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Bio-Based Building Materials: Innovations and Applications



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:	EcoBuilder AR App
Description of the exercises:	“EcoBuilder” AR App helps students explore five different bio-based building materials using an augmented reality (AR) app. Each material reveals a clue about its ecological benefits, such as carbon capture, insulation properties, or sustainability in construction. Students will learn to identify and understand the unique properties of each material and how it contributes to building a greener, more sustainable future. Using AR, students interact with virtual representations of the materials, discover the clues they hold, and answer embedded quiz questions about each material. Correct answers earn points, helping students track their progress and reinforcing learning. This exercise combines hands-on exploration, AR visualization, and problem-solving.
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 virtual representations of the materials.
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: Bio-Based Building Materials: Innovations and Applications
Gamification process:	Points and Badges: Students earn points for correct quiz answers and effective material choices. Badges reward mastery of specific material types or sustainability concepts. Leaderboards: Track individual or team progress based on quiz performance, eco-friendly design decisions, and creative material use.





Written or graphic description of Augmented info:	• 3D Models: Virtual representations of bio based eco materials. • Information Overlays: Panels explaining materials functions and benefits, such as hemp and lime etc. • Animated Feedback: Visual cues indicate the impact of student decisions—correct or false answers give extra 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 *EcoBuilder* AR exercise makes the study of bio-based building materials and sustainable construction more engaging by turning abstract sustainability concepts into interactive, hands-on experiences. Students use AR to explore virtual representations of five different materials, observing their unique ecological properties such as carbon capture, insulation, and lifecycle sustainability. Embedded quiz questions encourage them to think critically about material selection and performance. This combines Science (material properties and environmental impact), Technology (AR tools), Engineering (designing sustainable structures), Art (visualizing creative material applications), and Math (measuring insulation efficiency, carbon impact), creating a playful and meaningful STEAM experience.

Which pedagogical objectives are addressed through this scenario?

Understand Sustainable Construction: Learn how bio-based materials contribute to greener buildings and lower environmental impact.

Develop Critical Thinking: Evaluate and choose materials based on ecological and functional properties.

Encourage Collaboration: Work individually or in groups to explore AR materials, share design ideas, and give feedback.

Foster Environmental Awareness: Observe the ecological benefits of materials in an immersive, interactive way, sparking curiosity and responsibility.

The exercise helps students gain knowledge about sustainable materials while also cultivating creativity, problem-solving, and teamwork skills that traditional lectures rarely foster.

Which results are expected to be reached with its use?

Through the *EcoBuilder* AR activity, students will understand the properties and ecological benefits of different bio-based building materials. They will gain both theoretical knowledge and practical insight into sustainable construction. By interacting with virtual models and completing embedded quizzes, students practice experimentation, reflection, and critical thinking. The exercise supports both individual learning and collaborative exploration, as students discuss material choices, analyze environmental impact, and refine their decisions in





a dynamic AR environment.

Which benefits are expected to be reached with its use?

Using AR provides significant advantages over traditional methods. Students can visualize complex material properties and ecological processes in 3D, making learning more memorable, engaging, and enjoyable. The interactive, sensory-rich environment motivates curiosity and creativity while reducing stress. Moreover, it promotes collaboration, communication, and teamwork, offering a social dimension to STEM learning. Overall, students develop a positive connection with sustainable construction and urban ecology while acquiring the skills and mindset needed for responsible, future-oriented design.





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Technical specifications

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AR INFORMATION	
Technology	Augmented Reality
If it's needed a marker, description of the marker	QR Code:  Share Code: BGU-QFK Share link: https://edu.delightex.com/BGU-QFK
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 Welcome to EcoBuilder AR 1



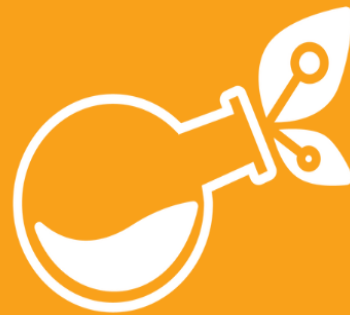


	Your goal is to get to know all 5 bio-based building materials. Each one holds a clue to building a greener future.
If video	-
If audio	-
If 3D model	The formats needed are:.obj,. stl.





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