



Abstract

Education on Sustainable Development Through Built Heritage and Technology: The “Art Nouveau Path” in the EduCITY App[†]

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Abstract: The value of cultural heritage for sustainable development has been acknowledged since the mid-20th century. Built heritage plays a key role in preserving identity, memory, and, currently, aiding education through mobile technology. The integration of education, heritage, and technology presents opportunities for innovation and originality, which are crucial for engaging students in sustainability. This paper focuses on the development of the “Art Nouveau Path” mobile game within the “EduCITY” app, which has been designed to promote Education for Sustainability. The game explores Aveiro’s Art Nouveau heritage and its alignment with nature and environmental concerns.

Keywords: sustainable development; key competences for sustainability; EduCITY; mobile game; Art Nouveau built heritage; Art Nouveau Path

1. Introduction

In the context of the current global focus on sustainability, new entities are emerging, emphasising the significance of cultural heritage in fostering sustainable development.

The recognition of cultural heritage’s importance, particularly in preserving identity and memory, has grown since the mid-20th century [1]. Technological advancements, particularly in mobile technologies, have expanded the potential for exploiting cultural heritage for educational purposes. This is exemplified by the development of “Art Nouveau Path”, a Mobile Augmented Reality Game (MARG) in the “EduCITY” application, which aims to enhance Education for Sustainability through Aveiro’s Art Nouveau built heritage.

This paper is divided into four sections. The first and second, Introduction and Methodology, respectively, inform the reader about the paper’s structure and research methods. The third section is devoted to contextualising this research and the development of the MARG “Art Nouveau Path”. The final sections, which constitute a kind of conclusion, set out the future work that will be carried out.

2. Methodology

Considering the nature of this paper, a narrative review of the literature was conducted. This comprehensive review had a main purpose: to create a knowledge base capable of inspiring and guiding future work in these specific thematic areas.



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3. Context

3.1. The EduCITY Project

The EduCITY Research and Development project (<https://educity.web.ua.pt/>, accessed on 6 May 2024) is grounded on the premise that sustainable cities and communities can be developed through the use of digital technologies as agents of change, with the aim of fostering awareness of issues concerning sustainable development. In this context, the EduCITY project aims to promote the urban space as a space for sustainable dynamics by facilitating a smart educational city environment using a mobile application (<https://educity.web.ua.pt/app.php>, accessed on 6 May 2024), which stores mobile games based on challenges that include, among other educational multimedia content, educational content in augmented reality (AR).

The EduCITY games can be developed and played collaboratively by the school public, as well as by locals and even tourists. These mobile educational games comprise an exploration of the surrounding environment through an interdisciplinary lens, which is facilitated by pre-defined routes that allow users to explore the urban space and beyond. One of EduCITY's potential features is the ability for any citizen to co-create games and educational resources, including those in AR. In this way, in addition to fostering sustainability literacy, EduCITY also advocates for the advancement of digital literacy and skills. This is predicated on the engagement of individuals with the objective of actualizing the need to change habits and awareness towards effective sustainable development [2,3].

3.2. The Role of Built Heritage in Education

The concept of built heritage encompasses tangible heritage, such as historic buildings or structures and cultural sites, including heritage landscapes. It provides a source and testimony about human history and development [4]. However, it should be noted that built heritage not only represents the past, but also the present, and is configured as a bridge to the future. Consequently, built heritage enables the exploration of various dimensions of human development, encompassing cultural and artistic perspectives, technical considerations, and ethical and social dimensions [4]. These diverse interpretations offer a potential resource for educational purposes, including direct applications in History and Art History, Citizenship, and Education for Sustainable Development.

4. The Mobile Game “Art Nouveau Path”

The development of an MARG involves the integration of diverse areas of knowledge, with an emphasis on the significance of contextual learning. This approach is crucial for a comprehensive understanding of complex phenomena, including those related to sustainability and sustainable development. In this context, it is vital to adopt a multifaceted perspective when examining the myriad phenomena that surround us, leveraging existing resources, such as built heritage. This will demonstrate the potential for collaboration with other fields and areas of knowledge.

4.1. The Role of Art Nouveau in Education for Sustainability

Art Nouveau, as an artistic movement, thrived during a relatively brief period between the late 19th and early 20th centuries. This style is often regarded as a comprehensive art form that encompassed various media, including architecture, painting, sculpture, decorative arts, graphic arts, textiles, fashion, and jewellery [5,6].

Art Nouveau emphasised a deep connection to nature as a counterbalance to the increasingly mechanised world. According to Walter Benjamin, Art Nouveau interiors provided a sanctuary from the rapid urbanisation and noise of cities while also seeking to blur the distinction between art and technique. This movement utilised technical aspects

to elevate artistic forms, resulting in stylised designs that could serve both functional and decorative purposes [7].

The defining characteristics of Art Nouveau products include flowing lines reminiscent of natural elements such as water and plants, as well as motifs inspired by fauna and representations of femininity. Moreover, the regional variations in Art Nouveau reflect the influence of local environments on artistic creations. This thematic and formal diversity underscores the movement's relevance to contemporary sustainability issues, emphasising the significance of local environments as sources of inspiration and the fusion of academic expertise with traditional craftsmanship [5,6].

The collaboration of local artisans and artists enabled the integration of academic knowledge from disciplines such as architecture, engineering, and sculpture with indigenous skills and techniques. This blending of expertise contributed to the distinctive semantic and visual grammar of Art Nouveau products, setting them apart from those of other contemporary styles such as Art Deco.

These connections allow us to state that Art Nouveau, as an artistic movement, permitted the inclusion of various strands, or 'regionalisms', which, while enriching the stylistic variety, were founded upon the relationship between the 'object produced', the local environment, and the various agents of the same environment where it was produced. This not only addresses the issue of environmental sustainability but also the holistic concept of sustainability, as recognised by all, in relation to the interconnectivity between the environment, society, and the economy.

4.2. The "Art Nouveau Path" Towards Education for Sustainability

The MARG "Art Nouveau Path" employs AR content in conjunction with other multimedia content and has yet to be implemented. This game is predicated on the premise that built heritage can serve as a space for learning and training [1]. Furthermore, it is based on the recognition of the potential of AR in the context of mobile learning and situated learning [8]. In addition to these considerations, it is important to note that built heritage plays a vital role in developing key competences for sustainability-related education.

The MARG "Art Nouveau Path" incorporates challenges that integrate AR educational resources, simulations, 3D animations, and various information points. The façades of buildings and other monuments become natural markers, allowing users to walk through the streets and squares of Aveiro's historic city centre and discover the educational content that these buildings 'hide' using a mobile device with the EduCITY app installed.

The development of this MARG adheres to the principles of design-based research and encompasses multiple iterations of improvement. The game is currently undergoing evaluation by a panel of experts in the fields of education and multimedia. The research and creation of this game are part of a doctoral research project whose objective is to contribute to the advancement of key competencies for Education for Sustainability through the valorisation of local built heritage [8].

To achieve this objective, the game will be implemented through a sequential explanatory quasi-experimental research plan, which will involve eighth-grade classes. These classes will be divided into two groups: a pre-test group and a post-test group. Questionnaires will be provided to both groups, and perceptions will be gathered through focus-group interviews.

4.3. The Potential of the “Art Nouveau Path” for Curriculum Development and Key Competences for Sustainability

Integrating the “Art Nouveau Path” into the educational curriculum requires aligning it with learning aims across various school subjects. The game allows for the exploration of historical, artistic, mathematical, and science content, among others. This is ensured by the game dynamics, which are grounded in quizzes. All questions have four answer choices and there is feedback on the chosen answer, even if it is correct. This makes it possible to add more information through the feedback. Furthermore, the “Art Nouveau Path” encourages interdisciplinary learning, allowing students to make connections between different subjects and see the broader implications of their studies. This holistic approach to education can foster a more integrated understanding of sustainability, emphasising the interconnectedness of cultural, historical, and environmental factors on the development of sustainability key competences [4].

The educational resources provided within the “Art Nouveau Path” are also designed to foster critical thinking and problem-solving skills. These resources comprise interactive quizzes, historical narratives, and real-time feedback, all delivered through the interface. By engaging with these elements, students can gain a deeper understanding of the principles of sustainable development and the role of cultural heritage in supporting these principles [8].

5. Conclusions

Since the “Art Nouveau Path” is still under development, it is hoped that built heritage will be recognised and valued as a new agent for Education for Sustainable Development. This will allow for the implementation of new curricular approaches, which will benefit from the local context of the heritage itself in conjunction with the potential of learning through mobile augmented reality. In this way, the significance of individual and collective memory and identity will be emphasised, thereby fostering awareness of the necessity for sustainable development to construct a healthier, fairer, and safer world for all.

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