

**Serious Games in Higher Education:
Exploring Cultural Heritage in Microsoft Flight Simulator 2024**

***Serious Games no Ensino Superior:*
*Exploração de Património Cultural no Microsoft Flight Simulator 2024***

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ABSTRACT: The creation of video games inspired by cultural heritage has increased significantly within the past few years. A vast variety of technical and visual features, content and narratives, and certainly educational and pedagogical aspects found in these games can be used to distinguish different categories of games. The following paper aims to provide insights into the potential of the most recent version of Microsoft Flight Simulator 2024 (MSFS 2024) as a serious game platform and tool for exploring cultural heritage and historical sites, also for educational purposes.

The advancement of digital technologies and immersive simulation games offer new possibilities to visit cultural heritage sites, and MSFS 2024 is known for its realistic virtual environments and expansive geographical coverage. It emerges as a promising platform for such explorations, since there are many professional software development companies known for creating detailed and immersive scenery add-ons focused on landmarks, airports, etc., to enhance the visual aspect of flying in the simulator which enhance the simulation experience for virtual pilots.

MSFS 2024 will be introduced in this paper as a cutting-edge simulation platform which allows users to virtually traverse real-world locations with unique realism and detail. Leveraging its advanced graphics, satellite imagery, and realistic flight procedures, it provides an immersive experience that closely mirrors real-life environments. Through selected cultural heritage and historical sites, this research will assess the effectiveness of MSFS 2024 in conveying the historical, architectural, and cultural significance of these locations. Furthermore, the paper will discuss the possible integration of additional features within the game, such as world photographer missions, historical information

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overlays, interactive elements, such as AI-driven tour guides who may provide users with information about cultural and historical sites during sightseeing flights, etc.

The findings of the pilot study suggest that MSFS 2024 holds immense promise as a tool for cultural heritage and historical site exploration, offering users a compelling and immersive means of engaging with such locations. This work will, thus, highlight its potential and related technologies to provide access to such sites and promote appreciation and knowledge of shared cultural heritage. However, the need for further research and development to address technological challenges and optimise the platform for educational and cultural heritage preservation purposes will also be focused on.

KEYWORDS: MSFS 2024; virtual cultural heritage; serious games; entrepreneurship; creative industries; authenticity; innovative teaching strategies

RESUMO: A criação de videojogos inspirados no património cultural tem aumentado significativamente nos últimos anos. A grande diversidade de características técnicas e visuais, conteúdos, narrativas e, sobretudo, de componentes educativas e pedagógicas presentes nestes jogos permite distinguir diferentes categorias de videojogos. O presente artigo pretende analisar o potencial da versão mais recente do Microsoft Flight Simulator 2024 (MSFS 2024) enquanto plataforma de serious games e ferramenta para a exploração do património cultural e de locais históricos, bem como para fins educativos.

O desenvolvimento das tecnologias digitais e dos jogos de simulação imersivos oferece novas possibilidades de visita a sítios de património cultural. O MSFS 2024 destaca-se pelos seus ambientes virtuais altamente realistas e pela vasta cobertura geográfica que proporciona. Neste contexto, apresenta-se como uma plataforma particularmente promissora para este tipo de exploração, sobretudo devido à existência de inúmeras empresas especializadas no desenvolvimento de complementos (add-ons) que recriam com elevado nível de detalhe monumentos, aeroportos e outras paisagens, enriquecendo a componente visual do simulador e tornando a experiência de voo mais imersiva para os pilotos virtuais.

Neste artigo, o MSFS 2024 é apresentado como uma plataforma de simulação de última geração que permite aos utilizadores percorrer virtualmente locais reais com um elevado nível de realismo e detalhe. Tirando partido de gráficos avançados, imagens de satélite e procedimentos de voo realistas, proporciona uma experiência imersiva que reproduz de forma muito próxima os ambientes do mundo real. Através da análise de um conjunto de sítios de património cultural e histórico, este estudo avalia a eficácia do MSFS 2024 na transmissão do significado histórico, arquitetónico e cultural desses locais. Paralelamente, discute-se o potencial de integração de funcionalidades adicionais na plataforma, como

as missões World Photographer, sobreposições de informação histórica, elementos interativos e guias turísticos virtuais baseados em inteligência artificial, capazes de fornecer aos utilizadores informações sobre monumentos e locais históricos durante voos turísticos.

Os resultados do estudo-piloto sugerem que o MSFS 2024 possui um elevado potencial enquanto ferramenta para a exploração do património cultural e de sítios históricos, oferecendo aos utilizadores uma forma envolvente e imersiva de interagir com estes espaços. O presente trabalho evidencia, assim, o potencial desta plataforma e das tecnologias associadas para facilitar o acesso ao património cultural e promover o seu conhecimento, valorização e preservação. Todavia, salienta-se igualmente a necessidade de investigação adicional e de novos desenvolvimentos tecnológicos que permitam ultrapassar os desafios existentes e otimizar a plataforma para fins educativos e de preservação do património cultural.

PALAVRAS-CHAVE: Microsoft Flight Simulator 2024 (MSFS 2024); património cultural virtual; *serious games*; empreendedorismo; indústrias criativas; autenticidade; estratégias inovadoras de ensino.

Introduction

Access to cultural heritage increase the simulation experience, its interpretation, and education within the field have all undergone significant change as a result of digital transformation. Through interactive media, users can now experience historical sites, landscapes, and cultural narratives in immersive digital environments which go beyond, for instance, traditional museum spaces or physical travel. Serious games have drawn scholarly attention in this developing ecosystem because of their ability to combine structured educational goals with experiential learning, encouraging engagement through simulation, narrative, and interactivity.

Large-scale commercial simulation platforms have simultaneously achieved technical sophistication levels that depict previously exceptional levels of environmental detail and geographical realism. These advancements encourage reevaluating the distinctions between educational technology and entertainment software. Despite being marketed primarily as an aviation simulation product, Microsoft Flight Simulator 2024 (MSFS 2024) offers a globally mapped digital environment that accurately replicates cities, monuments, and natural heritage sites. This raises a crucial question: how useful can a high-end commercial simulation platform be for higher education and cultural heritage exploration?

To answer this question, the current paper addresses first a theoretical framework by looking at serious games, how these can be used in higher education, and how they relate to cultural heritage

and the creative industries. It then analyses MSFS 2024 as a serious game and rates its cultural heritage features. Finally, wider educational and cultural implications, as well as limitations and future research directions are also to be discussed in the light of this paper's framework.

1. Serious Games

1.1 Defining Serious Games

Serious games have experienced remarkable growth in their definition and application, particularly within educational contexts. They are usually defined as digital games designed not merely for entertainment but with specific learning objectives in mind.

The term has evolved significantly since its inception, transitioning from a general educational concept to a sophisticated field of digital interactive design. Serious games are, therefore, conceptually characterised by their primary intentionality, which prioritises non-entertainment objectives while retaining the engaging mechanics of traditional video games. Clark C. Abt is widely credited with having popularised the term in the 1970s, originally referring to any game – digital or otherwise – designed to address changes in player behaviour or thinking rather than serving only to entertain (Laamarti, et al. 2014). Furthermore, according to Baptista et al. (2024), serious games originated pioneered by Abt (1987), whose work marked a fundamental shift in the perception of the medium. They note that this author “introduced the concept of Serious Games, [which] marked a shift in the perception of games, extending their meaning beyond mere entertainment when used or embedded in a specific context. Serious Games, as he defined them, are not primarily for amusement but have an explicit and carefully thought-out educational purpose” (Baptista et al., 2024, p. 5).

As claimed by Mortara et al. (2013), “learning objectives”, “genre” and “context” are three basic aspects that define serious games. Additional foundational factors which define the term “serious games” are provided by Laamarti et al. (2014). Accordingly, such games integrate also the technical and experiential aspects of the medium. The authors refer to “application[s] with three components: experience, entertainment, and multimedia” (p. 4). This definition highlights that for a game to be “serious”, it must still function as a game, i.e. providing entertaining elements while delivering a structured experience through various media modalities².

The potential of serious games to change how individuals learn, especially in complex subjects, is supported in findings emphasizing their effectiveness compared to traditional methods. As noted by Hanes and Stone (2017), serious games leverage the engaging and motivational characteristics typical

² Based on similar factors, Azevedo et al. (2025) emphasize the technological shift from traditional play to digital serious games, noting that they leverage graphical interfaces to create interactive and engaging environments that provide a more immersive and dynamic experience compared to physical board or card games.

of video games to produce educational outcomes grounded in established pedagogical assumptions. Furthermore, critical attributes which characterise serious games include their interactivity, narrative-driven experiences, and the ability to simulate complex situations, which facilitate experiential learning (Hanes & Stone, 2017).

Moreover, various studies have demonstrated that the incorporation of game-based learning results in improved student performance, increased engagement, and positive learning experiences (Sando & Feng, 2018). Thus, the educational community increasingly recognises serious games as innovative tools that can encapsulate complex content in accessible and interactive formats. Van der Linden and van Joolingen (2019) offer a complementary definition, emphasizing the dual nature of the medium as both a learning and an entertainment platform. Based on Charsky (2010), these authors claim that “[a] serious game is a computer game with the aim of facilitating learning in addition to entertaining users. In a serious game, the entertainment value of video games is used to influence learners’ motivation” (van der Linden & van Joolingen, 2019, p. 16).

Building upon these foundational perspectives, serious games may be understood as interactive tools designed to facilitate professional and cognitive growth. Commonly recognised as vehicles for learning, serious games, therefore, integrate various educational elements with gameplay mechanics to create meaningful experiences that foster engagement and knowledge retention (López-Martínez et al., 2022). Also, as further stated by Baptista et al. (2024), “Serious Games are interactive computer applications with a challenging goal, are fun to play and engage, incorporate some concept of scoring, and impart skills, knowledge, or attitudes that can be applied in the real world” (p. 5).

1.2 The Relevance of Serious Games in Higher Education

Serious games have gradually become prevalent across higher education programs, where they are employed to enhance teaching and learning processes. The application of such gaming platforms allows educators to transform traditional curricula by integrating engaging and interactive components. Serious games have additionally been adopted to address the limitations of traditional, passive learning models. The primary motivation for this integration is the ability of games to foster active learning and intrinsic incentive³. Furthermore, the integration of serious games aligns with a constructivist paradigm of education⁴. In such models, students are not passive recipients of information but active builders of

³ Baptista et al. (2024) suggest that digital serious games have a unique pedagogical value because they: “have a unique ability to provide challenges that align with learning objectives and adapt to the learner’s level. This adaptability empowers educators to create a flexible and customizable learning experience, crucial in acquiring knowledge, experience, and professional skills” (Baptista et al, 2024, p. 1).

⁴ See also Roberts (2018) for that matter: although concepts like “serious games” or “gamification” are not directly discussed by this author, such platforms facilitate experiential learning opportunities, aligning well with George Kuh’s

knowledge. As Mortara et al. (2013) explain, adventure games are particularly suited for this because the “learner does not passively receive information but rather actively constructs new knowledge by finding information in the game, understanding it and then applying the new knowledge to fulfill tasks” (Mortara et al., 2013, pp. 321-322).

The adoption of serious games in medical education, for instance, offers particularly clear standards of their effectiveness. Examples include simulations for nursing education, where students can practice clinical skills in a safe, controlled environment. Research indicates that simulation-based learning can significantly improve clinical competence and confidence (Kim et al., 2016). In addition, team-based learning approaches, which can be gamified, effectively bolstered learning outcomes within pharmacy education, reinforcing the value of active learning strategies (Lang et al., 2019). This trend suggests a growing acknowledgment of the utility of serious games to address the demands of modern educational environments and cater to the needs of diverse student populations.

Empirical studies in higher education, such as those conducted by López-Martínez et al. (2022), demonstrate that gamified strategies significantly increase student engagement. According to these authors, gamified strategies have been shown to influence intrinsic motivation, fostering better learning environments that promote collaboration and problem-solving skills among students. Relying on Karl Kapp’s findings (2014), and as pointed out, “the use of gamification [...] provides a rationale for increasing motivation in different subjects and student formats, [facilitating] effective learning using game-based-reasoning and mechanics, which makes it essential for effective teaching and learning contents that are described by students as “arid” and “boring”.” (López-Martínez et al., 2022, p. 3).

Furthermore, López-Martínez et al. (2022) suggest that gamification in higher education has been linked to higher retention rates of information and improved attitudes towards learning, concluding that

The commitment component makes gamification relevant to the context of higher education and a useful tool to engage learners. This may lead to desirable outcomes, for this reason, the aim of these gamified and innovative interventions should be on transforming the academic performance and motivational environment of university students, so that they could obtain maximum benefits, as well as to increase the commitment of those students who are often more concerned about passing rather than learning. (López-Martínez et al., 2022, p. 11)

findings on High Impact Practices in education suggested by Roberts. These games allow for moments of practical application and project-based learning, both of which have been associated with significant improvements in student learning outcomes and overall success. Practices like service learning, internships, etc. (Roberts, 2018) can be effectively mirrored in game-based experiences, promoting active involvement among learners and bridging the gap between theoretical knowledge and practical application.

Many cited reasons for using serious games in higher education settings refer to the creation of a safe environment for failure. Precisely, in a complex field such as medicine – and others alike, for instance, cybersecurity, software engineering, etc. – real-world mistakes can have catastrophic consequences. Georgiadou and Xinogalos (2023) state that serious games “provide the chance to create a simulated environment for players to experience situations that are impossible to achieve in the real world for reasons such as safety and cost” (Georgiadou & Xinogalos, 2023, p. 2). This perspective is echoed by Spatafora et al. (2024), who argue that “[e]ducational games allow students to improve their social skills, teamwork, leadership, and collaboration. In addition, they are beneficial in training for hazardous processes (as is the case with cybersecurity applications and training) or situations where physical classrooms are too expensive” (Spatafora et al., 2024, p. 3).

1.3 Cultural Heritage in Serious Games

Cultural heritage represents a significant application area for serious games, offering innovative ways to preserve, reproduce, and disseminate both tangible heritage (physical artifacts, buildings, monuments, historic sites, documents, etc.) and intangible assets, i.e., traditions, languages, beliefs, artistic expressions, folklore, etc. Mortara et al. (2013) provide an extensive framework for classifying heritage-focused serious games into three primary categories: “cultural awareness”, “historical reconstruction”, and “heritage awareness”. They argue that “

Immersive technologies such as virtual environments and augmented reality have a clear potential to support the experiencing of cultural heritage by the large public, complementing the current tools and practices based on tangible goods [...]. Serious games, that is, videogames designed for educational objectives appear as a new tool to learn cultural content in an engaging way.” (Mortara et al., 2013, p. 318)

Bearing in mind that, according to these authors, the preservation of intangible assets presents a challenge *per se*, they believe that serious games

have the potential to maintain and communicate effectively, especially this immaterial legacy, [recreating] accurately non only a physical setting but rather: provide a holistic experience including sounds (spoken language, traditional music) and aesthetic elements; bring to life folkloristic and religious events; give the opportunity to practice in first person behavioural codes and habits through in-game tasks. (ibidem, p. 319)

The exploration of cultural heritage through serious games presents unique opportunities for educational engagement. By combining historical context with interactive gameplay, serious games can effectively raise awareness of cultural narratives and stimulate interest in heritage among diverse audiences. The design and analysis of heritage content in serious games allow players to immerse

themselves in cultural explorations, enabling a deeper understanding of history and societal evolution (Hanes & Stone, 2017).

Research emphasizes that serious games also serve as powerful tools to educate users about historical events and sites, cultural practices, and the significance of heritage preservation. Within the digitalisation of cultural heritage (Licata et al., 2021), serious gaming platforms allow players to experience historical simulations, aiding in the comprehension of cultural artifacts' importance while providing an engaging learning pathway. On the one hand, implementing such games in education – and particularly within programs related to cultural heritage studies – can guide learners to develop a critical understanding of their cultural contexts and societal heritage, thereby promoting cultural appreciation and preservation. On the other hand, the incorporation of new technologies in cultural heritage projects – and in a wider sense gamified elements – can also help empower educators to convey complex cultural narratives, making history accessible and appealing to broader audiences, as suggested by Licata et al. (2021).

Furthermore, exploring cultural heritage occurs in different spaces or environments. Plecher et al. (2022) discuss in their study the underwater world to explore cultural heritage sites, highlighting that

[w]ith Virtual Reality (VR) technology maturing and spreading widely in recent years, it is becoming an increasingly useful tool for entertainment and education alike. [...] VR enriched with techniques from immersive Serious Games (SG) provide an authentic way to enjoy Underwater Cultural Heritage [...] from the comfort of the user's home or as a museum exhibit. (Plecher et al., 2022, p. 1)

Their project focuses specifically on a 5th-century Roman merchant shipwreck found near Veliki Piruzi, Croatia, utilising actual archaeological data and photogrammetry to create a highly accurate three-dimensional reconstruction of the excavation site. By simulating authentic dives, this technology democratises access to remnants of human history that are typically unavailable to the public due to geographical, financial, or physical constraints. The simulator serves as a novel tool for cultural knowledge transfer, allowing digital visitors to experience the atmosphere of underwater archaeological fieldwork from their own homes.

The use of specific game genres is also crucial for the effective transmission of heritage knowledge. For instance, location-based augmented reality games have also emerged as a powerful tool for exploring (on-site) cultural heritage (Lehto et al, 2020; Tsai, 2020). For instance, Kleftodimos et al. (2023) describe how these games guide visitors through physical destinations, using digital overlays to tell stories and reveal the history of monuments. They consider that “Location-based AR

games are also used extensively in cultural heritage communication and education as this field holds an important role in tourism since many tourists are interested in exploring the history and cultural heritage of the places they visit.” (Kleftodimos et al., 2023, p. 5), Moreover, they note that “AR location-based games often harness the power of storytelling to transform an AR tour into a more exciting and engaging experience.” (ibidem).

1.4. Serious Games as Creative Industry Initiatives for Cultural Heritage

In contemporary innovation ecosystems, the creative industries provide a great place for cultural production and technological entrepreneurship to meet. They are defined as

knowledge-based creative activities that link producers, consumers and places by utilising technology, talent or skill to generate meaningful intangible cultural products, creative content and experiences. They comprise many different sectors, including advertising, animation, architecture, design, film, gaming, [...] and interactive games [...], and television and radio (OECD, 2014, apud Richards, 2018, p. 15)

This is especially true when it comes to producing serious games based on cultural heritage, once they serve as a vital tool within the creative economy to make heritage sites more distinctive and attractive to gamers and/or visitors to the sites. Aydin and Schnabel (2016) propose the concept of the “Museum of Gamers”, where cultural heritage is not merely a collection of objects, but an unmediated experience produced through contemporary technology. They argue that “[it] is a creation not only for the dissemination of cultural heritage information but also for its production through contemporary media technologies” (Aydin & Schnabel, 2016, p. 125).

The previous discussion suggests serious games are, indeed, a good example of how creative content can be rendered into knowledge-enriching platforms. They are at the crossroads of digital media, design, education, and heritage interpretation in the most diverse fields and at different levels. Furthermore, the creative industries leverage serious games to overcome the limitations of traditional heritage tourism, such as seasonality. Gao et al. (2025) point out that many agricultural heritage programs are only open for part of the year due to biological cycles, but “digital distribution of serious games and online usage scenarios can overcome the seasonal and time limitations of educational programming” (Gao et al., 2025, p. 13).

Higher education institutions provide spaces where students from different fields, such as computer science, design, history, cultural studies, etc. can work together to produce content for or prototypes of heritage-based games. Such environments encourage entrepreneurial thinking by combining cultural awareness with trying out new technologies and being aware of market needs.

Professionally, companies that emerge from these ecosystems can turn stories about cultural heritage narratives into immersive digital experiences, leveraging, for instance, game engines and interactive storytelling stages. This hybrid form of cultural and technological entrepreneurship adds new ways to enhance the social valorisation of heritage, by bringing together innovation, public engagement, and sustainable cultural development.

2. Microsoft Flight Simulator 2024

2.1 MSFS 2024 as a Serious Game

The literature confirms that serious games are designed with educational objectives at their core, leveraging gameplay mechanics to promote engagement and learning outcomes. The presented analysis is supported by the idea that serious games have a meaningful impact on both cognitive skills and motivational factors among learners. Microsoft Flight Simulator 2024 (MSFS 2024) embodies these principles through its incorporation of realistic flight experiences, geographical accuracy, immersive technology, AI-driven add-on software, etc. It, therefore, stands as a pivotal example of how serious gaming can be utilised not merely for entertainment but also as a valuable educational tool. Through the lens of the literature on serious games reviewed previously, this discussion also explores the potential of MSFS 2024 to enhance learning efficiency, particularly in the understanding of cultural heritage.

The platform utilises realistic graphics and scenarios to make learning enjoyable and immersive. As regards its predecessor MSFS 2020, and referring to this gaming platform, Jörg Neumann, MSFS's CEO (2021), highlights that "[w]ith the power of satellite data from Bing Maps and cloud-based AI using Azure, you'll travel the entire planet in amazing detail with over 37 thousand airports, 2 million cities, 1.5 billion buildings, real mountain ranges, roads, trees, rivers, animals, traffic, and more." As far as discovery flights are concerned – and this is what also matters within this paper – Neumann also highlights that "[n]ewcomers can easily enter the world of Microsoft Flight Simulator and experience some of the most impressive wonders of our planet, including awe-inspiring locations like the Great Pyramid of Giza and Mount Everest, or vibrant cities like Naples and Rio de Janeiro." (ibidem).

The fidelity of MSFS 2024 in virtually depicting our planet allows users to explore richly rendered environments that replicate real-world geographical features, providing an educational grounding that broadens learners' understanding of different regions. MSFS 2024, therefore, serves as a virtual platform capable of promoting cultural heritage. This aspect is consistent with the ideas suggested by Mortara et al. (2013) – see above – and entirely aligns with findings by Li et al. (2020), who assert that serious games effectively enhance learning performance and motivation concerning

cultural heritage. MSFS 2024's map not only covers geographical locations but also gives users a sense of cultural exploration through history and geography. This serious game may, therefore, significantly contribute to cultural heritage exploration, exemplifying how it can transcend traditional boundaries of entertainment to serve educational purposes critically.

2.2 Cultural Heritage in MSFS 2024

As previously discussed, engagement seems to be a fundamental factor in the success of any serious game, and MSFS 2024 excels in this area. Various design features significantly contribute to user engagement, including compelling graphics and free exploration. Furthermore, the integration of virtual reality (VR) in MSFS 2024 allows players to truly immerse themselves in the experience, enhancing their connection to the virtual world and increasing their engagement. The variety of aircraft and global locations also adds to the appeal of the game, providing endless opportunities for discovery and learning.

The current gaming platform MSFS 2024 is presented on its website as a resource through which virtual pilots may pursue an aviation career. “This brand-new simulator is designed to take advantage of the latest technologies in simulation, cloud, machine learning, graphics and gaming to create the most sophisticated, immersive and awe-inspiring flight simulator of all time” (Microsoft, n.d.). It, thus, appears at first glance that MSFS 2024 may be focused exclusively on aircraft operations. The act of flying over diverse terrains, however, allows players also to appreciate the historical significance of certain locations, from landmarks and significant cities to natural landscapes. As highlighted in the previous literature, serious games connect users with cultural narratives in an engaging manner. MSFS 2024, therefore, does this by not merely offering a flight experience but encouraging users to appreciate the historical and socio-cultural backgrounds of the places they virtually visit.

Besides that, flying within the simulator and exploring all its potential – for instance, cultural heritage sites – can be done without any major restrictions, once “the use of [flight simulators] is not dependent on external factors to which flight operations are susceptible, such as poor weather, time of day, or air traffic. Hence, flight simulators can be used practically at any time” (Dattel et al., 2023).

Engaging in flight simulation can provide a unique opportunity to explore different cultures and historical landmarks from around the world. By immersing players in realistic virtual environments, gaming can be a powerful tool for preserving and experiencing cultural heritage in a way that is both educational and entertaining.

An in-game menu titled “World Photographer” (see figure 1) is a notable feature of MSFS 2024 when it comes to exploring cultural heritage and/or historical sites:



Figure 1: MSFS 2024's start-up menu
Source: Copyright Microsoft Flight Simulator 2024

The game provides players with an activity of “[being] a World Photographer and [travelling] across our beautiful planet to capture awe-inspiring natural vistas, [visiting] famous landmarks, and [recording] these adventures with pictures in your travel book” (Microsoft, n.d.). The majority of the nearly **500 items** one can visit are directly related to cultural heritage. By assuming the role of a virtual photographer, players can take breathtaking pictures of well-known monuments, landmarks, and cultural locations. Gamers and/or virtual pilots may take on the role of a virtual photographer and capture stunning images of famous landmarks, monuments, and cultural sites. This feature not only encourages players to learn more about the history and significance of these locations but also allows them to appreciate the beauty and intricacies of different cultures. Through this interactive experience, players can develop a deeper understanding and appreciation for the rich heritage that exists all around the world. Thus, researching cultural heritage is a tangible opportunity within the gaming platform. Whether you like to explore cultural or historical places or engage in nature tourism, discover the exquisite landscapes and animals of our virtual world.

Gamers may access many menus from which they can select multiple items to explore and photograph, beginning with the “World’s Most Famous Monuments” or merely soaring over “Stunning Cities of the World” (see figure 2). Certain cities, such as Paris and New York City, offer distinct menus, allowing for the exploration of fascinating landmarks inside these regions:



Figure 2: World Photographer’s menu “Stunning Cities of the World”
Source: Copyright Microsoft Flight Simulator 2024

While exploring these virtual surroundings, you will acquire knowledge regarding the history and importance of each landmark, enhancing your comprehension of many cultures and societies. You can virtually explore iconic sights such as the Eiffel Tower and the Statue of Liberty, appreciating their beauty from the comfort of your home.

Selecting the option “World's Most Famous Monuments” reveals sights such as The Pyramids and the Sphinx in Egypt and the Taj Mahal, presented as the “Crown of the Palace” (see figure 3). Each location is depicted on the map and accompanied by a concise summary of its historical and/or cultural context:



Figure 3: The Sphinx in Egypt and the Taj Mahal in India
Source: Copyright Microsoft Flight Simulator 2024

These virtual tours enable global exploration and may encourage players to deepen their study of various civilisations. Comprehensive descriptions and photographs for each monument facilitate a profound comprehension of the significance and symbolism inherent in these renowned landmarks. This interactive platform provides a distinctive opportunity to expand your knowledge and admire the beauty of many architectural marvels, appealing to both history enthusiasts and those curious about diverse cultures.

The tour of castles in Europe, another menu found within the in-game “World Photographer” activity, is equally appealing for virtual pilots or gamers to explore cultural heritage sites. The several excursions include, for instance, Neuschwanstein Castle, Germany's probably most popular and photographed landmark, which has also become a symbol of the Walt Disney brand, and The Pena Palace, situated in Sintra, Portugal, a monument that was designated a UNESCO World Heritage Site in 1995 (see figure 4). These castles exemplify the historical significance and architectural brilliance of their nations while offering insight into the values and ambitions of their creators. Visiting these landmarks enables individuals to recognise the talent and dedication involved in their creation, rendering them remarkable sites for travellers – and particularly virtual pilots – desiring insight into history. The European castle trip offers a voyage rich with marvel and exploration, whether you are captivated by the fairy-tale towers of Neuschwanstein Castle or the vibrant colours of The Pena Palace:

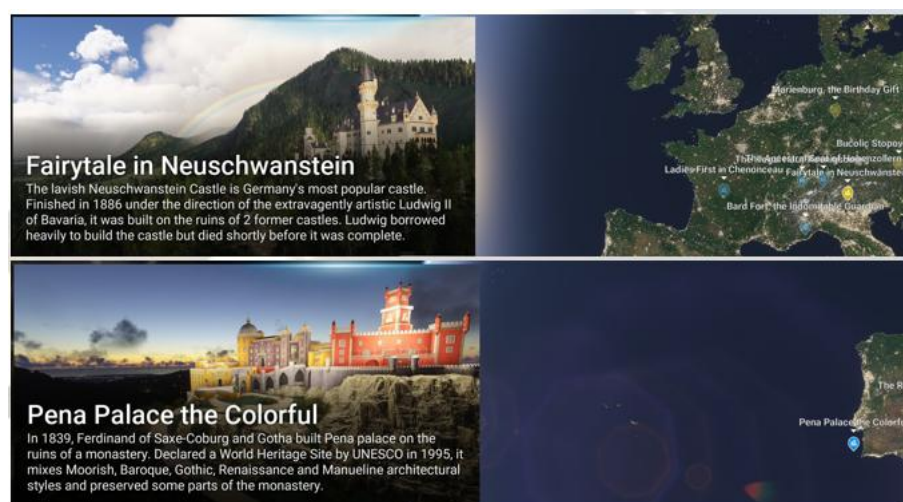


Figure 4: Neuschwanstein Castle (Germany) and the Pena Palace, Sintra (Portugal)
Source: Copyright Microsoft Flight Simulator 2024

By selecting the menu “Nature from High Above”, users can explore stunning views such as the Danube Delta in Romania and the frequently overflowed Grand Canyon in Arizona, United States (see figure 5). These aerial perspectives provide a distinctive perspective, enabling virtual visitors to admire the natural beauty of these sites in a manner often unattainable from ground level. The intricate

details and vast expanses captured in these images provide a sense of awe and wonder, showcasing the diversity and magnificence of the world we live in:



Figure 5: The Sphinx in Egypt and the Taj Mahal in India.
Source: Copyright Microsoft Flight Simulator 2024.

Additionally, this feature is certain to inspire a sense of wanderlust and a desire to experience these stunning settings firsthand.

Nature encompasses more than just landscapes, whether in reality or virtually in MSFS 2024. “Animals Worldwide” is a menu that can also be explored through virtual nature tourism. This section enables players to investigate many ecosystems and wildlife habitats worldwide, providing insight into the captivating realm of creatures in their natural environments. Users can observe the beauty and diversity of the animal kingdom through striking graphics and detailed descriptions. The “Animals Worldwide” section underscores the significance of conserving and safeguarding the natural environment for the enjoyment of future generations.

Virtual nature tourism in MSFS 2024 enables players to immerse themselves in the splendour of nature, whether by exploring expansive landscapes or experiencing iconic fauna such as the Australian kangaroo (see figure 6), depicted as a country’s symbol and prominently featured in the nation’s coat of arms and currency:

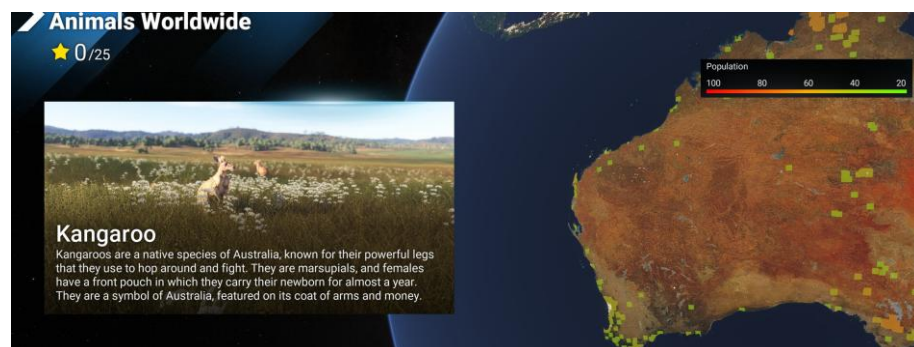


Figure 6: The menu “Animals Worldwide” with the Australian kangaroo.
Source: Copyright Microsoft Flight Simulator 2024.

Comprehensive maps and information facilitate gamers and virtual pilots in acquiring knowledge about these animals and their habitats, awakening interest and a desire for further exploration of the surrounding world.

The degree of realism is truly remarkable. The experience can be enhanced with appropriate equipment, such as yokes, throttle quadrants, rudder pedals, or a VR headset. The incorporation of VR provides players with a depth and viewpoint that is usually difficult to replicate with a conventional screen. With VR, players can genuinely experience the sensation of being in the cockpit, seeing their surroundings as if they were piloting an aircraft. The immersion offered by VR elevates the experience of flying in MSFS 2024, rendering it one of the most realistic and engaging flight simulation games available. Supplementary devices can, therefore, significantly elevate the game experience, simulating the sensation of controlling a real aircraft. The intricate detail in MSFS 2024 is unparalleled, enabling users to examine renowned landmarks and airports with remarkable precision. The interactive cockpit controls and configurable settings enhance realism, creating a genuinely realistic experience for aviation aficionados and gamers.

The integration of artificial intelligence (AI) tools for exploring cultural heritage sites and landmarks further enhances the virtual tourism experience in MSFS 2024. By incorporating these advanced technologies, players may not only admire the natural beauty of the world but also explore the rich history and significance of each location they visit. Such an innovative approach to virtual tourism offers a unique opportunity for individuals to explore and appreciate different cultures, promoting a sense of global interconnectedness and understanding.

The in-game experience can indeed become more interactive with AI tools. Sayintentions.AI Entourage, for instance, is an intercom add-on/interface with which players can interact, allowing them to engage with virtual characters, gaining insight into both local tangible and intangible cultural assets, which makes each destination unique. By incorporating AI technology, virtual tourism becomes not just a visual experience, but a fully immersive cultural journey. Sayintentions.AI Entourage enhances the virtual travel experience, making it feel as if players were truly interacting with the people and places they encounter along the way, while “[learning] fascinating facts about landmarks, cities, and regions as you fly” (Sayintentions.AI, n.d.).

One of Sayintentions.AI Entourage's virtual tour guide, Sarah, is programmed to provide insightful commentary and interesting facts about the destinations you visit (see figure 7). With her help, you can learn about the history, architecture, and local customs of each location, adding depth and richness to your virtual travel experience:

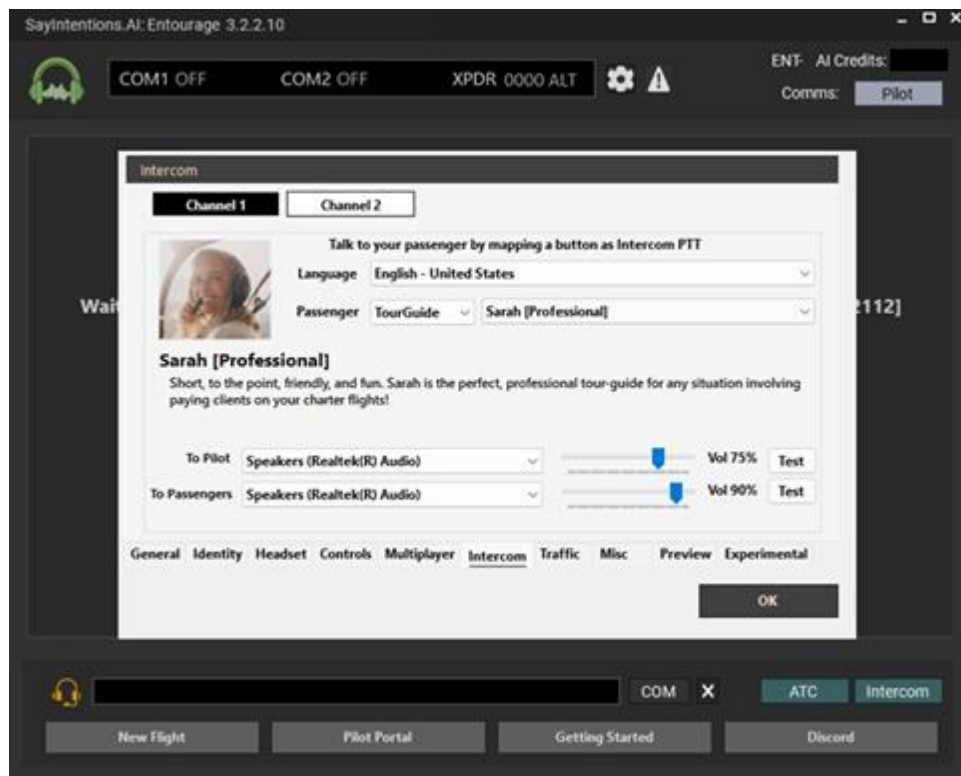


Figure 7: Intercom menu for virtual guided tours

Source: Copyright Sayintentions.AI

Sarah's interactive capabilities allow for a more personalised and engaging journey, making it feel as though you are truly exploring the world from the comfort of your own home. Whether you are a virtual pilot, a seasoned traveller or new to virtual tourism within MSFS 2024, Sarah's guidance and expertise will ensure that you have a memorable and educational adventure.

Conclusion

This research has analysed MSFS 2024 as a viable serious game platform for the exploration of cultural heritage, contextualising it within current debates on gamification, experiential learning, and digital heritage. The analysis reveals that while MSFS 2024 was not specifically intended as an educational heritage instrument, its technological framework, i.e., the integration of satellite data, artificial intelligence, high-fidelity environmental modelling, and immersive VR compatibility, presents substantial opportunities for cultural engagement. Elements like “World Photographer” missions, curated landmark collections, and AI-driven virtual guides demonstrate how commercial entertainment platforms can inadvertently serve as significant contexts for heritage interpretation.

The findings also indicate that simulation-based environments like MSFS 2024 can be effectively included into programs in cultural studies, tourism, intercultural communication, and creative sectors within higher education. Serious games provide constructivist and engaging learning

experiences that enable students to actively investigate geographical and cultural contexts instead of passively absorbing information. In cultural studies curriculum, MSFS 2024 may facilitate comparative heritage study, digital storytelling initiatives, critical examinations of authenticity, and interdisciplinary collaboration between, for instance, diverse scientific areas such as technologies, humanities, etc.

Despite their promising benefits, serious games face several challenges in higher education implementation. One major constraint is the significant time and resource investment required to develop or adapt quality games aligned with curricular goals (Tokarieva & Chyzhykova, 2022). Educators may, additionally, often lack the necessary knowledge, training, and/or even digital skills to adopt and implement gamified learning tools effectively, which acts as a barrier to wider acceptance in higher education (Azad, 2023). Therefore, subsequent study should empirically evaluate the learning outcomes linked to simulation-based heritage discovery, covering student motivation, the development of intercultural competence, and long-term information retention.

Furthermore, extensive ramifications for the tourism sector warrant additional research. Virtual exploration may serve as an auxiliary pre-visit experience that incites curiosity and enhances destination awareness, potentially affecting travel intentions. As digital natives increasingly depend on interactive media for information and inspiration, serious games may emerge as significant players within destination marketing ecosystems. Further analysis should investigate if immersive simulation experiences lead to quantifiable improvements in tourism, enhance off-season participation, and aid in the valorisation and preservation of cultural heritage sites.

The integration of serious gaming, cultural heritage, and higher education signifies a wider evolution within the creative sectors. Platforms like MSFS 2024 demonstrate how digital simulations may enhance access to global heritage and promote creative, entrepreneurial, and project-based teaching methodologies. Ongoing multidisciplinary research will be crucial to enhance these ecosystems for academic, cultural, and socio-economic sustainability.

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