

ENGAGING COMMUNITIES THROUGH GAMIFICATION: CASE STUDIES IN CULTURAL HERITAGE PRESERVATION – ALDEIA PINTADA AND LAGOA GEOTOUR IN PORTUGAL

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Abstract

The HERITAGE GAME - “A gamification model for community-based heritage work”, is a university consortium project included in a KA2¹. The action aims, among other things, to create a gamification handbook of strategies, tools, and techniques based on best practices of community-based heritage actions. In the first stage, the project’s development relies on identifying, selecting, analysing, and evaluating community-based heritage initiatives in low-density areas in each consortium country, involving gamification strategies.

The collected community heritage actions were analysed and verified using a multi-criteria matrix that included gamification criteria and social and economic impact. In Portugal, the evaluation led to the selection of two case studies: Aldeia Pintada in the municipality of Batalha and Lagoa Geotour on the island of São Miguel in the Azores archipelago. This evaluation allows us to identify successful gamification strategies within community-based heritage projects, assessing success factors and potential pitfalls. Our findings suggest that gamification techniques applied to cultural heritage can develop decision-making skills, ensure that heritage contributes to the social and cultural dynamics of the communities, and increase the visibility and replicability of heritage-related actions.

Keywords: Community Heritage, Gamification, Lagoa Geotour, Aldeia Pintada

Introduction

The HERITAGE GAME project - “A gamification model for community-based heritage work” (2023-1-PT01-KA220-HED-000154261), involves seven European universities – Polytechnic University of Tomar (Portugal – coordinator), D. A. Tsenov Academy of Economics (Bulgaria), University of Trnava (Slovakia), University of Camerino (Italy), University of South Bohemia in České Budějovice (Czech Republic), Valahia University of Târgoviste (Romania) and Adana Alparslan Türkeş Science and Technology University (Turkey) and is co-funded by the European Union under The Erasmus+ initiative.

¹ EU Erasmus+ programme

Gamification, i.e. the use of gaming elements in a non-gaming context, has emerged as a powerful and innovative tool in several fields, including the preservation and promotion of cultural heritage².

The application of gamification to cultural heritage offers several significant advantages. Firstly, it has the potential to enhance the appeal of heritage sites, incorporating narratives that contextualise the heritage in creative ways and making it more accessible and relevant to a broader audience. Secondly, it encourages active participation through the use of challenges, rewards and immediate feedback, thereby promoting a more personalised experience for those engaging with the heritage³. Simultaneously, gamification strategies have significant educational and learning implications, rendering historical and cultural information interactive, facilitating learning and knowledge retention, and enhancing awareness of the importance of heritage conservation⁴. Using gamification in heritage establishes a more profound and enduring connection between public and cultural heritage⁵.

The role of communities in heritage has been the subject of repeated debate in academic and public forums⁶. In recent years, research projects have emerged that explore how communities engage with heritage, including their contributions to heritage valuation and preservation⁷. This project explored community-based initiatives involving the local community in preserving, promoting and celebrating cultural heritage and sites using gamification strategies and techniques. A key

² Célio Gonçalo Marques, João Paulo Pedro and Inês Araújo, “A Systematic Literature Review of Gamification in/for Cultural Heritage: Levelling up, Going Beyond” *Heritage* 6, no. 8 (2023): 5935-5951, <https://doi.org/10.3390/heritage6080312>

³ Suepphong Chernbumroong, Wanvimol Nadee, Kanjana Jansukpum, Kitti Puritat and Phichete Julrode, “The Effects of Gamified Exhibition in a Physical and Online Digital Interactive Exhibition Promoting Digital Heritage and Tourism”, *TEM Journal* 11, n° 4 (2022): 1520–1530. <https://doi.org/10.18421/TEM114-12>; Dália Liberato, Pedro Liberato, Marta Nunes and Ana Ferreira, “Sustainable Destination Development Based on Gamification and Storytelling: Empowering the Douro Region Through Wine and Gastronomy”, *Smart Innovation, Systems and Technologies*, n° 340 (2023): 683–705. https://doi.org/10.1007/978-981-19-9960-4_57

⁴ Kalak, Dogan, Derya Özer and Serdar Aydin, “Experiencing Cultural Heritage Through Gamification: Mardin orphanage” in *Proceedings of the International Conference on Education and Research in Computer Aided Architectural Design in Europe*, 2, 2023, 671–680. <https://doi.org/10.52842/conf.eacaade.2023.2.671>

⁵ Mario Casillo, Francesco Colace, Francesco Marongiu, Domenico Santaniello and Carmine Valentino, “Gamification in Cultural Heritage: When History Becomes SmART”, *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, n° 14366 (2023): 387–397. https://doi.org/10.1007/978-3-031-51026-7_33

⁶ Elizabeth Crooke, “The Politics of Community Heritage: Motivations, Authority and Control.” *International Journal of Heritage Studies* 16, special issue, n° 1–2 (2010): 16–29. doi:10.1080/13527250903441705.

⁷ Elizabeth Waterton and Laurajane Smith, “The Recognition and misrecognition of community heritage”, *International Journal of Heritage Studies* 16, special issue, n° 1-2 (2010): 4-10 doi:10.1080/13527250903441671



criterion was the placement of these communities' initiatives in low-density regions, which typically face "several challenges, including a lack of favourable locations resulting in low socio-economic development and a history of low levels of technological investment."⁸

While there is no unique and legal definition of low-density regions, they are typically characterised by sparse demographics and a "lack of economic density, as evidenced by below-average GDP per capita and economic development levels. Additionally, there is often a significant physical and relational distance to decision-making centres."⁹ In Portugal, the legal framework¹⁰ for identifying low-density areas, adopted a set of multi-criteria that considers the population density¹¹, demography, physical/geographical characteristics, socioeconomic features and accessibility at the lowest administrative level, i.e., the parish.

In brief, the primary objectives of HERITAGE GAME are to identify innovative solutions for gamified cultural heritage through community-based approaches in low-density areas, to stimulate democratic cultural citizenship and participation in the preservation of cultural heritage in communities, and to foster a collaborative and practice-oriented learning environment for participating students and teachers.

The project is structured around three core development phases. The initial phase involves collecting case studies from communities that have already developed community-based projects using gamification strategies. The second phase entails a comparative and transnational analysis of the case studies collected, while the third phase is dedicated to creating a digital tool designed to empower communities to preserve and celebrate their heritage through gamified tools.

This paper addresses the outcomes of the second phase, in which the Portuguese team introduced a series of selected case studies for analysis and comparison. These case studies were analysed from a common conceptual framework.

The two case studies were selected based on an evaluation process using a

⁸ Luca Bisaschi, Francesco Romano, Malin Carlberg, Jessica Carneiro, Davide Ceccanti and Liviu Calofir, *Transport infrastructure in low-density and depopulating areas*. (European Union European Parliament Committee on Transport and Tourism, 2021): 17. [https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU\(2021\)652227](https://www.europarl.europa.eu/thinktank/en/document.html?reference=IPOL_STU(2021)652227)

⁹ José Victorino Cristiano do Rosário and Livia Madureira, "Valuing Forest Ecosystem Services in Portugal: A Literature Review" in *Analyzing Sustainability in Peripheral, Ultra-Peripheral, and Low-Density Regions*, ed. Rui Alexandre Castanho (Hershey: IGI Global, 2022): 183-203.

¹⁰ Deliberação n.º 31/2023/PL, Comissão Interministerial de Coordenação do Portugal 2030, (2023), https://portugal2030.pt/wp-content/uploads/sites/3/2023/09/31_2023_PL_BaixaDensidade.pdf

¹¹ In accordance with the provisions set forth in Regulatory Decree (Decreto Regulamentar) no. 5/2019, dated 27 September 2019, the utility of population density as a parameter for urban planning is significantly constrained. Its application should be indicative and consistently complemented by more objective parameters.

matrix that included both gamification criteria and generic impact categories. Ten community heritage gamified initiatives were identified in low-density areas within mainland Portugal and the Azores archipelago. Subsequently, the entire corpus of collected projects was evaluated by the established parameters and guidelines¹², which had previously been defined to ensure the uniformity of the evaluation process across different countries and raters.

This study employs a common and shared analytical framework for evaluating community-based heritage gamified projects and their impact on the community. Its main objective is to contribute to a more comprehensive understanding of the community's role in preserving and celebrating heritage within initiatives that involve gamification techniques and strategies for achieving their goals.

The article is structured as follows: after the introduction, the key concepts of community-based heritage are established, followed by the methodology, the presentation of case studies, the results and concluding remarks.

2. Community-based heritage

In Europe, the institutional mechanisms underpinning heritage policies have been in place since the eighteenth century and underwent a significant expansion in the 1960s¹³. As argued elsewhere, “the institutional devices created over time become effective and consistently produce a memory authorised by the dominant social group”¹⁴. They are based on “memory machines” or mnemotechnic devices, such as archives, libraries, and memorials, which outline the heritage policies of modern states, defining what and how to remember, thus shaping an authorised memory.”

This concept has been extended in recent studies to the idea of “Authorised Heritage Discourse” (AHD), presumably empowered by a socially dominant white middle class¹⁵. As Waterton and Smith put it, the AHD is a “professional discourse that validates and defines what is and is not heritage and frames and constrains heritage practices”¹⁶. It implies a chosen past not shared by the communities but conjured up by political power structures, institutions and experts¹⁷.

¹² Marusya Smokova, Célio Gonçalo Marques, João Tomáz Simões, Lígia Mateus, Silviu Miloiu, Sergiu Musteata and Evelina Parashkekova (2024). A guide to identifying best practices for gamification in cultural heritage (Svishtov: Academic Publishing House “Tsenov”, 2024).

¹³ Françoise Choay, *Alegoria do Património* (Lisboa: Ed. 70, 2010).

¹⁴ Marc Guillaume, *A política do património*, 109. Freely translated from portuguese edition.

¹⁵ Laurajane Smith, *Uses of Heritage* (London: Routledge, 2006), Elizabeth Waterton and Laurajane Smith, “The Recognition and misrecognition of community heritage”, *International Journal of Heritage Studies* 16, special issue, n° 1-2 (2010): 4-10 and Laurajane Smith 2009 “Class, Heritage and the Negotiation of Place” paper presented in “Missing Out on Heritage: Socio-Economic Status and Heritage Participation” Conference.

¹⁶ Waterton and Smith, “The Recognition and misrecognition of community heritage”, 12.

¹⁷ Smith, *Uses of heritage*, 2006; Waterton and Smith, “The Recognition and misrecognition of community heritage”, 2010 and Laurajane Smith “Class, Heritage and the Negotiation of Place”, 2009.



Subsequent studies suggest that the heritage policies that focus on the AHD discourse inflate an artificial idea of community that represents an ideal [of the community] that is often imbued with nostalgia, imagining a golden age when communities were cohesive, homogeneous and agrarian or settled from an unchanging social or ethnic group.¹⁸

This imagery is politically cherished as it aligns with the concept of community as a resilient and enduring social structure characterised by static social interactions. This is often presented as a solution to the contemporary challenges of hyper-individualism and *deterritorialised* societies. However, communities are frequently excluded from decision-making processes and are usually merely “invited” to recognise and preserve heritage approved and legitimised by experts.

The community-based heritage concept implies that heritage is determined by and the responsibility of local communities. This includes interpreting, developing content, and valuing their respective heritage assets and narratives. Community heritage often materialises in artefacts and places and is created through dynamic stakeholder negotiation. This ongoing process involves the social and political construction, recreation, and reaction of heritage.

Which memories are selected in this struggle against oblivion and for the control of discourse? Which meanings, values and narratives are legitimised and validated?¹⁹

As the Faro Convention²⁰ implies, they are not essential objects and places in themselves but the meanings and uses people attach to them and the values they represent. It is necessary to view heritage communities as a valuable tool for empowerment. This allows communities to reinforce their vital shared values and cultural identities, which are not necessarily restricted by geographical boundaries. Although the term ‘community’ is often associated with a geographical boundary,

¹⁸ Waterton and Smith, “The Recognition and misrecognition of community heritage”, 2010 and Laurajane Smith and Gary Campbell, “Nostalgia for the future’: memory, nostalgia and the politics of class” *International Journal of Heritage Studies* 23, n° 26 (2017): 1-16.

¹⁹ Sophia Labadi and William Logan, *Urban Heritage, Development and Sustainability: International Frameworks, National and Local Governance*, (London/New York: Routledge, 2015). The question of ownership and control of collective memories remains a highly controversial topic. Recently, Japan proposed to UNESCO the inscription of an ancient silver and gold mine on the World Heritage List. This mine is located on the Japanese island of Sado. The South Korean government contested this request, arguing that the mine was built using forced labour during the Japanese colonisation of the Korean peninsula. Following negotiations between the two governments, an agreement was reached. As a result, Sado Island Gold Mines were inscribed on the World Heritage List in 2024.

For further information, please see: <https://asia.nikkei.com/Politics/Japan-South-Korea-ties/Japan-sheds-light-on-Korean-wartime-labor-at-World-Heritage-Sado-mines>

²⁰ European Commission, Faro Convention - Convention on the Value of Cultural Heritage for Society (CETS 199 – Value of Cultural Heritage for Society, 27.X.2005).

it is more accurately defined as a non-geographical concept encompassing a shared set of interests and social ties.”²¹ Heritage communities are pivotal in establishing and maintaining social institutions vital for preserving local identity.”²²

3. Methodology

This exploratory study focused on identifying, characterising, and evaluating case studies of gamification applied to cultural heritage in Portugal. In light of the evaluation findings above, the Aldeia Pintada and Lagoa Geotour cases were selected for detailed examination and presented herein.

Document analysis was employed to identify and characterise the case studies, focusing on academic publications and relevant websites. In addition, semi-structured interviews were conducted with those responsible for the gamification initiatives. Furthermore, direct observation was conducted through on-site visits to observe activities and interact with the initiatives. Secondary data, such as regional statistical information, was also utilised to characterise the cases.

During the first half of 2024, 10 operational case studies²³ were identified and evaluated by the previously established criteria, which are based on domain references. These criteria are grouped into two levels: gamification criteria (table 1) and impact criteria²⁴ (table 2). The gamification criteria are grouped into three dimensions, each with the same weight: Intrinsic Motivation Heuristics, Extrinsic Motivation Heuristics, and Context-Dependent Heuristics.

Table 1. Gamification Criteria

Intrinsic Motivation Heuristics	Purpose and Meaning
	Challenge and Competence
	Completeness and Mastery
	Autonomy and Creativity
	Relatedness
	Immersion

²¹ Stefan Berger, Bella Dicks, and Marion Fontaine, “‘Community’: a useful concept in heritage studies?” *International Journal of Heritage Studies* 26, n° 4 (2019): 325–351. <https://doi.org/10.1080/13527258.2019.1630662>

²² Leidulf Mydland and Wera Grah, “Identifying Heritage Values in Local Communities.” *International Journal of Heritage Studies* 18, n° 6 (2011): 564. doi:10.1080/13527258.2011.619554.

²³ Aldeia Pintada (Painted Village); Edugame: Gois Heritage Passport; Gymkhana 5.0: Cultural; Heritage for Youth; Historical Route of the Lines of Torres; Lagoa Geotour; Lost Stories, Folklore & History; Mira de Aire Caves; Napoleon Bonaparte, the Beginning of the End; Templar Route of the Middle Tagus.

²⁴ Marusya Smokova, Célio Gonçalo Marques, João Tomás Simões, Lígia Mateus, Silviu Miloiu, Sergiu Musteata and Evelina Parashkekova (2024). A guide to identifying best practices for gamification in cultural heritage (Svishtov: Academic Publishing House “Tsenov”, 2024)



Extrinsic Motivation Heuristics	Ownership and Rewards
	Scarcity
	Loss Avoidance
Context-Dependent Heuristics	Feedback
	Unpredictability
	Change and Disruption

The impact criteria are more general and employed to determine how much the initiative engenders or advances outcomes and effects. They are grouped into four domains, each with the same weight: performance, accessibility and Inclusion, innovation and Creativity, and social and cultural impact.

Table 2. Impact Criteria

Performance	Effectiveness
	Sustainability
Accessibility and Inclusion	Accessibility
	Inclusion
Innovation and Creativity	Originality
	Creativity
Social and Cultural Impact	Social Development
	Enhancement of Local Culture
	Multiplier effects

In the first stage, each case was assessed by two independent researchers with experience in the field, and an interrater assessment table was created. If the interrater reliability fell below 80 per cent, the case was subjected to assessment by a third researcher.

A quantitative and qualitative analysis is now presented for Aldeia Pintada in the Centro Region on the mainland and Lagoa Geotour in the Azores Autonomous Region. These case studies were selected for in-depth analysis due to their high ratings in the evaluation process.

4. Case studies: best practices

The set of selected case studies, which are community-based projects, gives us an excellent overview of the importance of gamification in the context of cultural heritage. The selection of the cases Aldeia Pintada and Lagoa Geotour allows us to identify best practices that will serve as a basis for the Heritage Game project and other initiatives in the field.

4.1 Aldeia Pintada

The Aldeia Pintada community project was launched in Torre da Magueixa, locally referred to as Torre, a village with a population of approximately 500, situated within the Reguengo de Fetal parish, Batalha municipality, and falling under the jurisdiction of the ‘Comunidade Intermunicipal da Região de Leiria’ (CIMRL)²⁵. Despite its average socio-economic context, the village has experienced a progressive demographic decline²⁶ and an ageing population²⁷, similar to many other interior small villages. The 2021 census data from the National Statistics Institute indicates that Reguengo has a population of 1,907 individuals distributed across nine small villages/settlements, including Torre. This equates to a density of 67,7 inhabitants per square kilometre.

The cultural association Aldeia Pintada was created in 2020 by a group of young locals. The initiative originated from informal gatherings that brought together individuals from different age groups. In an interview published in a national newspaper, one of the promoters stated, “We engaged in discourse with the elderly members of the community, who shared with us narratives about the village, including legends, traditions, and anecdotes about individuals they had known in the past. This prompted our interest in the Torre’s cultural heritage, leading us to consider how to make this heritage accessible and visible and, most importantly, ensure its preservation to prevent its loss.”²⁸

The activities of the Aldeia Pintada project commenced with an exhaustive bibliographical investigation and the documentation, in written and video formats, of narratives, folklore, musical compositions, personal accounts, poetic traditions, and even the vestiges of architectural heritage that have been erased from the landscape.

The documentation above has permitted the emergence of a series of artistic projects such as murals, audiovisual creations, musical performances and immersive displays. These initiatives have facilitated uncovering the region’s historical legacy and cultural heritage.

The Aldeia Pintada community enriches its residents’ lives while inviting visitors to explore, interact with, and treasure the community’s identity and stories. Its artistic endeavours facilitate a connection between generations, encouraging younger residents to engage with the community’s heritage and providing a platform for recollecting memories by older people.

A digital map created using Google Maps²⁹ provides visitors with a

²⁵ Nomenclature of territorial units for statistics (NUT) of level 3 – small regions-

²⁶ Lost 12,08% between 2011 and 2021. Retrieved from: https://censos.ine.pt/xportal/xmain?xpgid=censos21_populacao&xpid=CENSOS21

²⁷ Aging index (ratio between the number of people aged 65 and over and the number of people aged 0-14) at Reguengo do Fetal was in 2022 of 330 and compares to 163 of Batalha municipality.

²⁸ “Há paredes na Batalha que contam a história das suas aldeias”, Público, março, 1, 2021. <https://www.publico.pt/2021/03/01/p3/noticia/ha-paredes-batalha-contam-historia-aldeias-1952560>.

²⁹ See https://goo.gl/maps/GYbQznUBGtuhVZNu7?g_st=ac



comprehensive overview of the village's key points of interest and showcases the artistic installations throughout the village. A point of interest is the mural entitled “Composição - A Escola,”³⁰ located in the vicinity of Torre Elementary School (fig. 1). This mural serves as a tribute to the school and the role it plays in the community³¹. Additionally, the scenic viewpoint of Barrosinha features a swing that offers visitors a unique opportunity to enjoy the area's breathtaking vistas.

During the visit, one may observe a series of murals that feature the lyrics of traditional sayings and songs. Each mural is equipped with a Quick Response (QR) code, which directs the viewer to the YouTube channel³² “O Lugarinho da Torre”. This channel features traditional songs sung by local villagers, thereby contributing to preserving the community's oral heritage.

As visitors stroll through Torre's streets and locales, they may also embark on a playful quest to find *Mr Zé Vieira's* herd of free-roaming goats, depicted in murals in a fanciful manner: *As cobras do Zé Vieira, Andam pela Torre a pastor, Dos vales à Barrosinha, 32 podos encontrar*³³. In this activity, the visitors are challenged to identify each of the 32 goats depicted on murals throughout the village.



Fig. 1. Mural “Essay - The School” painted in the façade of Torre Elementary School, 2024. Author’s photo

³⁰ Freely translation: “Essay - The School”

³¹ In this mural, an imaginary pupil writes an essay. The text is a collective of memories from real pupils from several generations. Through social media we asked them to share their memories of Torre Elementary School, and these stories define the content for this essay. “Aldeia Pintada,” Facebook, last modified January 31, 2022, <https://www.facebook.com/aldeiapintada/posts/hoje-mostramos-o-mural-que-fizemos-na-escola-prim%C3%A1ria-da-torre-objetivo-foi-olh/418315316710600/> (31 January 2022).

³² See: https://www.youtube.com/playlist?list=OLAKSuy_kKAh5kxjeX5JDs-cLhwS8vR_JG-47mLuFo

³³ Freely translation: Zé Vieira's goats, Graze around the Tower, From the valleys to Barrosinha, 32 you can find.

4.2 Lagoa Geotour

Lagoa is a city in the Archipelago of Azores on S. Miguel Island. It is considered an ultraperipheral region at the European level, exhibiting a GDP per capita of 10% below the national average³⁴ and 67% below the European average³⁵. This is one of the most isolated insular regions of the EU: “The inhabitants of European insular regions must travel an average distance of 500 km to reach the aforementioned threshold population (...) In the case of the Azores, the distance is 1,500 km. Furthermore, the territory is fragmented, comprising nine islands. This results in additional transport costs for access from each island to the region’s administrative capital”³⁶.

Furthermore, educational indexes are unfavourable. Statistical data indicates that in 2022, only 59.6% of individuals in the Azores Islands possessed at least an upper secondary education qualification, while 26.5% of the population were identified as early leavers from education and training programmes. These figures starkly contrast with the average rates observed on the mainland, where 89% and 5% of the population have attained the above qualifications.

The municipality of Lagoa has a total area of 45.6 km² and is organised into five parishes: Santa Cruz, Nossa Senhora do Rosário, Cabouco, Ribeira Chã and Água de Pau. It is situated 9 km from the capital city of Ponta Delgada.

The Lagoa Geotour community project comprises a series of geocaches distributed across its five parishes, designed to showcase the municipality’s heritage (natural and cultural). The project was devised and delineated by a local academic community, the Geocaching Club of Lagoa High School. This association was established in 2017 and developed in partnership with the Lagoa Town Council. The club currently comprises one hundred students and six teaching staff.

The Geocaching Club promotes several educational STEAM-oriented activities³⁷, specifically designed for the academic community, which engages students and parents/guardians in collaborative endeavours. These activities encourage students to engage in “leisure activities in a playful manner, to view the school as a challenging environment, and to foster respect for nature, heritage and the environment, thereby promoting a more responsible and participatory attitude towards environmental conservation.”³⁸.

A geocache is a challenge that employs gamification dynamics and involves

³⁴ Serviço Regional de Estatística dos Açores, *Contas Regionais 2022* (provisional data), (Açores: SER, 2023), <https://srea.azores.gov.pt/upl/%7B083ab4bf-455e-4ec8-97fb-ee6fcd71648%7D.pdf>. GDP of Azores autonomous region was 89,7% of national average in 2022.

³⁵ According to data retrieved from: EU, *Regiões ultraperiféricas (RUP)*, (EU: Fichas técnicas sobre a União Europeia, 2024), https://www.adcoesao.pt/wp-content/uploads/regioes_ultra.pdf

³⁶ Cristina Trujillan, Meritxell Font and Jaume Jorba, *The Ultraperipheral Regions of the European Union: Indicators for the Characterisation of Ultraperipheralit* (Barcelona, Mcrit, 2005) 40, 46. . <http://www.cp-omr.eu/pt/wp-content/uploads/2011/10/The-Ultraperipheral-Regions-of-the-European-Union-Indicators-for-the-Characterisation-of-Ultraperipherality.pdf>

³⁷ STEAM fields are the areas of science, technology, engineering, the arts, and mathematics.

³⁸ PalhocosMachado, “Clube de Geocaching da ESL” Geocaching, April, 13, 2017, <https://www.geocaching.com/geocache/GC7DHFB>



multiple participants from diverse locations. It uses a Global Positioning System receiver or a smartphone to locate the cache (probably from the French word “cacher”, which means hide). A geocache is a concealed receptacle identified by GPS coordinates often furnished with inexpensive yet meaningful rewards.



Fig. 2. Geocachers images of Lagoa Geotour cache “Convento de Santo António” – Saint Anthony Coventry; (left) Stamp and date of the visit to the Coventry 2023; (right) “Convento de Santo António” Cache contents, 2019. Images shared on geocaching platform geocaching.com.

The Lagoa Geotour project exploits the potential of location-based games. A set of 33 basic geocaching sites has been established across heritage and landscape points of interest, selected through collaboration with partner organisations.

The locations of the geocaches are announced on the Lagoa Town Council website³⁹ and linked to the geocaching site (geocaching.com), which provides supplementary information and didactic explanations about the assets. These elements are paramount for advancing non-formal and formal education⁴⁰, particularly within school-based curricula. Participants must often engage in charades, challenges, and questions about specific locations or artefacts. These activities are designed to facilitate the discovery of a particular GPS coordinate, the registration of a cache, or the retrieval of a prize⁴¹. The 33 traditional geocaches, in addition to six optional joker caches, present five distinct difficulty levels. Upon completing the tour, which entails locating and registering 33 geocaches, participants are rewarded with a virtual “silver geocoin” award.

³⁹ The geocaches however are planned and placed by the Lagoa High School students.

⁴⁰ Ewa Referowska-Chodak, “Geocaching in education – a review of international experiences. Part 1. Introduction: advantages and problems”. *Forest Research Papers* 81, n° 1 (March 2020): 29. DOI: 10.2478/frp-2020-0004

⁴¹ See <https://lagoa-acores.pt/menu/descobrir-visitar/fazer/geotour/geocaches>

5. Results

The two case studies previously outlined were evaluated by two independent raters (see methodology) on impact and gamification criteria, as detailed in Tables 1 and 2. Codes PT-003 and PT-006 refer to the Lagoa Geotour and Aldeia Pintada projects. This section presents the key findings from the multicriteria evaluation of both case studies.

We begin by outlining the impact of these projects on their respective communities, with a particular focus on the categories where they achieved the highest scores. The impact criteria assessment is based on the four criteria and their respective subcategories, as previously described in the methodology. These criteria were devised to measure the extent of implementation and the potential social and cultural impact of these initiatives on the community and its real-life context. It has been demonstrated that the impact assessment is aligned with the predefined objectives of each project. This is achieved by measuring the impact of the complex social and cultural dynamics to which the initiatives intersect and are inextricably linked.

Impact criteria

The two case studies were rated highly, particularly in ‘performance’, ‘innovation and creativity’, and ‘social and cultural impact’, with specific reference to ‘social development’ and the ‘enhancement of local culture’ (Table 3).

Table 3. Impact criteria assessment

Assessment (5=very high; 4=high; 3=neither high, nor low; 2=low; 1=very low; 0=not applicable)	Rater's code	PT-003-R1	PT-003-R2	PT-006-R3	PT-006-R4
4. Performance	4a)	5	5	5	5
	4b)	4	4	5	5
5. Accessibility and Inclusion	5a)	3	3	3	3
	5b)	4	4	3	3
6. Innovation and Creativity	6a)	4	4	5	5
	6b)	5	4	5	5
7. Social and Cultural Impact	7a)	5	5	4	4
	7b)	5	5	5	5
	7c)	3	3	4	4

4a) Effectiveness, 4b) Sustainability; 5a) Accessibility, 5b) Inclusion; 6a) Originality, 6b) Creativity; 7a) Social Development, 7b) Enhancement of Local Culture 7c) Multiplier effects

The ‘performance’ criterion comprises ‘effectiveness’ and ‘sustainability.’ The ‘effectiveness’ category assesses the degree of commitment to local communities and gauges the awareness of cultural heritage among community members. The



‘sustainability’ category evaluates the potential of these projects to continue benefiting territories and populations over time, considering the duration of the project’s activities since its inception.

The Aldeia Pintada project has successfully fostered connections between different generations of villagers and engaged them in activities with a clear purpose. It encompasses a variety of media and communication tools, encouraging the community and visitors to preserve and celebrate local cultural heritage. The Aldeia Pintada activities are backed by the local community, who are encouraged to contribute their memories in poems, stories, drawings and songs to create a living and dynamic record of the collective memory. Following this, the community also became actively involved in the project events.⁴²

The Lagoa Geotour initiative has a distinct impact on the local community, mainly targeting scholars and the local community, including students, educators and families. As reported, “since its creation, [in 2017] an average of more than a hundred students have enrolled in this club [Lagoa high School geocaching club] every year”⁴³ Between 2017 and 2020, the club’s members discovered over 1,100 caches and created 28 of their own.

Regarding the ‘Innovation and creativity’ criteria, it can be observed that these projects offer experiences and activities that diverge from the typical routine, providing users with an exceptional experience that is both enjoyable and memorable. The Aldeia Pintada project demonstrates the value of creativity at every stage, from its inception to the creation of the accompanying audiovisual elements. It offers an innovative, original and accessible way of displaying community cultural heritage without the need for significant financial or technical resources. While the concept of a geocache is already well established, the Lagoa Geotour system requires a creative approach to placing caches in unconventional locations. This could include hiding a cache on the seabed or within a municipal library book.

The ‘social and cultural impact’ is a triple category criterion, measuring the impacts on ‘social development’ and ‘enhancement of local culture’ separately, and the ‘multiplier effects’ category is evaluated less favourably for both projects. The scores on the ‘social development’ criterion reveal the impact of these initiatives on the social cohesion of the communities in question. As one of the Aldeia Pintada promoters had suggested, caring for the village fosters a sense of connection and belonging among its inhabitants, reinforcing the group’s identity and values.⁴⁴ The

⁴² As documented on a television programme, women who collect pine resin (commonly referred to as “resineiras”) were prompted to perform traditional songs for tourists, showcasing aspects of these women’s daily lives.

⁴³ Clube de Geocaching, “Clube de Geocaching da Escola Secundária de Lagoa - Jovens em GEOAÇÃO!”. *Açoriano Oriental*, Last modified January 17, 2020, <https://www.acorianooriental.pt/escolas/noticia/dsfgdsfg-306428>

⁴⁴ This statement is aligned with the project’s primary objectives, which include: (...) in addition to providing benefits to local communities, the project also aims to raise awareness of the loca-

Lagoa Geotour project has successfully used geocaching activities to foster social cohesion between schools and local communities.

The entire community has been involved in the project, with local associations or companies placing some caches. One notable example is the cache placed on the seabed by a diving company. The tour, defined by Lagoa Geotour, allows visitors to explore sites of great cultural and historical significance, carefully selected to provide a meaningful experience for geocaching practitioners. Similarly, the Aldeia Pintada project aims to revitalise local traditions and customs, enhancing local culture.

Gamification criteria

The gamification assessment was conducted using the gamification heuristics criteria proposed by Tondello et al. These criteria suggest twelve categories based on “common dimensions of motivational affordances,” as outlined in the theories of intrinsic and extrinsic motivation and behavioural economics⁴⁵.

In the Lagoa Geotour (PT-003) case study, both reviewers awarded high scores to the intrinsic motivations of “purpose, challenge, relatedness” and “completeness and mastery.” Aldeia Pintada (PT-006) received a strong rating in the ‘autonomy and creativity’ and ‘immersion’ categories.

Lagoa Geotour is based on GPS location games, namely geocaching, and is supported by an international server. It sets up a tour comprising a collection of points of interest, including buildings, artefacts, and natural places of Lagoa municipality.

The game of geocaching is based on the concept of a classical motivation game, which involves setting challenges and quests that increase in difficulty in line with the user’s skill level⁴⁶. These challenges are rewarded with a prize. The system allows players to share and compare their achievements with other users worldwide, fostering engagement with other players and participants of varying skill levels.

In the Lagoa Geotour, the completion of the activity depends entirely on the participant, who is encouraged to “progress at their own pace towards mastery.” Completion occurs when all 33 geocaches on the tour have been found and registered on the platform.

The tour is a series of interconnected objects within a defined spatial framework unified by a coherent narrative. As Callois argued, any game is played in “(…) a

tion among visitors, enhance local heritage and identity, or simply add a vibrant element to the village.” https://www.facebook.com/aldeiapintada/about_details-ref.

⁴⁵ Gustavo Fortes Tondello, Dennis Kappen, Elisa Mekler, Marin Ganaba and Lennart Nacke, “Heuristic Evaluation for Gameful Design, in Proceedings of the ACM SIGCHI Annual Symposium on Computer-Human Interaction in Play (CHI PLAY 2016), Austin, TX, USA, 16–19 October 2016; pp. 315–323

⁴⁶ The Lagoa Geotour offers a selection of optional joker geocaches, which present varying levels of difficulty and expertise.



specific space, which may be the board, stadium, track, lane, ring, stage, or arena, among others”⁴⁷This spatial configuration establishes a distinct, transient domain dedicated to enacting an action, wherein the participants engage in ritual and play. In the context of the Lagoa Geotour, the geocache’s route-related elements define the space, wherein a narrative contextualises and imbues the challenges and tasks with meaning and purpose.

The Aldeia Pintada project employs a combination of analogue and digital media technologies, including geolocation and QR code technologies, to leverage gamification strategies that rely on storytelling to convey a compelling narrative structure, fostering a sense of understanding and cohesion.⁴⁸ In the dynamics of Aldeia Pintada, the “player” is permitted to make decisions, such as selecting the route to take, the tools to use, or the practices to engage in. The challenge of finding Mr Zé Vieira’s goats encourages discovery and the desire to complete the 32 goats painted around the village. Once the first goat has been located, the challenge becomes tangible. The participant is situated within the context of the village’s painted elements, which shift their perspective to a distinct space and time. This immersion in the community’s history and culture evokes a sense of displacement and a temporary dimension dedicated to performing a separate action.

About the concept of ‘extrinsic motivation’, both projects have demonstrated noteworthy excellence in meeting the criteria of ‘ownership and reward’, each in a distinct manner. In the case of Lagoa Geotour, the system delivers a reward upon completing a previously established activity. In contrast, Aldeia Pintada allows participants to explore the village freely, following a map⁴⁹ While engaging in activities such as goat chasing. Additionally, some painted murals feature QR codes that initiate new quests or direct users to other content, including a YouTube video showcasing the local community singing traditional songs, reciting poems, and sharing stories.

The participant is engaged in a dynamic tour designed to stimulate curiosity while presenting challenges. The challenge of finding Mr Zé Vieira’s goats encourages discovery and the desire to collect photos of 32 goats painted around the village. The participant becomes immersed in the local cultural heritage in this circuit, forging a profound connection with the community’s identity. The user’s experience is a significant memento, an emotional reward, as evidenced by the testimonies and photographs taken at various locations.

In both projects, the “context-dependent heuristics” were assessed favourably regarding their ability to handle unpredictability and accommodate change

⁴⁷ Roger Callois, *Os Jogos e os Homens* (Lisboa: Cotovia, 1990), 26. Freely translated from portuguese edition.

⁴⁸ Lucas Bietti, Otile Tilston and Adrian Bangarter, “Storytelling as Adaptive Collective Sensemaking”. *Top Cogn Sci*, 11 (jun 2018) 710-732. <https://doi.org/10.1111/tops.12358>

⁴⁹ This map, created in google maps, signs the points of interest – heritage sites and buildings- and the location of painting murals. https://www.google.com/maps/d/viewer?mid=12uQ-54JxIuYF-FuS8r99oAsB_rAsRxPbt&ll=39.660798478350564%2C-8.766341984655767&z=16

and disruption. In the case of Lagoa Geotour, the player is driven by a desire to uncover the next element of the narrative, which is created through enigmas and clues. These elements generate a sense of tension that is resolved upon completing the game’s objective. In Aldeia Pintada, the system does not impose a predefined route or plan, thereby offering the player a high degree of variability in the tasks and challenges that they can undertake. Furthermore, discovering murals with varying images in unconventional locations engenders the participants’ perception of unpredictability and continuous astonishment.

Table 4. Gamification criteria assessment

Assessment (5=very high; 4=high; 3=neither high, nor low; 2=low; 1=very low; 0=not applicable)	Rater’s code	PT-003-R1	PT-003-R2	PT-006-R3	PT-006-R4
1. Intrinsic Motivation Heuristics	1a)	4	4	2	2
	1b)	4	4	2	2
	1c)	4	4	0	0
	1d)	3	3	4	5
	1e)	5	5	3	3
	1f)	3	2	5	5
2. Extrinsic Motivation Heuristics	2a)	5	5	4	4
	2b)	1	1	0	0
	2c)	1	1	0	0
3. Context-Dependent Heuristics	3a)	1	0	0	0
	3b)	4	3	4	4
	3c)	0	0	4	4

1a) Purpose, 1b) Challenge, 1c) Completeness and Mastery, 1d) Autonomy and Creativity 1e) Relatedness 1f) Immersion; 2a) Ownership and Rewards, 2b) Scarcity, 2c) Loss Avoidance; 3a) Feedback, 3b) Unpredictability, 3c) Change and Disruption

Concluding remarks

The study had previously identified, analysed, and rated ten case studies, with the Aldeia Pintada and Lagoa Geotour projects standing out as particularly noteworthy. The evaluation outcomes indicate that using gamification strategies and techniques is a practical approach to achieving success in these projects and positively impacting communities.

The two projects engage with the local community and the region’s heritage differently per their objectives. The first project aims to promote and preserve traditional culture and vernacular heritage, which are at risk of being lost due to the decline of rural traditions and the fading popularity of folk stories. The second aims to create a tour of places and buildings to engage the scholarly community



in educational and STEAM activities while promoting the region's tourist attractions. They employ various gamification strategies and tools tailored to the specific contexts and objectives. Storytelling is a core element in Aldeia Pintada, encompassing community oral storytelling and the "techniques used in other media to unfold or disclose a narrative."⁵⁰

Since its inception in 2020, Aldeia Pintada has engaged over half a hundred participants and continues thriving. The project fosters connections between generations and ensures the memories of Torre village are recorded and preserved through art and storytelling. In 2024, the project remained active, hosting a live mural painting event and an artistic residency. The latter involved five invited artists working on five façades in the village, reinterpreting the stories, legends, songs and experiences collected from direct dialogue with the local inhabitants.⁵¹

The concept behind Aldeia Pintada provides an excellent case study for replicating similar projects in low-density areas, with direct community interaction and the application of local heritage. The project was developed by the community for the community. It uses accessible technological resources, offering an original and innovative approach.

A geocaching network with established rules and operational features supports the Lagoa Geotour. It is a reliable and globally tested gamification strategy that can be easily adapted to various applications. As this project originated in a school community and was subsequently extended to the municipality of Lagoa, it demonstrates a clear commitment to combining educational objectives with tourism development. In July 2021, the coordinator of the Lagoa Geotour project was interviewed by a regional television station and asserted that the project had led to an increase in the number of geocaches registered, highlighting the potential of geocaching as a promotional strategy for cultural tourism⁵².

These projects evidence communities' engagement in promoting and preserving local heritage and memories, embodying a paradigm shift from a "model of cultural consumption to a model of cultural commitment". As stated in the Porto Santo Charter, heritage stakeholders ought to work towards a shift that "values what each one knows, their traditions, their voice. The notion of cultural identity is inherent in every territory; therefore, it is inaccurate to suggest that they "introduce culture" into a territory⁵³.

Finally, our findings, based on impact and gamification assessments, also suggest that:

1. Gamification strategies included in cultural heritage promotion and preservation appear to improve/maximize community engagement,

⁵⁰ Marios Giakalaras, *Gamification and Storytelling*, (Univ. Aegean, 2016), 3.

⁵¹ Information retrieved from <https://pt-br.facebook.com/aldeiapintada/>

⁵² Luis Filipe Machado interviewed by RTP Açores, in 27 July 2021, retrieved from <https://www.facebook.com/acores.hoje/videos/lagoa-geotour/4169322796508122/>

⁵³ National Plan for the Arts, *Porto Santo Charter*, (Porto Santo. Apr, 2021) 6. <https://portosantocharter.eu/wp-content/uploads/2021/05/PortoSantoCharter.pdf>

helping to present a meaningful and challenging narrative for promoting cultural heritage.

2. These projects have a positive social and cultural impact on communities, effectively empowering them and encouraging people to get involved and participate in initiatives that protect and promote local heritage and cultural identity.
3. It seems clear that fitting cultural heritage projects within educational purposes can be beneficial, creating programmes not necessarily included in the formal curricula. Promoting group activities within cultural heritage and oriented to educational STEAM fields will likely stimulate awareness about local heritage and foster greater community participation and interaction.

Lastly, the global results of this international study can contribute to understanding how community-based heritage projects can maximise their impact using gamification techniques and further help establish or define some parameters of a cultural policy related to heritage conservation and tourism development of community engagement initiatives.

Rezumat

THE HERITAGE GAME – "A model gamification for community-based heritage work", este un proiect de consorțiu universitar inclus într-o acțiune KA2, care urmărește, printre altele, crearea unui manual de gamification cu strategii, instrumente și tehnici bazate pe cele mai bune practici ale acțiunilor comunitare de patrimoniu. Dezvoltarea proiectului se bazează, într-o primă etapă, pe identificarea, selecția, analiza și evaluarea inițiativelor comunitare de patrimoniu, în fiecare dintre țările consorțiului, situate în zone cu densitate redusă, și implicând strategii de gamification. Acțiunile de patrimoniu comunitar colectate au fost analizate și verificate conform unei matrice multicriteriale care a inclus criterii de gamificare și impact social și economic. În Portugalia, evaluarea a condus la selectarea a două studii de caz, Aldeia Pintada din municipalitatea Batalha și Lagoa Geotour pe insula São Miguel din arhipelagul Azore. Această evaluare ne permite să identificăm strategii de succes de gamification în cadrul proiectelor de patrimoniu bazate pe comunitate, evaluând atât factorii de succes, cât și potențialele capcane. Descoperirile noastre sugerează că tehnicile de gamification aplicate moștenirii culturale pot dezvolta abilități de luare a deciziilor, pot asigura că moștenirea contribuie la dinamica socială și culturală a comunităților și crește vizibilitatea și replicabilitatea acțiunilor legate de patrimoniu.

Cuvinte cheie: Patrimoniu comunitar, Gamificare, Geotour Lagoa, Aldeia Pintada



List of illustrations:

Fig. 1. Mural “Essay - The School” painted in the façade of Torre Elementary School, 2024.

Source: Authors’ photo.

Fig. 2. Geocachers pictures of Lagoa Geotour cache “Convento de Santo António” – Saint Anthony Coventry- left) Stamp and date of the visit to the Coventry 2023; right) “Convento de Santo António” Cache contents, 2019. Images shared in geocaching platform geocaching.com. Source: left: <https://www.geocaching.com/live/log/GL19C21B1> and right: <https://www.geocaching.com/live/log/GL108JV82>

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