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Estrategias de gamificación digital para promover el aprendizaje basado en la experiencia sobre preservación y curaduría en museos

Digital gamification strategies to promote experience-based learning about preservation and curatorship in museums

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Resumen

Como espacios de aprendizaje y fruición, los museos están constantemente adaptando sus contenidos y acciones para hacer frente a la dinámica de las transformaciones sociales. La introducción de nuevas tecnologías digitales en los espacios de exhibición permitió a los equipos del museo comunicar sus colecciones e interactuar con sus visitantes de formas muy diferenciadas. El fenómeno de la gamificación y sus estrategias implícitas plantean la posibilidad de mejorar el compromiso entre personas, objetos e información asociada, y puede permitir a los museos establecer nuevos enfoques y resultados. El trabajo a presentar forma parte de un programa de investigación de doctorado centrado en el desarrollo de experiencias gamificadas y sus implicaciones en el proceso infocomunicacional y de aprendizaje no formal en museos, específicamente aplicado a un grupo de visitantes entre 8 a 12 años. El objetivo es compartir reflexiones y consideraciones sobre el despliegue de un prototipo digital gamificado en un museo en Portugal, con el fin de mejorar el conocimiento sobre las colecciones y la conciencia sobre el trabajo entre bastidores invisible, complejo e interdisciplinario rico de los equipos del museo, que se ocupan de la curaduría y gestión de riesgos para asegurar su preservación, así como su fruición incluyente. Basándonos en literatura relevante y en marcos de gamificación identificados, nos enfocamos en la descripción de posibles soluciones gamificadas con la yuxtaposición de objetivos de aprendizaje y posibles resultados. Como parte de un enfoque exploratorio, pretendemos enumerar las mejores prácticas para cumplir con los requisitos educativos iniciales, así como proceder con posibles soluciones para responder a ellos. También pretendemos fusionar estas reflexiones con inferencias plausibles de motivaciones intrínsecas y extrínsecas en grupos y comprender cómo pueden influir en las acciones deseadas y en toda la experiencia de aprendizaje gamificada.

Palabras clave: *museos; estrategias de gamificación; desarrollo de experiencias digitales; conservación y curaduría; aprendizaje no formal.*

Abstract

As spaces of learning and fruition, museums are constantly adapting their contents and actions to deal with the dynamic of social transformations. The introduction of new digital technologies in the exhibition spaces empowered museum teams to communicate their collections and interact with their visitors in very

differentiated ways. The phenomenon of gamification and its implicit strategies, raise the possibility of improving engagement between people, objects and associated information, and may allow museums to establish new approaches and results. The work to be presented is part of a PhD research programme focused on the development of gamified experiences and their implications in the infocommunicational process and non-formal learning in museums, specifically applied to a group of visitors between 8 to 12 years old. The aim is to share reflections and considerations about the deployment of a digital gamified prototype in a museum in Portugal, in order to enhance knowledge about collections and awareness about the invisible, complex and interdisciplinary rich, backstage work of museum teams, dealing with curatorship and risk management to ensure their preservation, as well as inclusive fruition. Based on relevant literature and on identified gamification frameworks, we focus on the description of possible gamified solutions with the juxtaposition of learning objectives and possible outcomes. As part of an exploratory approach, we intend to enumerate the best practices to fulfil the initial educational requirements, as well as to proceed with possible solutions to respond to them. We also intend to merge these reflections with plausible inferences of intrinsic and extrinsic motivations in groups and understand how they can influence desired actions and the whole gamified learning experience.

Keywords: *museums; gamification strategies; digital experience development; preservation and curatorship; non-formal learning.*

1. Introduction

Museums are places of memory and protection, struggling to be lived and enjoyed by all and with all, and, therefore, constantly changing in order to adapt to the needs and advances of communities and, in general, to society. In exhibition spaces, the introduction of new multimedia formats and possibilities aroused digital experiences to unfold in very different ways, providing differentiated interactions with visitors, improving informational access, and amplifying the way in which institutions communicate their collections.

Gamification strategies in museums, as a result of a multiplicity of alternatives, may help to bridge disarticulations between spaces, promote distinct interactions and improve personal and social engagement through thoughtful and articulated game mechanisms. Nevertheless, gamified digital experiences may also promote non-formal learning, improving the infocommunicational processes that are established between collections and visitors. In recent years, this type of experiences and gamified approaches have been recurrent in museums. Although the results are not yet expressive, for the most part, experiences revealed positive outcomes, regarding engagement, satisfaction, and short-term retention of new information. However, the normal construction of these experiences is based on specific data and elements of the objects and the collections, or they introduce facts, stories about the building or events. What if gamified digital experiences in museums were based on the premise of preservation and curatorship? What if the experiences could provide visitors an articulated notion about some inherent team professional role functions and activities within the institutions, taking into account real learning objectives?

As a result of an ongoing PhD research programme, this article intends to summarize the exploratory procedures used in order to facilitate the integration of gamification strategies, aligned with preservation and curatorship, within a chosen museum in Portugal.

2. Objectives

A meaningful choice of game elements and solutions were intended, which could allow, not only a first raw design of the digital proposal, but also ensured a correct identification of educational objectives and corresponding learning outcomes.

3. Methodology

We propose an exploratory approach based on the frameworks and processes of Yu-Kai Chou (2019) and Andrzej Marczewski (2018), which we used to validate different stages alongside with other tools that can be replicated by users or museum teams that dwell into the first steps of digital gamification creation and development.

4. Concept and context: from gamification to preservation and curatorship

First characterized in 2003 by Nick Pelling, gamification identifies the construction of software or platforms that encourage people to build and act in a social way. Through the introduction of game mechanisms in environments that are not inscribed to the context, the concept of gamification evolved, in a broader way, as the process of game-thinking, design (Deterding et al, 2011) and game mechanics that aim to promote user engagement and problem solving (Zichermann & Cunningham, 2011). Chou (2019) defines the concept as the art of manipulating playful and engaging elements, normally found in games, and applying them painstakingly to the real world or in professional and production activities. In his work, he introduces the Octalysis Framework, where eight main core drives are identified. According to Chou (2019), these core drives should be implemented and analysed in every step of the gamified creation. Also, Marczweski (2018) focuses on identifying some

intrinsic motivations of users with RAMP approach (relatedness, autonomy, mastery, purpose) in order to guide the gamification processes, as he sees them as the use of design metaphors that enable the creation of engaging experiences similar to games.

Gamification experiences can promote user engagement, playfulness, new learning competences, the ability to trigger positive reactions, in a continuous relation between intrinsic and extrinsic motivations. Nevertheless, its approach is also the result of an appropriation, of an assemblage of characteristics, structures, design, narratives, and videogames, so represented in the participatory culture of the 21st century (Jenkins, 2005). Gamification strategies are mainly based on the introduction of game mechanisms and motivational setups in order to promote behavioral shifts such as: time, leaderboards, boosters, quests, points, status, levels, badges, rewards, feedback, tokens, graphics and appealing design components that allows users to engage socially in pursuit of one or more identified goals. Different from games, which are built upon mainly for the user's entertainment, gamification is sets upon clear objectives and needs from the organization or institution that sets the experience (Queirós & Pinto, 2022). The interaction process requires a deep reflection and analysis of the real motivations that lead to desired actions. The design of gamified proposals is demanding and must meet the initial objectives and be aligned with the target audience of the application or the built system. In museums, gamified digital experiences are profuse and applied in institutions with the aim of improving the visitors' experience and facilitating the premise of non-formal education. However, despite this scope, there are some factors to consider before undercome this type of endeavour: the size of the institution, the team and, above all, the financial capacity. These personalized projects are often carried out by external companies, whose design is time-consuming, very expensive and requires constant articulation between the institution's real objectives, investment, user interaction and validation of its applicability and effectiveness.

On the other hand, in museums, the preservation of collections unfolds in numerous spaces, such as exhibition and storage rooms, and multiple tasks, providing the prevention or mitigation of damage or loss. This preservation function and activities, often invisible to visitors, must be systematically carried out and involves scientific and technical knowledge that allows its efficiency, according to materials' nature and technology, condition state of collections (content) and building (container). Furthermore, these permanent preservation activities should go hand in hand with the notion of curatorship, in order to guarantee the best conditions for collections, ensuring risk management during exhibitions and educational activities. Preservation considers a set of policies and practices that allow a correct and integrated action with museum collections and spaces, enabling the delay of deterioration processes, thus ensuring preventive conservation, and avoiding future restoration interventions. Preventive conservation strategy has been assumed as an activity allied to the practice of monitoring and controlling the main causes of deterioration all over the world, including in Portuguese museums (IMC, 2007).

In articulation with preservation, curatorship is reaffirmed with the mediation of a curator or a curatorial team responsible for the concept and content, where architects, designers, workers, amongst others, can come together to imprint tangibility and transfer the proposal to a three-dimensional space (Hooper-Greenhill, 1995). The curator is responsible not only for promoting an exchange of information and dialogue between collections and visitors, but also for the idealization of exhibition solutions that guarantee the protection of collections.

Aligning gamification strategies to the concepts of preservation and curatorship presupposes unravelling the invisible, backstage, work of museum professionals' teams within institutions, which is often obliterated. The careful introduction of game mechanisms to facilitate knowledge about preservation and curatorship can rise new perspectives about collections, about the importance of museum teams, while, at the same time, promote a differentiated look about the relevance of safeguarding to insure inclusive access.

5. Gamified experience-based learning: prior considerations

When building gamified digital experiences, it will be necessary to take into account a number of prior considerations, not only about the financial capabilities and teams in the institution, but also about the visitors and characteristics of the target audience. Falk and Dierking (2000) in their book *Learning from Museums Visitor Experiences and the Making of Meaning*, consider the bases of a visitor experience model that is built from the relationship of three specific contexts (personal, social, and physical), where different forces, motivations and prior knowledges are underlying. This model, which years later they called the interactive experience model (Falk & Dierking, 2011), considers that an experience that responds effectively to these three contexts will have a greater probability of being long term remembered. Intersecting this model with the construction of gamified experiences, it will be necessary to foresee that, for many groups of visitors, both the notion of preservation and curatorship represents a novelty, thereby it changes the way the experience is received, and the learning retentions are carried out. To overcome this, the introduction of game mechanisms should be aligned to promote a strong narrative construction so that users can accommodate these notions through the storyline. The choice of collections or items in the museum space is also extremely relevant because they allow a physical integration of visitors, even though the gamified experience absorbs a digital format. This selection must be objective to establish an immediate connection through the identification of materials or characteristics, appealing to a careful observation and thus promoting social and physical interaction with the target audience of the gamified digital experience. Thereby, the introduction of mechanisms capable of promoting a physical circuit within the museum space, teamwork and the visualization of progression and visual feedback components may stimulate visitors to engage in the three contexts describe by Falk and Dierking (2011). Besides, the creation of scenarios mimicking dangerous situations (e.g., earthquakes, armed conflicts, fire…) can give visitors a sense of urgency, motivating individual users to solve problems through decision making.

6. Exploratory process and results

To define the narrative of the digital gamified experience and possible introduction of game mechanisms, an exploratory process was undertaken, keeping in mind the previous observations and intersections of the personal, social and physical contexts (Falk & Dierking, 2011).

The first phase of the process was focused on studying the defined target audience (8-12 years old) and their characteristics, summarized in Table 1.

Table 1. Target visitors capabilities and caracteristics from Piaget (2003)

target visitors	capabilities and caracteristics from Piaget (2003)
Children 8-12	social rules learning logic and concrete thought sense of justice mental operations verification and identification of concepts beyond objects make classifications and enumerations manipulation of objects throught the senses

Learning objectives (Table 2) were, then, established and intersected with The New Taxonomy elements from Marzano and Kendall (2008), which were aligned with the characteristics of the target audience.

Table 2. Learning objectives and New Taxonomy

target visitors	learning objectives	New Taxonomy from Marzano and Kendall (2008)
Children 8-12	better knowledge about some preservation procedures	Integration, classification and decision making
	better knowledge about the objects in the museum	recall, integration, correspondence
	identify threats and apply the best methods to erradicate them	Integration, classification and problem solving
	better knowledge about curationship	experiment, recall, decision making

Afterwards, the most striking testimonies and concerns regarding preservation and curatorship in the chosen museum were added (Table 3). These issues were crossed with the previously defined learning objectives which were turned into learning outcomes.

Table 3. Preservation and curatorship concerns and learning outcomes

Preservation and curatorship concerns in the museum	Learning outcomes
Territory and structure of the museum building	Better understanding regarding vulnerability to physical forces, such as earthquakes, and preservation procedures
Cleaning objects inside showcases	Better understanding regarding vulnerability to physical forces, such as hitting against objects accidentally, and preservation procedures
Historic wooden floors and instability of objects inside showcases	Better understanding regarding vulnerability to physical forces, such as vibration caused by visitors and/or traffic, and preservation procedures
Showcases with heavy glass enclosures	Better understanding of vulnerability to physical forces, of objects and professionals, associated with the opening of showcases
Non-rotativity of objects in long-term exhibitions	Better understanding of vulnerability to light, such as textile color fading, and preservation procedures
Textile collections as food for insects	Better understanding regarding vulnerability of textiles to insects, such as moths, and preservation procedures
Some plastic collections' chemical instability	Better understanding regarding vulnerability of some plastic collections to intrinsic chemical reactions due to their own chemical constituents and interaction with environment, and preservation procedures
No space for temporary exhibitions	Better understanding of the need for articulation between curatorship and preservation, in the exhibition of objects with very different natures and vulnerabilities

The second phase of this exploratory process began with brainstorming sessions. The sessions were carried out during several days in order to write the best general ideas that could encompass both learning objectives and the identified problems, taking into account the characteristics of the target audience.

To make a conscious and orderly choice, the ideas were organized, and an evaluation table was structured (Table 4), considering a score from 1 to 10 (10 being the maximum). Scores were validated through eight components based on Falk and Dierking (2011), that mirror the three contexts enunciated.

Table 4. Narrative ideas 1st evaluation based on the 3 contexts of visitors

	excitement	initiative	happiness	urgency	communication	problem solving	active listening	spatial orientation
idea 1	**1 to 10**	...						
idea 2	**1 to 10**	...						
idea 3	**1 to 10**	...						

At this phase it was also important to understand the different intrinsic and extrinsic motivations of the elaborated ideas. So, a second classification table was also made and scored the same way, according to the eight core drives (CD) stated by Chou (2019) in the Octalysis Framework: CD1 epic meaning; CD2 development and accomplishment; CD3 empowerment of creativity and feedback; CD4 ownership and possession; CD5 social influence and relatedness; CD6 scarcity and impatience; CD7 curiosity and unpredictability; CD8 loss and avoidance.

Table 5. Narrative ideas 2st evaluation based on the 8 core drives

	CD1	CD2	CD3	CD4	CD5	CD6	CD7	CD8
idea 1	**1 to 10**	...						
idea 2	**1 to 10**	...						
idea 3	**1 to 10**	...						

Then, a total sum was elaborated for each written idea. This sum accomodated both the obtained values of the context components as well as the extrinsic and intrinsic motivations. The idea with the highest value number was signaled, however, a careful comparison of values was carried out. This procedure enabled the highest value idea improvement, since there were better scores throughout certain components and core drives. These differences were considered, and new introductions were made to establish the final narrative proposal.

The third phase of this exploratory process began with an intersection of the final narrative and the integration of intrinsic motivation solutions based on Marczweski's RAMP (2018) (Table 6). This action allowed a better understanding of the different intrinsic motivations and stimulated a better description of the final gamified elements to consider.

Table 6. Narrative idea and possibilities with RAMP

RAMP	Description	integration
Relatedness	The desire of being connected with others	Possibility of working in groups
Autonomy	The need of freedom and independecy	Choice of caracters, customization of challenges, routes and objects
Mastery	The desired to learn something and become an expert	Sense of urgency, time, replays and differentiated challenges
Purpose	The need to do altruistic actions	Sense of belonging and saving the world like a hero

Finally, gamification strategies were aligned as possible solutions as demonstrated (Table 7). For each learning outcome possible gamified solutions were created, taking into account the identified motivations by RAMP.

Table 7. Possible gamified solutions results

Preservation and curatorship concerns in the museum	Possible gamified solutions
Territory and structure of the museum building	Simulate an earthquake, rescue and save endangered objects
Cleaning objects inside showcases	Cleaning dust without knocking down objects
Historic wooden floors and instability of objects inside showcases	Hearing sounds on cue (AR) and respond to visual questions, to avoid displacement and knocking down of objects
Showcases with heavy glass enclosures	Problem solving puzzle to lift showcases' heavy glass enclosures
Non-rotativity of objects in long-term exhibitions	Saving objects from lighting, intense and/or over time
Textile collections as food for insects	Detecting and trapping or killing moths to rescue "martyrs" textile objects (like flags) from damage
Some plastic collections' chemical instability	Detecting and neutralizing "suicidal" plastics (like some toy soldiers)
No space for temporary exhibitions	Creating a digital exhibition with the rescued and saved objects, responding to questions regarding the choices

7. Final considerations

This paper aimed to share a first sequence of exploratory procedures that allowed the construction of a general narrative for a gamified digital proposal, to be applied within a museum in Portugal. The obtained and schematized results enable the identification of some gamified integration solutions (Table 7), based on specific learning outcomes and notions of preservation and curatorship.

As further work, it is foreseen the creation of a detailed storyboard and a high-fidelity prototype, that will dwell with the chosen narrative and the possible solutions found. The prototype will integrate a sequence of desired actions, as well as possible characters, paths, and results, scoring and feedback systems and mechanisms, as well as a proposal of a circuit within the museum space. It is also perceived the future need to introduce at least two iterative cycles with groups in the museum in order to improve the final proposal.

It is believed that this exploratory procedure was very useful to consolidate new directions of empirical creation, thus enabling a simple and functional form that can be easily reproduced by museum professional teams within the institutions. Furthermore, it can be effective whilst working with external developer companies because it can guarantee an integrated digital proposal, with game mechanisms that reflect the defined learning needs and outcomes. Regarding preservation and curatorship, it is also perceived that the built narrative and the solutions found with these procedures will be helpful in retaining future knowledge through gamified experience-based learning, disseminating the invisible work of these permanent processes to the public.

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