Let Statues Talk: Applying AI Story Telling Scenarios in the Græco-Roman Museum in Alexandria

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ABSTRACT

Story telling is indisputably a trending and effective way of revealing the value of the items displayed in the museums. By the continuous development of VR technologies, using AI technology in story telling will immerse the user with an exquisite experience during his/her visit. Admittedly, AI technology has become a creative method in the field of museums. By the recent re-inauguration of the Græco-Roman Museum in Alexandria, applying AI story telling in this museum will be an innovative way to induce a favorable attitude toward the cultural heritage of Alexandria and promoting for the heritage of the city.

This research aims to provide a better understanding of the effectiveness of AI story telling the Græco-Roman Museum of Alexandria and its role in promoting for the cultural heritage of the city. Furthermore, the research examines the role of AI story telling in the experienec of visiting the museum in question and its effetivness in the frequency of visiting it once again. The research will presnet diverse AI story telling scenarios relevant to the main themes of the museusm in question.

AI-GENERATED STORYTELLING WITHIN MUSEUMS: ORIGIN AND DEVELOPMENT

Storytelling is identified as, "a *two-way interaction, written or oral, between someone telling a story and one or more listeners*" (Sundin et al., 2018, p.1; Beevor et. al., 2022, p. 2). Storytelling is practiced by groups and communities to achieve various goals such as, commemorating specific events, displaying personal identity, and historical value through a narrative context (Moortheeswari 2018, p. 2; Rinallo 2020, pp. 57-78). Moreover, storytelling gained a reputation as a remarkable tool for sharing wisdom, stimulating sympathy, providing knowledge and integrating the audience through promotional messages (Sobol et al., 2020, p. 57; Perouli 2021, p. 38). Museums are places to travel through time, and indisputably the best arenas to practice storytelling. Through storytelling, the cultural, artistic, and historical value of displayed objects are revealed through a narrative context (Moortheeswari 2018). In the field of heritage tourism, storytelling becomes an innovative tool for audiences leading to an unforgettable visitor experience, achieving effective audience engagement at heritage sites and museums (Sundin et al., 2018; Ross & Saxena 2019; Robiady et al., 2020; Beevor et al., 2022, p. 2; Caramiaux 2023, p. 120).

Telling stories is regarded a crucial element in the journey of humankind, for sharing peoples everyday experiences, emotions and thoughts (Nielson 2017; Beevor et al., 2022, p. 2; Abd El Halim & Gad 2024). The transition of the function of museums from only educational institutions into more cultural and collaborative centres within societies, became more attested

through the inclusions of storytelling (Baker et al., 2016; Abd El Halim & Gad 2024). Additionally, storytelling offers a remarkable chance for museum visitors to immerse in emotionally meaningful experiences. Consequently, storytelling is now recognized as a significant way for creating deeper connections, as it strengthens the emotional connection between visitors and museum staff (Nielsen 2017; Sundin et al., 2018; Doyle & Kelliher 2023; Abd El Halim & Gad 2024).

Conversational interfaces that enable visitor interaction can be developed with the aid of artificial intelligence (AI) in museums. A dynamic learning experience can also be enhanced by giving visitors the opportunity to ask questions and receive informative responses. This type of interaction produces a better bond between visitors and the exhibit and creates a different access point for information. Instead of being limited to static explanations, AI storytelling allows dynamic, personalized responses based on the interests of that visitor. Thus, the museum experience becomes a more interactive, stimulating, and personalized environment, focusing on each individual's ability to learn differently (O'Keefe et al., 2014; Dal Falco & Vassos 2017; Nielson 2017; pp. 442-450; Abd El Halim & Gad 2024).

To develop storytelling scenarios within museums, specific procedures must be followed. Firstly, data regarding the chosen objects should be processed. The museum staff should be engaged to enhance the authenticity of the collected data. Subsequently, the collected information should be organized based on various criteria, such as short stories, long stories, complete stories, and incomplete stories. The narrative is then conveyed through a variety of mediums. Examples of these mediums include narrative write-ups, pictorial storytelling, literary sources such as brochures, booklets, and leaflets, as well as videos, audio recordings, dioramas, guides for individual or group explanations, object models, and 3D presentations utilizing AR and QR codes. (Moortheeswari 2018, p. 1).

Digital storytelling became a crucial promotional method to share wisdom and exchange knowledge, as well as stimulation. Furthermore, digital story telling is an effective method for digital promotion and marketing in the field of intangible cultural heritage (ICH) (Nielsen 2017; Rinallo 2020, pp. 57- 58). George-Palilonis (2013), threw light on the importance of storytelling inside museums through iPad applications. He emphasises that using this type of digital technology enables information to be active, not passive, and enables the audience to engage in the content and experience of their museum visit (Perouli, 2021, 38). AI became a trending method in museum displays particularly after the Covid-19 pandemic (Vidu et. al. 2021, pp. 830-831). AI is digital technology that facilitates to automate tasks that were previously completed by hand or with the aid of other computations or human labour. The creation of textual or visual content, audience projections for public receptions, artist and market trend identification, assistance for decision-makers in the cultural sectors, personalization, and visitor services are some examples of AI implementation in the field of museums and cultural heritage (Caramiaux 2023, 119, p. 119).

AI presents a chance to enhance learning and entertainment inside museums in the long term (Vidu et. al. 2021; Rani et al. 2023). Approaching a better understanding of AI, we should consider two types of this technology; Artificial General Intelligence (AGI) and Artificial Narrow Intelligence (ANI). AGI, is defined as intelligence that can function at a level intellectually equivalent to, or higher than, ordinary human performance and is able to affect and comprehend a wide variety of situations and settings. ANI, on the other hand, has a very limited range of capabilities since it can only carry out the tasks for which it was originally intended. For instance, the game of chess served as one of the early models for AI, and computers could already play the game at a superhuman level (Kaplan & Haenlein 2019; Vidu et. al., 2021, pp. 830-831; Rani et al., 2023: p. 3).

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Consequently, there are two types of machines that depend on artificial intelligence: the Deep Learning Machine and the Narrow Learning Machine. The Deep Learning Machine, can identify patterns, comprehend, is trained on massive datasets, and can make informed decisions. Applications for this kind of AI are numerous and include financial forecasts, customer service automation, driverless cars, and medical diagnosis. The Narrow Learning Machine is basically designed to carry out a specific task such as identifying objects and images and interpreting languages. This type of AI is used in linguistic applications, and textual or pictorial recognition (Rani et al., 2023: p. 3).

Real-time interaction with visitors using Chatbots helps the museum visitor to engage with the museum to a greater extent. Chatbots can answer questions, make personalized recommendations, and even provide a guided tour of the museum. The Chatbot helps to improve and enrich the actual experience of visiting a museum in person. In essence, Chatbots can personalize content for all visitors. By analysing individual user activity, Chatbots can offer relevant information about artefacts on display, and even greater enriching the educational experience of the visit (Fabbri et al., 2023; Wang 2024, pp. 6-7). AI-supported Chatbots have the ability to understand the user's interests and describe the user's interests and behaviour. This contact enables the user to offer content and information based on greater personalization (Fast et al., 2018; Gaia et al., 2019; p. 315; Varitimiadis et al., 2020: 5-6).

Neuro Linguistic Programming (NLP) is an innovative AI interactive technique in museums, whereas the Chatbot technique has been used in both small and spacious museums around the world for decades (Vidu et. al., 2021, p. 834; Chai-Arayalert et al., 2024). According to Noh and Hong (2021), there are three main types of Chatbot users: the responsive communicator with a learning approach, the quick receiver, and the enthusiastic seeker. One of the earliest Chatbots used inside museums is named Max. This Chatbot, is an avatar used by the Heinz Nixdorf Museum Forum, the biggest computer museum in the world. The avatar functions as a virtual tour guide inside the museum to induce the audience to an unforgettable experience (Levere 2018; Gaia et al., 2019; p. 314; Noh and Hong 2021; Vidu et. al. 2021; Chai-Arayalert et al., 2024).

Other types of avatars are now used in museums and take the form of small robots welcoming and interacting with the visitors. For instance, the Pepper robot is found welcoming the visitors of Museum Forum. This robot is similar to another robot, also named Pepper, from Hydropolis. Certain Chatbot interfaces are interactive displays of one kind or another, such the Pepper robots from the Smithsonian Institution. In addition to having a touch screen, Pepper can respond instantly and do actions like dancing or gaming (Vidu et. al., 2021, p. 833-834).

Chatbots became an interactive creation in many museums around the world. Examples of such museums using Chatbots are the Anne Frank House in Amsterdam, the Cooper-Hewitt Museum in New York, the Field Museum in Chicago, the Carnegie Museum in Pittsburgh, the Smithsonian Museum in Washington DC, the Akron Art Museum in Ohio, the Dali Museum in Florida, the Barnes Foundation in Philadelphia, the House Museums in Milan, the Musée du Quai Branly in Paris, the National Art Museum in Belarus, the Museum of Tomorrow in Rio de Janeiro, and Pinacoteca in São Paulo (Munro 2016; Levere 2018; Gaia et al., 2019; p. 314; Richardson 2019; Varitimiadis et al., 2020: 4-5; Vidu et. al., 2021, p. 834-835; Chai-Arayalert et al., 2024).

Chatbots can be connected to applications or social media platforms, linked to museum websites, or used within museums themselves, to improve the visitor experience. Museum Chatbots can answer more complicated queries regarding the exhibits or subjects covered by museums in a personalized manner, and they can also frequently point visitors to other exhibits. Like the IRIS+ Chatbot at the Museum of Tomorrow in Rio de Janeiro, these Chatbots could

be programmed to learn from the many experiences and responses from users to provide better responses and more relevant reactions (Varitimiadis et al., 2020: 4-5; Vidu et al., 2021, p. 834; Chai-Arayalert et al., 2024). Both large and small museums can now experiment with Chatbots at a relatively low cost and with limited staff input due to the availability of open APIs and emerging free Chatbot development platforms like Chatfuel, Chatterbot, and Eliza. Additionally, these technologies typically only require minor adjustments to existing infrastructure (Dale 2016; Gaia et al., 2019, 314).

Google Arts & Culture is another excellent illustration of machine learning grounded in the arts and traditions. It has created an app called Art Selfie that allows you to find a match for you in art collections across the globe. Additionally, Art Selfie has a developed Art Filter and Art Transfer function (the latter in collaboration with the Getty Museum in Los Angeles). Art Transfer modifies a photo utilizing traditional artworks, whereas Art Filter is based on well-known museum pieces. These AI applications may not be particularly sophisticated or one-of-a-kind, but they do help the public engage with the arts in a fun way and have educational value because they provide detailed information about the artworks, artists, and/or art forms for users to explore (Vidu et. al., 2021, pp. 834-835).

Avatars can be imaginary characters. For instance, the manga comic "Bob's Adventure", was made by a young learner at the Samsung Digital Discovery Centre. This is an example of a typical object of creating a digital story. On the first page of the story, the author reveals the title and the main character, namely Bob, who had odd characteristics like no nose and weird feet. By mentioning in the caption that Bob did not know where everyone was, he skillfully set the scenario. Bob soon discovers that the exhibits had come to life and were speaking as he explored the British Museum's hallways. The problem that emerged during the story was that, as the title implies, he began to flee because he believed, "the Romans were chasing him." The king of Egypt, Rameses, however, blocked Bob's path. The story reaches its conclusion when the bust of Ramses comes to life, and Ramses declares, "*You will never leave this building, Bob*" (Perouli 2021, p. 39).

Bob eventually manages to escape unharmed, but he collapses from weariness and confusion in front of the main door of the British Museum. This work shows that the author was at ease applying theory and technology to his creation, as well as utilizing all the surroundings that were accessible. Furthermore, his story has a fantastic beginning, middle, and end, with captions at the bottom of the images, and six different backdrops with speech bubbles in a range of colours and shapes (Perouli 2021, p. 39).

THE GRÆCO-ROMAN MUSEUM OF ALEXANDRIA: INAUGURATION AND RE-INAUGURATION

The Græco-Roman Museum in Alexandria is the only museum in Egypt specializing in Græco-Roman artefacts. The idea to establish this remarkable museum was discussed in 1891 (Breccia 1922: pp. 120-122). The museum was closed in 2005 for a full renovation and reopened eighteen years later on October 11, 2023. The museum includes sixteen display halls over three floors. The first floor comprises thirteen display halls and provides access to an open-air café. The second floor houses the archives, documentation centre, educational departments and a Gypsoteca (a collection of plaster replicas - for the Gypsoteca see; Elsakhawy 2025: p. 130). The third floor contains three additional display halls, as well as lecture rooms and library (see Figures 1, 2, and 3).

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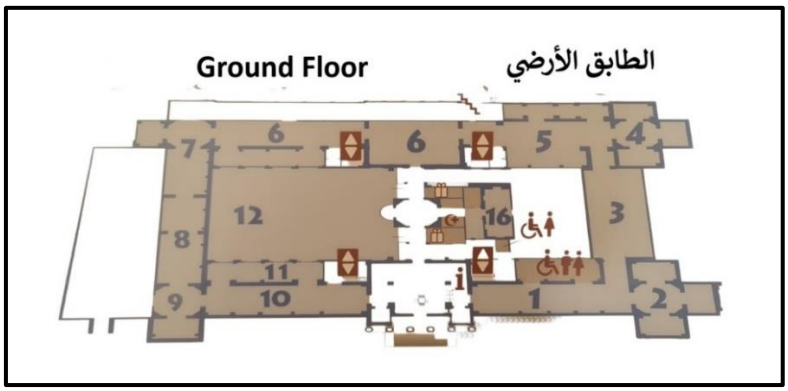

Figure 1. The Ground Floor, The Græco-Roman Museum, Alexandria

Produced by the Researcher

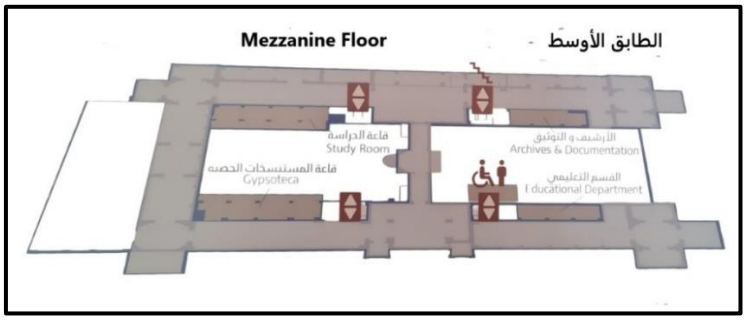

Figure 2. Mezzanine Floor, the Græco-Roman Museum, Alexandria

Produced by the Researcher

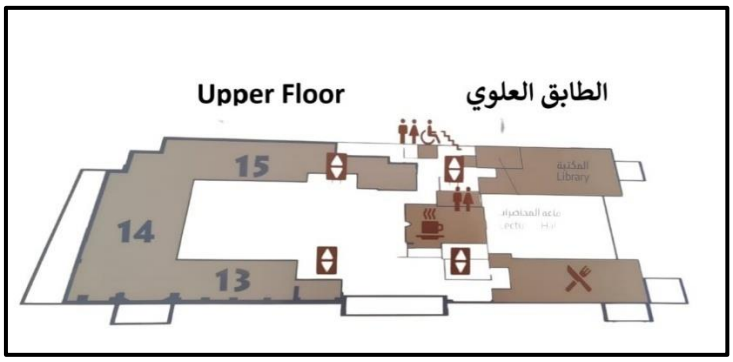

Figure 3. The upper floor, the Græco-Roman Museum, Alexandria

Produced by the Researcher

The Græco-Roman Museum uses screens to display multilingual documentaries describing the history of selected artefacts and the submerged monuments of the city of Alexandria. To enhance the experience of our guests, these films are projected on movable screens within the designated rooms furnished with wooden benches. However, the current media sources do not provide a complete immersive storytelling experience for the visitors. These screens could be utilized to create more dynamic narratives, featuring elements such as dramatized historical accounts, virtual films, and first-hand knowledge from professionals. By including these elements, the museum could provide a remarkable and unforgettable storytelling experience, strengthening the connection between visitors and Alexandria's rich cultural legacy (Figures. 4 and 5).

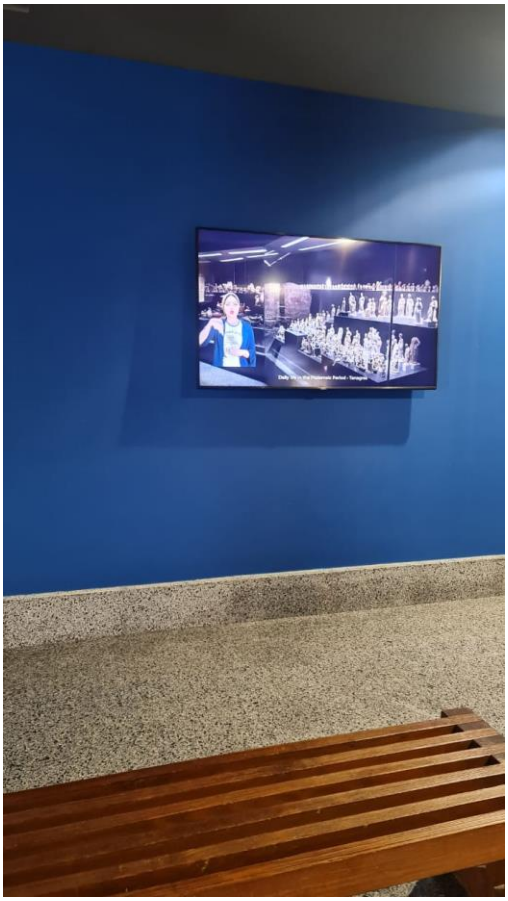

Figure.4

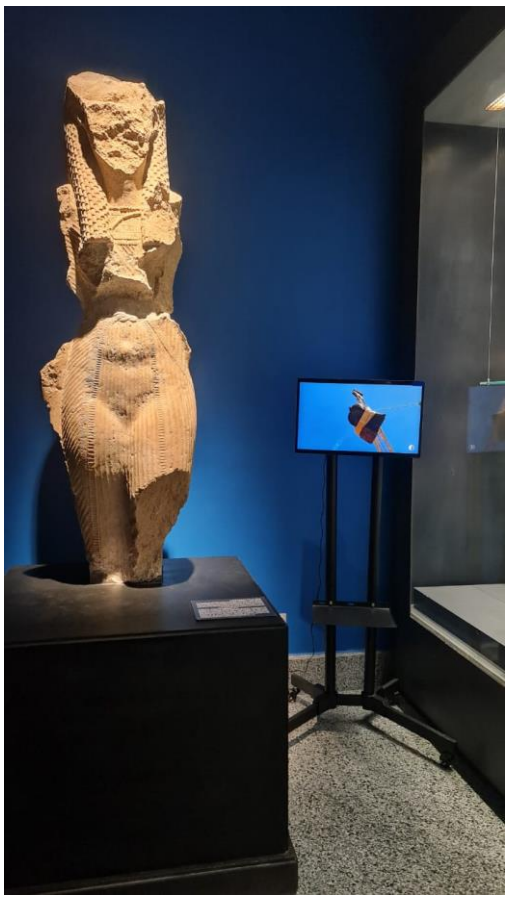

Figure.5

Screens inside the museum telling stories of exaction the Bubsation (left) and submerged monuments (right) in Alexandria, The Græco-Roman Museum, Alexandria

Photographed by the Researcher

IMPLEMENTING AND CONFIGURING AI-GENERATED MODELS OF DISPLAYED OBJECTS IN THE GRÆCO ROMAN MUSEUM OF ALEXANDRIA:

Short videos were created using HeyGen and Hedra AI creation platforms to animate selected masterpiece statues from the Græco-Roman Museum, making them appear as if they were speaking through AI technology. Although there are diverse AI platforms, HeyGen and Hedra were chosen for a number of reasons. HeyGen, produces high quality AI created videos with options to have text-to-speech-lip sync and multilingual voice options. As for Hedra, it produces high-quality AI generated videos with the option to control facial expressions. Thus, the two platforms can be integrated to provide an excellent workflow for selected pieces. HeyGen, made it easy to integrate voices, and generate realistic speech quickly, while Hedra focuses on giving detailed customization of facial expression.

The HeyGen and Hedra projects were uploaded to a dedicated playlist on the YouTube channel of the author as part of this research study. The videos could be a part of a bigger promising project that explores the integration of AI-driven storytelling within the Græco-Roman Museum to enhance the visitor experience, demonstrating how AI can be utilized to create engaging and interactive historical narratives
(https://www.youtube.com/playlist?list=PLJEqgz93fYOyiFKDvtbpoydAug6p9Q0KO).

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It is important to emphasize that Human-in-the-Loop AI, also known as Narrow AI, should be employed in this project involving the application of AI to statues in the Græco-Roman Museum. In this context, all data used must be carefully reviewed and managed by historians, heritage specialists, and museum staff. This approach is crucial to ensure the authenticity of the artifacts preserved and to avoid any misrepresentation of historical narratives.

The selected pieces represent masterpieces in the Græco-Roman Museum and were chosen for their artistic significance, as well as their historical and social value. Moreover, it was crucial that the selected pieces were well-preserved sculptures or photos**,** like the case of the photo of Guiseppe Botti**,** to produce convincing results.

Alexander the Great (356 BCE-323 BCE): Alexander III was the son of Philip II, king of Macedonia in the northern part of ancient Greece. Being the heir of his father, Alexander was brought up with much care. He was taught philosophy, poetry and history. His main tutor was the Greek philosopher Aristotle. At the age of sixteen, Alexander became the co-regent of his father (Abbot, 2009). After the death of his father in 336 BCE, Alexander succeeded his father to the throne of Greece. He followed in the steps of his father, conquering Persia by 334 BCE, and set out on campaigns that lasted for ten years. He also invaded India and built about twenty cities all over the ancient world that bear his name, the most famous of which is Alexandria in Egypt (Hölbl 2001, pp. 9-13; Heckel 2009, pp. 26-52).

In the Græco-Roman Museum there is a remarkable small head of Alexander the Great made of red granite (Figure 6). This head dates back to the early Ptolemaic period (305-150 BCE) and was discovered in Alexandria. The youthful features represent the idealistic portrait of Alexander. The head has inlaid eyes, which was one of the artistic features of statues sculpted in Egypt, and therefore, the head may have been made in Alexandria.

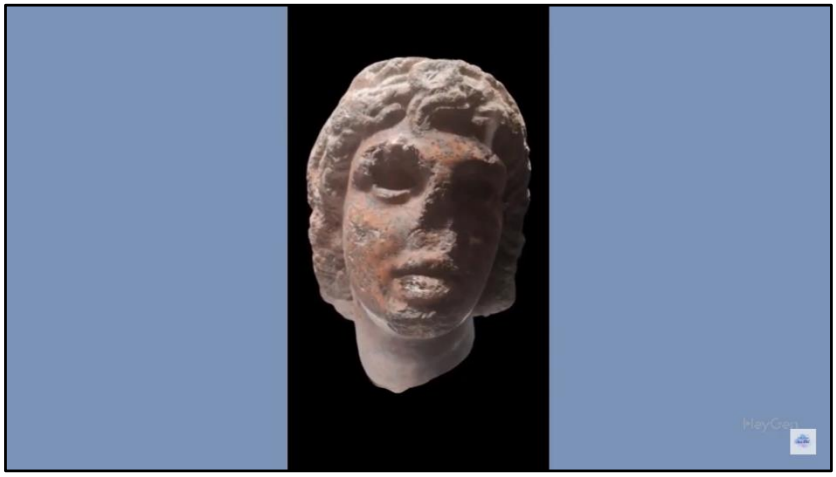

Figure. 6. AI-generated model of a granite head of Alexander the Great, hall1, Græco-Roman Museum, Alexandria

Produced through HeyGen by Researcher

Cleopatra VII (51-30 BC): **Cleopatra Philopator** was one of the most famous female characters in the history of Egypt. As the eldest daughter of Ptolemy XII, she played a prominent role in the history of Egypt. Cleopatra, ruled with her younger brother Ptolemy XIII. However, after a short time, she succeeded in exiling him and became the sole independent ruler of Egypt for about eighteen months before the intervention of the supporters of Ptolemy XIII. In 49 BCE, Roman general Julius Caesar, who was 55 years old fell in love Cleopatra VII, who was 22 years old at the time. Their marriage resulted in a civil war in Alexandria between Cleopatra and her supporters and the supporters of her brother Ptolemy XIII. Cleopatra VII gave birth to Caesarion

(Ptolemy XV) who was the last king of the Ptolemies. After the brutal death of Julius Caeser, Cleopatra married the Roman leader, Mark Anthony. At the famous battle of Actium in 30 BCE, Cleopatra and Mark Anthony were defeated by the army of Augustus (Hölbl 2001, pp. 231-247; Capponi 2005, pp. 19-23).

In the Græco-Roman Museum there is a sculptured head of Cleopatra VII, which was at Mazarita, near the Latin cemetery of Alexandria, and dates back to the second half of the 3rd century BCE (Figure 7). The head is made of shelly limestone and was sculpted in Egypt, perhaps in an atelier located in Alexandria itself, because this type of stone is characteristic of the Alexandrian landscape (GRM 21992; Ashton 2003, p. 25; Savvopoulos & Bianchi 2012: p. 127;).

Figure. 7. AI-generated model of a limestone head of Cleopatra VII, hall 2, Græco-Roman Museum, Alexandria

Produced through Hedra by Researcher

Roman Emperor Augustus (27 BCE- 14 CE): Gaius Julius Caesar Octavianus, often referred to as Augustus, was only 33 years old when he ruled over the whole Roman world. After the battle of Actium (31 BCE), Augustus succeeded in making Egypt a Roman vassal state. The day Egypt fell into the hands of the Romans was celebrated in Rome as an annual national feast. Moreover, this year marked the end of the Roman Republic period, and the beginning of the Imperial period. As emperor, Augustus was known as "*Imperator Caesar Divi Augustus*". To Commemorate this event, coins were issued bearing the phrase, "*Aegypto Capta*", meaning, "*the capture of Egypt*" (Capponi 2005, pp. 5-12).

On display in the Græco-Roman Museum is a marble head of Augustus, discovered in Athribis (modern day Benha in the Nile Delta) (Figure 8). The head depicts Augustus with curly short hair, wide eyes, straight long nose, and small mouth. The smooth prominent cheeks and straight eyebrows are perfectly sculptured. His heavy curly hair is brushed to one side across to his forehead, like a remarkable coiffure that is attested in other sculptured examples of Augustus (see; Zanker 1988).

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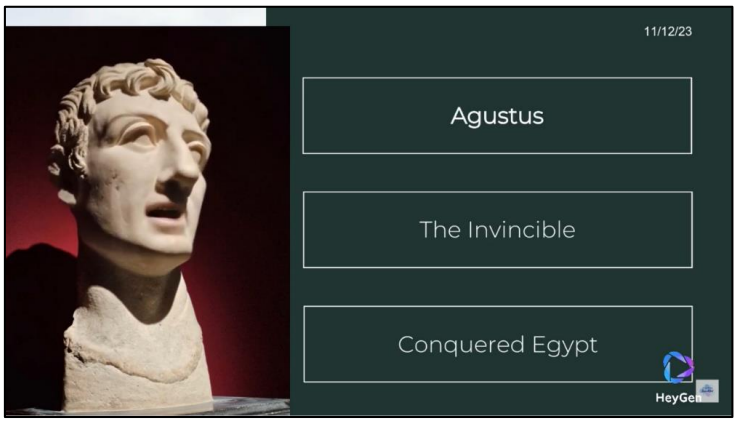

Figure 8. AI-generated model of a marble head of Augustus, hall 4, Græco-Roman Museum, Alexandria

Produced through HeyGen by Researcher

Head of an Athlete: Athletic events and competitions clearly flourished in Ptolemaic Egypt due to the support of the first four Ptolemaic kings (Ptolemy I–IV), who encouraged participation in prominent athletic events all over the country and instituted competitions in Alexandria. Furthermore, historical epigrams from the Early Hellenistic period show that people close to the Ptolemaic court were particularly engaged in equestrian events at major games in the Greek world, such as Olympia and Delphi. Unlike competitors from the new Greek cities in Asia, the names of the Alexandrians, who were the prestigious residents of Egypt, are mentioned in the lists of athletes who achieved victories at prominent Greek athletic festivals during the third century BCE. The Ptolemaic dynasty, particularly under the reign of Ptolemy II (283 - 246 BCE), also established athletic competitions in Egypt (Remijsen 2014, pp. 351-352).

The white marble head of a young athlete on display at the Græco-Roman Museum, was apparently part of a complete statue (Figure 9). The head is slightly bent to the right, and the neck is well-defined, with prominent muscles around the Adam's apple. The eyes are deep set and framed by pronounced eyelids, with the lower eyelid appearing nearly horizontal. The nose is straight, while the mouth is small, forming well-formed, rounded lips. The hair is thick and curly, and the head conveys a sense of energy, perhaps even passion. According to its artistic style, this head dates to the late 4th or early 3rd century BCE (GRM 3241; Breccia 1922, 175, no. 16; Savvopoulos & Bianchi 2012: p. 34) (Figure 9).

Figure 9. AI-generated model of a marble head of an athlete, hall 4, Græco-Roman Museum, Alexandria

Produced through HeyGen by Researcher

Giuseppe Botti (1853-1903): Giuseppe was an Italian archaeologist, born in Modena, Italy, in 1853 (Figure 10). He pursued his studies at the University of Bologna, focusing on ancient Egyptian civilization. He trained at the school of Schiaparelli in the Egyptian Museum of Turin. Following his training, he became the Curator of the Egyptian Department in the Archaeological Museum of Florence. In 1892, he was appointed as the inaugural director of the Græco-Roman Museum in Alexandria. He undertook excavations in Alexandria and produced numerous scholarly publications. He died in Alexandria in 1903 (Dawson et. al., 1995). The following white and black photo of Botti is within a gold frame is on display in hall 4 in the museum (Figure 10).

Figure 10. AI-generated model of the photo of Guiseppe Foundation Room, hall 4, Græco-Roman Museum, Alexandria

Produced through Hedra by Researcher

Research Sampling:

The sampling technique used in this research involved included 620 of a total of 700 questionnaires, which were distributed among the visitors of the Græco-Roman Museum in Alexandria.

Primary Data

The questionnaire was designed to include short answers and linear scaled answers. The first part of the questionnaire investigated the demographic features of the respondents, such as name, gender, nationality, and age. The second section investigated if visitors had previous experience of AI technology in museums, whether inside Egypt or abroad. Finally, the last part of the questionnaire explored their preference about the suggested generated characters inside the museum. The questionnaire investigated the respondents' opinion about generated characters, being inspired from the displayed sculptures inside the museum, as substitutes of tour guides.

To gather the necessary data for the study, a self-administered online survey was employed, as this was recognized as the most equitable method for data collection in this field of research (Huang et al. 2013; Huang et al. 2016). The survey questions were presented in both Arabic and English. Two specialized professors, proficient in both languages, thoroughly reviewed the questions for linguistic accuracy. The questionnaire was designed based on measurement items utilizing a five-point Likert-type scale (1 = strongly disagree; 5 = strongly agree) and another five-point Likert-type scale (1 = very boring; 5 = very appealing). Data collection occurred over a six-month period, from April 1, 2024, to September 1, 2024.

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Data Analysis Techniques:

Statistical Package for Social Sciences (SPSS) version 24 was used to analyze the data of the questionnaire. Furthermore, Cronbach Alpha was conducted to evaluate reliability, frequencies, percentage of the questionnaire samples.

Reliability and Validity of Statistics:

Validity and reliability are essential components of any quantitative research endeavour. Validity pertains to the degree to which research instruments, data, and findings accurately reflect the intended measurements and are trustworthy. On the other hand, reliability assesses whether the measurement yields consistent results that maintain equal value across different instances. In essence, reliability indicates the stability of the findings, while validity signifies the authenticity of those findings (Thatcher 2012; Mohajan 2017).

To assess the reliability and validity of the measurement items, Cronbach's alpha was employed with the questionnaire. As illustrated in Table 1, the statistical analysis reveals a reliability coefficient of .907 and a validity coefficient of .952. Consequently, the Cronbach alpha values for the research items exceed the threshold of 0.7, indicating that the variables in this study are reliable and exhibit internal consistency. Each construct within this research demonstrates a high level of internal consistency and is grounded in reliable instruments with outstanding reliability ratings.

Results

Sample profile

Table (1) sample profile (n=612)

Category	No.	Percentage (%)
Nationality		
Egyptian Respondents	520	84.97
Non-Egyptian Respondents	92	15.03
Gender		
Male	249	40.69
Female	363	59.31
Age		
Age 18-33	591	96.57
Age 34-49	21	3.43
Educational level		
Bachelor's Degree	307	50.16
Higher Diploma	231	37.75
PhD	10	1.63
Master's Degree	7	1.14
Other	51	8.33

The study surveyed a total of 612 respondents. The majority of participants were Egyptian, while 15% (92 respondents) were from various nationalities, including Portugal, Spain, Germany, Italy, and China. Regarding gender distribution, 249 respondents (40.7%) were male, while 363 (59.3%) were female. In terms of age groups, most respondents (591 individuals, 96.6%) were aged between 18 and 33 years, whereas 21 respondents (3.4%) belonged to the 34–49 age category. Concerning educational background, 307 participants (50.2%) held a

bachelor's degree, 231 (37.7%) had a higher diploma, 10 (1.6%) held a PhD, 7 (1.1%) had a master's degree, and 51 (8.3%) reported other educational qualifications.

Descriptive analysis

The survey aimed to assess respondents' prior exposure to museums incorporating artificial intelligence (AI) in their exhibits (Figure 11). Findings reveal that a minority of participants (17.6%, n = 108) reported having visited such museums, whereas the majority (82.4%, n = 504) indicated no prior experience with AI-enhanced museum environments. This distribution suggests that while AI applications in museums are gaining traction, public engagement with such technologies remains limited.

For those who had prior exposure to museums incorporating AI, they were asked to specify the name of the museum they had visited. Some respondents provided examples, including the Oman National Museum, The British Museum, Historical Museum Frankfurt, The Grand Egyptian Museum, and the Louvre Museum in France. These findings highlight that AI integration in museums is still relatively unfamiliar to the majority of respondents, emphasizing the potential for further adoption and awareness of AI-driven experiences in heritage and cultural institutions.

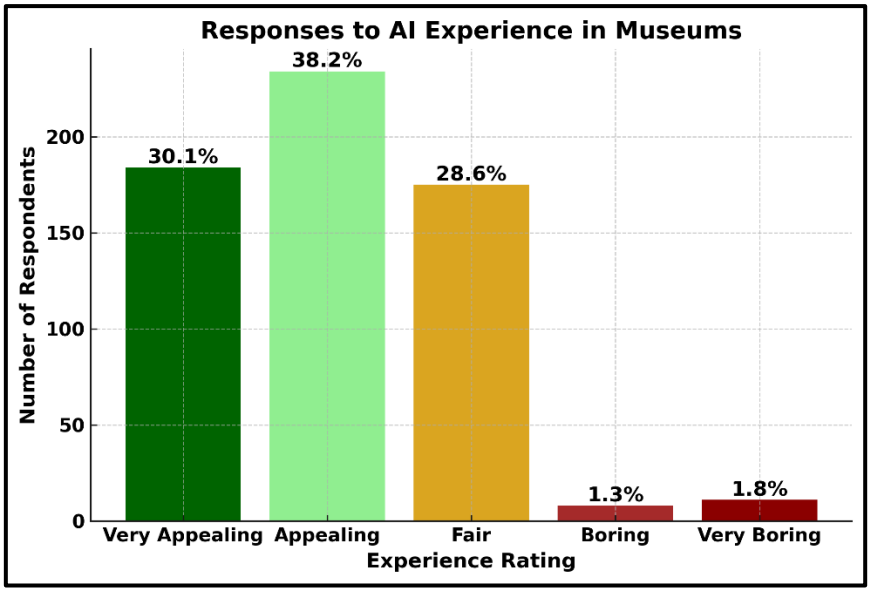

Figure 11. Perceptions of AI Experience in Museums

Analysis of Visitor Experience with AI-Enhanced Museums

Respondents who had previously visited AI-enhanced museums were also asked to evaluate their experience (Figure 12). The findings indicate that the majority perceived their interaction with AI technology positively. Specifically, 30.1% (n = 184) described the experience as *very appealing*, while 38.2% (n = 234) found it *appealing*. A considerable proportion, 28.6% (n = 175), rated their experience as *fair*, suggesting a moderate level of engagement. Conversely, only 1.3% (n = 8) found the experience *boring*, and an even smaller percentage, 1.8% (n = 11), considered it *very boring*.

These results suggest that AI applications in museums have the potential to significantly enhance visitor engagement through interactive and immersive storytelling. The combined 68.3% of respondents who rated their experience as appealing or very appealing, highlights the effectiveness of AI in enriching museum visits. However, the presence of neutral and negative responses indicate that the impact of AI-driven experiences may vary, depending on factors such as technological implementation, content relevance, and user expectations.

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Respondents were asked whether they would welcome the use of AI in generating talking statues inspired by the displayed artefacts in the museum (Figure 12). The findings in Figure 12 indicate a predominantly positive attitude toward this innovation. Specifically, 46.9% (n = 292) of respondents *agreed* with the idea, while 39.5% (n = 246) *strongly agreed*, demonstrating a high level of enthusiasm for AI-driven interactive exhibits. A smaller proportion, 6.3% (n = 39), rated their stance as *fair*, indicating neutrality. On the other hand, 4.7% (n = 29) *disagreed*, and only 1.0% (n = 6) *strongly disagreed*, reflecting minimal opposition to the concept. These results suggest that AI-powered talking statues have the strong potential to enhance museum experiences, offering visitors an engaging and educational way to interact with cultural heritage.

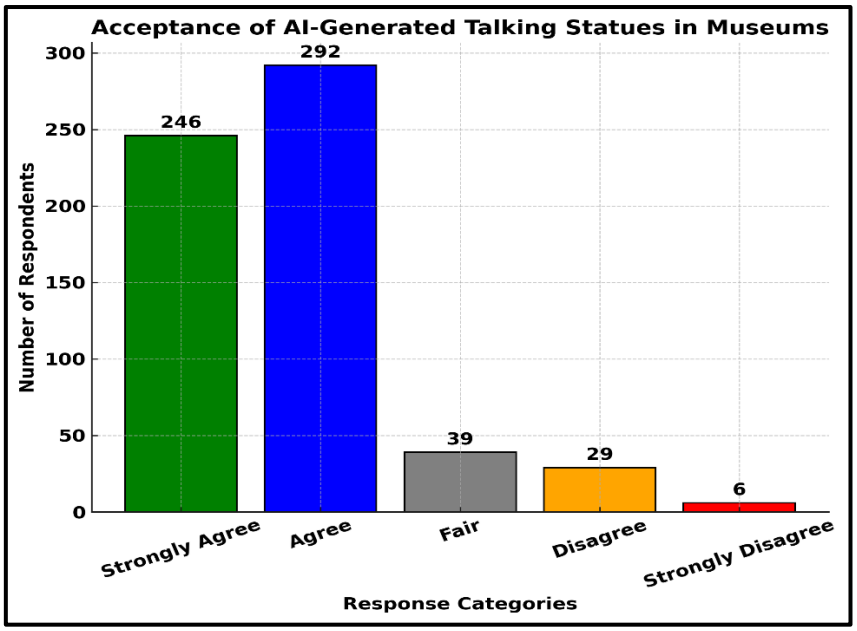

Figure 12. Acceptance of AI-Generated Talking Statues in Museums

In the context of the Græco-Roman Museum, respondents were asked which AI-generated character inspired by the statues on display, they would prefer. To ensure clarity, the question was introduced with relevant examples, allowing participants to choose from options such as Cleopatra VII, Emperor Augustus, one of the Greek philosophers, one of the Greek athletes, imaginary characters, or other historical figures of their choice. The objective was to explore visitor preferences regarding the integration of AI-designed characters in heritage and museum experiences. Their responses are summarized in Table 2.

Table (2) **Preferred AI-Generated Characters Inspired by Museum Statues**

If you choose a character designed with artificial intelligence inspired from the displayed statues inside the museum, which of the following characters do you prefer؟												
Characters	**Scale**											
	Strongly agree		**Agree**		**Fair**		**Disagree**		**Strongly disagree**		M	SD
	Freq	**%**	**Freq**	**%**	**Freq.**	**%**	**Freq**	**%**	**Freq**	**%**		
Cleopatra VII	289	47.2	221	36.1	68	11.1	25	4.1	9	1.5	4.24	0.91

Augustus	186	30.4	243	39.7	142	23.2	31	5.1	10	1.6	3.92	0.94
Imaginary characters	222	36.3	188	30.7	128	20.9	46	7.5	28	4.6	3.87	1.13
One of the Greek Philosophers	224	36.6	128	37.3	115	18.8	35	5.7	10	1.6	4.02	1.05
One of the Greek Athletes	185	30.3	207	33.8	153	25	47	7.7	20	3.3	3.80	1.06

Table 2 demonstrates that Cleopatra VII received the highest preference among participants, with the highest mean score (M = 4.24), indicating a strong inclination toward this character. The relatively low Standard Deviation (SD = 0.91) suggests a high level of agreement among respondents, reinforcing her strong cultural and historical appeal.

Augustus also gained a high preference (M = 3.92), although slightly lower than Cleopatra VII. The moderate SD (0.94) indicates some variation in responses, suggesting that while many participants favoured Augustus, there were some neutral or less enthusiastic responses.

The preference for *imaginary characters* was slightly lower (M = 3.87), showing that respondents were somewhat less inclined toward fictional figures compared to historical ones. The highest SD (1.13) in this category suggests greater variability in opinions, meaning some participants strongly preferred imaginary characters, while others were indifferent or opposed.

On the other hand, *Greek philosophers* ranked third in preference (M = 4.02), demonstrating a moderate level of interest. The SD (1.05) suggests a fair amount of variation, indicating that while many respondents appreciated this choice, there was still some disagreement.

In addition, *Greek athletes* received the lowest mean score (M = 3.80), showing the least preference among the options. The SD (1.06) indicates moderate variability, meaning opinions were relatively diverse.

The findings suggest that historical figures, especially those with strong cultural, symbolic, and historic significance, are preferred over imaginary or general figures. Cleopatra VII's high ranking highlights the potential for leveraging well-known historical characters in AI-driven museum experiences and marketing strategies for cultural tourism.

Moreover, the higher variability in preferences for imaginary characters and Greek figures, suggests that personalization or segmentation strategies may be required when designing AI-generated characters in heritage tourism applications.

A small percentage (10.1%, n=62) of the 612 respondents selected the "Other Characters" option, showing a diverse range of names that reflected their interests in history, mythology, and iconic figures. Among the suggested names were significant historical figures such as the Roman Emperor Constantine, and Dinocrates of Rhodes, who was known for planning the city of Alexandria. Additionally, legendary and philosophical figures such as Heracles, Hypatia, and Julius Caesar were mentioned, highlighting an interest in influential figures from ancient history.

Broader categories were also suggested, including *Divine & deified characters*, *Iconic people*, and *The kings of Ancient Egypt*, indicating the participants' fascination with famous figures who played pivotal roles in shaping civilizations and cultures.

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Some participants also included a modern fictional character, such as, *Loki* (from the Marvel film franchise), demonstrating the impact of contemporary and popular culture, and the expansion of the concept of iconic figures to include modern fictional characters with strong symbolic significance.

The diversity in choices suggests that participants are drawn to characters who embody power, leadership, intellectual influence, or cultural symbolism, whether they are historical, mythical, or even fictional. This reflects a broad spectrum of interests and perceptions of influential figures throughout history. Overall, this data provides valuable insights for museum curators, AI designers, and tourism marketers in enhancing visitor engagement through AI-driven storytelling and interactive exhibits.

Next, respondents were asked the following question, "*To what extent do you agree that AI-driven storytelling would encourage you to revisit the museum and deepen your appreciation for its historical narratives*?"

The results were distributed as follows: 30% strongly agreed, 45% agreed, 15% remained neutral, 7% disagreed, and 3% strongly disagreed. This indicates that a significant majority (75%) of respondents hold a positive perception of AI-driven storytelling (Figure 13). This supports the idea that interactive and evolving narratives can enhance visitor engagement and encourage repeat visits to the museum.

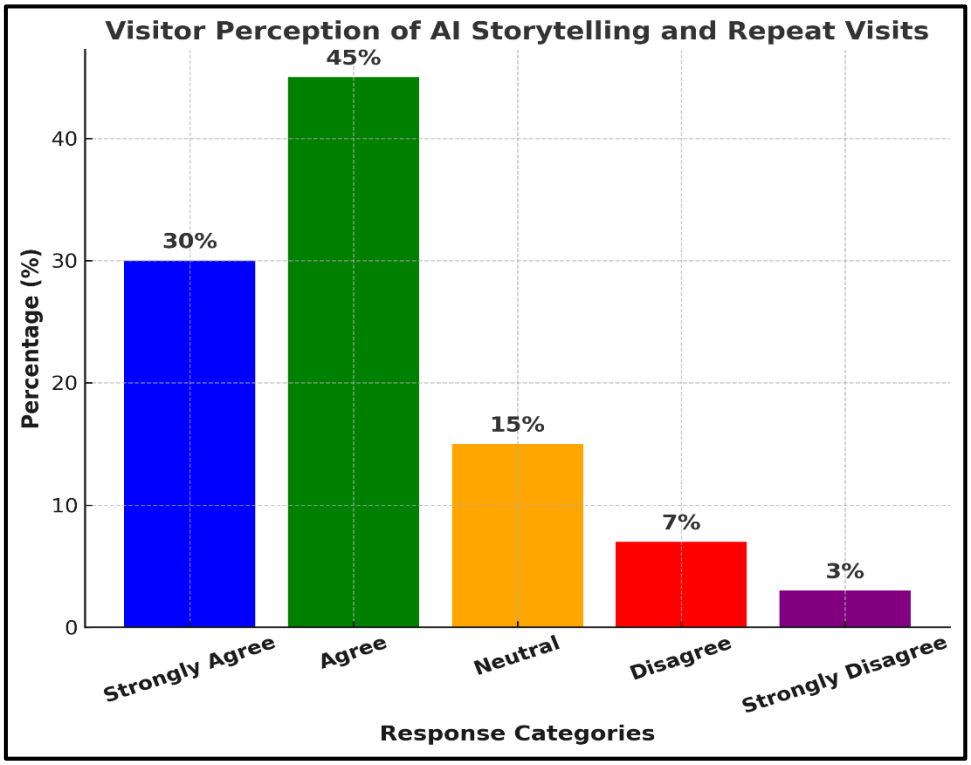

Figure 13. Visitor Perception of AI Storytelling and Repeat Visits

The 612 respondents were also asked the following question, *"Do you think that artificial intelligence can substitute the role of the tour guide inside the Græco-Roman Museum?"* This inquiry aimed to assess their perspectives on the role of AI in guiding visitors within the museum and evaluate their acceptance of this technology in comparison to the traditional experience provided by human tour guides.

The responses to this question as shown in Figure 14 reveal mixed opinions on replacing traditional tour guides with an alternative system in the Græco-Roman Museum. While 44.6%

of respondents (170 "Agree" and 103 "Strongly Agree") showed openness to the idea, a total of 39.3% (190 "Disagree" and 51 "Strongly Disagree") expressed uncertainty. Meanwhile, 16% (98 respondents) remained neutral, selecting "Fair." (Figure 14).

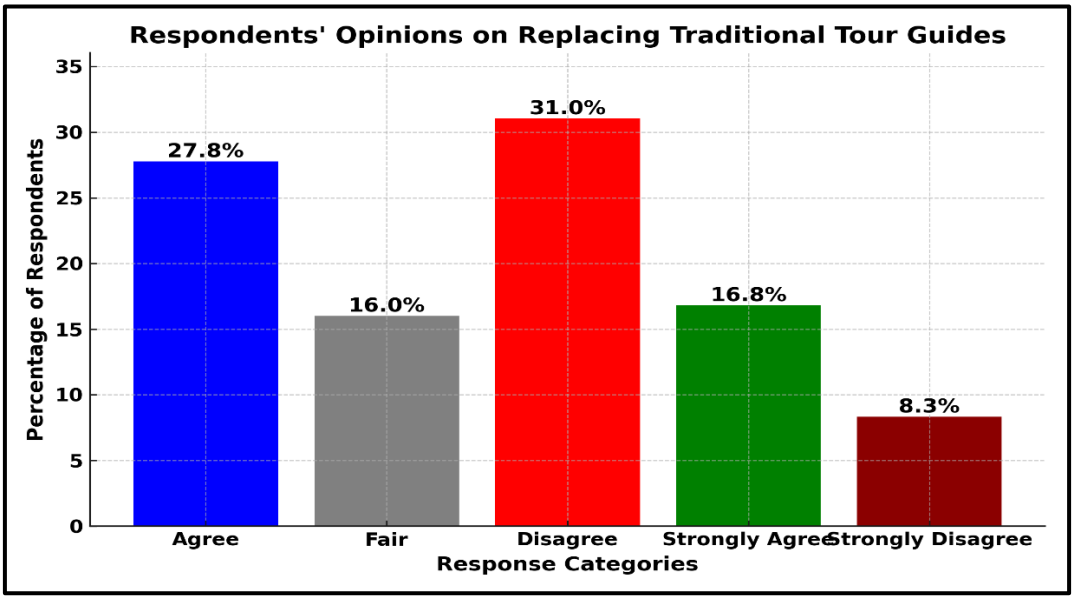

Figure 14. Respondents' Opinions on Replacing Tour Guides

This variation in opinions suggests that while some visitors see potential benefits in new guiding methods, others emphasize the importance of human interaction and storytelling in enhancing the museum experience.

When respondents were asked about their opinion on using AI-generated statues in mobile apps displaying museum content, their answers showed a range of perspectives (Figure 15).

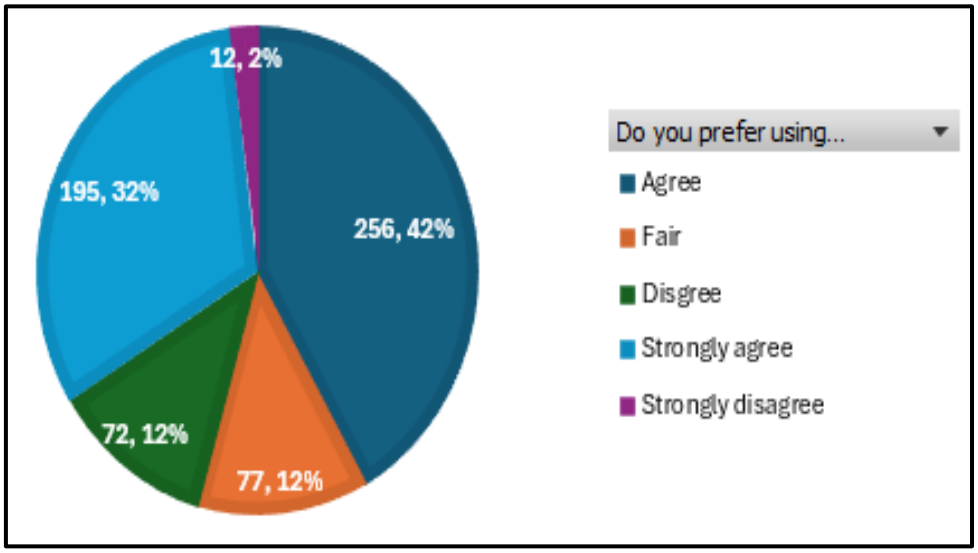

Figure 15. Respondents Opinion on AI-Generated Statues in Museum Apps

The results indicate a generally positive attitude toward the use of AI-generated statues in mobile applications displaying museum collections. A significant proportion of respondents expressed agreement, with 256 (41.8%) agreeing and 195 (31.9%) strongly agreeing, highlighting a strong acceptance of this technological integration.

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Meanwhile, 77 (12.6%) respondents rated their opinion as fair, suggesting a neutral stance, possibly due to uncertainties about the effectiveness or authenticity of AI-generated representations. On the other hand, 72 (11.8%) disagreed, and a small minority of 12 (2.0%) strongly disagreed, indicating some resistance, which may stem from concerns about the accuracy or cultural implications of AI-generated artifacts.

Overall, the data reflects a high level of approval for AI-generated statues in museum applications, with more than 75% of respondents (n=451) expressing positive support. This suggests that technological advancements in heritage presentation are well-received by the majority.

DISCUSSION

This research aimed to provide a better understanding of the effectiveness of AI-driven storytelling in the Græco-Roman Museum of Alexandria, and its role in promoting cultural heritage. Furthermore, the research examined how AI-storytelling can influence museum visit experience and its effectiveness in encouraging repeat visits. Based on the findings, the study proposed several hypotheses regarding the role of AI-driven storytelling in enhancing the museum experience. The following discussion evaluates these hypotheses based on the survey results:

Enhancing visitor engagement, comprehension, and emotional connection

The survey results strongly support this hypothesis, as most respondents expressed a positive attitude toward AI-generated storytelling in museum applications. A total of 73.7% (n=451) of participants agreed or strongly agreed to the integration of AI-generated statues, which is evidence that this approach enhances visitor interaction. Respondents, mentioned that AI-driven storytelling scenarios create an immersive atmosphere, making historical characters more relatable and engaging. This aligns with previous research by Afshar et al. (2024) and Hettmann et al. (2023) highlighting that digital storytelling can significantly improve museum engagement by offering interactive and personalized experiences.

Increasing the likelihood of repeated visits and fosters deeper appreciation

A significant portion of respondents noted that AI-enhanced storytelling would encourage them to revisit the museum. Those who expressed enthusiasm about AI-generated characters emphasized how interactive experiences make historical narratives more compelling. The ability of AI to present dynamic, evolving narratives means that visitors may discover new aspects of the exhibits with each visit. The findings align with recent studies on museum technology by Hettmann et al. (2023) and Abd El-Wareth (2024), who suggest that digital enhancements can increase visitor retention and overall appreciation for cultural heritage.

Improving understanding of historical contexts and value of the objects

The survey findings reveal that respondents believe AI-generated storytelling enhances comprehension of historical artifacts. The interactive nature of AI-driven storytelling allows for deeper exploration of the historical context behind objects, making information more accessible to different audiences. Several participants stated that they would feel more connected to the artefacts if AI provided detailed narratives, reinforcing the idea that digital storytelling serves as an effective educational tool in museums.

AI storytelling creates dynamic, personalized, and memorable experiences

The results also validate the hypothesis that AI storytelling contributes to a more interactive and memorable museum visit. The analysis confirms that AI storytelling enhances museum engagement, as evident from respondents who had previously visited AI-enhanced museums. The ability of AI to tailor storytelling based on visitor preferences ensures a unique experience for everyone. This aligns with previous research (Afshar et al., 2024) indicating that digital

personalization significantly enhances cultural heritage experiences, making them more appealing to both casual visitors and history enthusiasts.

SWOT Analysis:

The possible advantages and challenges associated with integrating AI-driven storytelling scenarios at the Græco-Roman Museum are discussed through the following SWOT analysis.

Strength:

- *Improving Visitor Experience:* the use of AI in storytelling facilitates the creation of personalized and interactive experiences for museum visitors. The previously discussed initiatives are designed to generate interactive Chatbots that take the shape of displayed statues in the museum, which could strengthen the bond between visitors and the artifacts on display.
- *Improving Accessibility for Museum Visitors:* applying AI technology provides a good chance to customize experiences for a wide range of audiences, particularly those with disabilities. By offering tailored narratives through Chatbots in the guise of displayed statues in the museum, can significantly enhance accessibility for all visitors.*Innovative Interpretation*: Historical narratives of the artifacts in the Græco-Roman Museum could be recreated through AI technology; thus, the use of AI will provide a more immersive and interactive visiting experience. AI technology could facilitate the engagement of Gen Z visitors, who prefer more animated and interactive cultural experiences.

Weakness:

- *Significant Implementation Expense:* Integrating AI into a museum setting is indisputably costly. This includes expenses for software development, purchasing hardware, and continuous maintenance, which can really strain a museum's budget.
- *Reliance on Technology:* a complete dependence on AI may lead to a decrease in human engagement. The Græco-Roman Museum has mainly depended on skilled museum staff and experts since its inauguration, for the interpretation of its collection. Thus, focusing solemnly on automation might actually weaken the human side of the museum.
- *Data Privacy:* Collecting visitor data to enhance personalized experiences can raise privacy concerns. Like other museums in Egypt, the Græco-Roman Museum must follow data protection laws. This point should be considered by technology experts when developing AI-generated narratives.

Opportunities:

- *Collaboration with Technology companies:* Working with technology companies, facilitates easy access to advanced AI technology in the field of cultural heritage. The partnership between Meta and Egyptian museums is a clear example of this co-operation. Both the Egyptian Museum in Cairo and Bibliotheca Alexandria, present a promising example when applying digital technology in their display scenarios (Abd El-Wareth 2024).
- *Educational Initiatives:* involving AI-generated storytelling into educational programs can provide schools with innovative and attractive educational methods for teaching history and culture. This approach may attract more visitors, particularly school groups, to the Græco-Roman Museum.
- Using AI for digital narratives allows museums to reach out to audiences who cannot visit in person. Through virtual tours, supported by AI, museums can really expand their value and impact on a local community level, and globally.

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Challenges:

- *Technological Obsolescence:* The rapid development of technology may require existing systems to be updated periodically, which means that museums and institution need to keep upgrading their technologies and training for their staff.
- Designers of AI-Generated storytelling scenarios might not achieve the balance between interactivity and narrativity through the interconnection between of the characters and the plot.
- *Cultural Sensitivity Concerns:* The potential for misinterpretation of the artifacts in the museums is one of the real concerns of heritage experts and stakeholders.
- *Competition from Alternative Attractions:* As additional museums integrate advanced technologies; the Græco-Roman Museum must continually innovate to maintain its competitive edge facing other cultural institutions that provide comparable or enhanced experiences.

Conclusion and Recommendations

The findings of this study demonstrate how museums can use AI-generated storytelling to engage visitors, provide a deeper understanding of history, and create interest in repeat visits. Although, AI-generated storytelling offers exciting possibilities for heritage preservation and education, it is important to strike a balance by using the powers of technology while preserving the authenticity of the artifacts and their expectations of visitors.

Aiming to enhance the experience of AI-driven storytelling in museums, the following recommendations are proposed:

- Develop a variety of different AI storytelling approaches that are suitable for different types of museum visitors, ensuring accessibility and relevance for a variety of audiences.
- Increase interactivity by utilizing voice recognition and gesture driven controls to enhance immersion.
- Increase historical accuracy by co-operating with historians, archaeologists, and museum professionals to substantiate AI storytelling.
- Customizing the storytelling experience on personal visitor preferences; users may select the theme, or the level of detail in the story.
- Further sustain dynamic experiences by frequently updating AI-generated content; a record of changes will help increase the likelihood of return visits.
- Evaluate and analyze visitor feedback to develop further AI storytelling strategies that adjust to the audience.

These recommendations will help museums effectively use AI-generated storytelling while preserving the integrity and educational value of historical narratives. The application of AI technology in museum storytelling offers both significant opportunities and notable challenges, particularly for the Græco-Roman Museum which was recently reinaugurated. The rapid development of AI, and its integration into museum storytelling offers promising opportunities to revolutionize cultural heritage interpretation and visitor engagement within this significant museum in Egypt.

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دع التماثيل تتحدث: تطبيق سيناريوهات السرد القصصي باستخدام الذكاء الاصطناعي في المتحف اليوناني الروماني بالإسكندرية

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الملخص

يُعد السرد القصصي بلا شك وسيلة رائجة وفعالة في الكشف عن قيمة القطع المعروضة في المتاحف. ومع التطور المستمر لتقنيات الواقع الافتراضي، فإن استخدام تقنيات الذكاء الاصطناعي في السرد القصصي سيوفر للزائر تجربة فريدة أثناء زيارته. ولا شك أن تقنية الذكاء الاصطناعي أصبحت وسيلة مبتكرة في مجال المتاحف. ومع إعادة افتتاح المتحف اليوناني الروماني بالإسكندرية مؤخرًا، فإن تطبيق السرد القصصي المصممة بالذكاء الاصطناعي في هذا المتحف سيكون وسيلة مبتكرة لخلق اتجاه إيجابي نحو التراث الثقافي لمدينة الإسكندرية والترويج لتراثها.

يهدف هذا البحث إلى تقديم فهم أعمق لمدى فعالية السرد القصصي بالذكاء الاصطناعي في المتحف اليوناني الروماني بالإسكندرية ودوره في الترويج للتراث الثقافي للمدينة. علاوة على ذلك، يتناول البحث دور السرد القصصي بالذكاء الاصطناعي في تجربة زيارة المتحف ومدى فعاليته في زيادة احتمالية تكرار الزيارة. كما سيعرض البحث سيناريوهات متنوعة للسرد القصصي بالذكاء الاصطناعي مرتبطة بالموضوعات الرئيسية للمتحف.

بيانات المقال

تاريخ المقال

تم الاستلام في ١٤ أبريل ٢٠٢٥

تم استلام النسخة المنقحة في ٢٤ يونيو ٢٠٢٥

تم قبول البحث في ٢٠ يوليو ٢٠٢٥

متاح على الإنترنت في ١٣ سبتمبر ٢٠٢٥

الكلمات الدالة

الذكاء الاصطناعي – السرد القصصي – التماثيل – المتحف اليوناني الروماني – الإسكندرية