A PRACTICAL GUIDE TO

TEACHING SUSTAINABILITY WITH 360° VIDEO

INTRODUCTORY GUIDE FOR EDUCATORS

Eco360

Immersive sustainability and STEAM education through Eco360 interactive learning environments

Eco360

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INTRODUCTION

THE ECO360 PROJECT

Eco360 – Immersive Sustainability and STEAM Education through Eco360 Interactive Learning Environments (Project Reference: 2024-1-DE03-KA220-SCH-000256179) is a European Project co-funded by the Erasmus+ Programme of the European Union. It brings together a diverse consortium of partners from Germany, Greece, Slovenia, and Serbia with a shared goal: **to support educators in making sustainability education more engaging, accessible, and future-oriented.**

Eco360 aims to **reduce the gap between sustainability and digital innovation** by **integrating 360-degree immersive video technology into classroom teaching**. Through interactive, real-world experiences, students can explore complex sustainability topics—such as ecosystems, energy, and climate change—while developing 21st-century skills in science, technology, engineering, arts, and mathematics (STEAM).

This project promotes the **use of immersive tools** not just as a trend and innovation, but as a **pedagogical method that enhances participation, critical thinking, and digital literacy**. In doing so, Eco360 contributes to both the European Green Deal and the Digital Education Action Plan by promoting green and digital transitions in education.

PURPOSE OF THIS GUIDE

This guide is one of the main outputs of Work Package 2 (WP2 – Eco360 Introductory Guide, Training Materials, and Lesson Plans) within the Eco360 project. It is designed to **support primary and secondary school educators** in **integrating sustainability education and 360-degree immersive video technology into their teaching practice**.

The guide provides a **clear and practical framework** to help teachers make **sustainability and STEAM** (Science, Technology, Engineering, Arts, and Mathematics) learning more interactive and relevant through immersive tools.

Specifically, it includes:

- **Innovative, effective ways** to teach sustainability and connect it with STEAM.
- A **technical intro to 360° video**: how it works and what equipment and software are needed.
- **Practical guidance** on integrating immersive video into lessons.
- A collection of **best practices from across Europe.**
- **Support for teachers** from setting up equipment to creating and accessing 360° content.

The guide is designed to be **hands-on, accessible, and adaptable** to provide teachers with practical tools and structured support for bringing **immersive, sustainability-focused education into classrooms**.

CHAPTER 1
INNOVATIVE APPROACHES TO SUSTAINABILITY EDUCATION

THE IMPORTANCE OF SUSTAINABILITY EDUCATION

In a world increasingly affected by environmental crises and climate change, **sustainability education is essential**. Issues such as **floods, droughts, heatwaves, biodiversity loss, and unsustainable consumption** already **impact communities, economies, and ecosystems**. It is therefore vital that young people begin to understand the causes, consequences, and possible solutions from an early age.

The students in today's classrooms will become **tomorrow's voters, scientists, engineers, farmers, and decision-makers**. Introducing sustainability early in education helps shape long-term values, habits, and skills related to environmental responsibility and global citizenship. This is why **the early years of schooling** are a key period for the introduction of eco-friendly sustainable behaviours.

As trusted guides, **educators play a central role in helping learners make sense of sustainability** and encouraging them to act on it. To do this effectively, teachers themselves need to **feel equipped with the knowledge**, **skills, and tools to integrate sustainability into their teaching**.

Understanding **nature, the environment, and our human impact** helps **students recognise the interconnectedness of ecological, economic, and social systems**, forming the basis of sustainability literacy.

Through sustainability education, students learn to make **informed choices, tackle complex problems**, and adopt responsible behaviours that promote both **personal well-being** and **planetary health**.

Across Europe, many schools have already taken steps to address this. **Climate change is the most commonly taught topic**, followed by **circular economy, renewable energy, sustainable consumption, and biodiversity**.

A 2024 Eurydice report confirms that all 39 European education systems now include sustainability in their curricula, often through multiple subjects.

This aligns with the **European Sustainability Competence Framework (GreenComp)**, which outlines twelve competences grouped into four key areas:

GreenComp offers a **flexible structure and a shared language** that can **help schools integrate sustainability across disciplines and education levels**.

Nonetheless, some key challenges in sustainability education resist. In many cases, **sustainability learning often relies on individual schools or teachers,** limiting its broader impact. Time constraints, limited resources, and lack of clear guidance are among the main barriers. Meanwhile, **many young people report that they have had few meaningful opportunities to learn about sustainability** in school, despite believing strongly in its importance.

All this highlights the need to strengthen our efforts in **promoting successful** and **effective learning** about **sustainability topics** within the school environment.

CONNECTING SUSTAINABILITY AND STE(A)M

STEM/STEAM is an **educational approach** that **integrates Science, Technology, Engineering, and Mathematics**—with the **Arts** added in STEAM—to promote **interdisciplinary learning, creativity, and problem-solving skills** essential for addressing real-world challenges.

STEM subjects help students build **core skills such as critical thinking, data analysis, creativity, and problem-solving**. When combined with the Arts (forming STEAM), students are also encouraged to **express ideas, understand human impact, and communicate effectively**.

Every student must have access to STEAM learning opportunities—regardless of background, gender, or learning style. Inclusion in STEAM ensures that **diverse perspectives are part of designing future sustainability solutions**. Empowering all students in these subjects not only **promotes equity** but also **strengthens the global movement toward sustainability**.

Moreover, STEAM literacy includes **conceptual understanding and procedural skills**, and for individuals to address STEAM-related personal, social, and global issues.

The effect of STEAM disciplines on the students can be recognised by the development of the abilities associated with **inquiry, design, and analysis** that enable the **creation of engaged, concerned, effective, and constructive citizens.**

Sustainability can be **meaningfully integrated** into nearly every STEAM subject. To keep students engaged, STEAM lessons should relate to **real-world issues** and **experiences** they care about. This relevance can be built by **connecting classroom content to both local and global sustainability challenges**.

In the next pages, you can find practical examples of **how sustainability** topics can be explored within different STEAM fields.

Practical examples of how you can connect STEAM subjects with sustainability topics in your classroom:

SCIENCE

- Test water quality using simple kits
- Document biodiversity in local parks or school grounds
- Create a volcano model and explore its environmental impact on air quality and ecosystems
- Investigate how temperature affects plant growth

TECHNOLOGY

- Use energy-tracking apps to analyse school electricity use
- Explore open-source satellite data to track deforestation or melting glaciers
- Map classroom energy consumption using spreadsheet tools

ENGINEERING

- Design and test simple water filters
- Explore solar panel design and its application in renewable energy projects
- Construct small wind turbines to explore renewable energy
- Improve classroom recycling systems through design thinking

ARTS

- Create a poster or short video campaign on sustainability challenges
- Develop eco-themed comic strips or photo essays for awareness projects
- Reimagine product packaging to be plastic-free or reusable

MATHEMATICS

- Calculate carbon footprints using online tools
- Graph daily school waste and brainstorm reduction strategies
- Compare climate data from different countries and analyse trends

These examples can be **further explored using 360° video or VR** to provide students with immersive, real-world context.

These activities do more than build **subject knowledge**—they encourage students to **engage with sustainability** through practical, local topics, such as energy use in school or biodiversity in nearby green areas. **Working on real challenges** helps students **apply what they learn in meaningful ways**, deepening their understanding and sense of responsibility.

As sustainability becomes a growing priority across education and the job market, these integrated approaches also help students see **how their learning connects to real careers**.

Many young people are interested in sustainability-related professions but lack exposure to them. By showing **how STEAM subjects connect to green jobs**, schools can help students understand the **practical value of what they are learning**.

EFFECTIVE TEACHING APPROACHES

Sustainability education is most effective when students are **involved in the learning process**. Teaching approaches that encourage **curiosity, hands-on exploration, and creativity** help students connect more deeply with sustainability topics and build important lifelong skills.

Active, student-centred learning approaches, such as **immersive learning, project-based learning, inquiry-based learning, and experiential education,** are especially effective in addressing complex, real-world challenges.

Immersive learning

Uses tools like VR or 360º videos to let students "step inside" a topic, making abstract ideas feel real and relevant. It supports different learning styles—whether students learn best by seeing, hearing, or interacting with content—while also boosting motivation and engagement.

Project-based learning

Involves students working on long tasks with real-world relevance. For example, improving the school's recycling system or investigating local water quality. These projects help students see the direct impact of their work and understand how their skills can solve real problems.

Inquiry-based learning

Starts with students' own questions and investigations. Rather than just receiving information, students explore, research, and draw their own conclusions. This develops critical thinking and problem-solving—key abilities for addressing sustainability issues.

Experiential education

Focuses on learning through direct experiences, such as fieldwork, community projects, or hands-on experiments. These allow students to apply classroom knowledge to real-life situations, making learning more practical and memorable.

Many teachers already use tools like **interactive videos**, **group discussions**, **field trips**, and **hands-on experiments** to make lessons more dynamic and memorable.

The key is to **start small.** Introduce just **one new method per unit**—such as a simple project, digital tool, or group activity. **Use free resources**, **work with colleagues**, and **encourage peer learning among students**.

Teachers are not expected to have all the answers. Instead, show students **how to find reliable information, evaluate sources, and deal with uncertainty**. These are **essential skills** for their future.

Flexibility is essential. Before starting, consider whether a particular method fits your students' needs and group dynamics. Be prepared to adjust your approach as necessary.

Test new activities in advance and **identify where students might face difficulties**. If a task appears too complex or technical, **simplify it** or be ready to **guide students through the process** as part of the learning experience.

Both teachers and students need time to adjust to new approaches, so it is important to **allow space for gradual adaptation**. With each attempt, the process becomes smoother, leading to **greater confidence**, **clearer instruction**, and **more independent learners**.

Regardless of the teaching method used, **flexibility is essential**. The chosen approach should **align with the group's needs** and **remain focused on the learning objectives**, even if the path to achieving them shifts along the way.

Most importantly, reflect regularly on **what is truly relevant and meaningful for your students**. Effective sustainability education is not defined by the method itself, but by **how well it helps students connect with real-world challenges**, **develop critical skills**, and **take informed action.**

TIPS FOR AN EFFECTIVE STEAM LESSON

- ☐ **Set clear goals, flexible paths:** Define what students should achieve, but let them choose how to get there.
- ☐ **Provide structure and feedback:** Use deadlines, checkpoints, and regular feedback to keep students focused and progressing.
- ☐ **Embrace failure as learning:** Treat mistakes as valuable opportunities for reflection, adjustment, and growth.
- ☐ **Encourage reflection:** Have students present their work and share what they learned to build critical thinking and communication skills.
- ☐ **Be a supportive guide:** Mentor students with thoughtful questions, fostering independence while offering guidance.
- ☐ **Ask open-ended questions:** Promote deeper engagement by encouraging students to express ideas, explore solutions, and reflect on their learning.
- ☐ **Foster active participation**: Involve students in discussions, problem-solving, and decision-making to strengthen understanding and ownership of sustainability topics.

CHAPTER 2
360° VIDEO: TECHNICAL OVERVIEW

WHAT IS 360° TECHNOLOGY

A 360° video is an **immersive media format** that **captures an entire surrounding environment** in all directions — front, back, above, below, and side-to-side — **placing the viewer at the center of the scene**. Unlike traditional videos, which are limited to a fixed frame, 360° video allows viewers to explore freely within the recorded space.

This is achieved through special cameras equipped with multiple wide-angle lenses that record simultaneously. The result is a **spherical video**, offering a sense of "being there" by **enabling users to look around the scene** as if they were physically present.

While originally popularised in entertainment and virtual tourism, **360° video has gained increasing relevance in education**. Its ability to immerse students in otherwise inaccessible environments — from underwater ecosystems to historical landmarks — provides a **unique opportunity for experiential learning**.

By shifting from passive observation to active exploration, **360° technology** enhances **engagement, spatial awareness,** and **contextual understanding**.

HOW DOES 360° VIDEO WORKS

Although the concept of 360° video may seem technologically complex, the production process can be broken down into three fundamental steps: **capture, stitch, and view**.

1. **Capture:** Most 360° cameras include two or more wide-angle lenses that face opposite directions. Each lens captures half (or a section) of the environment, resulting in overlapping streams that together record the entire sphere around the device. Think of it as filming the inside of a globe, with the camera in the center. When you press the record button, each lens simultaneously captures a panoramic field of view, leaving no blind spots.

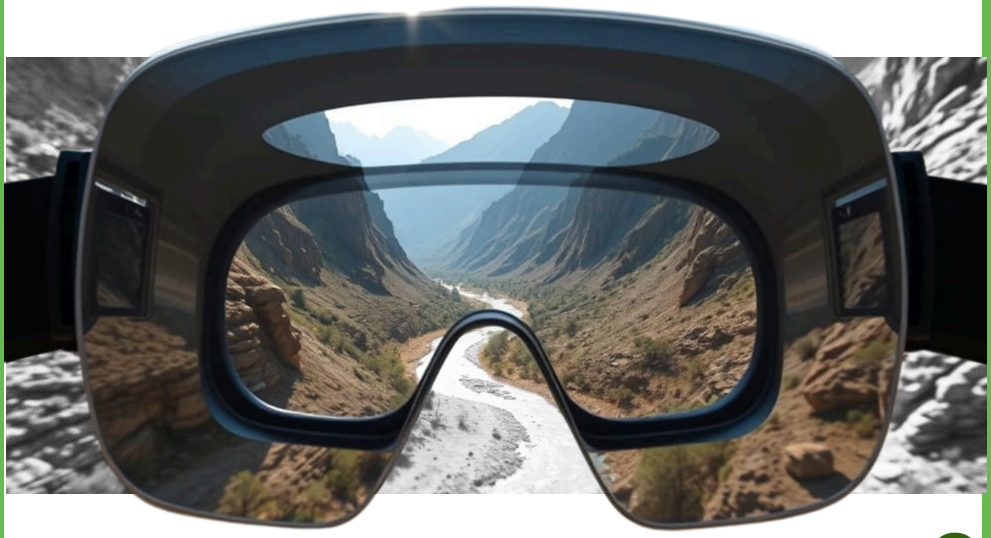
2. **Stitching:** After recording, the individual video streams must be combined into one seamless sphere—a process called "stitching." Modern consumer cameras typically handle stitching automatically, either within the camera itself or via a companion app. The software overlaps the edges of each lens's footage and blends them together so that the viewer doesn't see any visible seams. In the past, manual stitching required specialized software and a time-consuming process, but today's cameras and apps make it largely effortless, a huge benefit for busy educators.

3 **Viewing:** The stitched 360° video is usually saved in a standard MP4 file format, but laid out in an equirectangular projection — essentially a flattened sphere resembling a world map.

While this appears distorted when viewed in a normal media player, specialised 360° video players re-wrap the video into an interactive sphere. Viewers can then look around freely:

- **On a Computer:** By clicking and dragging with a mouse.
- **On a Phone or Tablet**: By physically tilting or moving the device.
- **In a VR Headset:** By turning their head, creating a natural sense of presence.

The entire process — from capture to stitched playback — has been **simplified to a level where educators can record and share 360° videos with minimal technical intervention**.



EQUIPMENT AND SOFTWARE OVERVIEW

Selecting appropriate equipment is essential for producing high-quality 360° video content. Today's market offers a wide range of devices, from entry-level models to advanced professional systems, making it important to balance quality, ease of use, and budget considerations.

Cameras and Budget

- **Entry-Level Devices:** Models such as the **Ricoh Theta SC2** (around €300) or older **Samsung Gear 360** (often found second-hand) offer user-friendly operation at lower cost.
- **Mid-Range Cameras: Insta360 X5** typically retails for €400–€550. They include higher resolutions (up to 8K), waterproofing, image stabilization, and, most importantly, robust companion apps. These features can prove valuable if you plan to shoot in varied settings or let students handle the camera often.
- **High-End Devices:** Some 360° cameras exceed thousands of euros, featuring extremely high resolution or advanced professional features like stereoscopic (3D) capture. However, these capabilities e rarely necessary for educational projects.

Technical Considerations

- **Resolution:** A minimum of 4K resolution is recommended for educational use to ensure adequate visual clarity. Devices offering 5.7K or higher provide sharper details, especially when viewed in VR, but result in larger file sizes.
- **Stabilisation:** For dynamic recordings, such as virtual tours or field activities, built-in image stabilization is essential to prevent viewer discomfort caused by shaky footage.
- **Low-Light Performance:** Cameras with better low-light sensitivity are beneficial for indoor recordings or poorly lit environments.
- **Battery Life and Storage:** Recording in 360° is energy-intensive. Typical cameras offer 40–60 minutes of recording per charge. Sufficient storage capacity (64–128 GB microSD cards) is also necessary due to large file sizes generated by high-resolution footage.

Companion Apps and Software

Most consumer-grade 360° cameras are come with mobile apps that simplify essential tasks:

- Automatic stitching and export.
- Basic editing functions (trimming, reframing, adding titles).
- Direct sharing to platforms like YouTube.

Brands like Insta360 stand out for their user-friendly apps, offering teachers an efficient workflow to capture, process, and share content with minimal learning curve.

FILE FORMATS, RESOLUTION & STORAGE CONSIDERATIONS

Understanding the technical parameters of 360° video helps ensure smooth playback and compatibility across devices.

File Format: Most 360° cameras save videos as MP4 files using H.264 or H.265 compression. They record in an equirectangular format, which works well with platforms like YouTube and Facebook for 360° playback.

Resolution: Although 4K sounds high-quality, in 360° video this resolution is spread across the entire scene—so the actual sharpness appears closer to 1080p. For classroom use, 4K or 5.7K gives a good balance between image clarity and file size.

Storage and Bandwidth: High-resolution videos use lot of space. Just one minute of 5.7K footage can use several hundred MB. Plan for storage (e.g. external drives or cloud solutions) and check your school's bandwidth before uploading or streaming.

Audio: Built-in mics record ambient sound, which helps immersion. For clearer voice recording, use an external microphone. Spatial audio adds realism but is not essential for most classroom projects.

COMMON QUESTIONS AND HELPFUL ADVICE

Is it difficult to edit 360° footage?

No. Footage is now automatically stitched by most cameras. and basic editing can be done using free or low-cost apps. If one is familiar with simple video editing, working with 360° is manageable.

What if my school has a tight budget for VR?

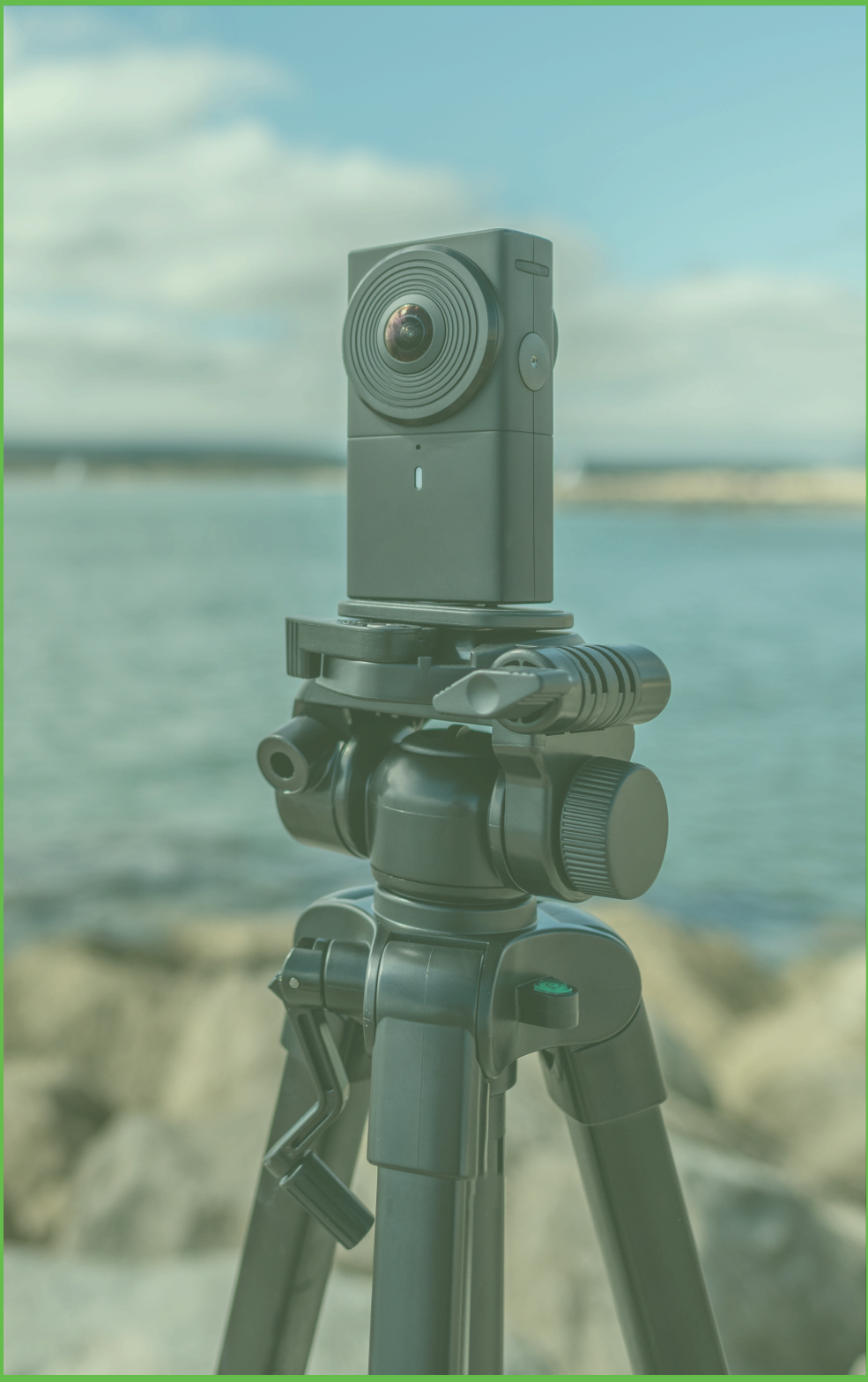
Students can view 360° content on computers, tablets, or phones without the need for expensive headsets. Affordable options such as the Meta Quest 3S may be considered for enhanced immersion.

Are there privacy or safety concerns when filming in 360°?

Yes. Always follow school policies on recording and ensure consent is obtained, as the camera captures everything in its surroundings.

Is high-speed internet required to share 360° videos?

A fast connection helps with uploading, but streaming platforms adjust quality automatically. Videos can also be stored locally for offline use.



CHAPTER 3
INTEGRATING 360° VIDEO INTO LEARNING

THE ROLE OF 360° VIDEO IN EDUCATION

Today's students face learning needs that traditional methods no longer fully address. In response, **immersive tools like 360° video** offer a **practical and powerful solution**. Technologies such as Augmented Reality (AR), Virtual Reality (VR), and Extended Reality (XR) create **interactive, emotionally engaging environments that support different learning styles**.

360° video stands out as an affordable and accessible entry point to immersive learning. It works with common devices, like smartphones, desktops, or low-cost headsets like Google Cardboard, making it **ideal for schools with limited resources** (For an overview of affordable equipment setups, see Classroom Setup and Essential Equipment).

Advances in technology have removed many barriers of cost and complexity, allowing students to **"step inside" the content**, better **visualise abstract concepts**, and **connect with learning** on an emotional level. Teachers can also design real-world learning scenarios that help bridge theory and practice.

360° video can offer significant **benefits to the entire school community**, including students, teachers, and the school as a whole.

Benefits for Students

- **Greater engagement and active learning:** Immersion encourages students to participate more and interact deeply with the subject.
- **Better understanding of complex topics:** Students retain more and develop stronger conceptual understanding.
- **Adaptability to different learning styles:** 360° video provides a multi-sensory experience that supports visual, auditory, and kinesthetic learners.
- **Safe experiential learning:** Simulations allow exploration of environments that are otherwise too risky, costly, or inaccessible.
- **Inclusive access to learning:** It offers a viable alternative for students unable to attend physical trips or visits.
- **Development of transferable skills:** Activities using 360° video promote teamwork, problem-solving, and decision-making.
- **Improved memory retention:** Immersive learning tends to leave a lasting impression, especially in subjects like history or geography.
- **Increased motivation:** The playful, interactive nature makes learning more enjoyable, especially for disengaged learners.

Benefits for Teachers

- **Professional development:** Using 360° video builds digital and pedagogical skills, aligning with modern ICT demands.
- **Greater creativity and motivation:** Many teachers report feeling more inspired when using immersive tools.
- **Better classroom flow**: Immersed students are less distracted, especially in hybrid or digital settings.
- **Engaging, time-saving resources**: Teachers can use ready-made content, saving preparation time.
- **Stronger teacher-student connection**: Embracing modern tools helps teachers appear more approachable and innovative.

Benefits for Schools

- **Cost-effective enrichment:** A practical alternative to expensive field trips or specialised labs.
- **Reusable content:** 360° video resources can be used across subjects and year levels, and they can also be viewed immersively on smartphones and tablets.
- **Stronger student retention**: Schools offering immersive learning are more appealing to tech-savvy families.
- **Access to funding and partnerships**: Aligning with digital strategies and initiatives (e.g. Erasmus+) opens doors to grants and collaborations with external partners.

WAYS TO USE 360° TECHNOLOGY IN LESSONS

360° video technology offers **enriches learning across disciplines** by enabling inquiry-based, hands-on experiences—often without leaving the classroom.

Teachers can begin by allowing students to **explore a 360° scene independently**, then revisit it with guiding questions, tasks, or discussion. **Combining immersive experiences with traditional activities**, such as worksheets, creative writing, quizzes, or group discussions, **helps deepen understanding**.

Importantly, student-created content is possible even without a 360° camera. For example, **learners can storyboard immersive lessons**, **draft narratives for virtual environments**, or **create story spheres**, all of which build digital literacy, critical thinking, and communication skills.

Whether a teacher is working with students in STEAM, humanities, or sustainability, **360° technology can enhance their teaching toolkit**. Implementing 360° video does not require advanced equipment: a **Google Cardboard** or other VR chipset can be used as the only piece of equipment to experience virtual reality. In the next page we explore how 360° videos can be integrated into a range of different activities.

- **Virtual Field Trips**: 360º video allows students explore distant or significant places—like the Amazon rainforest, ancient ruins, or the International Space Station—without leaving the classroom. These experiences enhance geographic, scientific, or historical understanding. Paired with observation tasks, reflection prompts, or worksheets, they become structured and engaging learning activities.
- **Immersive Storytelling:** In language and literature lessons, 360-degree environments provide a dynamic platform for storytelling and perspective-taking. Students explore settings through a character's eyes, supporting creative writing, descriptive language, and literary analysis. This approach is especially helpful for reluctant writers or visual learners.
- **STEM Demonstrations and Simulations**: In STEM subjects, immersive video helps students visualise complex concepts—from planetary motion and chemical reactions to the human circulatory system. It gives students access to labs, engineering sites, or natural events that are too dangerous, expensive, or hard to see in real life.
- **Environmental and Social Awareness:** Teachers can place students at the heart of global challenges—such as climate change, deforestation, or inequality—using immersive content. These experiences build empathy, critical thinking, and a stronger emotional connection to real-world issues.

- **Interactive Role-play and Soft Skills Development**: 360º video supports social and emotional learning (SEL) through realistic, scenario-based role-play. Students can practice conflict resolution, collaboration, or decision-making in immersive contexts. These activities help develop communication, empathy, and leadership, and are useful in both life skills and career readiness programmes.
- **Student-Created Documentaries:** When possible, students can create their own 360° video projects. Examples include a virtual campus tour, recording science fair presentations, or documenting outdoor activities. These tasks support digital literacy, teamwork, and creative thinking. Allowing students to take charge of the filming process also builds valuable technical skills and gives them greater ownership of their learning. To learn how to create your own 360º videos with students, refer to section Creating your own 360º Video.

Reflection and Discussion: To make the most of 360° videos, teachers can include guided observation tasks. For example, during a virtual field trip, questions like "Look for the waterfall behind you. What details stand out?" or "Scan the skyline. What changes do you notice in the architecture?" help direct student attention. Comparing these observations with those from a traditional 2D video can spark useful discussions about how different formats shape perception and understanding.

TRY THIS IN THE CLASSROOM

- **Have students present a topic** (e.g. the water cycle) as a 360° experience. What elements would they include? Where would the viewer "stand"? What would they see or hear?
- **Ask students to write scripts and create storyboards** for their own immersive experiences—even if they don't have the tools to produce them. This develops planning and narrative skills.
- **Create a "travel journal" task based on a 360° journey** (e.g. into the Amazon rainforest). Ask students to describe what they saw and felt, and reflect on what they learned about biodiversity.
- **Ask students to write a "story from the inside"** by placing themselves as characters in a 360° scene (e.g. a natural disaster area). Encourage creative writing that combines factual detail with imaginative perspective.

CHALLENGES AND TO HOW TO OVERCOME

While 360º technology presents exciting opportunities for education, **several practical barriers** have been identified across Europe. However, each of these challenges can be addressed with **targeted, realistic solutions** to help **ensure immersive learning** is both **achievable and sustainable** in any classroom.

Challenges	Solutions
Limited Access to Equipment	• Use smartphones with basic VR viewers (e.g. Google Cardboard). • Choose web-based tools that don't require headsets (e.g. YouTube VR, Thinglink). • Seek funding or donations through local partnerships.
Limited Technical Skills and Confidence	• Join free courses or workshops on new technologies (e.g. Google Street View app, Insta360 Studio, Thinglink) and learn from colleagues who have have experience with 360° activities. • Ask school administration to appoint a tech mentor who can provide support. • Present the pedagogical benefits of 360° learning to school administration using examples and student feedback, to gain their support for funding training or using school resources for professional development.

Challenges	Solutions
Lack of Ready-Made Content	• Use curated libraries (e.g. National Geographic VR, BBC Planet Earth). • Collaborate with schools or networks producing immersive content. • Share ideas and materials through teacher platforms.
Lack of Time due to Excessive Workload	• Start with short, low-prep activities (e.g. 5-minute virtual tours). • Embed 360° video into existing lesson plans rather than creating new units.
Platform and Software Accessibility	• Use free tools that are compatible with school systems (e.g. Kuula, SeekBeak). • Coordinate with IT staff to whitelist essential apps. • Store content locally to avoid reliance on unstable internet connections. • Use school email accounts to access VR platforms securely.
Financial Barriers	• Link 360° use to national digital or inclusion goals to support funding requests. • Present evidence of impact (e.g. student engagement, skill development). • Apply for grants focused on innovation, STEM, or digital education (e.g. Erasmus+).

CHAPTER 4
BEST PRACTICES

BEST PRACTICES ON SUSTAINABILITY EDUCATION

Best practices in education are real-life examples of **effective teaching approaches** that have shown positive results in educational contexts. In **sustainability education**, they provide teachers with practical ways to introduce topics like **climate change, biodiversity, and the circular economy** in a meaningful and engaging way.

These practices are valuable because they provide **concrete examples** that other educators can replicate or adapt to connect theory and practice, making **sustainability topics more accessible and to students**.

To make the most of each activity, teachers are encouraged to extend these practices through **reflection and creative follow-ups**. This might include **classroom discussions on what students observed**, **linking the experience to local issues**, or having students work on **posters, presentations, or short videos** as a way to deepen understanding and share their learning with others.

The next section presents 12 selected **best practices from across Europe**. They demonstrate how teachers can combine **sustainability content** with **interactive and immersive learning approaches**, offering inspiration for applying similar ideas in different educational settings.

EXAMPLES OF BEST PRACTICES

1 Virtual Reality Excursions in Geography Studies (VREX)

Developed by the University of Potsdam, VREX offers immersive virtual field trips designed to enhance geography learning. Using 360° video, students explore urban environments and spatial development, supporting critical reflection on sustainable cities and planning. Students also contribute to creating the experiences by capturing and curating content.

Objectives 	• Promote spatial awareness and geographical competence • Enhance understanding of urban and cross-border development • Use immersive tools to deepen engagement with geography
Example of Use 	Students from the University of Potsdam visited Vienna, captured 360° videos of eco-friendly infrastructure, and created VR excursions that were later used in geography lessons to support classroom learning.
Learn More 	• VREX Platform and educational material • Project Overview

2 360° Wilderness in Germany

"360° Wildnis in Deutschland" is a collaborative initiative using immersive video to promote environmental education and wilderness conservation in Germany. The 360° video "Wilderness in Germany" offers students a dynamic, engaging experience of the country's wild forests and ecosystems.

Objectives 	• Increase understanding of ecosystems, biodiversity, and wilderness conservation • Encourage reflection on human impacts on the environment • Promote environmental protection through digital learning
Example of Use 	Developed with support from 21 conservation organizations and students from Hochschule Trier, this 360° wilderness video is used in classrooms to explore wild forest environments, followed by reflection and group activities about biodiversity and conservation strategies.
Learn More 	• Project website • 360° Wilderness Video – "Discover fascinating wild forests" • Photo Gallery Making-Of

3 Digital Forest Lab Haselberg

Developed by HNEE - The Eberswalde University for Sustainable Development, the Digital Forest Lab combines immersive 360° video with on-site data collection to teach forest ecology, biodiversity, and sustainable forestry practices. Students can virtually revisit the Haselberg Forest to assess seasonal changes and sustainability outcomes through an interactive platform.

Objectives 	• Learn sustainable forest management • Combine virtual and field-based observation • Use digital tools for ecological data analysis
Example of Use 	HNEE students collected forest data, recorded 360° footage, and later used the platform to analyse seasonal changes and assess the ecological effects of different forestry techniques.
Learn More 	• Digital Forest Tour Platform • Digital Forest Lab Haselberg Overview

4 Isonzo XR

Isonzo XR is an immersive educational app combining 360° video, augmented reality, and GPS storytelling to explore the Isonzo River region's environment, history, and culture. Thematic routes link local issues to the UN Sustainable Development Goals, encouraging students to think critically about sustainability and regional identity.

Objectives 	• Introduce sustainability through heritage and geography • Explore local SDG challenges interactively • Use immersive tech to promote place-based learning
Example of Use 	Students used the app during outdoor excursions to explore biodiversity, irrigation systems, and SDG-related issues, linking immersive media with physical geography and local contexts.
Learn More 	• Official project website • Isonzo XR app on Google Play • Isonzo XR app on the App Store

5 Train2Sustain

Train2Sustain is a European digital platform offering immersive 360° simulations in sectors such as construction, healthcare, and hospitality. Through virtual tours with embedded activities, learners can understand how sustainability is applied in real-world settings, making the abstract more tangible.

Objectives 	• Teach sustainability through sector-based simulations • Promote sustainable business practices in VET • Enable self-paced, immersive learning experiences
Example of Use 	VET students explored a virtual hotel or building site, examined eco-friendly practices, and completed quizzes and tasks focused on sector-specific sustainability solutions.
Learn More 	• Train2Sustain 360° Environments • Train2Sustain main website

6 GlacierXperience

GlacierXperience is a digital education platform where students explore glaciers like Hallstätter and Steindalsbreen using 360° video and experiments. This virtual tool enhances climate education by providing real glacier visuals and activities for understanding environmental change.

Objectives 	• Raise awareness of glacier retreat and climate change • Offer immersive glacier access to non-local students • Promote climate science and sustainability education
Example of Use 	Students navigated glaciers virtually via the platform and QR-linked scenes. Activities included studying erosion and climate data and exploring the Future Lab for insight into climate solutions.
Learn More 	• Main project platform • Overview of available digital glacier environments

7 EIB 360° Quest for Climate Solutions

The European Investment Bank's (EIB) "360° Quest for Climate Solutions" is an immersive video series showcasing climate resilience and sustainability projects in Greece. The 360° format allows viewers to explore initiatives such as marine research and renewable energy, presented through interviews and on-site visits.

Objectives 	• Highlight real-world climate solutions • Encourage discussion on renewable energy and sustainability • Promote EU-led environmental initiatives
Example of Use 	Students explored a virtual marine research expedition through 360° video, then discussed project impacts, clean energy strategies, and the role of EU investments in climate resilience.
Learn More 	• Project website • EIB 360° climate action videos • EIB Europe Day press article with video links

8 SEPA360: Supporting Educators' Pedagogical Activities with 360 Video

SSEPA360 is an Erasmus+ project supporting university educators in integrating 360° video into teaching. It offers technical training and an authoring platform (Vivista) to help create interactive, immersive learning experiences. Educators can design custom lessons with clickable hotspots, questions, and media to simulate real environments. The platform tracks student interaction and engagement, enabling active learning. It supports digital upskilling in higher education and shows how immersive media can enrich teaching.

Objectives 	• Train educators in 360° video integration • Use VR for realistic teaching simulations • Showcase editable, interactive video tools
Example of Use 	University teachers used 360° videos to simulate natural events like volcanic eruptions, then led group discussions on environmental and geological implications.
Learn More 	• SEPA360 homepage • SEPA360 MOOC – free online course for teachers • SEPA360 360° video library • SEPA360 workshop documentation

9 V-Global: Virtual Field Trips

V-Global promotes blended learning and Education for Sustainable Development (ESD) through participatory virtual field trips. University students and teachers co-design immersive journeys using real data to understand global change.

Objectives 	• Promote sustainability through experiential virtual learning • Engage students in co-design of field trips • Expand access to ESD regardless of geography or mobility
Example of Use 	Greek professors led students in planning a virtual trip around urban heat islands. Students collected data, designed scenes, and used the result in class for climate-related lessons.
Learn More 	• V-Global official website • V-Global MOOC – free blended learning course • Example virtual field trip (ArcGIS StoryMap)

10 Coast 360: A Virtual Day in the Delta

Coast 360 is a high-quality 360º video experience developed by the Restore the Mississippi River Delta Coalition. It offers a virtual field trip to Louisiana's rapidly vanishing coastal wetlands, showing both the beauty of these environments and the urgency of land loss. Through immersive 360° visuals and narration, viewers witness active restoration projects and hear from the communities affected, gaining a first-hand sense of why protecting coastal ecology matters.

Objectives 	• Teach wetland ecology and climate adaptation • Engage with real-world environmental restoration • Spark empathy and awareness through immersive media
Example of Use 	Students viewed the delta through VR, then discussed local species, coastal restoration, and human impacts. Activities reinforced concepts through art, reflection, and debate.
Learn More 	• Watch the Coast 360° video – Mississippi River Delta

11 360 Video as a Teaching Technique (Erasmus+)

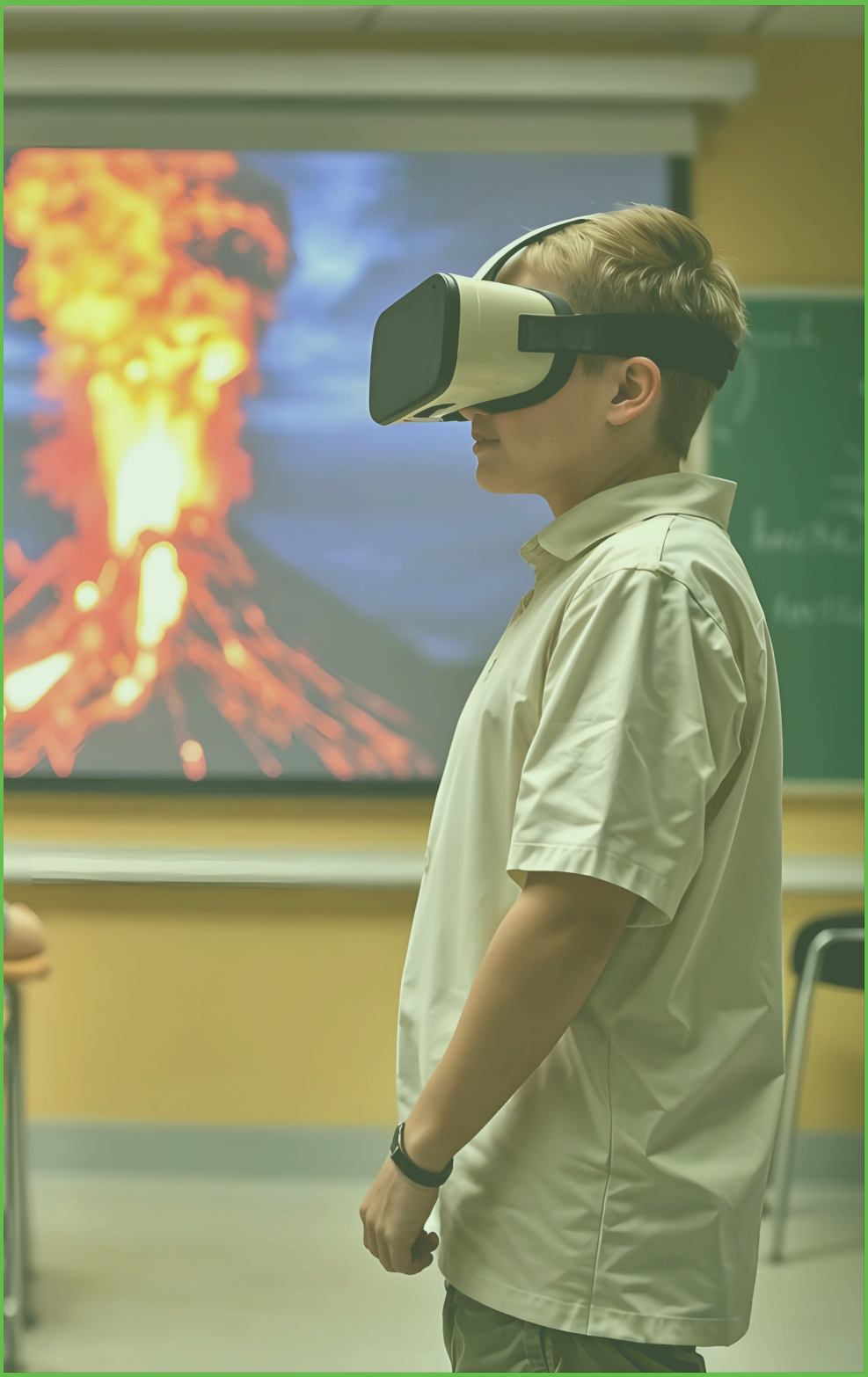
This initiative explores the use of 360º video cameras as an affordable and effective solution to enhance teaching and learning in higher education. The project involves training 'digital champions' within partner institutions to create exemplar 360-degree videos across various educational scenarios, such as visits to chemical plants, wildlife sanctuaries, and classroom management techniques.

Objectives 	• Expand use of immersive content in universities • Train educators as content creators • Use 360° video for practical, accessible field simulations
Example of Use 	At the University of Hull, teachers filmed chemical plants and nature sites. These immersive clips were integrated into science and geography units to prepare for real field trips.
Learn More 	• Project overview • Vivista open-source 360° video editor and viewer

12 Immersive Virtual Field Trips (UNSW)

UNSW Sydney developed an open-source tool that lets lecturers create immersive virtual field trips. It's a a teacher-co-developed, open source software to easily add immersion and additional content to 360 recordings, kind of like commercial virtual tour softwares.

Objectives 	• Enable low-cost immersive lesson creation • Provide VR learning for inaccessible locations • Foster digital content skills in teaching
Example of Use 	Used to simulate environments like emergency rooms and aircraft cockpits. Teachers embedded 360° content into lessons, allowing students to safely experience complex settings.
Learn More 	• UNSW Newsroom article on virtual field trip tool UNSW Virtual Field Trip Video



CHAPTER 5
GETTING STARTED WITH 360° VIDEO IN THE CLASSROOM

CLASSROOM SETUP AND ESSENTIAL EQUIPMENT

Setting up a classroom for 360º video does not have to be complicated or expensive. With careful planning and the right tools, teachers can **create engaging, immersive environments that support learning and help students develop digital skills**.

The integration of this technology requires consideration of **physical space, equipment selection, and classroom management strategies** to ensure a smooth and effective learning experience.

Adequate physical space is critical for safe and effective 360º video use. For **VR headset experiences, ensure a minimum clear area of 2 x 2 meters per user** to prevent collisions and allow natural movement.

This space enables students to turn freely, crouch, or reach out while exploring virtual environments, which are key actions for immersion.

When choosing equipment, consider about **learning objectives**, (school) **available budget**, and the **age group** you teach.

- **Basic setup:** this might include smartphones equipped with 360º video apps and low-cost VR viewers such as Google Cardboard (approximately €5–15 each). A classroom tablet or computer can be used for demonstrations, and a stable Wi-Fi connection is important. This approach offers an affordable way to introduce immersive learning while keeping the system straightforward and easy to manage.

- **Intermediate setup:** For schools with greater flexibility, it could involve standalone VR headsets such as the Meta Quest, tablets for students not using headsets, Bluetooth controllers for easier use, and a portable charging station. This setup improves the immersive experience without requiring a dedicated VR lab.

- **Advanced setup**: schools with larger technology budgets may opt for a dedicated VR lab with ample space, higher-quality headsets and controllers, a large display for sharing what students see, and a central computer for managing content. While this option is more expensive, it offers the most complete and engaging experience.

Even with limited resources, schools can introduce 360° video by **starting with simple setups and building over time**. It is more important to **match technology to specific teaching goals than to invest in the latest devices**, as **meaningful learning depends on how tools are used**, not how advanced they are.

TIPS FOR GETTING STARTED

- ☐ **Test before class:** Ensure all devices and videos work smoothly.
- ☐ **Plan for space:** Rearrange furniture if needed and mark safe movement zones.
- ☐ **Limit headsets:** One headset per class is often more effective and easier to manage.
- ☐ **Offer alternatives:** Use tablets or screens for students uncomfortable with headsets.
- ☐ **Keep it clean:** Wipe headsets or use disposable covers between uses.

CREATING YOUR OWN 360° VIDEO

Creating original 360° video content allows educators to design im**mersive learning experiences** that align with **curriculum goals** and **reflect local contexts**. While it might seem complex at first, many **user-friendly tools** make the process **manageable, even for beginners.**

1) Define clear learning goals

Start by identifying what students to learn and how it connects to the curriculum. When video content supports a specific learning objective, students engage more and retain information better.

2) Choose a location

Select a place that support the learning lesson and goals—like a recycling centre for sustainability or a park for biodiversity. Real-life settings help students link classroom topics to everyday life.

3) Develop a storyboard

Plan the video's structure in advance. Break the content into short scenes, identify key camera angles, and prepare a simple narration to guide students' attention. For most lessons, keeping the final video under five minutes makes the filming and editing process easier to manage.

4) Select Equipment

A smartphone with a 360° lens is a budget-friendly option. For better quality, use a mid-range 360° camera with a tripod, microphone, and spare batteries. Keep the camera steady and at eye level to maintain clarity and immersion.

5) Editing

This is where raw material becomes an effective teaching resource. Basic editing can greatly enhance clarity and student engagement.

- Simple mobile apps, such as Insta360, allow for stitching footage, trimming clips, and adding captions or text overlays. These are ideal for teachers with limited time or editing experience.
- User-friendly desktop software, like CyberLink PowerDirector or Magix Movie Edit Pro, enables the addition of titles, transitions, and background music, while ensuring content is correctly displayed in a 360º format.
- For more advanced needs, programs like Adobe Premiere Pro, Final Cut Pro, or DaVinci Resolve offer professional editing features, including colour correction, complex transitions, and multi-clip workflows.

When editing, it is also important to:

- Avoid rapid cuts; longer, smooth shots allow students time to explore the scene.
- Place overlays (text, arrows) carefully to avoid distortion at the edges. Use VR-specific title features when available.
- Always preview the video on the devices intended for classroom use to ensure proper display and smooth performance.

Finally, to improve accessibility, consider adding subtitles or alternative language versions where relevant, making the content usable for a wider range of students.

After editing, the final video is ready to be integrated into lesson activities For practical, classroom ideas, check the section Ways to Use 360º Technology in Lessons.

SEARCHING AND ACCESSING FREE, EXISTING 360° VIDEOS ONLINE

For educators with time or resource limitations, **using free, high-quality 360° videos** can be an effective way to introduce immersive learning experiences without the need to produce original material.

Platforms like **YouTube remain the most accessible starting point**, hosting thousands of free 360° videos. To locate relevant videos more efficiently, it is advisable to **search using targeted phrases** such as "360 video + deforestation" or "virtual field trip + renewable energy." **Videos between five and ten minutes in length are typically suitable for classroom use**, and a resolution of **HD or 4K is recommended** to maintain visual clarity.

Before using any video in class, it is important to **review the entire content** to ensure it is accurate, age-appropriate, and aligned with your learning objectives.

For more structured experiences, platforms such as **Google Arts & Culture** (formerly Google Expeditions) offer browser-based and app-accessible tours. These include **virtual visits to energy facilities, endangered ecosystems, historical landmarks**, and other curriculum-relevant environments.

Additional platforms with subject-specific 360° content include:

- **Discovery Education VR**: Climate simulations and conservation-focused tours.
- **National Geographic 360** (YouTube) – Biome explorations and human impact stories.
- **NASA 360 and VR Gallery** – Earth science, climate systems, and space-based visualisations.

Where possible, **educators should prioritise videos that come with supplementary teaching materials** such as lesson plans, worksheets, or discussion questions.

HOSTING AND SHARING 360° VIDEOS

After creating or sourcing 360° videos, it is essential to **plan how students will access them**. A reliable hosting and sharing method **ensure video quality, preserves interactive features**, and **makes classroom use simple and efficient**.

Embedding videos into presentation slides, learning platforms, or school websites can make access more convenient for students during lessons.

Educators may also **generate QR codes** that link directly to the videos, enabling students to **view them easily on mobile devices**. This can be especially useful in settings where **devices are shared or rotated across groups.**

As for other online options, **YouTube** remains one of the most widely used platforms for hosting 360º due to its **ease of use and broad accessibility**. To ensure proper playback, videos must be **formatted correctly as 360º content prior before uploading**. It is important to follow YouTube's standard upload process, **include accurate educational tags and descriptions**. If the video is not to be public and is intended only for students with the link, then it should be set to **"unlisted"**.

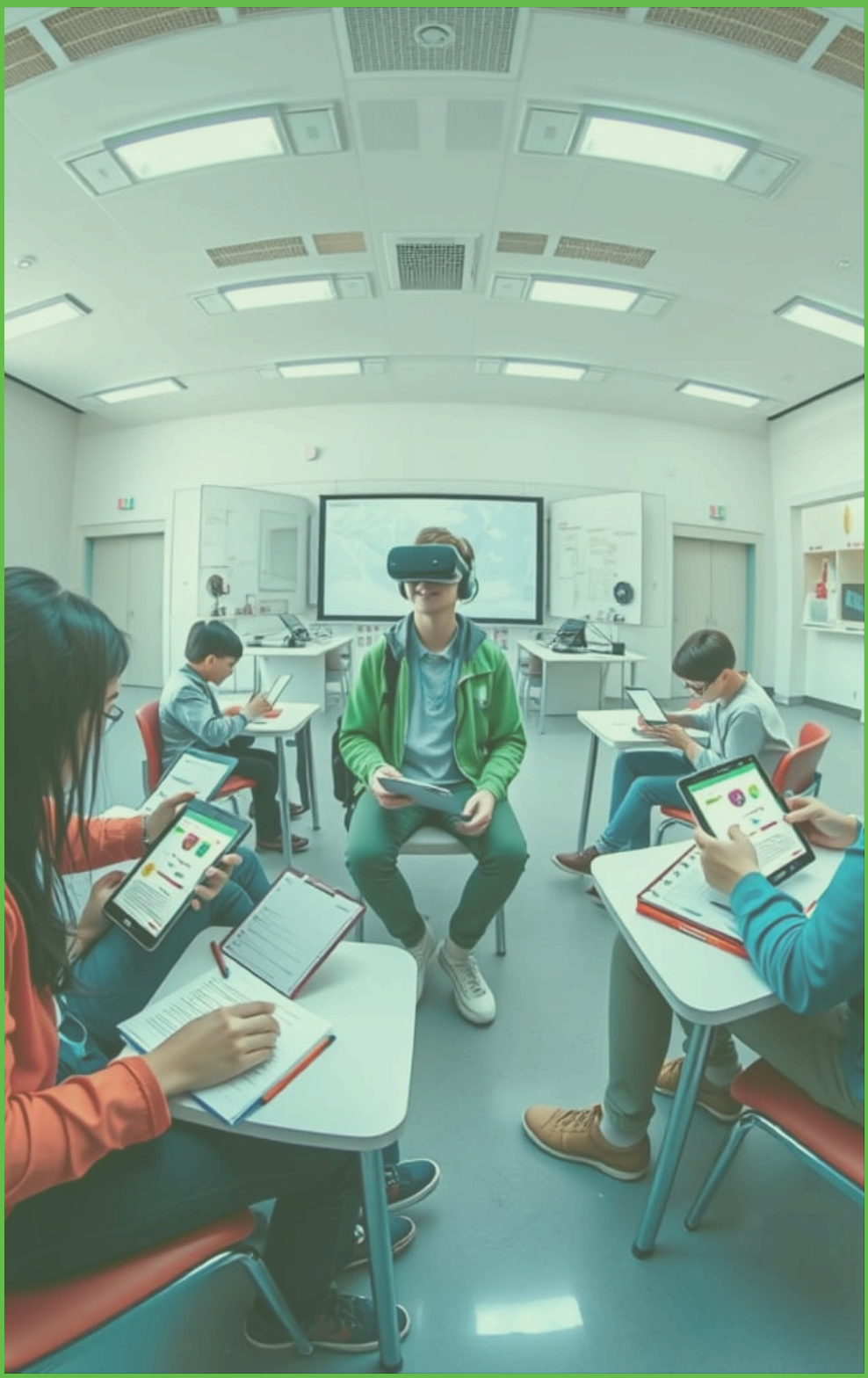
For teachers looking for **quick, informal ways to share videos**, tools like **Google Drive** or **Canva** can be useful. Google Drive allows educators to **upload and store video content**, which can then be **shared via direct link with specific individuals or groups**.

Canva, while primarily a design platform, also **supports embedding 360º videos into educational presentations or visual guides**, which can then be exported or shared digitally.

Alternatively, **institutional platforms such as Google Classroom** or **Moodle** are also commonly used, particularly when content is part of a **structured learning unit**. These platforms allow educators to **place 360º videos directly within lessons, alongside written instructions, assignments, and related activities**. Content can be **organised into modules** and shared securely within the school's learning environment, offering greater control over access and integration.

TRY THIS IN THE CLASSROOM

- ❑ **Create quick access:** Print QR codes for each video and tape them to students' desks or notebooks. This reduces transition time and works well in shared classrooms.
- ❑ **Prepare student roles:** Assign specific observation tasks (e.g., "focus on sounds", "look for movement", "watch the sky") to different students during viewing. Discuss findings afterward.
- ❑ **Embed directly:** Add 360-degree videos into PowerPoint or Google Slides presentations so they appear naturally during the lesson without switching tools.
- ❑ **Keep a checklist:** Build a short pre-class checklist (device charged, Wi-Fi working, video preloaded) to avoid tech delays during the session.



CONCLUSION

360º video offers teachers a **practical and engaging way to enhance classroom learning**. It lets students explore environments beyond the classroom, **bridging the gap between theory and real-world application**. It brings sustainability and STEAM topics to life—whether through virtual field trips, immersive storytelling, or student-led projects.

Recent developments have made 360º video more accessible. Affordable cameras, simple editing tools, and widely available platforms mean teachers can start using this technology **without advanced technical skills**. **Starting small** (e.g. short virtual tours or guided scenes), **makes it easy to begin.**

As shown throughout this guide, **360º video supports project-based, inquiry-based, and experiential learning**. It works well with everyday classroom devices and allows for **flexible use**, whether on **VR headsets, tablets, or laptops**.

Used with purpose, this technology **boosts motivation, deepens understanding, and builds real-world skills**. What matters isn't how complex the tools are, but **how effectively they help students engage with the content**.

The potential is clear: immersive technology can help students **grasp complex topics**, **stay engaged**, and see their **learning from a different perspective.**

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