of plants, animals, water, and wind

The roles of the students

Nature Detectives: It is a good role for the students since what we want to focus on is to fit perfectly with observation and problem-solving.

Introduction Phase

Possible dialog for Liora:

“Hi! I’m Liora. I’ve spent my whole life listening to nature, the rustle of leaves, the chatter of birds, the stories carried by the wind. Usually, nature’s voice is calm and full of wonder... but lately, something feels different. Have you ever felt that the world around you is trying to tell you something? A tree that looks tired... a stream that seems quieter... the air feeling heavier than usual? I think nature is asking for help. And I can’t do this alone. I need people who can observe carefully, think creatively, and take action. People like you. Would you like to be my Nature Detectives? Your mission is to notice clues, uncover what’s changing, and help me take action to help nature!”

Mission:

Possible dialog for Liora:

“Before we begin, take a moment. Look around you, right here, right now.

What is one thing in nature you love or want to protect?”

Students will take some time and look around and then they will record their voices to answer the question posed by Liora. This mission builds emotional connection and it is a great way to start this actionbound.

This mission will include a recording, after the kids are given some time, they must record themselves to answer the question provided above.

Possible dialog for Liora after they give their answer:

“Great. That’s exactly why you’re here. Together, we’ll explore, investigate, and uncover what nature is trying to tell us and together we’ll plan actions that make a real difference.”

Before the introduction phase is over, Liora will provide the students with videos (taken from the AR educational activity 3.3) so they can see some people take climate actions.

Possible dialog for Liora:

“You know... even though nature’s messages feel confused right now, there are people all over the world who are already taking action. Kids, teens, and adults who noticed a problem and decided to do something about it. I want to show you some of their stories. These climate action heroes started with small steps, just like you, and their ideas grew into real change. Watch their journeys. Let them inspire you. Soon, you’ll begin your own investigation. Click the links below so you can see them in action!”

At this point we will provide the links of the videos! (not all of them)

short video with stories of climate action heroes

- <https://www.britishcouncil.org/climate-connection/get-involved/action-language-education/school-video-competition/winners>
- <https://drawdown.org/global-solutions-diary>
- https://climate-pact.europa.eu/get-inspired/success-stories_en
- <https://climateheroes.org/>
- <https://www.youtube.com/watch?v=8nPpALA1Wts&t=1s>
- <https://www.ecoschools.global/videos>
- https://climate-pact.europa.eu/get-inspired/myeuclimatepact-challenge_en

Checkpoint 1

At this checkpoint the students will begin their real investigation, Liora will provide them the blips from the AR educational activity to help them understand that climate change affects the weather, they will be the clues that Liora has.

Possible dialog for Liora:

“Nature Detectives, I’ve been hearing strange signals from the weather. Storms, heatwaves, floods... they’re changing faster than ever. I’ve gathered a set of *Weather Clues*. All of them are hidden on a Poster. Press the links below and scan the images on the poster, it reveals a story about an extreme weather event. These aren’t just random events. They’re connected. I need you to look for the poster, press the links below, and scan the Makers Images, observe what you see, return to your mission, and tell me what clues you discover.”

Blipp 1

Blipp 2

Blipp 3

Blipp 4

Mission:

After the students take the information needed from the blips, they have to answer a quiz about what they notice in these weather effects, how climate change made them stronger. This can be multiple-choice question:

Possible dialog for Liora:

“You’ve collected powerful clues. Now, go back look at them together.

What do these weather events have in common? The correct answer is more than one option. ”

Possible answers:

"They are becoming more intense." - **CORRECT**

"They happen more often." - **CORRECT**

"They affect people, animals, and nature." - **CORRECT**

"They only happen in far-away countries."

"They are caused by normal seasonal changes."

"They always happen at night."

"They are completely random and unrelated."

Possible dialog for Liora:

"You've done amazing work, Nature Detectives. The clues you found in those weather events tell us something important, nature is changing, and it's asking us to pay attention. But extreme weather isn't just happening far away. Nature sends signals *right here* too... in the places we walk, play, and live."

Checkpoint 2

This checkpoint turns students into **local Nature Detectives**.

They shift from global extreme weather clues (Checkpoint 1) to **real-world clues in their immediate environment**. This checkpoint and mission are also a good way for each school to adapt in the school.

Possible Dialog for Liora:

"Nature Detectives, you've learned how extreme weather is changing around the world. But nature also sends clues right here, in the places we walk, play, and learn. Every school is different. Some are surrounded by buildings, some others by parks. But no matter where you are, nature always has something to say. Let's explore your surroundings and discover the signs hidden in this place."

Missions:

Possible dialog for Liora:

"Before we begin, choose a spot around your school to investigate. It can be a corner of the schoolyard, a small garden or planter, every space can be a place for field research!"

Follow up dialog:

"Take a photo of **one sign that nature might be stressed** in your chosen place and upload it."

Here the students have to choose what they think the stressed nature might be but some possible answers depending on the area could be dry soil, wilted plants, lack of shade etc. After they take the photo, they must upload it in the actionbound app.

Continuing the mission, possible dialog for Liora:

"Now take a photo of **one sign that nature is doing well** and upload it."

Again, this is going to be the choice of the students but here are some examples, Healthy plants, shade from trees, green spaces etc.

After they take the photo, they must upload it in the actionbound app.

The final part of this mission is going to be a record mission, where the students have to answer in the following question:

Possible dialog for Liora:

"You've found signs that nature is stressed and signs that nature is strong. Think like a true Nature Detective now, look at your two clues together. Which sign was easier to find, and why do you think that is? Record your answer and share it with me."

This mission will include a recording, after the kids are given some time, they must record themselves to answer the question provided above.

Possible dialog for Liora:

"You've done careful work, Nature Detectives. You explored your surroundings, spotted signs of stress, and noticed where nature is still strong. These clues are more important than they seem. Every sign you found is part of a bigger story. Now it's time to connect them, to

understand *why* nature feels this way and what these clues might be telling us about climate change in your own school environment. Let's bring your observations together and uncover the meaning behind them."

Checkpoint 3

In this checkpoint our goal is to help the students interpret their observations, build casual reasoning, connect local issues to climate change and final prepare them for the final micro-action they will think their school could do to help the environment making them more active in the climate change front. Here we will try to make our hero have a conversation with the student through a series of recording missions.

Possible dialog for Liora:

"You've gathered clues from your school environment, signs of stress and signs of strength. Now comes the detective work that matters most: understanding what these clues mean. Nature doesn't speak with words. It speaks through patterns. Let's look at your findings and uncover the story they're telling."

Missions:

1st mission:

"Start by looking at your two clues side by side. One showed nature struggling, the other showed nature doing well. Both are important, but sometimes one clue stands out more than the other. **Which clue feels more important for your school right now, the stressed one or the strong one? Why?**"

This mission will include a recording, after the kids are given some time, they must record themselves to answer the question provided above.

Transition to the next mission:

"Good. Now that you've chosen the clue that stands out, let's dig deeper.

A clue is only the beginning the real detective work is understanding *why* it looks the way it does. Every sign in nature has a cause. Let's uncover it."

2nd mission: Survey

"Think about your stressed clue. **What do you think is the most likely cause of the stressed sign?**"

Is it dry because of heat?

Is it struggling because it doesn't get enough water?

Is pollution affecting it?

Does human activity play a role?

This mission will include a survey, after the kids must answer the survey question provided above.

Transition to the next mission:

"You're doing exactly what Nature Detectives do — moving from observation to explanation. Some local problems are connected to bigger changes happening around the world. Let's see if your clue might be part of a larger pattern."

3rd mission:

"Climate change can make days hotter, soil drier, storms stronger, and wildlife patterns shift. Your clue might be a small piece of that bigger puzzle... or it might be something local. Either way, your thinking matters. **Do you think your stressed clue could be linked to climate change? Why or why not?**"

This mission will include a recording, after the kids are given some time, they must record themselves to answer the question provided above.

Transition to the next mission:

"Now that you understand your clue and its possible causes, you're ready for the most important detective skill: spotting opportunities for action. Every problem you noticed is also a chance to help."

4th mission:

“Look around your school. Where do you see the biggest need? Where could a small change make a big difference? **Which part of your school environment do you think needs the most improvement?**”

This mission will include a photo, after the kids are given some time, they must take a photo of the spot and upload it on ActionBound.

Transition to the final Phase:

“You’ve connected your clues, uncovered causes, and spotted opportunities. This is the heart of detective work, understanding the story behind what you see. Now you’re ready for the final step: turning your discoveries into a real micro-action for your school. Let’s move to the final phase, where your ideas are realised!!”

Final Phase

Possible dialog for Liora:

“You’ve uncovered clues, understood their causes, and spotted opportunities.

Now it’s time to bring everything together. Every Nature Detective sees the world a little differently, and that’s a strength. Each of you might have your own idea for how to help your school environment. This is your moment to design it.”

“Think back to the stressed sign you found. Think about what might be causing it. Think about where it is, who uses that space, and what could make it better. Now imagine a small, realistic action that *you* could help make happen — something that improves your school environment and supports nature. This is your micro-action. It can be simple. It can be creative. It can be something only you thought of.”

Mission:

“Describe your micro-action: What would you do, where would it happen, and who could help you make it happen? Write your answer in the text below”

This question is an open question where students have to record their idea in one big paragraph. Possible things they could include are their action, location, and team, and how they believe it could be achieved. **Free Text** task is the only task type in Actionbound that allows students to write **as much as they want**, multiple sentences, a full paragraph, even several paragraphs if needed. There is **no character limit** that stops them. (Important tip for long answers: Actionbound automatically expands the text box as students type. So even though it looks small at first, it grows with their writing. This makes it perfect for your **one big micro-action design task**, where each student needs space to express their own idea.)

Dialog for Liora after they answer the question:

“You’ve shaped your idea, chosen a place, and imagined your team. Every hero makes a promise, not to be perfect, but to try. Your micro-action is your promise to nature.”

Goodbye from Liora/ ending of the actionbound:

“You’ve completed your journey as Nature Detectives. You listened. You explored. You understood. And now, you’ve designed a micro-action that can help your school and your community. Remember: change starts with people like you, curious, caring, and brave. Thank you for listening to nature with me. And thank you for choosing to act. Your micro-action is the beginning of something useful.

3.11 Mediterranean Cuisine & Diet vs Climate Change

A. Classroom Activity

Activity Overview

This educational activity aims to develop students' knowledge, awareness, and responsible attitudes toward sustainable and healthy eating by linking the principles of the Mediterranean diet with climate change, agriculture, and environmental sustainability. Through inquiry-based learning, ICT tools, and Augmented Reality (AR), students explore food systems, seasonal and local products, food miles, and sustainable dietary choices, and translate this understanding into creative digital and experiential outputs.

The table below summarizes the phases of the educational activity, including their specific goals, teaching methods, and tools used.

1st Phase: Activation / Prior Knowledge Investigation		
Introduce global food distribution challenges and activate students' prior knowledge about food inequality, hunger, and sustainable food systems in relation to climate change	Individual reflection, group discussion, whole-class dialogue	Introductory video on global food challenges, projector/interactive board, Worksheet 1
2nd Phase: Exploration		
Explore the benefits of seasonal and local foods, understand the concept of food miles, and identify the environmental	Collaborative group work, AR-supported exploration, guided discussion	Poster with QR codes and AR markers, Blippar AR app, Worksheet 2

advantages of sustainable food choices		
3rd Phase: Concept Introduction / Explanation		
Understand the principles and health benefits of the Mediterranean diet, including the nutraceutical properties of its ingredients, and recognize typical Mediterranean dishes from different countries	Group research, digital content creation, whole-class discussion	Padlet collaborative wall, images and short videos, online sources
4th Phase: Analyze Experimental Data (Application/Elaboration)		
Analyze real-life stories related to agriculture, food production, and sustainability in Mediterranean countries and connect them to students' own dietary choices and daily practices	Group analysis, reflective discussion, application to personal contexts	EU agriculture case stories, Worksheet 3, projector/interactive board
5th Phase: Exploring and Reflecting Data		
Design and develop original digital AR experiences that communicate key messages about sustainable eating, Mediterranean diet principles, and climate-friendly food choices.	Creative group work, multimedia design, presentation, peer feedback	Blippar AR app, student-designed posters, multimedia elements, Worksheet 4

Worksheet Correct Answers

Worksheet 1

Feeding the World: Understanding Hunger and Food Distribution

Humans have made great progress over time, but sharing the Earth's resources is still a big challenge. Out of 6 billion people, about 850 million do not get enough food to stay healthy. Most of these people live in the southern hemisphere. Where you are born often decides if you get enough to eat. For example, Bob lives in Europe and has plenty of healthy food, while Seku in Africa does not get enough food and nutrients, which puts his health at risk.

Many undernourished people are actually farmers, but they struggle because they have small plots of land, old equipment, or they do not own their land. In some places, farmers leave to work in cities, and then people rely on imported food. This makes them dependent on food prices set by traders in other countries. Sometimes, food aid helps, but it can also hurt local farmers by lowering prices for their crops.

Experts say that to feed everyone in the future, we need to grow more food in smarter ways, such as using better farming methods and helping farmers in poorer countries. People in richer countries can also help by eating less meat and more plant-based foods, which use fewer resources. Feeding the world is a big problem with many parts, but everyone can help by making good choices.

Worksheet 2

Correct Answer: A-3, B-1, C-2, D-4 ***Available in the Toolkit**

Correct Answer: 1-B, 2-C ***Available in the Toolkit**

Image Markers and QR Codes (Augmented Reality)

Image Marker 1 # QR Code

● Popup Text:	When the Earth goes around the Sun, we get different seasons!
----------------------	---



● Popup Image:	
	



● Popup text:	Each season brings different weather—and the weather affects what can grow!
----------------------	---



● Popup Image:	
	



● Popup text:	Warm or cold temperatures, rain, and sunlight all help plants grow at certain times!
--	--



Image Marker 2 # QR Code

● Popup Text:	Mediterranean seasonal fruits and vegetables in spring!
----------------------	---



● Popup Image:	
	   
	   



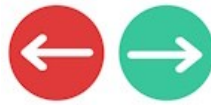
● Popup text:	Mediterranean seasonal fruits and vegetables in summer!
----------------------	---



● Popup Image:	
   	
   	



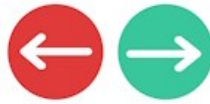
● Popup text:	Mediterranean seasonal fruits and vegetables in autumn!
--	---



● Popup Image:	
   	
   	



● Popup text:	Mediterranean seasonal fruits and vegetables in winter!
--	--



● Popup image:	



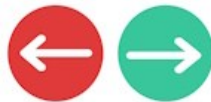
Image Marker 3 # QR Code

- **Popup Text:**

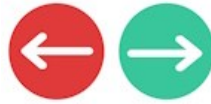
Europe is generally characterized by a Temperate climate



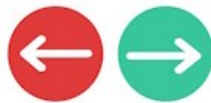
- **Popup Image:**



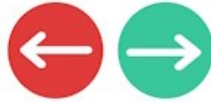
● Popup text:	The climate around the Mediterranean Sea creates uniquely flavorful fruits and vegetables
--	--



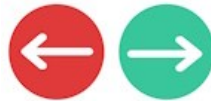
● Popup Image:	



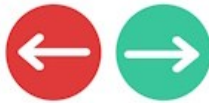
● Popup text:	Mediterranean fruits are grouped by the climate they grow in, not by how they look.
--	---



● Popup Image:	



● Popup text:	Seasonal fruits and vegetables are fresher and have more vitamins to help our bodies grow strong.
--	---



● Popup video:	
https://youtu.be/kteZneJm1EI [ολόκληρο το βίντεο]	



Image Marker 4 # QR Code

● Popup Text:	Seasonal fruits and vegetables usually grow near our homes
----------------------	--



● Popup Image:	
	

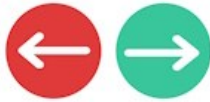


● Popup text:	These fruits and vegetables are ready to eat in different seasons
----------------------	---

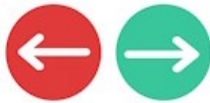


● Popup Text:	Fruit and vegetables may also be grown in greenhouses, plastic tunnels or glass houses
--	---

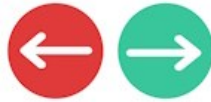
● Popup Image:	
In a greenhouse  In an indoor farm  In plastic tunnels  In a glass house 	



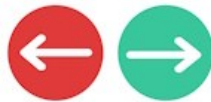
● Popup text:	This means foods can be ready at different times than if they were grown outdoors
--	--



● Popup text:	When fruit and vegetables are not in season in our country, they might be imported from other countries.
--	---



● Popup Image:	



● Popup text:	The fruit and vegetables need to travel further, and be stored for longer, from 'farm to fork'.
--	--



● Popup Image:	



● Popup text:	Food miles tell us how many miles food travels from the farm to our plate
--	---



● Popup video:	
Video https://www.youtube.com/watch?v=nhRnGNMA9FA [ολόκληρο το βίντεο]	Link:



B: Action Bound

Flow overview

- **Introduction Phase:** The hero will introduce himself and give the children their roles while showing them inspiring examples of how food choices and climate change are connected.
- **Checkpoint 1:** Students begin their first real investigation as Junior Eco-Chefs. They learn how seasons, climate, and food miles affect Mediterranean foods and how climate change disrupts these patterns. They interact with AR “clues” provided by Chef Oliveo.
- **Checkpoint 2:** This checkpoint is where students shift from **AR learning to real-world observation**. They learn what makes this diet one of the healthiest in the world and how its ingredients support human health through their **nutraceutical properties**.
- **Checkpoint 3:** Checkpoint 3 is where the students understand how climate change affects the Mediterranean diet.
- **Ending Phase:** It gives students a sense of accomplishment, responsibility, and belonging to the “Eco-Chef” identity they have built with Chef Oliveo by making a small pledge.

Hero of the Action bound

Chef Oliveo, the Mediterranean Guardian: Chef Oliveo is a magical chef born from an ancient olive tree. His special ability: he understands how nature, climate, and Mediterranean foods are connected and he teaches children how to protect them.

The roles of the students

Junior Eco-Chefs: A perfect role for students, since the goal is to observe, explore, and understand how Mediterranean foods and climate change are linked.

Introduction Phase

Possible dialog for Chef Oliveo:

“Hello, my bright Junior Eco-Chefs! I am Chef Oliveo, guardian of the Mediterranean cuisine and protector of the foods that make our bodies strong and our planet healthy. I was born from an ancient olive tree, and I’ve spent my life learning how sunshine, seasons, and climate shape the foods we love.”

“But lately... something feels different.

Some fruits ripen too early. Some vegetables struggle to grow. The seasons don’t always behave the way they used to. Have you ever noticed nature acting a little strange?

These are signs that our Mediterranean diet is being affected by climate change.

And I can’t protect it alone. I need Junior Eco-Chefs who can observe carefully, think creatively, and take action. Will you join me on this journey? Your mission is to discover clues, understand what’s changing, and help protect our Mediterranean foods!”

Possible dialog for Chef Oliveo before the video (video is taken from the 3.11 Educational Activity 1st Phase: Activation / Prior Knowledge Investigation):

“Before we begin I would like to help you understand something important: all around the world people are trying to grow enough food for everyone... but it’s not always easy. Let’s watch a short video together to understand why feeding the whole planet is such a big

challenge, and how climate change makes it even harder.”

At this point the video is provided: <https://vimeo.com/8812686>

Possible dialog for Chef Oliveo after the video:

“Well done, Junior Eco-Chefs. You saw how some people have plenty of food while others don’t have enough, and how our planet is struggling to keep up.

The way we grow, share, and eat food can help the Earth or it could harm it. And climate change makes everything even more complicated.”

Mission:

Possible dialog for Chef Oliveo:

“Before we continue, I want to hear your thoughts about the video we saw earlier. Do you think it is unfair that some people have plenty of food while others do not have enough? What do you believe? Record your answer.”

Students will take some time and look around and then they will record their voices to answer the question posed by Oliveo. This mission builds emotional connection and it is a great way to start this actionbound.

This mission will include a recording, after the kids are given some time, they must record themselves to answer the question provided above.

Possible dialog for Oliveo to transition to the next phase:

“You’ve seen how people around the world are taking action, Junior Eco-Chefs.

Now it’s your turn to begin your own Mediterranean investigation.

The foods we love like olives, tomatoes, oranges, herbs are whispering clues about how the seasons are changing. Follow me to find out more!”

Checkpoint 1

At this checkpoint, students begin their real investigation.

Chef Oliveo provides them with the four AR blips from the educational activity to help them understand:

- how seasons affect what grows
- how Mediterranean foods depend on climate
- how food miles impact the planet
- how climate change disrupts these patterns

The blips are going to be provided by the teacher for the students to scan and get the information they need. The Poster with the QR Codes and Markers will be displayed in the school yard.

Possible dialog for Chef Oliveo:

“Junior Eco-Chefs, I’ve been noticing strange signals in our Mediterranean pantry. Fruits ripening too early... vegetables struggling in the heat... foods traveling farther than ever before. I’ve gathered a set of Mediterranean Food Clues. Each clue is hidden inside a special symbol, a Marker Image. Click on the links below find the Marker Images to scan, it reveals a secret about seasons, climate, and food miles. These clues are connected. Once you have studied the clues return for another mission.”

Mission:

The students after they take the information needed from the blips, they have to complete a drawing mission.

Possible dialog for Chef Oliveo:

"You've uncovered powerful clues, Junior Eco-Chefs. Now it's time to show me what you've learned. Draw one fruit or vegetable from *each* season, spring, summer, autumn, and winter, all together in one drawing. It can be four small drawings or one big picture. Use your creativity! Then take a photo of your drawing and upload it."

The students are going to first draw a picture and then upload the picture to the actionbound through a photo mission.

Possible dialog for Chef Oliveo after the mission:

"Fantastic, Junior Eco-Chefs! The clues you discovered show something important: Climate change is affecting the seasons, making it harder for some foods to grow and when foods travel far, they create more pollution. But by choosing seasonal and local Mediterranean foods, we can help protect our planet. Now, you're ready for the next step of your journey."

Checkpoint 2

This checkpoint is where students shift from **AR learning** to **real-world observation**.

They learn what makes this diet one of the healthiest in the world and how its ingredients support human health through their **nutraceutical properties**. Students are introduced to the Mediterranean region as a whole, discovering that many countries share similar food traditions shaped by climate, geography, and culture.

After this broad introduction, the focus narrows to **four representative Mediterranean countries, Cyprus, Italy, Greece, and France**, allowing students to explore typical dishes and understand how common ingredients are used in different ways across the region.

Possible Dialog for Oliveo:

"Junior Eco-Chefs, welcome to the next step of your journey! The Mediterranean Sea touches many lands, Spain, France, Italy, Greece, Cyprus, Turkey, Lebanon, Israel, Egypt, Tunisia, Morocco, and more. Even though these countries speak different languages and have different traditions, they share something magical: **a diet that keeps people strong, healthy, and full of life**. This is the **Mediterranean diet**; a treasure passed from generation to generation. This diet has special powers. We call these powers **nutraceuticals**, nutrients that protect our heart, our brain, and our body."

Now that we have established a base on the Mediterranean, we turn the focus on the countries that are important for this Actionbound since these are the countries the partners from the program are from.

Possible Dialog for Oliveo:

"Even though many countries share the Mediterranean Sea, today we will focus on four of them, each with delicious traditions and powerful ingredients: **Cyprus, Italy, Greece, and France**. These countries show us how the same ingredients can create different dishes, flavors, and stories."

Below we will show a simple image of the ingredients below and their superpower and we will name this: **Ingredients & Their "Superpowers"**

Olive oil — protects the heart

Tomatoes — full of antioxidants

Legumes (beans, lentils) — give long-lasting energy

Whole grains — help digestion

Herbs (oregano, basil, rosemary) — natural anti-inflammatories

Nuts & seeds — support the brain

Fish — strengthens heart and brain

Fruits (figs, oranges, grapes) — rich in vitamins

Possible Dialog for Oliveo:

“These ingredients are the heroes of the Mediterranean diet. They grow naturally in our climate and help our bodies stay strong. Now, go out into your schoolyard, find the hidden maps of the four countries, and see how our four Mediterranean countries use these ingredients to create delicious dishes!”

Teachers need to have hidden or posted maps of the 4 countries around the school playground.

Each of the next 4 short texts is accompanied with a picture of the dish.

“First stop: **Cyprus**! Here, people love fresh, simple foods. One famous dish is the **village salad**, full of cucumbers, olives, herbs, and a drizzle of heart-protecting olive oil. Cyprus shows us how powerful simple ingredients can be.”

“Next, we sail to **Italy**, the land of pasta and sunshine. Italians also enjoy **caprese salad**, a beautiful mix of tomatoes, basil, and fresh mozzarella. Italian dishes celebrate the magic of tomatoes, herbs, and olive oil.”

“Now we arrive in **Greece**, where the Mediterranean diet has deep roots. One classic dish is **fasolada**, a warm bean soup that gives long-lasting energy. Greek dishes remind us how powerful legumes and vegetables can be.”

“Our final stop is **France**, especially the sunny region of Provence. Here, people enjoy **ratatouille**, a colorful stew made from tomatoes, eggplants, peppers, and herbs. French Mediterranean dishes show how vegetables and herbs work together to keep us healthy.”

“Different countries, different recipes... but the same Mediterranean ingredients that protect our bodies and our planet. Now that you’ve explored these dishes, you’re ready for your next missions!”

Missions:

The students after they take the information needed from Oliveo, they have to complete a drawing mission.

Possible dialog for Oliveo:

“Now it’s your turn to become real Mediterranean chefs!”

Follow up dialog:

“Draw your own Mediterranean dish using **at least 4 ingredients** you discovered today. Your plate can be a real dish from Cyprus, Italy, Greece or France or a brand-new creation from your imagination! Then take a photo of your drawing and upload it.”

The students are going to first draw a picture and then upload the picture to the actionbound through a photo mission.

Possible dialog for Oliveo after the mission:

“Brilliant Junior Eco-Chefs! Your Mediterranean dish looks full of color, creativity, and powerful ingredients. You didn’t just draw food, you designed a plate that celebrates health, tradition, and the flavors of the Mediterranean Sea. Every ingredient you chose has a story... every color has a purpose... and every dish you imagined shows how well you understand the Mediterranean diet. You’re becoming true Eco-Chefs, chefs who think not only about taste, but also about health and the planet.”

Possible dialog for Oliveo for transition to checkpoint 3:

“Now that you understand the magic of Mediterranean foods: their flavours, their health powers, and their traditions it’s time for the next step in your journey. But there is something important we must explore together... **What happens to these foods when the climate changes?** Some ingredients grow differently. Some seasons shift. Some dishes become harder to make.”

Checkpoint 3

This is the **reasoning checkpoint**, the moment where they begin to understand why some

foods may become harder to grow how rising temperatures, droughts, and extreme weather affect crops, why local, seasonal foods are more sustainable How their own choices can help protect Mediterranean foods. So basically checkpoint 3 is where the students we understand how climate change affects the Mediterranean diet.

Possible dialog for Oliveo:

“Junior Eco-Chefs, you’ve learned how the seasons shape our foods... and how the Mediterranean diet keeps our bodies strong. But now we must face a challenge that affects everything we love about our food. **The climate is changing.** Temperatures are rising. Rainfall is becoming unpredictable. Some seasons arrive too early... others too late. And when the climate changes, our Mediterranean ingredients feel it first. Today, you will discover how climate change affects the foods we explored and how this might change the dishes from Cyprus, Italy, Greece, and France. This part of our journey is important. It is where you connect everything you’ve learned... and begin to understand why protecting the climate also protects our food.”

More dialog for Oliveo:

“Let me show you what is happening in the Mediterranean. When summers become too hot, tomatoes dry out before they ripen. When rain becomes rare, olive trees struggle to grow fruit. When storms become stronger, crops can be damaged in a single day. Even fish in the Mediterranean Sea are moving to cooler waters. And when ingredients change... our dishes change too. Imagine Greek salad without juicy tomatoes... or Italian pasta without basil... or French ratatouille without peppers... This is why we must understand how climate change affects our food, so we can protect it.”

More dialog for Oliveo:

“Before we continue, Junior Eco-Chefs, I want to show you something special. Across the Mediterranean, in Cyprus, Italy, Greece, France, and many other countries farmers, families, and communities work every day to grow the foods we love. Their stories are full of tradition, creativity, and care for the land. They show how farming is not just work... it is **culture, identity, and sustainability.** Take a moment to look at them by clicking on the link below. Learn from them, and think about what they teach us about food and sustainability in the Mediterranean.”

At this stage we will provide the link below which is taken from the 3.11 Educational AR Activity 4th phase: https://agriculture.ec.europa.eu/media/stories_en

“After you explore these stories, think about this: **How is farming connected to culture? How is it connected to sustainability? And how is it connected to *your own life*?**”

Missions:

The missions for this checkpoint are going to be quiz missions where students have to answer based on the information they got from Oliveo.

1st mission quiz:

Possible dialog for Oliveo:

“First question, Junior Eco-Chefs!

When the seasons change too quickly or become unpredictable, what happens to Mediterranean crops?”

Possible answers:

- A. They grow normally
- B. They may grow at the wrong time
- C. They become stronger
- D. They don’t need water anymore

Correct answer: B

Possible dialog for Oliveo:

"Exactly! Plants depend on stable seasons.

When seasons shift, crops get confused, they grow too early or too late.

Ready for the next challenge?"

2nd mission quiz:

Possible dialog for Oliveo:

"Which ingredient is most affected by very hot, dry summers?"

Possible answers:

- A. Tomatoes
- B. Chocolate
- C. Ice cream
- D. Plastic toys

Correct answer: A

Possible dialog for Oliveo:

"Congratulations! Tomatoes love sunshine, but too much heat dries them out before they ripen.

Let's keep going, your Eco-Chef skills are growing!"

3rd mission quiz:

Possible dialog for Oliveo:

"When food has to travel very far to reach us, what happens?"

Possible answers:

- A. It becomes healthier
- B. It creates more pollution
- C. It grows faster
- D. It tastes sweeter

Correct answer: B

Possible dialog for Oliveo:

"Correct! The farther food travels, the more fuel is used and the warmer the planet gets.

Choosing local foods helps both our health and the Earth.

One last question!"

4th mission:

Possible dialog for Oliveo:

"What is one way we can help protect Mediterranean foods?"

Possible answers:

- A. Eat only candy
- B. Choose seasonal and local foods
- C. Leave the fridge open
- D. Throw food away

Correct answer: B

Possible dialog for Oliveo:

"That's right! You've shown great wisdom, Junior Eco-Chefs. Now you understand something

very important, **when the climate changes, our food changes too.** But small choices, like eating seasonal foods, reducing waste, and supporting local farmers can protect the Mediterranean diet for the future.”

Dialog for Oliveo to transition to the Ending phase:

“Junior Eco-Chefs, you have done something truly important today. You explored how climate change affects our Mediterranean foods... you learned how seasons, farming, and ingredients are all connected... and you discovered how even small choices can protect the dishes we love. Now, there is just one final step in our journey together. Every great chef makes a promise to care for the land, the food, and the people who grow it. In the final part of our journey together, you will create **your own Eco-Chef Promise**. A small action you choose... a commitment that shows how you will help protect Mediterranean foods and our planet.”

Final Phase

In the final phase the students will make a promise to Chef Oliveo. It gives them a sense of accomplishment, responsibility, and belonging to the “Eco-Chef” identity they will build with Chef Oliveo.

Mission:

Possible dialog for Oliveo:

“Choose **one small action** you want to take in your life to protect Mediterranean foods and the climate. It can be something simple, like:

- choosing seasonal fruits
- eating more local foods
- wasting less food
- using less plastic
- learning more about farming

Record it with your voice so I know what you chose to do and why you chose it! And remember that this is your pledge, your gift to the Mediterranean.”

Goodbye from Oliveo/ ending of the actionbound:

“Well Done, Eco-Chefs. Your promise may be small, but small actions create big change. The Mediterranean Sea, its farmers, its foods, and its traditions are safer because of you. Thank you for exploring and learning with me. Our journey ends here... but your Eco-Chef adventure is just beginning.”

Indicative maps.
CYPRUS



ITALY



GREECE



FRANCE



Part C: Guidelines for Students and Teachers

Exploring AR Scenes: Student Guide



This guide is designed to help students explore AR scenes by scanning QR codes and image markers on the Poster

Explore the poster with QR codes and the AR markers

- Each **QR code** is linked to the image next to it
- The images are called **AR markers** and work like magic windows
- Use the **QR reader** to scan each code and marker to unlock the AR experience

Step 1: Scan the QR Code

- Use your tablet or phone to scan the QR code first. Click on the link that appears
- Be patient! The AR content might take a few seconds to appear
- Then look at the image beside it

Step 2: Scan the AR Marker

- Hold your phone or tablet about 10–20 cm away from the marker image
- Make sure the whole image is visible on your screen
- The AR experience is started

Step 3: Your Mission

- The AR scene appears with words, images, and videos
- Explore the visual objects appeared on your screen
- When done, close the AR

Step 4: Repeat the same process for all the QR codes and images on the poster

- Explore, discover, and learn — one marker at a time

Step 5: Complete the assessment worksheet

- Use what you see and learn in the AR scenes to complete the assessment worksheet

Tips for Success

- ✓ Use the QR reader to scan each code and image
- ✓ Make sure you have good lighting on the marker image
- ✓ Don't cover the image with your fingers

Ready?

Hands-On Learning with ICT: Teacher Guide



This guide is designed to support teachers in facilitating a hands-on learning experience that integrates physical materials, ICT tools, and Augmented Reality (AR).

Teacher Preparation Checklist

- Prepare ICT tools (PC/ tablet, projector, Wi-Fi, interactive board, AR apps)
- Set up the classroom for group work
- Familiarize yourself with the ICT software, including datasheets and links
- Print the live poster in color and high resolution
- Test one QR code and marker in advance to check if everything loads
- Review all materials and worksheets
- Prepare guiding questions and feedback prompts
- Support students in designing Blippar posters and Action Bound Activities.
- Facilitate presentations.
- Highlight the importance of climate action



Physical & Augmented Reality for Climate Change Education



Co-funded by
the European Union

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1st Experimental
Primary School of Pyrgos
Wonder is the seed of knowledge



The project is Co-funded by the Erasmus+ programme of the European Union.

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