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# MOBILE LEARNING

DUCATIONA

and

TECHNOLOGIE

# VIRTUAL 3 - 5 March 2021

Edited by Inmaculada Arnedillo Sánchez Piet Kommers Tomayess Issa Pedro Isaías





international association for development of the information society

# INTERNATIONAL CONFERENCES ON

# **MOBILE LEARNING 2021**

# AND

# **EDUCATIONAL TECHNOLOGIES 2021**

# PROCEEDINGS OF THE INTERNATIONAL CONFERENCES

on

# **MOBILE LEARNING 2021**

# AND

# **EDUCATIONAL TECHNOLOGIES 2021**

3 - 5 March, 2021

Organised by



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# ALTERNATIVE LEARNING APPROACHES IN A PANDEMIC CONTEXT: FROM THE COLLABORATIVE OUTDOOR EDUPARK GAME TO A VIRTUAL VISIT

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#### ABSTRACT

Over the last years, there has been much interest in mobile technologies for teaching and learning. Despite the focus on these emerging and innovative tools, mobile learning (mLearning) is facing many challenges. In response to the spread of the COVID-19 pandemic, many schools implemented eLearning or mLearning during school closures. However, mobile activities that involve collaboration of students in outdoor environments need to be rethought, as social distance is advised. This paper provides a pragmatic example of how to respond in the uncertain present, and plan systematically for an unpredictable, post-pandemic future. It presents an alternative learning approach in a pandemic context, as the EduPARK can be explored in a virtual visit, reinforcing the connection between physical and virtual learning spaces. This way learning can happen without face-to-face interactions for those who are avoiding physical contact, for those who are far away from the location, or even for students with motor difficulties. As a reflection, the authors examine major educational changes that have recently been imposed upon teachers and educational researchers, as well as key aspects of the current emergency response in education, and resultant implications for educational technology and mLearning.

#### KEYWORDS

Real-World Learning, Virtual Visit, Smart Education, Mobile Games, Augmented Reality

## 1. INTRODUCTION

Game-based and mobile learning (mLearning) are growing fields of research with positive empirical results in learning (Zydney & Warner, 2016; Pombo & Marques, 2019). The competition created by games may increase students' engagement in challenging learning situations and improve their overall sense of enjoyment (Huang, Chang & Wu, 2017). The challenge is how to create better learning experiences and develop game-based learning, supported by the users' experience *in situ* and their performance while playing (Groff et al., 2015; Zhonggen, 2019). Real-world learning opportunities provide students with competencies that cannot be taught in a classroom, because real-world situations include different kinds of challenges, communication styles, politics, and so forth. So, what we need is a system that recognizes and rewards interdisciplinary excellence, and real-world achievements. With the use of Augmented Reality (AR), real-world environment can be augmented by providing users with accurate digital overlays. AR is a promising technology that has the potential to encourage learners to explore learning materials from a totally new perspective (Sungkur et al., 2016; Pombo & Marques, 2020).

Smart Education concept integrates the potential of the adoption of mobile technologies to generate and collect data for situated games outside the classroom (Gianni & Divitini, 2015), fostering authentic and situated learning, but also personal and collaborative learning within a lifelong perspective (Schreiber-Barsch, 2017). Additionally, Smart Education can be used to create new learning ecosystems, where technologies enhance the multidimensional well-being of all learning players. Mobile devices, and apps, are pervasive and can be used to promote contextualized and interdisciplinary learning (Zydney & Warner, 2016; Laine, 2018; Pombo & Marques, 2020). Under these principles, emerged the EduPARK project, funded by FEDER and FCT, that seeks to promote outdoor learning strategies under geocaching principles, by means of an interactive mobile AR app that supports educational guides, in formal, non-formal

and informal contexts, in the Aveiro green park, in Portugal (Pombo et al., 2019). The EduPARK allows learning to move from traditional classroom environments to natural spaces, through an outdoor game with educational guides, in a treasure hunt format specific to certain school levels, and by adding AR to an everyday technology - the smartphone (Pombo et al., 2019). The fact that the educational guides were designed to be explored in the Park provides an example of a truly authentic context for situated learning, where the location is essential for learning. The app can be explored either individually or in a group, although working in groups may support the users' construction of meaning, being this influenced by the interaction of the learners' prior knowledge with the new experiences, as well as by their interactions with others (Pombo & Marques, 2020). However, since the 2020 quarantine period, social distancing is recommendable across universities and schools, and the selection of collaborative outdoor games might not be the most convenient solution to pursue educational aims. Many authors claim that the emergence of COVID-19 has shaped a new type of learning, the "digital learning", which can be approached through eLearning and mLearning technologies (Al-Emran, 2020; Naciri et al., 2020). They also reinforce the preparation for mLearning infrastructure as this would be the key to handle future global risks (Al-Emran, 2020). But specificities among mLearning and games should be considered, as well as different types of context, among which the learner's needs, location, and time. In the EduPARK context, during pandemic times, the virtual visit might be a good alternative, as it reinforces the connection between physical and virtual learning spaces without face-to-face interactions.

This paper is based on the emergency changes we had to apply in the mobile game educational approach, avoiding physical contact, but allowing virtual education outside the classroom, also with interdisciplinary and contextualized AR resources. The purpose is to demonstrate how a collaborative outdoor game can be explored through a virtual visit, without leaving home, to access the learning materials. The paper starts by briefly presenting the EduPARK app game, created for exploration in a park. Follows the alternative learning approach, integrating a virtual visit, which is suitable for pandemic situations. The paper ends with some final considerations and future needs. The main contribution of this paper is to demonstrate the advantages of taking virtual visits as alternative learning environments to the *in situ* locations, such as green parks. This encompasses elements of formal and informal learning, in activities that happen in distributed settings (indoors and outdoors), across physical and virtual spaces, also allowing learning anytime, anyplace, and anywhere.

## 2. THE EDUPARK APP GAME

The EduPARK app is an example of a successful mobile AR game for learning. The app was developed for Androids and can be installed from the project website (http://edupark.web.ua.pt/app), requiring guides (games) update after download. It was developed to foster collaboration, authentic and situated learning outside the classroom, under the umbrella of constructivist learning, as the learner assumes an active role by constructing new knowledge within the articulation between the learning experience, previous knowledge and interaction with others (Pombo & Marques, 2020). With the EduPARK app, learning takes place in a green park, where students interact with the setting to gain an experiential connection to the ideas, concepts, and subjects. For educational relevance of the app and game approach, it was important to carefully analyse the National Curriculum to identify multidisciplinary issues (e.g., integrating Biology, History, Maths, among others), so that students may correlate the experiences promoted by the app with the aimed curriculum learning. The app can be explored in two different ways: free mode or game mode. The free mode gives access to content in AR, without having to follow a predetermined path, allowing total liberty in the exploration of the Park. In the game mode, the app gives access to excellent educational guides, with cross subjects' educational materials specific to different school levels, from primary to higher Education. A specific guide for the public, with local culture and curiosities, is available in Portuguese and in English. In each guide users are welcomed by the EduPARK mascot, a female monkey, created to foster student engagement, who explains the game rules to the players. The objective is to correctly answer the largest number of questions, gathering points, while stablishing connections between the real world and the school contents (Pombo et al., 2019). Afterwards, the mascot guides the players through the game's four stages, each one corresponding to a specific area of the Park, in which the user is challenged to search for points of interest, collect information, answer multiple choice questions and receive immediate and adapted feedback,

whether they answer the question correctly or not. In the EduPARK game, the dynamics of a multiple-choice question are associated to several types of multimedia resources, such as audio, photography, illustration, video, or 3D objects in AR. This is not suitable for just a particular type of education, it could be any type, formal, informal or non-formal education. The ability to understand ecosystems is enhanced by experiences in real environments, so this justifies teacher's effort to take students outside the four walls of the classroom for effective learning. It comprises a very useful tool for Portuguese teachers and students to explore scientific knowledge by accessing contextualised and appealing information on biological and historical references that augment the experience of exploring a local urban green park. mLearning game-based strategies are very appreciated by the students (Huang, Y.-L. et al., 2017), as they are familiar to mobile phones, but normally they are not allowed to use them for learning in the classroom. Therefore, this approach creates opportunities to use those day-to-day technologies to learn. In addition, the use of interactive educational resources reaches students with difficulties in understanding abstract concepts, enhancing their spirit of observation, as e.g. AR allows 3D visualisation of phenomena, which might not be clear in traditional textbooks. Outdoor activities become a form of community contact instructional strategy adopted in the formal school system for the purpose of education (Obadiora, 2016) to create conditions to promote students' enjoyment, motivation and involvement in learning with hands-on activities. The EduPARK capitalises the education value of urban spaces, as green parks can act as a natural laboratory to learn. This type of innovative educational resource is not common in Portuguese speaking countries, hence, adding to the relevance of the EduPARK app (Pombo et al., 2019).

## 3. EDUPARK VIRTUAL VISIT

Although the EduPARK app has been designed to be explored in a specific green park, as the idea was to provide other learning environments outside the traditional classroom, the project also created a virtual visit to the park with some AR elements that can be explored indoors. This 360° visit, with access through the project's website (http://edupark.web.ua.pt/visit), is advantageous for those who are far away from the park, who have motor difficulties or are avoiding social contact in a pandemic situation, in which distance learning and confinement are advised. This last situation was not foreseen at all when this virtual visit was created, but its importance became evident in this critical period, since learners can explore the park virtually. Through the virtual visit, it is not possible to play the game, because its aim was to enhance the user will of going to the park to live the experience in loco. However, it is possible to search and find 23 hotspots with multimedia information that are scattered throughout the park. These points of interest contain informational text, images, and videos with real experiences. For example, the Torreão (historical water deposit) is usually closed to the public, but it can be explored inside with this virtual tour. When winding up the Torreão stairs it is possible to have access to several informative posters about the city and park. Those posters can be used as educational resources in History classes, promoting students' knowledge of local culture and historical facts, allowing students to know and analyze the importance of the water deposit in the city's history. Additionally, from its four upper windows, it is possible to sight magnificent landscapes over the city. These privileged views can reach the vast green spot of the park, its vegetation, the interesting geometry of its gardens, as well as its biodiversity of plant species, which can be used to explore real-world issues and interdisciplinary problems to enhance integrated and contextualized learning.

## 4. FINAL CONSIDERATIONS

Learning can take place everywhere, not only in the classroom or in the school environment (Obadiora, 2016). It could happen on the street, in the market place, in the park, etc. mLearning is finding an increasing adoption in education, as it encompasses elements of formal and informal learning, in activities that happen in distributed settings (indoors and outdoors), across physical and virtual spaces. Game-based and mLearning enable students to develop their conversational and technical skills, find answers to their queries, facilitate knowledge sharing and collaboration, and enhance their learning outcomes (Al-Emran, 2020). The collaborative outdoor EduPARK game was created to support the users' construction of meaning through experiences in an urban green park. In this experience, meaning construction is influenced by the interaction of the learners' prior knowledge with the new experiences, as well as by their interactions with others

(Pombo & Marques, 2020). However, the physical distance imposed by the emergence of COVID-19 has shaped the "digital learning" that can be approached through eLearning and mLearning technologies (Al-Emran, 2020). Educators can personalize their teaching strategies through mLearning and enable learners to self-regulate their learning without any restrictions to time and location. The proposed approach acts as an example for educators, systems developers, policymakers, researchers and stakeholders interested in implementing mLearning programs. The virtual visit strategy may become an adequate alternative to the traditional field trip strategy which involves, in the EduPARK context, a collaborative game. However, on the 360 visit, the park can be visited and explored virtually, although it is not possible to play the game, as its primary aim was to increase the user's will to go to the park to experience the game *in locus* (Pombo et al., 2019). However, the authors recognize that the virtual game experience can be explored in a near future project. As limitations, it is worthy to point out that some schools do not have enough resources to provide mLearning opportunities for students, and not all children have internet access at home (Naciri, 2020). However, given its benefits (Al-Emran, 2020), within and beyond the era of COVID-19, educational institutions might consider the mLearning and games as an effective approach for digital learning during the current and future crises.

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