

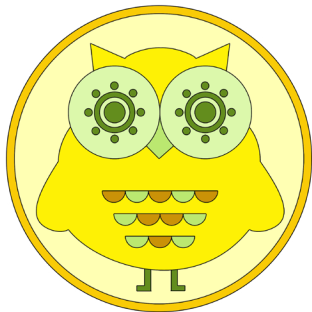
MIRACLE

BOOKLET 3

Digital Augmentation of Comics



MIRACLE



L-Università
ta' Malta



AGRUPAMENTO DE ESCOLAS TERRAS DO AVE



Maria Regina College
St. Paul's Bay Primary



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Booklet 3

Digital Augmentation for Primary School Teachers: Enhancing Climate Change Education

prepared by
Cleverbooks

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Introduction

Assisting primary school teachers in using digital augmentation to enhance climate change education can significantly improve students' understanding of this crucial global issue. MIRACLE project offers some practical guidelines to help teachers incorporate digital augmentation effectively, along with emphasizing the impact of technology on students.

MIRACLE tools help to align with the curriculum and can engage students effectively by using Augmented Reality (AR) applications. Those applications support creating within AR environments, applying AR on existing comics and creating AR experiences overlaid with real world like classroom or school yard.

Teachers can start creating Interactive Lessons by incorporating interactive activities like virtual field trips, online simulations, and multimedia presentations to make climate change education more engaging and accessible. This will help to explain how interactive lessons can help students grasp abstract concepts by visualizing the impact of climate change on different environments.

The objective of MIRACLE project is to encourage collaborative projects using digital platform (Augmented Classroom) to enable students to work together on climate change-related initiatives.

This can include creating AR scenes, educational quests and augmenting textbooks and comics that raise awareness about environmental issues. Teachers can facilitate gamified learning experiences, such as environmental quizzes with AR elements, interactive challenges, and digital AR storytelling, can motivate students to actively participate in climate change education. Generally, gamification can foster a sense of achievement and encourage students to develop a deeper interest in environmental sustainability.

MIRACLE project aims to facilitate Critical Thinking via use of digital resources to promote critical thinking and problem-solving skills related to climate change.

Section 1: Understanding Digital Augmentation

Digital augmentation refers to the use of digital technology to enhance and improve traditional methods of teaching and learning. Essentially, it's about integrating digital tools and resources into educational practices to make the learning experience more engaging, interactive, and effective. This approach aims to leverage the benefits of technology to complement and amplify the impact of conventional teaching methods.

In the context of education, digital augmentation can be immensely beneficial. It can make learning more accessible, personalized, and adaptable to various learning styles. It can also create an immersive and dynamic learning environment that fosters active participation and deeper understanding. Moreover, it can provide instant feedback, foster collaboration, and offer diverse learning experiences that go beyond the limitations of traditional classroom settings.

Here are some examples of how digital augmentation with MIRACLE AR tools can enhance traditional teaching materials:

- 1. Interactive simulations:** by using ARC Create app, teachers can facilitate creating climate education related scenes, support teamwork and enjoy their own virtual trips.
- 2. Multimedia content:** Incorporating multimedia elements such as videos, animations, and audio clips into existing comics and textbooks by using ARC TextBooks app can make learning more engaging and accessible.
- 3. Adaptive learning platforms:** Digital platforms can provide personalized learning experiences tailored to individual student needs. Use of ARC apps can support visual, audial, and kinetic needs of students due to the nature of the software involved.
- 4. Gamification:** Introducing educational games and gamified learning experiences can make learning more enjoyable and interactive. Gamification can be used with ARC Quest, which can motivate students to actively participate in the learning process.

5. Augmented reality (AR): Using AR technology, educators can create immersive learning experiences that allow students to explore virtual environments and interact with three-dimensional objects, making abstract concepts more tangible and understandable.

By integrating these digital tools into traditional teaching materials, educators can create a more dynamic and engaging learning environment that caters to the diverse needs and learning styles of students, ultimately enhancing the overall educational experience.

Digital augmentation refers to the use of digital technology to enhance or improve traditional teaching and learning methods. It involves incorporating digital tools, resources, and platforms into educational processes to make them more effective and engaging. Digital augmentation allows for interactive learning experiences: use of ARC Create, for example, can promote teamwork and support creativity by creating AR worlds on your own, historical scenes, climate change scenes.

Digital augmentation can provide educational materials in various formats, making it more accessible to students with diverse learning needs. For instance, students with visual impairments can use screen readers to access digital textbooks; use of audio overlaid on images with AR software can support personalized learning and individual needs of different students. Digital augmentation can include multimedia elements like videos, animations, and interactive simulations. These make learning more engaging and can help students grasp complex concepts more easily.

Digital tools often provide instant feedback, allowing students to understand their mistakes and correct them immediately. AR live quizzes and learning analytics via immediate feedback via ARC Quest app help students track their progress.

Digital resources can connect students and educators from around the world, going beyond the limits of a classroom or a school. Virtual classrooms provide opportunities for global collaboration and exposure to diverse perspectives via tools like ARC Create or ARC TextBooks.

Digital augmentation can introduce game elements into learning, making it more fun and motivating. With the help

of ARC Quest, a teacher can produce gamified quizzes, challenges, and leaderboards to make learning enjoyable and competitive.

Additionally, digital learning is cost-effective: by reducing the need for physical textbooks and materials, digital augmentation can potentially reduce educational costs for both institutions and students.

In summary, digital augmentation enhances education by making it more interactive, personalized, accessible, and engaging. It also facilitates remote learning, immediate feedback, and global connections. By leveraging technology, educators can create a more dynamic and effective learning environment, ultimately benefitting students in various ways.

Section 2: Digital Tools for Non-Tech-Savvy Teachers

In today's dynamic learning environment, technology has become an indispensable tool for fostering engaging and interactive educational experiences. While the prospect of integrating advanced technologies like augmented reality (AR) into your teaching practices might seem daunting, the benefits it offers in terms of student engagement and comprehension are truly remarkable.

Augmented reality has the power to transform traditional teaching materials into immersive, interactive, and memorable learning experiences, making complex concepts more accessible and stimulating for students. Despite any initial concerns about your level of tech experience, rest assured that there are user-friendly tools and resources available to help you seamlessly incorporate AR into your classroom activities.

MIRACLE project aims to guide you through the process of embracing AR as a valuable educational asset, providing you with practical tips, easy-to-follow instructions, and inspiring examples of how AR can enrich your teaching practices and captivate your students' imaginations. Embrace this exciting opportunity to revolutionize your classroom and unlock a world

of endless possibilities for both you and your students.

There are several tools within Augmented Classroom that can be used by anyone with no or limited technology experience:



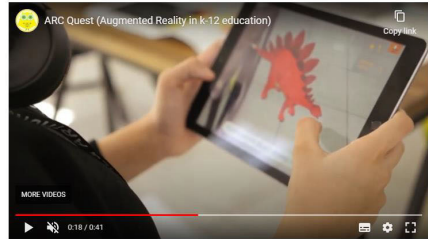
What can I do with it?

Create interactive Tests related to any subject to get students moving. 0 stress and 0 test anxiety!

How does it work?

1. Download and launch the "ARC Quest" app
2. Create or choose a quiz to assign to students
3. Get your students joined on their mobile devices

Subjects | Student Activity | Languages
Any subject | Test | Any language



What do you want to do?

Explore or assign quizzes to students

Create my own quizzes

Find, edit and manage quizzes

ARC Quest

Create interactive Tests related to any subject to get students moving. 0 stress and 0 test anxiety!

How does it work?

- Download and launch the "ARC Quest" app
- Create or choose a quiz to assign to students
- Get your students joined on their mobile devices



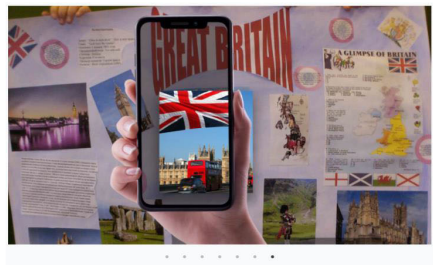
What can I do with it?

Create more interactive and engaging class materials by adding videos, audio, images, ... in AR.

How does it work?

- Create a new project
- Take a photo of your class material
- Add videos, audio, images, etc.
- Share with your students

Subjects | Student Activity | Languages
Any subject | Explore | Any language



ARC Textbooks is still in an early stage of development but you can get early access by completing a short survey about your expectations towards the app.

ARC Textbooks

Create more interactive and engaging class materials by

adding videos, audio, images, ... in AR.

How does it work?

- Create a new project
- Take a photo of your class material
- Add videos, audio, images, etc.
- Share with your students



What can I do with it?

Create and co-create 3D worlds (Arctic, the moon, wild west etc.) with your students in real-time.

How does it work?

- Create a project
- Invite students with the join code or link
- Create and co-create

Subjects

Any subject

Student Activity

Create

Collaborate

Languages

Any language



What device do you want to explore on?

 Mobile Phone/Tablet

 Touchboard

 Laptop/Desktop/Chromebook

ARC Create

Create and co-create 3D worlds (Arctic, the moon, wild west etc.) with your students in real-time.

How does it work?

- Create a project
- Invite students with the join code or link
- Create and co-create

For non-tech savvy teachers, getting started with augmented reality (AR) content creation might initially seem daunting. However, with some simple tips and guidance, it's possible to use AR effectively for content creation. Here are some tips:

- **Start with Simple AR Tools:** Begin with user-friendly AR tools that require minimal technical expertise like MIRACLE tools. Look for platforms or applications that offer easy-to-use templates and guides for creating AR content without the need for extensive coding knowledge.
- **Explore Pre-Made Templates:** Utilize pre-made AR templates provided by MIRACLE AR content creation platform withing Augmented Classroom (www.

augmented-classroom.com). These templates can serve as a starting point for creating interactive and engaging AR experiences. Experiment with customizing these templates to suit your educational content.

- **Attend Workshops or Training Sessions:** Consider attending workshops or training sessions specifically designed for non-tech savvy individuals from MIRACLE team. These sessions can provide hands-on guidance and step-by-step instructions on how to create AR content without requiring advanced technical skills.
- **Collaborate with Tech-Savvy Colleagues or Students:** Collaborate with tech-savvy colleagues or students who can provide guidance and support in using AR tools. Seek their assistance in navigating the technical aspects of AR content creation, and involve them in the process to foster a collaborative learning environment.
- **Follow Step-by-Step Guides and Video Tutorials:** Follow step-by-step guides and video tutorials available online that provide detailed instructions on how to create AR content. These resources can offer practical demonstrations and explanations that make it easier to understand and implement AR technologies in your teaching materials.
- **Start Small and Build Confidence:** Begin with small AR projects to build your confidence and familiarity with the technology. Experiment with creating simple AR-enhanced worksheets, posters, or educational materials before gradually progressing to more complex AR content creation.
- **Seek Support from AR Content Creation Communities:** Join online communities and forums dedicated to AR content creation. Engage with other educators and professionals who are using AR in education, and seek their advice and recommendations on how to effectively integrate AR into your teaching materials.

By following these tips, non-tech savvy teachers can overcome initial challenges and become proficient in using augmented reality for content creation, thereby enhancing the overall learning experience for their students.

Section 3: Designing Augmented Content

Designing digitally-augmented print media involves creating physical materials (like books, posters, or worksheets) that integrate digital elements to enhance the learning experience. For these purposes, we can take ARC TextBooks app as an example and walk through a step-by-step process.

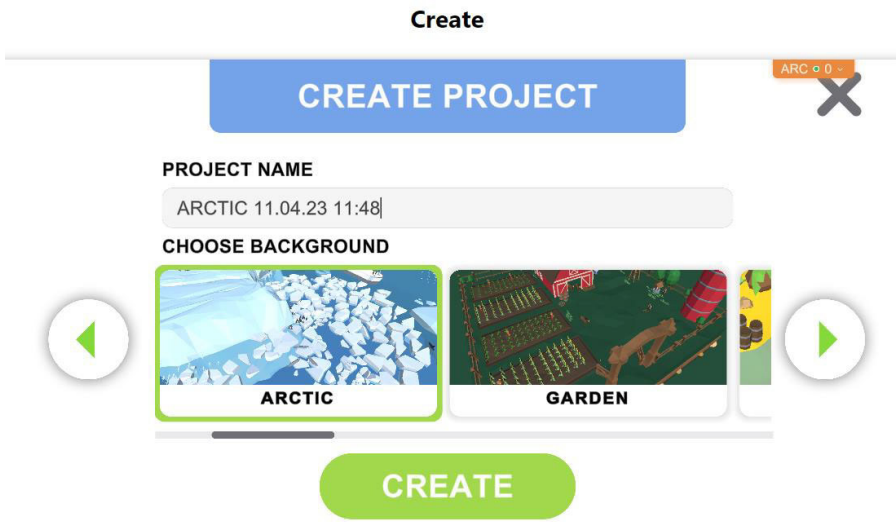
| Step | Description |
|-----------------------------------|--|
| Define Your Objectives | Determine your educational goals and what you want to achieve with your digitally-augmented print media. For example, do you want to make a textbook more interactive, create engaging posters, or design worksheets with links to online resources? Which existing textbook you would like to use? Any comics can be prepared to deliver the message? |
| Select Your Digital Tools | Choose the digital elements you want to integrate: augmented reality (AR) markers, or interactive content like videos, quizzes, existing images in textbooks, Youtube videos, own prepared comics drawings. |
| Create or Collect Digital Content | Design or gather the digital content that will enhance your visual printed materials. This might involve creating videos, interactive PDFs, or web links. Ensure that these digital resources align with your educational objectives. |
| Integrate Digital Elements | In your print materials, add the digital elements in the designated spaces using ARC TextBooks app. |
| Test Your Materials | Test the digital elements to ensure they work correctly. Use an AR app to check the functionality. |
| Share with Students | Distribute your digitally-augmented print materials to your students. Ensure they have the necessary devices, like smartphones or tablets, to access the digital content using ARC TextBooks. |
| Gather Feedback | Ask for feedback from your students about their experience with the digitally-augmented print materials. Use this feedback to make improvements. |

Section 4: Best Practices

Augmented Reality is widely used for education and MIRACLE projects aims to enhance the use of AR tools to support climate change. We empower teachers to use creation tools for climate and environmental education as described above.

Additionally, there are other ideas of how teachers around the world use AR for environmental and STEAM education:

- **Climate Change Simulations (ARC Create):** In some primary schools, teachers have integrated climate change simulations into their science curriculum using interactive software and digital tools. By simulating various environmental scenarios, students gain a deeper understanding of the impact of human activities on the planet. This approach has helped students recognize the importance of sustainable practices and environmental conservation from an early age, fostering a sense of responsibility toward the planet. Creating scenes with ARC Create by outlining specific circumstances: riverside now and after impact of global warming.



- Virtual Field Trips to Ecological Sites (ARC Quest) by adding 3D elements overlays:** Several primary school teachers have organized virtual field trips to ecological sites through the use of immersive augmented reality (AR) experiences. Students can explore diverse ecosystems, observe endangered species, and understand the implications of climate change on biodiversity without leaving the classroom. These virtual experiences have not only sparked students' curiosity but have also encouraged them to take an active role in protecting the environment. ARC Quest can add animals that do not exist anymore to your classroom or school yard, where kids can search them and answer interactive questions.





[Go Back](#)

Τύποι Vehicles

Quiz name: Tags:

Public: Complexity: Age: Language:

| # | Question | Options | Model preview |
|---|---|---|---|
| 1 | Ποια είναι η ονομασία αυτού του οχήματος; | 1. a car 2. ποδηλάτο 3. λεωφορείο 4. σκάφος |  |
| 2 | Ποια είναι η ονομασία αυτού του οχήματος; | 1. αεροπλάνο 2. a car 3. σκάφος 4. γιαντ |  |

- **Digital Storytelling on Environmental Conservation (ARC Quest and ARC TextBooks):** Teachers have incorporated digital storytelling into their language arts lessons to raise awareness about environmental conservation and climate change. By utilizing various multimedia tools, students create and share their narratives on the importance of protecting the environment. This approach has not only improved students' literacy skills but has also empowered them to become advocates for sustainable living within their communities. ARC Quest can overlay new elements to existing real world with interactive questions designed by a teacher. ARC TextBooks, on the other hand, can help with augmenting school posters, monthly school newsletters and textbooks.
- **AR Interactive Science Books (ARC TextBooks):** In a STEAM-focused primary school, teachers introduced augmented reality books that, when scanned with a tablet or smartphone, displayed 3D models and interactive simulations related to climate change, ecosystems, and weather patterns. Students became more engaged in their science studies, as the interactive content made learning more fun and comprehensible. Teachers observed improved retention of complex scientific concepts. ARC TextBooks app empowers any teacher and any student with a technology that allows augmenting any book by adding AR elements, audio and video.
- **Online Collaborative Projects (ARC Create):** Primary school teachers encouraged students to participate in collaborative online projects where they researched and created digital presentations about climate change and its impact on ecosystems. Students developed research, digital literacy, and teamwork skills while gaining a profound understanding of climate change and its implications. ARC Create makes it possible to drive AR collaborative projects within one classroom, across schools and multiple classrooms.



The positive outcomes of these initiatives include heightened student engagement, improved critical thinking skills, and a deeper understanding of complex environmental issues. Students become more conscious of their ecological footprint and develop a sense of responsibility toward the planet. Additionally, teachers benefit from enhanced teaching methodologies, as digital augmentation allows for a more dynamic and interactive classroom environment, fostering a love for learning among their students.

Conclusion

In this booklet we have proposed some ideas and inspiration for the use of various Augmented Reality tools that can help teachers with ideas and inspiration to engage students in a new way of learning by providing immersive experiences.

The potential of digital augmentation to enhance climate change education in primary schools is immense and offers a unique opportunity for teachers to foster a “green” teaching culture.

Use of digital tools and interactive technology like

Augmented Reality can help with digital augmentation, through interactive simulations, virtual field trips, and augmented reality, captivates young minds, making complex climate change concepts accessible and engaging. Students are more likely to retain information when learning is fun and interactive. By incorporating digital augmentation into their teaching practices, educators contribute to a “green” teaching culture that values sustainability and environmental consciousness. This sets an example for students and encourages them to adopt eco-friendly habits.

By incorporating real-time collaboration in AR space, interactive maps, and 3D models, teachers can show students the immediate and tangible impact of climate change on their communities and the world. This makes the subject matter more relatable and actionable. Digital tools enable collaborative projects and global connections, allowing students to work together to find solutions to climate-related problems. This promotes a sense of shared responsibility and the exchange of diverse perspectives.

Fostering 21st-Century Skills requires more attention from teachers in building their lessons and aligning with curricula. Embracing digital tools exposes students to essential skills, such as digital literacy, data analysis, critical thinking, and problem-solving, which are increasingly valuable in a technology-driven world.

Climate change education can empower students to become responsible environmental stewards. They can use technology to monitor, understand, and address environmental challenges, helping create a more sustainable future.

Incorporating digital augmentation in climate change education is not just a teaching strategy; it's a commitment to shaping a generation that understands, values, and actively participates in preserving our planet. By embracing these tools and creating a “green” teaching culture, educators play a pivotal role in preparing their students to address the critical challenges of climate change with knowledge, skills, and passion.

Additional Resources

List of online resources, video tutorials, and additional support for teachers who want to explore digital augmentation further.

- **Augmented Classroom by CleverBooks** – offers a range of AR tools for ready to use as well as for creating augmented content.
<https://augmented-classroom.com/>
- **National Geographic Education** - Provides a wide range of free resources, lesson plans, and activities for teaching climate change and environmental science at the elementary school level.
<https://www.nationalgeographic.org/society/education-resources/>
- **NASA Climate Kids** - Offers interactive games, videos, and educational resources to help students learn about climate science and environmental issues in an engaging and accessible way.
<https://climatekids.nasa.gov/>
- **Google Earth Education** - Offers resources, lesson plans, and tutorials on using Google Earth for teaching climate change and environmental science, including virtual field trips and interactive map-based learning.
<https://www.google.com/earth/education/>
- **Smithsonian's National Zoo & Conservation Biology Institute** - Provides educational resources, videos, and activities focused on wildlife conservation, biodiversity, and the impact of climate change on ecosystems.
<https://www.google.com/earth/education/>
- **TED-Ed** - Offers a collection of educational videos and lessons on various topics related to climate change, sustainability, and environmental science, providing an

engaging platform for students to learn about complex scientific concepts.

<https://ed.ted.com/>

- **Khan Academy** - Provides a library of educational resources, tutorials, and interactive exercises on environmental science, including climate change, ecology, and sustainability, suitable for elementary school students.

<https://www.khanacademy.org/>

- **Edutopia** - Offers articles, videos, and resources that provide insights into incorporating technology and digital tools in the classroom, including tips on using digital augmentation for climate change education.

<https://www.edutopia.org/>

- **Coursera for Teachers** - Offers online courses specifically designed for educators interested in integrating technology and digital tools into their teaching practices, including courses on climate change education and STEAM subjects.

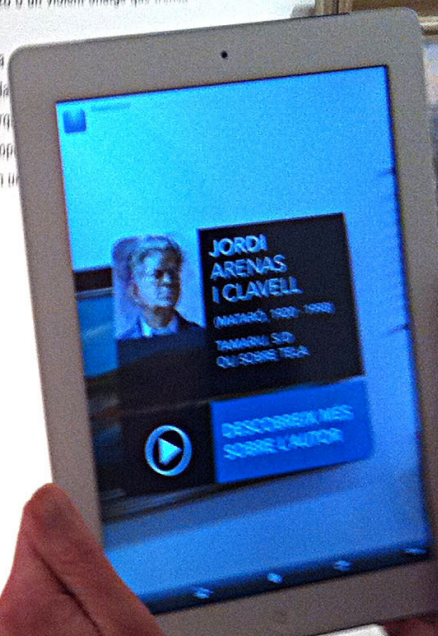
<https://www.coursera.org/>

These resources and platforms can serve as valuable tools for teachers to deepen their understanding of digital augmentation and climate change education, enabling them to create impactful and engaging learning experiences for their students.

BELLESA INABASTABLE

La bellesa del paisatge marítim és inabastable, tant en essència com per la infinitat de variants que ofereix. Res ens revela la immensitat de la natura com un mar en calma que es desdibuixa a l'horitzó o un violent onatge que trenca amb força contra les roques.

L'atracció que sent l'artista davant d'aquesta dels gèneres de major tradició pictòrica, el de la l'element humà. La inclusió d'edificacions, barques, bellesa i dibuixa un paisatge més amable i propi. el mar i el cel prenen el protagonisme i creen un



THE TOOLKIT

includes five booklets

1) **THE BASIC SCIENCE BEHIND CLIMATE CHANGE** aims to empower educators to teach the elements of CC inside and outside their classrooms. It is guided by four principles: contextual relevance, knowledge-based learning, action-oriented learning, and curriculum links. It combines elements from the five types of learning (UNESCO's CCE for SD), the New European Bauhaus initiative; the Council Recommendation on learning for environmental sustainability; and the "GreenComp" to incorporate rigorous scientific knowledge and ethical reflection into CC adaptation and mitigation approaches and measures in small communities.

2) **DIGITAL COMICS CO-CREATION** aims to explore CC through art and digital technology, developing an understanding of the concepts of visual narrative-creating stories with images and words that tell stories in ways that the two cannot say separately.

3) **DIGITAL AUGMENTATION OF COMICS** aims to provide a series of design guidelines to assist teachers and pupils in the development of digitally-augmented print media. With the advances of affordable mobile AR hardware and off the-shelf AR libraries, the focus will shift from technical development to the effects of the technology on pupils.

4) **FAKE NEWS AND DISINFORMATION** discusses a truly global problem, extending beyond the political sphere to all aspects of information, including climate change.

5) **EDUCATIONAL SCENARIOS**, each including Lesson Plans, with hands-on and online activities on co-creation of comics on climate change.



BOOKLET 3

Digital Augmentation of Comics for Primary School Teachers: Enhancing Climate Change Education

Assisting primary school teachers in using digital augmentation to enhance climate change education can significantly improve students' understanding of this crucial global issue.

This booklet, as part of the MIRACLE project, offers some practical guidelines to help teachers incorporate digital augmentation effectively, along with emphasizing the impact of technology on students.