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Green Roofs and Vertical Gardens – Enhancing Urban Biodiversity



BIOS4YOU
AR 2.0

BIO-INSPIRED STEM TOPICS FOR ENGAGING YOUNG GENERATIONS
THANKS TO THE USE OF AUGMENTED REALITY

Project Number: 2023-1-DE03-KA220-SCH-000126516

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General information

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Name of the exercise:	Green up the building AR App
Description of the exercises:	This AR exercise helps students explore how green roofs and vertical gardens can transform buildings and improve urban environments. The “Green up the building” exercise is designed as a game to make learning interactive and fun, while reinforcing key sustainability concepts. Students will understand how vegetation on buildings helps. Students will be challenged to “green” a virtual building they see through AR. Their mission is to add green roofs and vertical gardens strategically in order to maximize environmental benefits. As they play, they will see real-time overlays showing how plants reduce heat.
Participants:	It can be conducted individually or in small groups (2–4 students) to encourage collaboration, discussion, and peer feedback while interacting with AR simulations of green roofs and vertical gardens.
Participants’ age range:	14-18 Participants should have a basic understanding of environmental science concepts (e.g., water recycling), along with fundamental literacy, numeracy, and ICT skills. They need access to a computer or tablet with internet connectivity and a willingness to engage with digital tools such as AR apps and Delightx. No prior coding or AR development experience is required.
STEM subject and specific topic:	STEM Subject: Bio-Architecture: Urban Ecosystem Integration Related Areas: Environmental Science, Biology, Geography, Urban Planning, Design Technology, Art Topic: Green Roofs and Vertical Gardens – Enhancing Urban Biodiversity
Gamification process:	Quests and Levels: Answer correctly embedded quiz questions and progress through levels by strategically adding green roofs and vertical gardens to the virtual building. Rewards for Exploration: Unlock new plant species or advanced AR visualizations as students answer quiz questions.





Written or graphic description of Augmented info:	● 3D Models: Virtual representations of green roofs, vertical gardens, and urban wildlife. ● Information Overlays: Panels explaining ecological functions and benefits, such as stormwater retention, temperature reduction, air purification, and habitat creation. ● Animated Feedback: Visual cues indicate the impact of student decisions—correctly placed vegetation glows, while unsustainable choices show degradation. ● Static AR Environments: Each location in the urban ecosystem (e.g., rooftop garden) is represented as a themed AR diorama showing ecological elements in context. The App is designed for classroom tables or desks, allowing students to explore and design without needing to move physically through the space.
External (or extra) tools required	Students will need a mobile device or tablet with AR capabilities, along with an internet connection for the initial file loading. A printed AR marker sheet or a screen-displayed trigger image may also be used to activate the AR experience.
Links (video, images, text online and so on).	-





Pedagogical specifications

Here we will collect information on how to use the exercise in the learning session and the results and benefits of using it, from a pedagogical perspective.

How can this augmented information be used to address a STEAM topic in a more interesting way for students?

The “Green up the building” AR exercise makes the study of green roofs, vertical gardens, and urban biodiversity more engaging by transforming abstract sustainability concepts into interactive, hands-on experiences. Using mobile devices, students visualize **virtual vegetation layers on buildings**, observe **real-time overlays** (e.g., heat reduction, stormwater absorption), and explore ecological information boards. This combines **Science** (ecosystem functions), **Technology** (AR tools), **Engineering** (designing sustainable structures), **Art** (creative greening design), and **Math** (measuring impacts like water retention), creating a playful and meaningful STEAM experience.

Which pedagogical objectives are addressed through this scenario?

Understand Urban Ecosystems: Learn how green roofs and vertical gardens enhance biodiversity and climate resilience.

Develop Critical Thinking: Decide how to strategically place vegetation for maximum environmental benefits.

Encourage Collaboration: Work individually or in groups, sharing design choices and giving peer feedback.

Foster Environmental Awareness: Experience the impact of urban greening in an immersive way that sparks curiosity and responsibility.

The exercise helps students gain **knowledge** about ecological design while also cultivating **attitudes and skills** such as creativity, problem-solving, and teamwork that traditional lectures rarely foster.

Which results are expected to be reached with its use?

Through the “Green up the building” AR activity, students will gain a clear understanding of how green roofs and vertical gardens contribute to urban biodiversity, air quality improvement, and heat mitigation. By engaging with the interactive overlays, they will not only acquire new ecological knowledge but also develop a STEM-oriented mindset, practicing experimentation, problem-solving, and critical reflection. The exercise promotes both individual learning and collaborative exploration, as students work together to design greener buildings, share





perspectives, and provide peer feedback.

Which benefits are expected to be reached with its use?

The use of AR also brings significant benefits to the learning process. Students can visualize complex ecological processes in a way that makes learning more memorable, engaging, and enjoyable compared to traditional teaching. The gamified and sensory-rich environment reduces stress while encouraging motivation, curiosity, and creativity. Moreover, the activity strengthens communication and teamwork skills, providing a social and interactive dimension to STEM learning. In this way, students connect positively with sustainability and urban ecology, while developing the skills and attitudes necessary for active participation in future climate action.

Technical specifications





AR INFORMATION	
Technology	Augmented Reality
If it's needed a marker, description of the marker	QR Code:  Share Code: XEA-NUA Share link: https://edu.delightex.com/BQY-PLF
Hardware and software needed:	Smartphone, tablet, laptop, PC
Type of Augmented data	3D models
Written description of the AR data	Students visualize 3D models such as virtual vegetation layers on buildings , observe real-time overlays (e.g., heat reduction, stormwater absorption), and explore ecological information boards.
If Image	-
If Text	Scene Green Up the Building!  Plants on buildings help absorb sunlight, reduce urban heat, 1



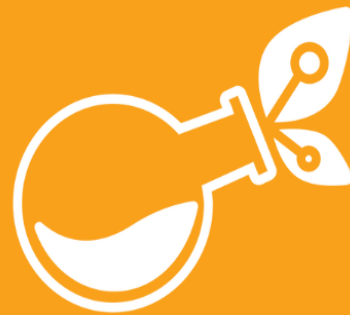


	and cool down cities naturally. They even protect buildings from extreme temperatures! In this game, your mission is to transform the building using the power of green roofs and vertical gardens. Scene 2 Answer quiz questions correctly to unlock these plants! Each correct answer will place a plant on the building to: ☒ Cool the temperature ☒ Clean the air ☒ Attract urban wildlife Tap the building to start!
If video	-
If audio	-
If 3D model	The formats needed are:.obj,. stl.





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