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# *Mobile Games for Environmental Education*



# Why?

The Age of the 4th industrial revolution, the technological/digital revolution or revolution of automation, robots and virtual-digital worlds has begun.

- We have the emergence of Mobile and Augmented Reality (AR) environments, as well as the creation of corresponding educational games, (Serious Games), in order to develop knowledge and skills of students.
- In today's era of digital worlds and digital identities, this new generation of students, often called the "Digitally Indigenous", as well as the "Internet Generation" and the "Game User Generation", is increasingly using these smart devices in their free time for various activities, such as entertainment, communication and learning.



# Why?

## Environmental Awareness

- There is an urgent need to educate the public, particularly children, about climate change and environmental waste as well as garbage disposal issues.
- Environmental awareness measures could include: selective waste collection, recycling, waste reduction, and waste reuse.
- Although these themes are generally introduced in schools, a more engaging and interdisciplinary approach from the first school years is required to understand the problem at global levels in different society sectors.





# Serious Games

- According to Alvarez and Djaouti (2010), a serious game is a computer software that combines serious aspects of teaching, communication, and/or information change (serious) with the fun experience that a digital game provides (games).
- Serious games have been a trend in the educational field in various knowledge areas because they stimulate curiosity and motivation while attempting to develop educative and sociocultural aspects in users.
- These specific games utilise actions rather than explanations, increasing user motivation and satisfaction in the learning process.



# The Augmented Reality Games

- A recent review by Koutromanos, Sofos, and Avraamidou, (2015), showed that augmented reality games, when used under specific learning conditions in formal and informal learning environments, can have a positive effect on learning and the development of complex skills.
- Different studies have concluded that A.R. is effective for activities where students acquire knowledge about topics and concepts that they could not see in the real world or without a specialized device and thus acquire abstract or complex concepts, (Hsiao et al, 2016, ; Chen et al, 2015)



# So Why should I use Mobile Games and thus Smart Education Systems?

- It promotes cognitive outcomes and motivation to engage in the teaching and learning process.
- In 55 relevant articles studied, most of the studies reported that A.R. leads to better learning outcomes as it promotes motivation to learn, because A.R. provides a highly engaging graphical and virtual study environment as well as circumstances for authentic interaction of students with the subject matter.
- Active student participation, improved perceptual association and playful interaction as well as positive student attitudes towards the tools and educational applications of A.R. are reported as effective parameters of the use of A.R. in everyday teaching reality.



The background features a dark blue field with a complex network of thin orange lines forming a wireframe face. To the left, there are several overlapping geometric shapes: a large dark grey hexagon, a smaller white hexagon, and a small cyan triangle. The title text is centered within a dark grey rectangular box.

# Mobile Games for Environmental Education



# Applications for Preschool and Primary Education

- **Metaverse.** We create A.R. learning experiences in an impressive way with collaborative tools and learning apps
- **My Very Hungry Caterpillar AR** for children from preschool to early elementary grades where students discover the space and world around them through the snail until it grows into a beautiful butterfly.
- **WWF Free Rivers** where students study the characteristics of rivers in a realistic depiction of the ecosystem surrounding rivers and the potential for sustainable development through the presentation of stories and the impact of rivers on people's lives





# Applications for Environmental Education

- **NOAA Games.** The National Oceanic and Atmospheric Administration (NOAA) wants to raise environmental awareness, and the most entertaining way to do so is through well-designed games.
- **Recycle City** was designed with the classroom in mind. All of the games and locations have been designed to make it easy for a teacher to set different goals that can match up with lessons being taught in class.
- **Plum's Photo Hunt** Inspiring photo-hunting missions are wonderful outlets for creative expression and easily prompt deeper exploration.
- **iNaturalist** Global citizen-science community for real-world research. Students can collect data about species diversity as citizen scientists.

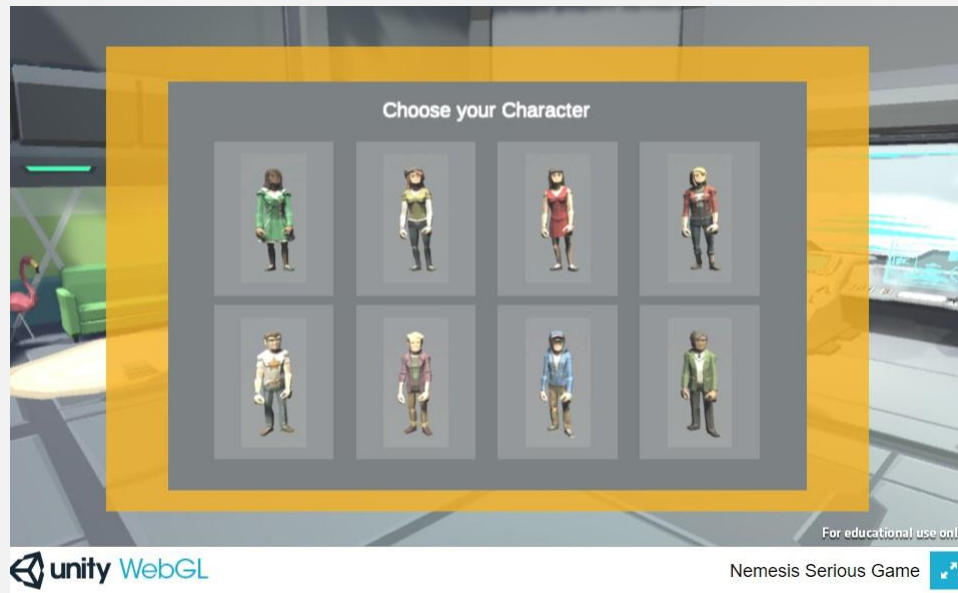


# Applications for Environmental Education

## The Nemesis Game

<https://changemakergame.ili.eu/>

- The NEMESIS Serious Game brings you as a citizen to NEMESIS City to aim to increase the well-being and happiness of the inhabitants of the city with your “social innovation power”.

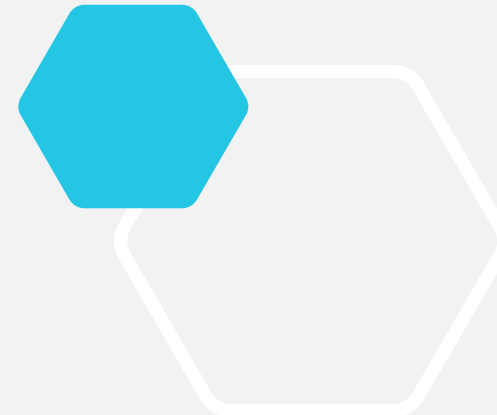
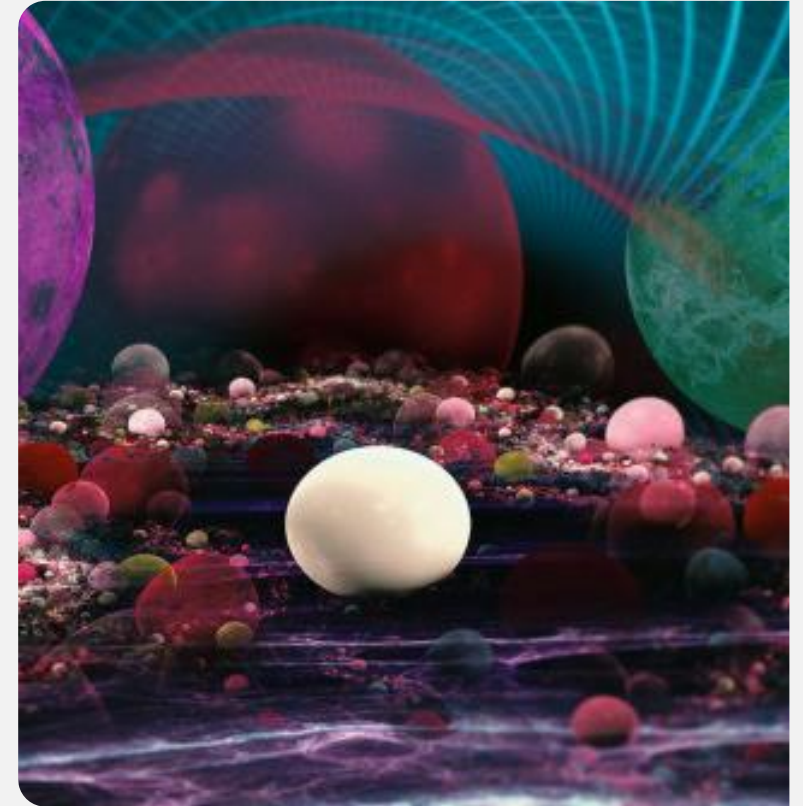


# Pedagogic Utilization

## Project Based Learning and Problem Based Learning. Active Learning. Communities of Practice

### Metaverse Open Source

- Students design and create an amusement park. They first create a scale map of their park using all their math skills. They then digitally build a model of the park by applying their knowledge and skills in physics, geography and environmental studies.
- They also compose and present a poster for their park and a football and basketball field. They explain why the park should be chosen as the one to be built.
- The project concludes with a science fair where the students present their project to visiting parents and teachers.
- Application lessons Physics, Environmental Education, Math, Language, STEM, STEM, 3D Printing





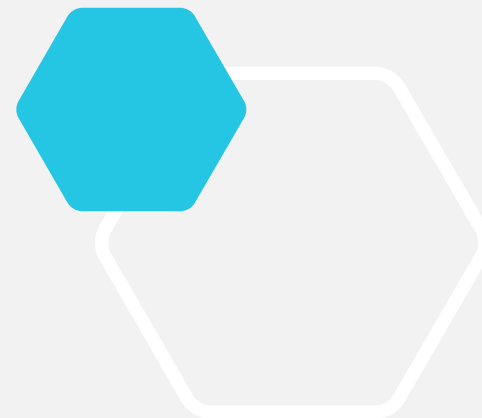
# Pedagogic Utilization

## Project Based Learning, Problem Based Learning and Game Based Learning

### My Very Hungry Caterpillar AR (Preschool and Primary)

Derived from a very successful children's book by Eric Carle. Creating a game look for the caterpillar and enhancing virtual memory. Identifying and naming plants, trees and insects in a very fun and creative way. Orientation in space, points on the horizon. Giving directions-directing in space. Colours, shapes and words. Numbers

Connecting to the outside of the school such as the yard and studying the plants and/or trees present through this playful application



# Pedagogic Utilization

## Project Based Learning and Problem Based Learning

### WWF Free Rivers

- Start your lesson by talking about historical civilisations that have benefited from flowing rivers, including their seasonal variations, such as the Nile Valley in Egypt, the Amazon or the rivers of Greece, Aliakmon, Axios, Pinios, etc.
- In what way do cultures benefit from the river? Then talk with your students about dams. Plastira, Veria.
- Discuss why the dams were built and how they benefit local communities.
- Talk about the hydroelectric dams
- Then discuss what happens to the ecosystems behind the dam. Who is affected? How?
- Application lessons Physics, Environmental Education, STEM, 3D Printing





# Specific Learning Objectives through Mobile Games and A.R. Their application in the Educational Process





# Pedagogic Utilization Clever Books AR Geometry

Augmented Reality has the potential to be used effectively in mathematics education (arithmetic-algebra-geometry) both in the classroom and in the creation of materials for the self-construction of models. Complex geometric shapes can be represented by their 3D models, which would facilitate learners to develop their spatial thinking.

With the application, learners can:

View 2D and 3D geometric shapes from all angles

Voice support for all shapes and interactions made by the children

See the sides of 3D shapes unfold into 2D shapes (deconstruction is visualized)

To check the main properties of 3D shapes

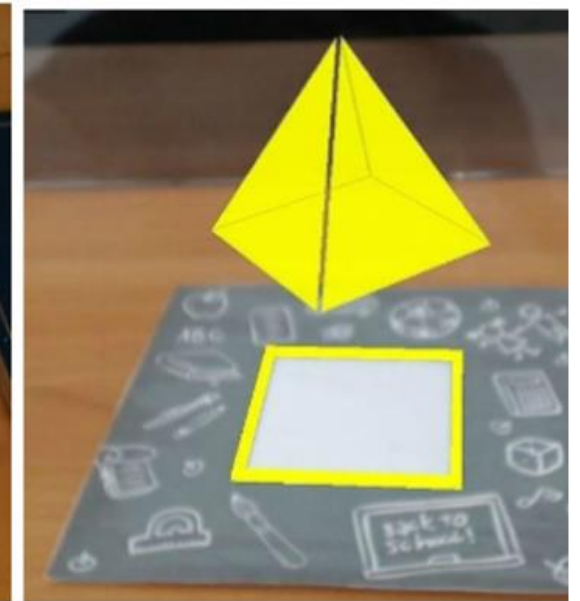
To learn about the different variations of 2D shapes

Develop spatial imagination by observing 3D and plane models

To learn the properties of geometric 2D and 3D shapes

**Objectives:** Learn the space around you, familiarize about your environment. Distinguish objects. Find dimensions

**Skills:** Investigative, Collaborative, Critical, Communicative.



Enhance your reality.  
Find a new way to learn.



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# Pedagogic Utilization Mondly AR

Mondly Ar is an A.R. application for learning foreign languages in a fun and playful way. There are eleven themes for each language, including body, sports, animals and family.

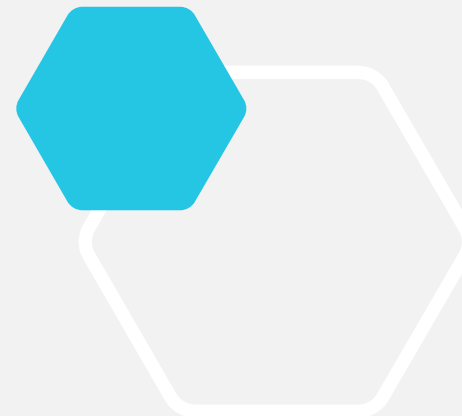
In addition to the eleven topics available, the app releases additional daily and weekly topics, such as objects around the house and musical instruments. Each theme includes seven lessons. The first six lessons focus on language learning through vocabulary and phrase repetition, and the seventh lesson focuses solely on memorizing vocabulary related to the topic. There is also a button with the grey activity labeled "Conversation".

Mondly for Kids provides language instruction aimed at young learners using very interesting, fun and interactive vocabulary building activities, translation activities, recorded audio and check pages. Using this application, users are given the opportunity to enjoyably develop a rich vocabulary in a second or foreign language.

Specificity: Pronunciation by native speakers of the language.

**Objectives:** Gain in language learning through activities for the environment. Engage students through interdisciplinary instruction.

**Skills:** Investigative, Collaborative, Critical, Communicative.



# Pedagogic Utilization Fizziq



FizziQ turns any smartphone into a portable laboratory that can be used in the classroom, at home and in the field.

The many sensors present in smartphones and tablets make it possible to make precision measurements in many fields of science such as sound, light, color, movement, etc. By using the digital tools at their disposal, the student can experiment in the classroom, in the field or at home, and accelerate their learning.

FizziQ is an application that transforms information from smartphones or tablets sensors into data that can be used by students to conduct quality scientific experiments in most fields studied in science. Activities can be carried out in class or at home: on sound, light, movement, position, colors, magnets to consolidate theoretical knowledge through experimentation and scientific questioning.

The app and all learning materials are free and available for download for Android and iOS devices.

**Objectives:** Gain in knowledge through activities for the environment. Engage students through interdisciplinary instruction.

**Skills:** Investigative, Collaborative, Critical, Communicative.

## Analyze more than 40 physical measurement

### Accelerometer

- Linear acceleration X
- Linear acceleration Y
- Linear acceleration Z
- Absolute acceleration
- Absolute acceleration X
- Absolute acceleration Y
- Absolute acceleration Z

### Microphone

- Oscillogram
- Fundamental frequency
- Frequency spectrum
- Sound volume

### Colorimeter

- Colors
- Color spectrum
- Red absorbance
- Absorbance blue
- Green absorbance

### GPS

- Latitude
- Longitude
- Precision
- Speed
- Altitude

### Gyroscope

- Rotation X
- Y rotation
- Z rotation

### Luxmeter

- Illumination
- Average luminance
- Point luminance

### Inclinometer

- Vertical tilt

### Compass

- Orientation

### Pedometer

- Number of steps

### Magnetometer

- Magnetic field

### Clock

- Stopwatch

### Théodolite

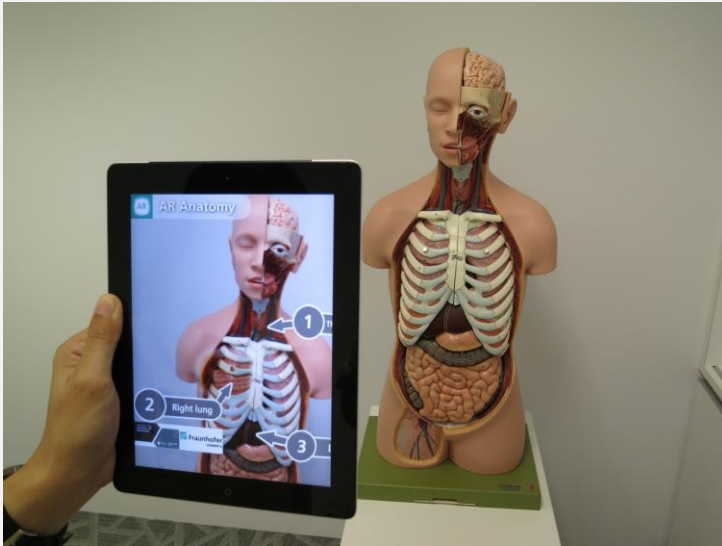
- Azimuth
- Elevation



# Why the use of Mobile Games and Augmented Reality in Education?

## Why;

- While technology has become a key part of the classroom, there has not yet been widespread adoption of A.R. and Mobile Games in the classroom. Integrating A.R. into the classroom can enhance lessons and allow students to learn more about different subjects through exploration, creation and development of content, as well as enhance important skills such as collaboration, critique, analysis and presentation.



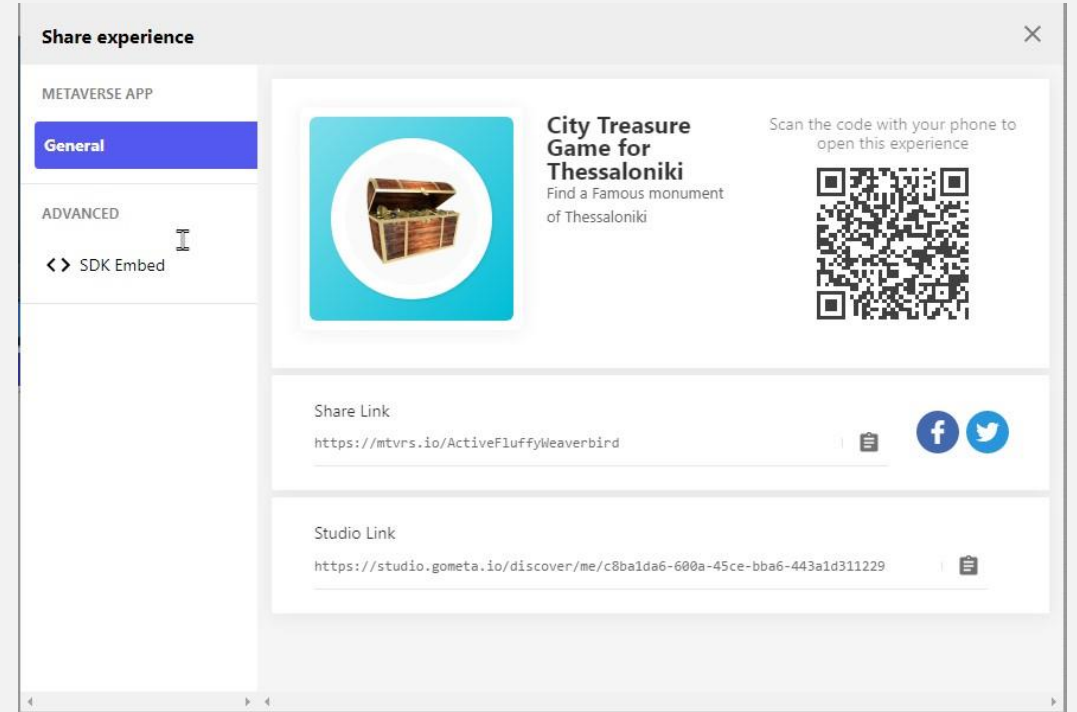
## How;

- Students can promote their learning by creating their own experiences through their own virtual and learning worlds, acquiring important digital skills useful in today's world. The opportunities for Mobile Games and Augmented Reality in the classroom are many - it's exciting to see how it can unlock students' creativity and imagination as well as inspire learning for students of all ages.

# Let's Play and Create a Game

## Metaverse

- Open your smartphones
- Go to Camera
- Scan





Go to

<https://studio.gometa.io>



# Ευχαριστώ!

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