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The transport of nanomedicines

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

KIT Karlsruher Institut für Technologie · ktu kaunas university of technology · Università degli Studi di Palermo · CEIPES · Eduact

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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

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- Pedagogical specifications
- Technical specifications

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:	The transport of nanomedicines
Description of the exercises:	The activity uses augmented reality to travel inside the blood vessel and understand the application of nanomedicines in the medical world. Students interact with the game using their mobile devices or tablets. Students must choose the right speed to capture all the bad cells.
Participants:	The activity is designed to be done **individually**, with optional group reflection afterward. Individual participation ensures that each student makes their own decisions throughout the experience, fostering personal curiosity. Group discussions at the end (optional) allow comparison of results and reasoning behind choices, strengthening collaborative learning and peer feedback.
Participants' age range:	Minimum age: 17, Maximum age: 19 The exercise assumes prior basic knowledge of science. Students at this age are cognitively ready to engage in abstract thinking, ethical reasoning, and real-world problem-solving.

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STEM subject and specific topic:	The exercise addresses the challenge of making the path of nanomedicines and their importance understandable. Students are often unaware of new medical experiments. Augmented reality helps simplify this aspect by showing each step in a clear and interactive way.
Gamification process:	Students navigate a carousel that simulates the path of a cell in a blood vessel, hitting cells at different speeds to understand the difficulty involved in applying this technique. Each decision reflects their awareness of health and biology.
Written or graphic description of Augmented info:	• Animated carousel hosts the student . • Information overlay: Decision prompts and visual feedback effects • Floating 3D choices: Students select or not the yellow cell. • Static AR environments: A 3d carousel with which interact The AR experience is anchored via image recognition or QR markers, and requires no physical movement — it's designed to be used at a desk or classroom table.
External (or extra) tools required	Mobile device or tablet with AR capabilities. Internet connection for initial file loading. Printed AR marker sheet (optional) or screen-displayed trigger image.
Links (video, images, text online and so on).	https://www.ellenmacarthurfoundation.org/ .

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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?

Using a mobile device (tablet or phone), students will scan the QR code that will take them into the game. Once inside the laboratory, they will have to explore their surroundings to interact with augmented reality. Through the hunting, they will learn in a fun and playful way what nanotecnology are and how they can be used.

Which pedagogical objectives are addressed through this scenario?

The educational objective of this game is to improve students' logical skills. In addition to acquiring new knowledge on the subject matter, students will have to figure out for themselves how to interact with the surrounding space and what order of information will be useful for completing the game.

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Which results are expected to be reached with its use?

Nanopharmaceuticals are a complex topic to understand when studied, especially since research in this field is still ongoing. The game can improve understanding of this specific topic, providing players with more opportunities to learn independently and expanding their curiosity.

Which benefits are expected to be reached with its use?

Students can improve their technical and IT skills through the use of augmented reality. By improving their proprioception and gestures, they can acquire greater skills for their future. The game mode will make the educational experience more enjoyable, improving empathy when dealing with challenging and difficult-to-understand topics.

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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	https://edu.delightex.com/Studio/Space/3iHSB5FEyFHnStnW Marker
If it's needed a marker, description of the marker	
Hardware and software needed:	pc, smartphone, tablet, camera.
Type of Augmented data	Images; Text; 3D models
Written description of the AR data	Students will begin the experience by scanning a marker or accessing an AR app on their mobile device or tablet. The AR laboratory will appear on the screen, featuring the character Mr. Ted, who will invite the student to become his assistant in

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	developing a treatment for arthritis. One by one, students will learn how stem cells work through questions and immersive games that will lead them to explore the laboratory. Along the way, they can discover hidden objects to obtain information that will help them answer the questions. After completing all the tasks, students receive immediate feedback and educational information on this topic. The activity is carried out individually, but can conclude with a class discussion or reflection to compare results and share insights.
If Image	
If Text	Welcome to the human body. Right now, you are a nanomedicine traveling through the blood vessels. Your task will be crucial in transporting the medicine and targeting the malignant cells. Find the right speed to hit all the yellow cells. CLICK THE BUTTON WHEN YOU ARE READY.
If video	-
If audio	-
If 3D model	The formats needed are:.obj,. stl.

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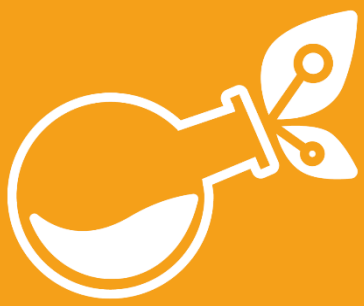

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