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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



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- 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 Invisible World Inside Us: How Gut Microbes Shape Our Health

Description of the exercises:

In this interactive AR game, students transform their classmates into a living “microbial world.” By pointing their device at another student’s stomach area, a colorful augmented reality scene appears, showing friendly and harmful microbes moving around. The player’s mission is to protect the good bacteria while using a virtual racket to eliminate the harmful ones. This playful and immersive experience helps students understand the importance of gut health and microbial balance in a fun, hands-on way.

Participants:

The activity is designed as a single-player game but requires teamwork: one student plays while another student assists by acting as the “AR model” for the visualization. This encourages collaboration while keeping the core gameplay experience individual.

Group discussions at the end (optional) allow comparison of results and reasoning behind choices, strengthening collaborative learning and peer feedback.

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Participants' age
range:

Minimum age: 17 **Maximum age:** 19

This AR game is designed for older high school students who already have a basic understanding of biology or environmental science. At this age, learners are cognitively ready for abstract thinking, ethical reasoning, and real-world problem-solving. The activity uses these skills to explore gut health and the invisible ecosystem of microbes living inside the human body. Students play individually but work in pairs: one student interacts with the AR microbes, while the other serves as the “model” for visualization, encouraging teamwork and peer learning.

STEM subject and
specific topic:

This activity falls under **Biology and Health Sciences**, focusing on the **human gut microbiome** and the complex interactions between beneficial and harmful microbes. Through augmented reality, students visualize and interact with bacteria and viruses in the digestive system, exploring how diet, lifestyle, and hygiene influence microbial balance and overall health.

Gamification
process:

The game turns microbiology into an interactive AR challenge. Students earn points by eliminating harmful microbes and protecting beneficial ones with a virtual racket. Visual effects, sound cues, and quick feedback keep players engaged, while pop-up facts and teamwork reinforce learning through play.

Written or graphic
description of
Augmented info:

- No Animated character
- Information overlay: Decision prompts and visual feedback effects
- Floating 3D choices: Students select correct or incorrect bacteria.
- AR environments

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.



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External (or extra)
tools required

Links (video,
images, text online
and so on).

Mobile device or tablet with AR capabilities. Internet
connection for initial file loading. Printed AR marker sheet
(optional) or screen-displayed trigger image.



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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?

Augmented reality makes the invisible world of microbes visible and interactive, turning a complex biology topic into a hands-on experience. By projecting bacteria and viruses onto a classmate's body, students can explore microbiology in a playful and relatable way. The mix of gaming elements, real-time visuals, and teamwork encourages curiosity, critical thinking, and problem-solving, making STEM concepts—like ecosystems, health, and microbial interactions—far more engaging and memorable.

Which pedagogical objectives are addressed through this scenario?

This scenario promotes scientific literacy by helping students understand the gut microbiome and its role in human health. It develops critical thinking and problem-solving skills as students distinguish between beneficial and harmful microbes. The activity also encourages collaboration, digital literacy, and engagement with real-world science, making abstract biological concepts tangible through AR.

Which results are expected to be reached with its use?

Using this activity, students are expected to develop a clear understanding of the gut microbiome and its role in human health. The use of augmented reality makes complex biological concepts easier to visualize and remember, while the interactive gameplay strengthens critical thinking and decision-making skills as students distinguish between beneficial and harmful microbes.

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Which benefits are expected to be reached with its use?

This activity is expected to enhance students' understanding of microbiology by turning abstract concepts into an immersive and interactive experience. Augmented reality helps make the invisible visible, improving memory retention and comprehension. The game-based format fosters engagement, motivation, and curiosity about science while developing critical thinking, problem-solving, and collaboration skills.



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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/DT1Lff97oUun7d7d>
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



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Written description of
the AR data

The AR experience overlays a dynamic microbiome simulation onto a live view of a student's body, transforming their torso into an animated ecosystem. Using image recognition, the app triggers 3D models of various bacteria and viruses, each with unique colors, shapes, and movements to distinguish beneficial microbes from harmful ones. Students can interact with this data in real time by "hitting" harmful microbes with a virtual racket while protecting beneficial ones. Informational pop-ups and animations provide key facts about each microorganism, helping students connect visual AR data with biological knowledge and real-world health concepts.

If Image

If Text

Welcome to "Gut Heroes: Microbes on a Mission! An invisible world lives inside you: billions of bacteria and viruses that make up your gut microbiome. Some microbes help you digest food, produce vitamins, and protect your body from disease. Others can make you sick. Your mission is to recognize the good and bad microbes and learn how your daily choices affect your health! Focus on your friend's belly and you'll see lots of microbes popping up!

Are you ready to explore your gut and become a microbiome expert?

-Yes

-Of course

Welcome!

Among the enemies you will encounter are Clostridium, a bacterium that can cause serious intestinal infections; Salmonella, which is often found in contaminated food; and the fast-moving Norovirus, known to cause gastroenteritis. But you are not alone: at your side are Lactobacillus, which aids digestion, Bifidobacterium, which strengthens the immune system, and Akkermansia, which protects the intestinal barrier. These allies are essential to your health and must be defended! Your mission is simple but essential: grab your virtual racket and hit only the



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bad microbes, leaving the good ones alone. Maintain the balance of the microbiome and show that you can tell friends from foes!

Congratulations, Microbiome Hero!

You have defeated all the bad bacteria and viruses and protected your microscopic allies: Lactobacillus, Bifidobacterium, and Akkermansia. Thanks to your choices and attention, your gut is now in balance and your body can function at its best! You have learned that: Good microbes are essential for digestion, the immune system, and overall health. A diet rich in fiber, fruit, and fermented foods helps the microbiome grow strong. Eliminating pathogens is important, but protecting your allies is even more so. Continue to make healthy choices every day: you are now a true Guardian of the Microbiome!

If video

-

If audio

-

If 3D model

The formats needed are:.obj,. stl.



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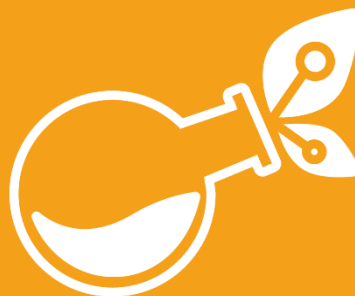
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