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Interactive and Gamified Educational Virtual Tour for the Preservation of Tangible and Intangible Rural Heritage

Damiana Luzzi[1], Erica Isabella Parisi[2], Maria Ranieri[1], Grazia Tucci[2]

[1]Deparment of Education, Languages, Interculture, Literatures and Psychology, University of Florence, Italy - (damiana.luzzi, maria.ranieri)@unifi.it
[2]Deparment of Civil and Environmental Engineering, University of Florence, Italy - (ericaisabella.parisi, grazia.tucci)@unifi.it

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Abstract

How can a closed museum continue to tell stories, share knowledge, and strengthen community identity?
This paper presents an interactive, gamified virtual tour designed to enhance both the tangible and intangible heritage of Tuscan rural life, preserved in the *Museo della Civiltà Contadina - Casa del Guidi* in Sesto Fiorentino. Developed as part of the T-PLACE project, the experience makes use of 360° panoramic images, 3D models, and oral testimonies to offer an immersive, web-accessible journey.
The tour is based on the ADDIE instructional design model and incorporates gamification strategies inspired by the ARCS model. It is structured around two modes: a free, exploratory path, and an educational mode entitled *The Guardian of Traditions*. The latter engages users through adaptive quizzes and branching scenarios, encouraging active learning and critical reflection.
The voices of local elders, reinterpreted and associated with museum artefacts, reinforce the connection between memory and knowledge, fostering the intergenerational transmission of traditional know-how. Compatible with multiple devices and enhanced by accessibility features such as automatic text-to-speech, the project offers a replicable model for small cultural institutions. It demonstrates how immersive technologies can support new forms of engagement, participation, and heritage preservation.

1. Introduction

The creation of an interactive virtual tour for the *Museo della Civilta Contadina*[1] (*Museum of Peasant Civilisation*) offers an alternative to in-person visits, compensating for the (hopefully temporary) closure of the museum. The museum is housed in *Casa del Guidi*, a typical rural dwelling from the sharecropping system (mezzadria) that once characterised the Florentine Plain. The building, located in the municipality of Sesto Fiorentino, dates back to the mid-eighteenth century and was restored in 1995. It houses a collection initiated in 1972 by Professor Bruno Carmagnini, developed with the involvement of students and the local community (Calosi, 2016). The collection includes traditional artefacts organised into six themed rooms, each dedicated to a specific aspect of rural life: agricultural activities, the stable, textile production, craft workshops, the cellar, and domestic life. In these rooms, objects and furnishings are not merely "exhibits", but bearers of stories, memories, and traditions (UNESCO, 2003).

To reinforce this narrative and transmit intangible knowledge, the virtual tour integrates oral testimonies, videos, and digital reconstructions, linking the objects to rural traditions. This transforms the digital museum into an interactive archive, capable of preserving both tangible and intangible forms of heritage, in accordance with UNESCO recommendations. The initiative aligns with the Faro Convention[2] (2005), which recognises cultural heritage as a driver of sustainable development and community participation. By enabling digital access to the museum's collection, the virtual tour promotes the collective interpretation of heritage, the intergenerational transfer of knowledge, and the strengthening of local identity. It also reaffirms the Faro Convention's vision of heritage as an inclusive and dynamic process that fosters social cohesion and a sense of belonging to the community.

The creation of a virtual tour for a museum that is no longer accessible highlights the fundamental importance of documenting cultural heritage, not only to preserve the objects themselves, but also to protect and safeguard spaces, stories, and lived experiences. In-depth knowledge of the heritage asset is an essential element of any safeguarding process, and documentation is a crucial tool for ensuring its protection, management, and transmission to future generations. In this perspective, digital documentation takes on strategic value: it enables the visual and structural preservation of heritage, while also supporting its interpretation and participatory engagement, making cultural memory accessible even in the absence of physical access. As the tour of the *Museum of Peasant Civilisation* demonstrates, the integration of 360° images, 3D models, and oral testimonies transforms the virtual visit into an interactive narrative archive, capable of activating an ongoing dialogue between past and present, community and territory.

In line with these objectives, the tour has been designed to provide an accessible and engaging experience, structured around two clearly distinct yet complementary modes of use, also suitable for educational purposes. The first mode is a free and exploratory visit, allowing users to move through the virtual rooms of the museum. During the tour, visitors can access interactive content such as excerpts from video documentaries, oral interviews, and 3D models of the objects, enriching their understanding of the historical, cultural, and emotional context of the settings. This mode is particularly well suited to introducing themes and concepts in an intuitive and engaging manner, stimulating curiosity and promoting discovery-based learning.

[1] https://geomaticaeconservazione.it/virtual-tour/museo-civilta-contadina/

[2] https://www.coe.int/en/web/culture-and-heritage/faro-convention

The second mode, titled *Guardian of Traditions*, is designed for structured educational use through playful learning. It consists of a gamified component that presents interactive quizzes with questions organised across increasing levels of difficulty: from simple identification of objects, to understanding their practical function, and ultimately to reflection on their historical and cultural significance. This mode is intended to consolidate acquired knowledge, develop critical thinking, and promote long-term learning through a playful and motivating approach. The two modes can be used individually or in combination, depending on educational needs, providing a flexible and adaptable learning experience that can be tailored to various educational contexts.

The virtual tour was developed within the framework of the T-PLACE (*Teaching Places, Building Community*[3]) project, funded by the 2021–2027 National Research Programme and coordinated by the University of Florence. The project promotes a participatory approach to territorial knowledge, making use of immersive technologies.

1.1 From Voice to Museum: Oral Testimonies and Visual Narration

An important feature of the virtual tour is its focus on enhancing the intangible heritage represented by the oral testimonies of inhabitants from the Sesto Fiorentino area. The interviews, conducted by researchers Giovanna Bandini and Andrea Grifoni in the early 1990s, are preserved in the museum as part of the Casa del Guidi ethnographic collection and were published in the volume *Così ci siamo trovati a questo mondo. Trenta storie di vita contadina* (*Thus We Found Ourselves in This World: Thirty Stories of Rural Life*, Bandini & Grifoni, 2002). These life stories are a valuable source of local oral heritage, offering an authentic insight into individual and collective memories related to rural life in the Sesto Fiorentino area. The interviewees were selected from among farmers who were still active at the time, with the aim of shedding light on and sharing the cultural heritage of peasant civilisation through the collection, preservation, and dissemination of oral autobiographical testimonies.

Restoring value and dignity to life stories – particularly those of peasants, so often forgotten or marginalised – was one of the project's central aims. Autobiographical narration was chosen as a tool to evoke memories, experiences, and worldviews. At the heart of the project lay careful listening to elders, appreciation of their affective and practical knowledge, and the opportunity to reconnect their stories with the objects preserved in the museum collection. These interviews, recorded and transcribed according to the autobiographical method and approach (Thompson, 2017), were later synthesised and adapted for inclusion in the virtual tour. Each narrative was linked to specific objects or themed rooms, creating a direct interaction between the protagonists' voices and the exhibited artefacts.

The inclusion of these memories in the virtual tour strengthens the museum's educational and identity-building role, in line with the principles of the T-PLACE project and UNESCO's guidelines for the safeguarding of intangible cultural heritage. The virtual tour thus becomes a tool for connecting generations and communities through the voices of the past, made accessible via contemporary media. The content, as outlined in later sections, is available through interactive hotspots, allowing users to listen to or read short narrative extracts, offering an immersive experience enriched by strong emotional and cultural engagement. Through these integrations, the tour does not merely document material heritage: it brings it to life, tells its stories, and allows it to resonate through the words and experiences of those who once lived it.

The selected narratives and accompanying documentary video offer a vivid, multifaceted, and deeply human portrait of life on Tuscan farms, capturing the complexity of the rural world in the mid-twentieth century. Through the protagonists' voices emerges a plural fresco touching on key aspects of rural existence: agricultural labour, daily life in the farmhouses, the condition of women, schooling, religious practices, and the profound social transformations linked to the shift from sharecropping to industrialisation.

Certain recurring themes emerge with particular strength, weaving a narrative fabric rich in emotion and meaning. There are stories of the hardships of childhood in the countryside, marked by poverty, early responsibilities, and long days spent working the land or tending animals. The family—often large—served as a vital point of reference, a space of affection and necessary cooperation in facing everyday challenges. Especially poignant are the accounts concerning the condition of women, who were heavily involved in both agricultural labour and domestic management: central figures, yet too often invisible in official historical narratives.

Another key theme is the experience of war, lived through fear, deprivation, and loss, but also moments of solidarity and resistance. The stories evoke hiding in the woods, hunger during the occupation, raids, and daily strategies for survival in a time of instability and crisis. Popular religiosity emerges as a strong element of identity, interwoven with nature's rhythms and the agricultural cycle: patron saint festivals, seasonal rituals, farmers' prayers, and orally transmitted beliefs all represent authentic expressions of a collective sensibility rooted in time.

Finally, a transversal and decisive theme is that of social transformation: the gradual decline of sharecropping, the advent of agricultural mechanisation, migration to the cities, and the emergence of new productive and cultural models. These changes marked the end of an era, but also the birth of a new awareness of labour and rights. Alongside these overarching themes, the testimonies are punctuated by emotional and moral reflections, offering an intimate, sometimes poetic, perspective on lived experience.

These are simple yet powerful narratives, capable of conveying the profound significance of a culture rooted in hardship, solidarity, and adaptability. Memories unfold through everyday scenes: chestnut gathering in the woods, mothers baking bread in wood-fired ovens, snowy winters spent in stables, peasant festivals, evening vigils, winter schooling, and early encounters with modernity. Some recall the fear experienced during the war, the pervasive poverty, the first struggles of farm workers, and the early stirrings of political and social awareness that would go on to transform rural life. Together, these voices form a mosaic of memory that restores dignity and depth to a world at risk of being forgotten—one that today speaks again through the power of words and the respectful act of remembering.

The outcome of a subsequent project, *La memoria racconta* (*Memory Speaks*), carried out under the scientific guidance of the Libera Università di Anghiari, led to the creation of the Museum's informational panels. The project involved active participation from the local community, promoting a

[3] https://www.t-place.unifi.it/

collaborative process of storytelling and rediscovery of the area's historical and cultural roots. Alongside the elderly narrators – the true custodians of peasant memory – high school students, agricultural associations, the public library, and various local stakeholders contributed, helping to create a vibrant and cohesive network. The intergenerational and multidisciplinary working group fostered a fruitful dialogue between memory, research, and education, generating meaningful exchanges between different skills and perspectives.

The informational panels, the result of this collective process, were photographed and included in the virtual tour, allowing their content to be preserved and shared beyond the Museum's walls, and to continue, at least virtually, the community's collective narrative journey.

2. Objectives

The virtual tour aims to enhance, promote, make accessible, and preserve ethnographic heritage and traditional rural craftsmanship as part of a broader strategy to safeguard both tangible and intangible cultural assets. It supports active and informed engagement with rural cultural heritage, fosters the intergenerational transmission of knowledge, and strengthens cultural identity and the sense of belonging within the local community.

To achieve these objectives, the system provides an immersive online experience featuring navigable environments based on 360° photographs and interactive multimedia content. This approach broadens access to heritage by overcoming physical, geographical, and cognitive barriers, engaging a diverse audience at both local and international levels.

The educational component employs gamification strategies to make the experience more engaging and to facilitate informal learning. The use of immersive media has also been shown to enhance users' cognitive and emotional involvement, promoting greater participation and a deeper understanding of cultural content (Barkoukis et al., 2021).

Finally, the virtual tour is designed according to principles of inclusivity and sustainability, aligned with the long-term objectives of cultural heritage conservation and digital communication.

3. Methodology

The design of the virtual tour followed the five phases of the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), applied in its most iterative and dynamic forms (Bonaiuti & Dipace, 2021). This approach enabled the organic integration of educational content, motivational strategies, and immersive technologies, structuring the design process into distinct yet interdependent phases and encouraging continuous revision and optimisation of the overall experience.

3.1 Analysis Phase

The first phase, analysis, was based on the operational framework of the T-PLACE project, which had previously identified the main target groups: students, teachers, local citizens, and tourists. For this reason, no direct surveys (such as questionnaires or interviews) were conducted, as the educational and cultural needs were derived from the project objectives (Ranieri et al., 2023) and from documentation shared within the partnership network. The analysis focused on collecting ethnographic documentation, user profiling, identifying educational and cultural needs, and planning immersive activities and gamified educational content.

3.2 Design Phase

In the design phase, to ensure an effective learning experience, the ADDIE model was integrated with the principles of Keller's ARCS model (1987), with the aim of enhancing motivation, engagement, and learning. The structure of the virtual tour is divided into six thematic areas, corresponding to the physical rooms of the museum:

- Nel campo (In the Field).
- Nella stalla (In the Stable).
- Al telaio (At the Loom).
- In bottega (In the Studio)
- In cantina (In the Cellar)
- In cucina (In the Kitchen)

The main design activities were developed along the following lines:

- Definition of the thematic narrative for each room and selection of the corresponding educational content.
- Drafting of informational entries based on the contents of the museum's official catalogue (Calosi, 2016), considered a primary source of ethnographic documentation, reworked into an accessible format suitable for an immersive environment.
- Selection and contextualisation of explanatory panels from the physical museum to be converted into interactive pop-ups within the tour.
- Planning of 360° photography, supported by the museum's floor plan, to determine the optimal positioning of the 360° camera in each room, ensuring full visual coverage and maintaining narrative and spatial coherence between the physical and digital layouts of the museum rooms.
- Planning of photographic sessions of the descriptive panels and museum artefacts for inclusion in the informational hotspots.
- Selection and adaptation of oral interviews with witnesses of rural life in Sesto Fiorentino (including Bruna Marchi, Lido Palchetti, and Elio Palchetti), to be used as audio content in specific thematic sections of the tour (e.g. in the field, in the stable, in the kitchen).
- Selection of specific museum objects (e.g. a coffee grinder, a crab fishing jar) for the creation of 3D models.
- Verification of consistency among historical documentation, visual sources, and museum content, to ensure accuracy and narrative cohesion. consistency.

3.3 Development and Implementation Phases

The development and implementation phases led to the actual creation of the virtual tour, structured into an exploratory mode and an educational mode based on gamification elements. During the development phase, the educational content was organised into narrative pathways and interactive scenarios. The 360° images of the museum rooms underwent post-production to improve visual quality (sharpness and colour balance) and to remove the camera tripod from the images.

In parallel, the development of 3D models was initiated using photogrammetry, and these models were later integrated into specific hotspots within the tour and made interactive to allow user navigation and exploration.

The implementation phase of the virtual tour, carried out using the software *3D Vista Virtual Tour,* included adaptation for multi-device accessibility (desktop, mobile, and VR headsets),

ensuring compatibility across platforms. A detailed description of the tools and configurations used is provided in the *Technologies* section.
The implementation also considered the different usage contexts (individual, educational, and museum-based) and led to the definition of a symbolic recognition system for achievements, with both motivational and educational purposes. To this end, digital badges were used, designed to highlight milestones achieved and to encourage active learning.

A post-launch evaluation phase is planned, using both quantitative and qualitative methods, aimed at measuring and analysing the educational effectiveness and user engagement of the tour. engagement.

4. Technologies

The virtual tour was created using high-resolution spherical images captured with the Insta360 X4 camera. These images were subsequently subjected to a post-production process using Insta Studio and Adobe Photoshop, aimed at enhancing their overall visual quality. The spherical images were then integrated into the *3DVista Virtual Tour*[4], a professional software for designing immersive and navigable virtual environments.

The system enables the creation of interactive tours through the use of hotspots, teleportation points, and clickable points of interest that support intuitive, guided navigation and ensure narrative continuity across the various virtual rooms. Interactive hotspots also allow users to activate informational content (such as pop-up sheets, audio, video, and 3D models) and educational activities (including quizzes, thematic pathways, and narrative sequences), fostering a personalised, exploratory experience geared towards learning (Figg. 1, 2, 3, 4).

The virtual pathway is enriched with thematic content presented via pop-up panels that provide informative texts and images relating to the rural culture of Sesto Fiorentino, with particular emphasis on daily life, agricultural practices, artisanal knowledge, and intangible cultural expressions. These pop-up sheets are accessed via interactive icons (Figg. 1, 2) strategically placed along the virtual tour route.

Three-dimensional models of selected museum objects – specifically a terracotta vessel (olletta) (Fig. 5) used for crab farming and a manual coffee grinder (Fig. 6) – were produced using photogrammetric techniques. For each object, approximately 150 images were captured using a Nikon D3300 camera equipped with an 18 mm lens, kept stationary under controlled lighting conditions.
The acquisition followed a circular path, ensuring adequate overlap between images. The photographs were processed using Agisoft Metashape software (v. 2.0.1), generating two textured mesh surface models. Scaling was achieved using reference markers placed on A3 sheets beneath the objects, resulting in a spatial resolution with a Ground Sampling Distance (GSD) of approximately 1 mm/pixel (Tucci et, al., 2011).
The models were integrated into the virtual tour through interactive hotspots, making them fully explorable and enhancing the immersive and educational dimensions of the experience.

The tour is compatible with both desktop and mobile devices and is fully accessible via VR headsets such as Oculus Quest 2 and 3, as well as stereoscopic mode for Google Cardboard and equivalent devices. Particular attention has been given to accessibility, with the integration of text-to-speech functionality to improve usability for visually impaired users or those with reading difficulties (Raffoul & Jaber, 2023).

5. Education and Gamification

The project is characterised by the integration of an educational approach based on gamification, entitled *Guardian of Traditions*, which places the user in an active role of discovery, reflection, and knowledge acquisition.
The entire experience unfolds within a virtual museum environment, conceived as a cognitive space in which the user – guided by a branching scenarios – is invited to act in a conscious, reflective, and culturally engaged manner. This interactive educational model combines immersive technologies, multimedia content, and game-based learning strategies (Marston, 2000), with the aim of promoting situated (Lave & Wenger, 1991), experiential (Kolb, 1984), motivating, and participatory learning, oriented towards the enhancement and transmission of local ethnographic knowledge and heritage.

Game-based learning explores how play dynamics can enhance education. While offering different perspectives, the main theories agree that the enjoyment of play increases motivation, promotes deep engagement, and reduces the frustration associated with making mistakes (Dickey, 2015), transforming failure into an opportunity for growth within a safe environment. This aligns with the principles of situated and experiential learning mentioned above.

According to the paradigm of situated learning, knowledge acquires meaning when embedded within an authentic context capable of activating shared practices, roles, and meanings. Accordingly, the user is immersed in a virtual community of practice, in which they can exercise symbolic functions, negotiate content, and progressively construct an active cultural identity.

The second theoretical reference, as previously noted, is Kolb's theory of experiential learning (1984), which is articulated in a dynamic cycle comprising four stages: concrete experience, reflective observation, abstract conceptualisation, and active experimentation.
The game-based educational pathway naturally stimulates this cycle, allowing the user to experience meaningful situations, reflect upon them, internalise their significance, and apply them in new narrative configurations.

Completing the theoretical framework is the adoption of the principle of scaffolded learning (Wood et al., 1976; Moreno & Mayer, 2005; Abdul Jabbar & Felicia, 2015), according to which the support provided is gradually withdrawn as the user develops autonomy.
The various levels of difficulty and alternative pathways are designed according to this logic, creating a progressive, personalised, and non-punitive learning environment.

[4] https://www.3dvista.com/en/

Figure 1. Virtual Tour Interface: the room navigation menu (the navigation menu, on the right, displays icons at the bottom with various functions: full-screen mode, stereoscopic mode for VR devices such as Google Cardboard, and a camera icon to capture a screenshot, simulating a real-life view. On the right, popup provides descriptions with text, images, and text-to-speech audio.

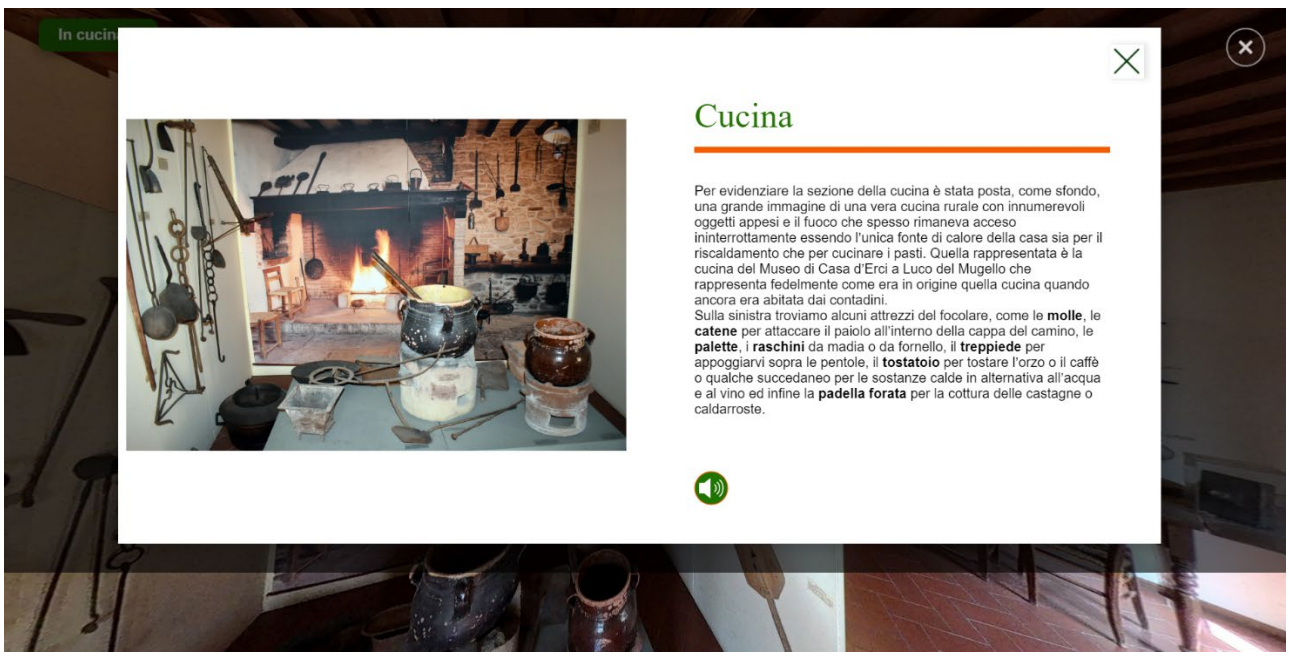

Figure 2. Virtual Tour Interface: the popup provides descriptions with text, images, and text-to-speech audio.

Figure 3. Virtual Tour Interface – *Guardian of Traditions*: the bar displays scores and elapsed time; in the center, icons to activate quizzes. On the right, an example of a quiz.

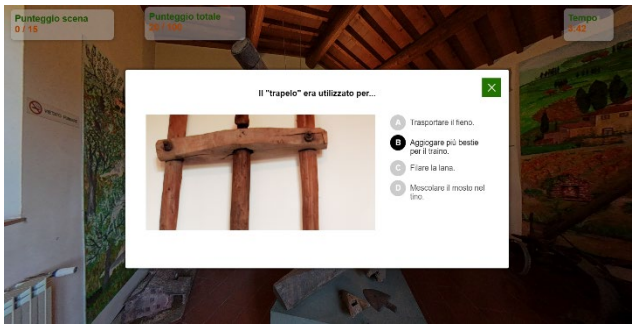

Figure 4. Virtual Tour Interface – *Guardian of Traditions*: an example of a quiz.

Figure 5. 3D Models: terracotta vessel (olletta).

Figure 6. 3D Models: manual coffee grinder.

6. Guardian of Traditions: a Gamified Experience

The educational game integrated within the virtual tour, entitled Guardian of Traditions, constitutes an interactive experience designed according to the principles of instructional design (Reigeluth, 1999), Universal Design for Learning (CAST, 2018), and, as noted in the previous section, the ARCS model (Keller, 1987). It takes the form of an immersive and adaptive branching scenarios. The game promotes the transmission and understanding of knowledge and practices related to rural civilisation, transforming the virtual visit into an active, exploratory, and participatory learning environment. Its objective is to stimulate reflective and engaged interaction with rural heritage through adaptive, contextualised learning paths.

6.1 Educational Aims and Narrative Structure

The user assumes the symbolic role of Guardian of Traditions, a narrative figure entrusted with safeguarding and passing on traditional knowledge across generations. This metaphor, embedded within the virtual museum context, enhances engagement and fosters processes of cultural identification (Kiili et al., 2014). The experience unfolds across six thematic environments corresponding to the museum's physical rooms. In each environment, the user progresses through a sequence of three levels of difficulty:

- Basic level: visual recognition among multiple objects of material culture.
- Intermediate level: understanding of the object's use or function.
- Advanced level: interpretation of its symbolic or socio-historical value.

The questions, delivered through interactive hotspots, are associated with visual elements from the tour and enable the activation of textual content, images, or voice-over narration. The design is also inspired by learning-by-doing and active meaning-making models (Hein, 1998). This approach makes the experience accessible to users with varying levels of prior knowledge and supports the progressive development of interpretive and cultural skills.

6.2 Branching scenarios and Adaptivity

The integrated use of conditional hotspots, narrative triggers, and interactive quizzes allows for the creation of a branched and non-linear educational experience, in which the path dynamically adapts to the user's responses. Each answer represents a decision node that determines the next stage of the experience: correct answers unlock more advanced content, while incorrect ones activate explanatory feedback and simplified paths. This mechanism ensures a personalised and progressive experience, supporting the active construction of knowledge and framing error as a formative opportunity. Interaction thus becomes not merely a method of assessment but a constitutive element of the learning process, encouraging autonomous exploration, intrinsic motivation, and critical reflection on the content.

An example from the In the Field room—the first environment of the tour—illustrates how the decision structure and feedback mechanism operate:

Question (Basic level): "Which of these tools was used for cutting grass?"

A) Hoe
B) Scythe
C) Pitchfork
D) Rake

If the user selects the correct answer (B), they are directed to the intermediate level of the same room, with access to more complex content. If an incorrect answer is selected (A, C or D), the system provides feedback in the form of a short explanatory text, an illustrative image, and an audio prompt, for example:
"The scythe was used for manually cutting grass and hay. The pitchfork, on the other hand, was used for moving already gathered hay."
Following the feedback, the user can choose to retry the question, access additional explanatory content to reinforce understanding, or continue along a simplified alternative branch that maintains narrative coherence and allows the experience to progress without interruption. In this way, even errors become opportunities for learning, enabling the path to adapt to the level of competence achieved. development of interpretive and cultural skills.

6.3 Scoring System and Recognition

The evaluation system has been designed according to an incremental and adaptive logic, consistent with the fluid structure of the virtual museum path. Responses to the quizzes generate a cumulative score, updated in real time.
The player is guided through a branched path that adapts to their choices and skills. Each decision node (quiz) contributes to the overall score, while incorrect answers trigger compensatory content without blocking or interrupting progression.
At the end of the game, based on the final score, the user is awarded one of the following symbolic recognitions:

- *Apprentice of Traditions* (0–5 points): indicates an initial level of interaction, focused on recognition and early discovery of heritage content.
- *Knowledge Keeper of Traditions* (6–10 points): reflects a solid ability to interpret and connect objects, practices, and contexts.
- *Guardian of Traditions* (10 or more points): represents a critical and contextual mastery of the content, with mature awareness of the historical and symbolic dimensions of the explored heritage.

The badges are displayed as graphic elements and accompanied by a short, personalised message describing the level achieved. These badges have no competitive or certification value, but serve a metacognitive, motivational, and reflective function: they make the learning process visible and encourage self-assessment. Each badge represents a milestone in the knowledge journey and symbolises the degree of connection established with the explored cultural heritage, promoting a sense of progression and belonging to the values of peasant tradition.

7. Conclusion and Outlook: Toward Scalable and Inclusive Digital Heritage Models

The virtual tour of the *Museum of Peasant Civilisation* represents a tangible response to the challenges of conservation, accessibility, and the transmission of cultural heritage in local, rural, and marginalised contexts. Its creation demonstrates that even small museums, lacking advanced structural or technological resources, can implement effective strategies to document, enhance, and make accessible a heritage that would otherwise risk being forgotten. Through the integration of 360° imagery, 3D models, oral testimonies, and gamified content, the project has created an immersive digital environment capable of transcending spatial and temporal boundaries, actively engaging diverse audiences, particularly young people, schools, and local communities.

The methodology adopted is based on a virtuous balance between documentary rigour, technological accessibility, intergenerational participation, and educational objectives, and it emerges as a replicable model in many contexts—not only in Italy, but across Europe and beyond—where similar needs for safeguarding and promoting heritage exist. In this respect, the experience is fully aligned with the priorities of European cultural policies and sits at the intersection of *Horizon Europe*[5] (supporting innovation and digitalisation), *Creative Europe*[6] (strengthening cultural diversity and transnational cooperation), and the cultural regeneration programmes promoted by *NextGenerationEU*[7].

Another strength lies in the project's technical scalability: the use of relatively low-cost and accessible technologies (photogrammetry, interactive tours, text-to-speech tools, multi-device support) allows the model to be adapted even in areas with limited infrastructure or in small museums with reduced staffing capacity. Moreover, the modular structure of the tour and its openness to participatory content facilitate future development and the integration of new memories, objects, or local practices, reinforcing the role of museums as active and dynamic cultural hubs.

Looking ahead, projects such as this may contribute to the emergence of transnational networks of community-based digital museums, capable of sharing resources, methodologies, and content through interoperable platforms. This vision aligns with the objectives of the *2030 Agenda for Sustainable Development*[8] (particularly *Goal 11.4*, which focuses on protecting cultural heritage) and the *New European Agenda for Culture*[9], which promotes an inclusive, accessible, and participatory culture as a driver of social cohesion, innovation, and sustainable growth.

An English-language version of the tour is also planned, with the aim of further expanding accessibility and reaching a broader international audience. Future studies will assess its educational effectiveness and user experience in detail, through qualitative feedback and quantitative analysis, in order to optimise digital interaction with ethnographic heritage and foster the creation of inclusive networks for cultural and territorial enhancement.

The experience of the *Museum of Peasant Civilisation* demonstrates that digital transformation – when guided by principles of accessibility, participation, and local rootedness – can become a tool of cultural justice. Not only to preserve the memory of the past, but to reactivate it in the present and project it into the future, strengthening the bond between communities, their territories, their heritage, and the processes of social and cultural innovation. In this ongoing dialogue between local and global, between tradition and technology, new possibilities emerge for rethinking the role of museums as active agents of inclusion, sustainability, and cultural citizenship.

[5] https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en
[6] https://culture.ec.europa.eu/creative-europe
[7] https://next-generation-eu.europa.eu/index_it
[8] https://www.un.org/sustainabledevelopment/development-agenda/
[9] https://culture.ec.europa.eu/document/a-new-european-agenda-for-culture-swd2018-267-final

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References

Abdul Jabbar, A. I., & Felicia, P. (2015). Gameplay engagement and learning in game-based learning: A systematic review. *Review of Educational Research, 85*(4), 740–779. https://doi.org/10.3102/0034654315577210

Bandini, G., Grifoni, A., 2002. *Così ci siamo trovati a questo mondo. Trenta storie di vita contadina*. Firenze: Polistampa.

Bonaiuti, Giovanni, e Anna Dipace, 2021: *Insegnare e apprendere in aula e in rete*. Roma: Carocci.

Barkoukis, V., Ranieri, M., Luzzi, D., Cuomo, S., et al., 2021: Implementation of 360°-Videos in Higher Education: Guide for Educators. In SEPA360, https://www.sepa360.eu/wp-content/uploads/2021/09/pedagogical-manual.pdf

CAST. (2018). Universal Design for Learning Guidelines version 2.2.

Calosi, P., 2016: *Guida alla raccolta etnografica Casa del Guidi*, Firenze: Arti Grafiche Giorgi e Gambi.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September). From game design elements to gamefulness: defining" gamification". In *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments* (pp. 9-15). https://doi.org/10.1145/2181037.2181040

Dickey, M. D. (2015). *Aesthetics and design for game-based learning*. Routledge.

Evens, M., Empsen, M., Hustinx, W.,2022: A literature review on 360-degree video as an educational tool: towards design guidelines. *Journal of Computers in Education*, 1-51. https://doi.org/10.1007/s40692-022-00233-z

Hein, G. E. (1998). *Learning in the Museum.* London: Routledge.

Keller, J. M. (1987). Development and use of the ARCS model of instructional design. *Journal of Instructional Development, 10*(3), 2–10. https://doi.org/10.1007/BF02905780

Kiili, K., Ketamo, H., Koivisto, A., & Finn, E. (2014). Evaluating the educational use of a game-based learning environment with a modeling tool. *Simulation & Gaming, 45*(2), 198–220. https://doi.org/10.1177/1046878114555453

Kolb, David A. 1984. *Experiential Learning experience as the source of Learning and Development*. New York: Prentice Hall.

Leave, Jean, e Etienne Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.

Marston, M., & Mistree, F. (2000, September). Game-Based Design: A Game Theoretic Extension to Decision-Based Design. In *International Design Engineering Technical Conferences and Computers and Information in Engineering Conference* (Vol. 35142, pp. 367-378). American Society of Mechanical Engineers. https://doi.org/10.1115/DETC2000/DTM-14578

Metcalf, S. J. (1999). *The design of guided learner-adaptable scaffolding in interactive learning environments*. University of Michigan.

Moreno, R., & Mayer, R. E. (2005). Role of guidance, reflection, and interactivity in an agent-based multimedia game. *Journal of Educational Psychology, 97*(1), 117-128.

Putra, E. Y., Wahyudi, A., & Tumilaar, A., 2018: Virtual Reality 360 Interactive Digital Tour of Tomohon City with Stereoscopic Views. *Cogito Smart Journal*, 4(1), 104-112.

Raffoul, S., & Jaber, L., 2023: Text-to-speech software and reading comprehension: The impact for students with learning disabilities. *Canadian Journal of Learning and Technology*, *49*(2), 1-18.

Ranieri, M., Luzzi, D., Cuomo, S., Bruni, I., 2022: If and how do 360-degree videos fit into education settings? Results from a scoping review of empirical research. *Journal of Computer Assisted Learning*. https://doi.org/10.1111/jcal.12683

Ranieri, M., Tucci, G., Azzari, M., Parisi, E. I., & Cuomo, S. (2023). A multidimensional model for place-based education through a cross-media approach and new technologies. The T-Place project. *International Archives of the Photogrammetry, Remote Sensing and Spatial Information Science*, *48*, 1279-1285.

Reigeluth, C. M. (1999). *Instructional-design theories and models: A new paradigm of instructional theory.* Routledge.

Tucci, G., Cini, D., & Nobile, A. (2011). Effective 3D digitization of archaeological artifacts for interactive virtual museum. *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, *38*, 1-8.

Sailer, M., Hense, J. U., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior, 69*, 371–380. https://doi.org/10.1016/j.chb.2016.12.033

Thompson, P. (2017). *The voice of the past: Oral history*. Oxford university press.

UNESCO. (2003). Convention for the Safeguarding of the Intangible Cultural Heritage. Paris: UNESCO Publishing. https://ich.unesco.org/en/convention