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Hollow Cylinder Modeling

BIOS4YOU AR 2.0

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

Project Number: KA220-BW-23-30-126516

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Introduction

The purpose of this document is to create guidelines to help the project staff that are dealing with school children, 14-19 aged, to create and re-adapt exercises using Augmented Reality technology.

To this end, a series of templates have been created that define exercises from a methodological, pedagogical and technological point of view.

A good written description, along with images, videos or sketches of the exercise is very important for experts to understand the idea. This will be part of the “General Information” template.

On the other hand, it will be important to define what STEM topic/subject each exercise is intended for and how AR technology can help students or staff or people interested in it when they use these exercises. In addition, people interested in the exercise can understand the usefulness of augmented information, and it will be necessary to explain the benefits.

During the process of defining the augmented information that each exercise will offer, staff working with teachers will be able to develop innovative ideas that make it easier to learn teaching concepts in an easier way.

All students will be able to view the contents explained by professionals projected in the real world in the form of text, 3D model, image, video, sound... This will help them focus their attention on exercise and more easily assimilate the associated concepts.

This document consists of the following points:

- Information about AR technology
- How to define AR exercise thanks to the template:
    - General information
    - Pedagogical specifications
    - Technical specifications

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General information

In this part it will be necessary to report the generic information of the exercise so that it can be recognised.

Name of the exercise:	Hollow Cylinder Modeling
Description of the exercises:	In this task, students will create a hollow cylinder using Tinkercad. The exercise focuses on teaching how to use 3D primitives and transformation tools to create precise shapes. Before starting, students will use the Tinkercad AR Viewer to visualize a sample hollow cylinder in augmented reality (AR), allowing them to better understand the proportions and structure of the final model. This AR preview will help students conceptualize their designs in a real-world context.
Participants:	This is an individual exercise to ensure each student develops their own modeling skills. However, students can collaborate and compare their AR visualizations for peer feedback.
Participants' age range:	14-18 years old, with basic computer literacy and an understanding of spatial primitives.
STEM subject and specific topic:	Geometry, Spatial Visualization, and 3D Modeling. The exercise focuses on understanding geometric shapes, projections, and the creation of hollow structures using 3D design tools.

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Gamification process:	Students will earn points based on the precision of their models and how accurately they align with the AR preview. Bonus points can be awarded for creative adaptations of the basic cylinder model.
Written or graphic description of Augmented info:	Students will use AR to visualize a sample hollow cylinder in their physical environment. The AR model will include dimensional annotations to guide the modeling process.
External (or extra) tools required	Smartphones or tablets for AR visualization, internet connection for accessing Tinkercad AR Viewer
Links (video, images, text online and so on).	**Creating a hollow cylinder in tinkercad:** https://youtu.be/boju3n61Pp8 **Using the AR viewer in Tinkercad for iPad:** https://youtu.be/jwmrle47FU0 **Export from Tinkercad to SketchFab for VR AR** https://youtu.be/U7bPsNrZhkI

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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 AR model of the hollow cylinder will help students visualize how different dimensions and proportions affect the final design. This hands-on visualization aids in spatial understanding and ensures more accurate modeling. By allowing students to interact with 3D models in their real-world environment, AR transforms abstract geometric concepts into tangible experiences, making the learning process more engaging and accessible. This immersive approach not only captures students' attention but also fosters a deeper, more intuitive understanding of STEM topics, enhancing both their technical skills .

Which pedagogical objectives are addressed through this scenario?

- Improve spatial visualization skills.
- Understand geometric principles through hands-on modeling.
- Apply precision in design using digital tools.

Which results are expected to be reached with its use?

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Students will gain confidence in their ability to model complex shapes and will develop an intuitive understanding of spatial relationships. These results are often difficult to achieve through traditional teaching methods, where abstract concepts of geometry and spatial visualization may not easy translate into practical understanding. With the integration of AR, students not only learn specific modeling techniques but also acquire a hands-on, immersive experience that fosters a deeper comprehension of spatial dynamics. This helps cultivate a mindset geared towards STEM knowledge acquisition, enhancing both technical skills and creative problem-solving abilities.

Which results are expected to be reached with its use?

AR helps students bridge the gap between abstract geometric concepts and real-world applications, enhancing both understanding and engagement.

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Technical specifications

In this part it is necessary to specify whether the exercise was designed to be implemented with AR technology. This part is fundamental for the translation process. Please include text, audio text and all the necessary materials.

AR INFORMATION

Technology	Markerless AR using **Tinkercad AR Viewer, Sketchfab, or WebAR solutions** Or other selected and used tools
If it's needed a marker, description of the marker	-
Hardware and software needed:	Smartphones or tablets, Tinkercad account (or other tools, Sketchfab or WebAR account, etc.), internet connection
Type of Augmented data	3D models with dimensional annotations
Written description of the AR data	The AR model of the hollow cylinder will appear on students' devices when they access the provided link or scan the QR code. Students can rotate, zoom, and place the model in their environment to better understand its proportions.

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If Image	https://www.tinkercad.com/things/dWnlOZEbFxa-cylinder
If Text	
If video	**Creating a hollow cylinder in tinkercad:** **https://youtu.be/boju3n61Pp8** **Using the AR viewer in Tinkercad for iPad:** **https://youtu.be/jwmrle47FU0** **Export from Tinkercad to SketchFab for VR AR** **https://youtu.be/U7bPsNrZhkI**
If audio	-
If 3D model	Model example for download: https://edu.cospaces.io/WJF-DHM Preview of Cylinder in TinkerCad Preview of Cylinder in CoSpace (Delightex)

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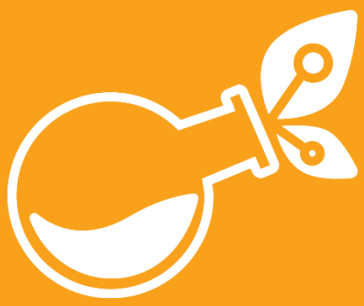

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