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TRANSFORMING MUSEUM EXPERIENCES WITH HISTORICAL FIGURE CHATBOTS: A CASE STUDY OF THE NIKOLA TESLA CHATBOT

Summary

The integration of artificial intelligence into cultural institutions is reshaping visitor engagement with heritage. This paper presents a case study of the Nikola Tesla Chatbot, the world's first historical figure chatbot in a museum context, introduced at the Museum of Science and Technology in Belgrade. Unlike generic conversational agents, it is based on Tesla's biography and designed to reflect the linguistic styles of his time, offering visitors an authentic and educational interaction with the scientist. The study explores the pedagogical and experiential value of such chatbots, emphasizing their ability to enhance learning, spark engagement, and simplify complex scientific ideas for diverse audiences. A survey of 306 adult visitors at the Nikola Tesla Museum in Belgrade was analyzed descriptively, focusing on interactivity, educational impact, and satisfaction. Results show that the chatbot enriches the visitor experience while positioning itself as a novel digital museology tool that bridges heritage preservation with interactive education.

Key words: digital museology, artificial intelligence, cultural heritage, interactive education, cultural informatics.

INTRODUCTION

In the contemporary digital age, museums are increasingly turning to innovative solutions to meet the challenges posed by new generations of visitors and to elevate the level of interaction with cultural heritage. Digital museology signifies a novel phase in the evolution of museum practices, predicated on the integration of information technologies into the interpretation, presentation, and preservation of cultural heritage (Guboglo, 2020). Digital museology diverges from traditional museology, which prioritizes physical exhibits and exhibition spaces (Qi et al., 2024). Rather, it aims to facilitate expanded, interactive, and personalized communication with visitors through digital media. In this context, digital tools become instruments that enable museums to both preserve cultural heritage and adapt it to the needs and expectations of contemporary society.

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A particularly noteworthy approach involves the incorporation of historical figures into the form of chatbots, which meld artificial intelligence with educational and cultural content. These digital interpretive tools facilitate engagement with "revived" historical figures, thereby creating an authentic experience that surpasses the limitations of conventional exhibition formats. Consequently, museums are no longer regarded as static institutions; rather, they are now understood as dynamic spaces that facilitate connections between generations, cultures, and scientific disciplines through technological integration. Digital museology, therefore, is not merely a matter of modernization but a new vision of the museum's role in the digital age (Boiano et al., 2018).

Such chatbots hold particular value in merging educational and interactive dimensions: they not only convey knowledge in an engaging and accessible way but also encourage curiosity and critical thinking. Concurrently, these initiatives position museums as contemporary spaces conducive to learning, innovation, and dialogue between the past and the present. The paper demonstrates how the Nikola Tesla Chatbot can be situated within the broader context of digital museology and cultural informatics, highlighting its potential to transform visitor experience and contribute to the modernization of museum practices.

DIGITAL MUSEOLOGY – INTERACTIVE MEDIA AND VISITOR ENGAGEMENT

Digital museology is a contemporary approach in museum practice that redefines the traditional relationship between museums and visitors. It transforms museum spaces into dynamic and interactive knowledge environments. The implementation of digital technologies, interactive displays, multimedia guides, and digital archives, is instrumental in facilitating visitor engagement. These technologies enable active participation in the learning and exploratory process, thereby enhancing the visitor experience. This transformation of museums from static repositories of cultural artifacts into spaces of interactive engagement not only increases the accessibility of information but also enriches visitor experience through multimedia narratives that connect historical, artistic, and scientific content with contemporary contexts (Alabau et al., 2024).

Within the domain of digital museology, interactive media assumes a pivotal role in motivating visitors to engage, explore, and reflect on the exhibited content. Through technologies such as touchscreens, simulations, gamification, and interactive applications, visitors are encouraged to actively engage, enhancing both their cognitive and emotional involvement. Visitors are no longer merely passive consumers of information; rather, they become co-creators of meaning through interaction with exhibits and digital narratives (Xia, Wang & Xue, 2024). The efficacy of this approach in facilitating a more profound comprehension of the material presented, enhancing memory and analytical skills, and empowering the museum to communicate with a more extensive audience, including younger generations that are well-versed in digital media and instantaneous access to information, has been demonstrated.

In the contemporary museum setting, the integration of digital and interactive media not only enhances audience engagement but also facilitates a high degree of personalization in museum experiences. Technologies capable of tracking user preferences, behavior, and interactions can generate customized tours, content recommendations, or even interactive quizzes based on prior knowledge and interests. This approach is designed to provide a customized learning and exploration experience, making museum content accessible to a broader range of visitors, including those with specific educational or sensory requirements. Interactivity has been shown to enhance experience and democratize access to cultural and scientific knowledge. It has been demonstrated that this quality reduces the barriers often present in traditional museum formats (Qi et al., 2024).

Digital museology, in conjunction with interactive media, enables museums to function as conduits between the past and contemporary society. These museums not only serve as repositories for cultural and historical heritage but also function as catalysts for the development of novel forms of communication and engagement. Engagement with digital media has been demonstrated to foster critical thinking, creativity, and the ability to connect different contexts. This, in turn, contributes to the educational and cultural mission of museums. In the contemporary epoch, characterized by the proliferation of digital experiences, museums that incorporate interactive media into their exhibits have demonstrated a remarkable capacity to maintain relevance, attract a diverse audience base, and proactively influence societal perceptions of cultural and scientific heritage.

CHATBOTS IN CULTURAL INSTITUTIONS: ENGAGING HISTORY THROUGH DIGITAL PERSONAS

The integration of chatbot technologies into cultural institutions signifies a substantial evolution in the methods by which museums, galleries, and heritage sites interact with their audiences. Chatbots, which are powered by artificial intelligence and natural language processing, offer a unique opportunity to create personalized, real-time interactions that extend beyond static displays and traditional guided tours. The integration of chatbots within institutions has been demonstrated to enhance accessibility and interactivity by delivering instantaneous responses to visitor inquiries, offering contextual explanations, and enabling exploration through exhibits. This integration enables institutions to engage diverse audiences with varying levels of prior knowledge. The adaptability of museums has enabled them to extend their educational offerings beyond the physical institution's walls through the utilization of online platforms, thereby reaching remote audiences (Gaia, Boiano & Borda, 2019).

A particularly innovative application of chatbot technology lies in the creation of historical figure chatbots, digital personas that simulate the voice, knowledge, and personality of renowned individuals from the past. These chatbots are designed to provide historically accurate information, often employing primary sources, letters, and documented speech patterns to ensure authenticity. Engaging with a historical figure enables visitors

to experience a form of time travel that engages both their emotions and cognitive faculties, thereby creating a memorable learning experience that traditional methods are unable to replicate. The distinguishing characteristic of these AI-driven entities is their ability to provide narratives, anecdotes, and personal perspectives, which facilitates a more profound connection between the audience and the historical content. This distinguishes them from conventional informational bots. (Nafis, Yahyaouy & Aghoutane, 2021).

The distinguishing characteristic of chatbots that are based on historical figures is their dual role as both educators and performers. It is imperative that they strike a balance between factual accuracy and engaging storytelling, while maintaining historical integrity and responding naturally to a wide array of visitor queries (Nafis, Yahyaouy & Aghoutane, 2021). The development of such chatbots necessitates interdisciplinary collaboration, integrating expertise from multiple fields, including history, linguistics, AI programming, and user experience design. This methodological approach is conceived to guarantee that the interactions persist in their capacity to be immersive, informative, and credible. Chatbots have the capacity to address diverse learning styles by providing explanations through conversation, visual aids, and interactive prompts. This renders history tangible and relevant to contemporary audiences.

Furthermore, the integration of historical figure chatbots presents both opportunities for critical reflection and ethical consideration. Museums must exercise meticulous curation in their presentation of content, as these bots have the potential to influence visitors' perceptions of historical events and figures. Decisions regarding the perspectives to include the handling of controversial topics, and the degree of personalization offered to users require careful planning. Notwithstanding the aforementioned challenges, the implementation of chatbots depicting historical figures has exhibited considerable success in enhancing visitor engagement, cultivating curiosity, and fostering a more profound comprehension of intricate historical narratives (Gaia, Boiano & Borda, 2019).

The application of chatbot technology in cultural institutions, particularly through the creation of historical figure chatbots, represents a transformative approach to public history. Integrating elements of interactivity and technology alongside educational content allows these digital tools to redefine museum experiences by making history more accessible, engaging, and emotionally resonant for contemporary audiences. As technology continues to advance, the potential for more sophisticated and interactive historical chatbots will further expand the role of museums as centers of both knowledge and innovation.

NIKOLA TESLA AI PROJECT

The Tesla chatbot is a distinctive digital replica of Nikola Tesla, distinguishing itself from generic generative models and commercial imitations inspired by famous figures. The content has been meticulously structured to mirror historical and linguistic precision, articulating the discourse

as if it were Tesla himself expressing himself in the first-person singular. The vocabulary, syntax, and tone of the text reproduce the cultural norms of the late 19th and early 20th centuries, purposefully avoiding modern expressions to preserve authenticity (Škobo & Šović, 2025).

A salient innovation is its multilingual adaptability: the chatbot communicates in Serbian, English, German, and French. In Serbian, it exclusively utilizes the Cyrillic script and the Ijekavian dialect, which is characteristic of the Military Frontier. In German, it reflects the refined style of an educated speaker of the Habsburg monarchy. In French, it provides simple yet accurate responses, indicative of Tesla's actual intermediate (B2) proficiency. It is noteworthy that when confronted with content that extends beyond its designated French scope, the bot concedes its limitations rather than resorting to improvisation. Despite the contemporary nature of current English outputs, refinements are underway to align them with Tesla's historical style. The behavior of the bot is governed by the parameters of the historical context; it does not respond to inquiries pertaining to events, technologies, or concepts that came into existence subsequent to 1943, the year of Tesla's demise. The temporal limitation is strictly enforced to preserve chronological accuracy and to prevent the intrusion of contemporary interpretations (Škobo & Šović, 2025).

The utilization of chatbots in museums and educational settings, exemplified by those developed by institutions such as the Smithsonian or the London Science Museum, does not generally entail the emulation of particular historical figures. Instead, they adopt the role of curators or guides. The Tesla bot is a notable exception, as it supports multiple languages, is accessible outside of the institution's premises, and maintains a consistent personal style, identity, and historical fidelity.

A notable benefit of this chatbot also is that its prompt was meticulously designed by an expert with proficiency in history, linguistics, pedagogy, and artificial intelligence. This design ensures that the prompt is not a generic one. It is noteworthy for its exceptional engineering, which is exemplary within the context of its era. In terms of clarity, behavioral control, structure, role definition, and multilingual management, it would be classified as one of the top 10% in comparison to industry standards (Škobo & Šović, 2025). The prompt delineates the parameters within which Tesla's identity, capabilities, and responses are to be situated. The manner in which he should approach political inquiries and contemporary scientific concepts is thereby determined. The stylistic and register choices he is to employ are also determined, and these are based on the linguistic nuances of the inquiry. The hierarchy of sources he is to prioritize is also determined.

A series of enhancements are currently under development. Subsequent steps in this project entail training the bot to replicate Tesla's distinctive style of writing in English. This will be based on Tesla's letters, interviews, and autobiography. The viability of this approach is yet to be determined. A comparable approach has previously been implemented in research involving the Nušić chatbot, which was trained to write in the style of Branislav Nušić (also known as Serbian Mark Twain) and to emu-

late his humor. Four passages were generated by the chatbot and subsequently compared with four authentic excerpts from Nušić's lesser-known works. The evaluation process entailed the participation of 50 teachers and professors of Serbian as a foreign language, who were tasked with identifying which passages were authored by Nušić and which were generated by the bot. The accuracy of the responses was found to be satisfactory, with a mere 50% of the responses being correct, thereby suggesting that the stylistic simulation was highly convincing (Škobo & Šović, 2025). This experience will lay the foundation for training the Tesla chatbot to replicate Tesla's own writing style in English.

The creation of a voice version of the bot is pending the completion of meticulous research into the accentological and dialectal characteristics of Tesla's Serbian speech and its foreign language pronunciations. The incorporation of a Nikola Tesla hologram is being contemplated as a component of prospective enhancements.

Another enhancement that has been meticulously planned is the bot's capacity to adapt its responses to the user's level of expertise. The system will be capable of differentiating between individuals with varying degrees of expertise, ranging from novices to specialists. It will be able to adapt the intricacy of the language, the duration of the response, and the extent of the explanation based on these distinctions.

When all these characteristics are considered, the Tesla chatbot stands out as a historically consistent, linguistically sensitive, document-based, and pedagogically applicable tool. The entity in question has a clearly defined role, strict behavioral rules, a structured hierarchy of information access, and well-developed fallback scenarios. In the event that a question falls outside its domain, it provides a clear and precise response without improvisation. In essence, the Tesla chatbot does not merely replicate a historical figure; rather, it serves as a paradigm of how contemporary technologies can be utilized to safeguard cultural heritage and enhance educational endeavors.

In the ensuing phase, there is a plan to develop supplementary digital twin chatbots based on prominent historical figures. Each chatbot will undergo rigorous training to replicate the style, language, and content of a specific individual with precision. The process will rely exclusively on verified sources, including letters, published works, speeches, and archival materials, as successfully implemented in the Tesla and Nušić projects. These types of chatbots have the potential to be applied in educational institutions, such as schools and universities, as interactive educational tools. Additionally, they can be utilized in museums as part of digital exhibitions. Furthermore, these chatbots can be employed in libraries, cultural centers, and other similar institutions.

A substantial proportion of extant educational and cultural digital instruments offer content that is superficial, generalized, or historically inaccurate, frequently derived from unverified sources. The Tesla chatbot addresses this issue by facilitating interactive communication with a digitally authenticated twin, constructed exclusively on the basis of verified documents and Tesla's authentic linguistic style. This initiative fosters en-

gagement in simulated, authentic dialogue, thereby enhancing the comprehension of scientific and cultural heritage among students, educators, and museum visitors.

RESEARCH METHODOLOGY

The aim of this study is to examine the impact of the Tesla Chatbot on museum visitors' experiences, with a focus on user satisfaction, interactivity, educational value, and audience engagement. The overarching objective of the research is to ascertain whether the implementation of the Tesla Chatbot will result in a substantial enhancement of visitor satisfaction, which may, in turn, exert an indirect influence on the volume of museum attendance.

The prevailing hypothesis is as follows: The utilization of the Tesla Chatbot has a substantial impact on enhancing visitor satisfaction, thereby contributing to an increase in museum attendance.

Specific hypotheses are as follows:

- H1: Visitors of the museum perceive the Tesla Chatbot as accurate, relevant, easy to use, and free of technical difficulties.
- H2: Visitors to the museum perceive the Tesla Chatbot to be an interactive tool that deepens their understanding of the inventor's work and encourages further interest in his legacy.
- H3: The implementation of the Tesla Chatbot has been demonstrated to enhance the museum experience, extend visitors' stay and foster their loyalty and recommendations.
- H4: Enhancing the functionality of the Tesla Chatbot through voice, multimedia, and visual options increases visitor interactivity and engagement.
- H5: Museum visitors have expressed a strong conviction that chatbots should become a standard component of interactive content.

The data collection process involved the implementation of a quantitative survey method, which examined a total of 306 adult museum visitors. The questionnaire was designed to assess various dimensions, including interactivity, educational impact, visitor satisfaction, technical functionality, and users' perception of the chatbot's significance for museum content.

For the purposes of this study, a structured questionnaire was employed to examine visitors' perceptions of the Tesla Chatbot at the Museum of Science and Technology in Belgrade, as well as their level of interaction with this digital tool originally created by created by the study's authors. The questionnaire was composed of two primary sections. The initial section inquired about the respondents' socio-demographic characteristics, while the subsequent section focused on the users' attitudes, experiences, and perceptions concerning the utilization of the chatbot.

The initial section of the questionnaire encompassed inquiries pertaining to the respondents' gender, age, and educational attainment. These inquiries facilitated the comprehension of the fundamental demographic parameters of the sample, a prerequisite for the interpretation of results

and the identification of potential patterns in chatbot perception among diverse visitor groups. The questions were of a closed-ended nature, with predefined response categories, thereby facilitating quantitative analysis.

The second part of the questionnaire contained 22 statements that respondents evaluated using a five-point Likert scale, where 1 represented "strongly disagree" and 5 represented "strongly agree." The objective of this section was to assess various dimensions of chatbot utilization, including the perception of information accuracy and relevance (H1), the ease of use and the absence of technical difficulties (H1), interactivity and educational impact (H2), as well as the effect on visitor satisfaction, the extended time spent in the museum, and visitor loyalty (H3). Furthermore, the questionnaire investigated participants' perspectives on the potential enhancement of the chatbot's functionality through voice, multimedia, and visual options (H4), as well as their attitudes towards the potential standardization of chatbots in other museums (H5).

RESULTS

A total of 306 respondents participated in the study, completing the questionnaire after interacting with the Tesla Chatbot at the Museum of Science and Technology in Belgrade. A subsequent analysis of gender distribution revealed that 162 respondents (52.9%) identified as female, while 144 respondents (47.1%) identified as male. This distribution enables a balanced understanding of the perception of the chatbot from both gender perspectives and provides a representative basis for analyzing visitor attitudes and experiences.

With respect to age distribution, the largest group of visitors fell within the 20-35 age range, constituting 41.8% of the total sample size. The second-largest group was between the ages of 36 and 50, with 92 respondents (30.1%), while the third-largest group was between the ages of 12 and 19, with 38 participants (12.4%). The study's sample included 31 respondents in the 51–65 age group and 17 respondents in the over 65 age group, constituting 10.1% and 5.6% of the total sample, respectively. This distribution of age groups indicates that the population is predominantly composed of younger and middle-aged adults, a fact that is significant for the analysis of interactive and digital engagement.

Regarding educational attainment, the majority of respondents possessed degrees from post-secondary institutions. Specifically, 162 respondents (52.9%) had completed a Bachelor's degree, while 74 respondents (24.2%) held a Master's or PhD degree. The remaining 70 respondents (22.9%) had completed secondary education, which includes primary and high school. This educational structure enables the assessment of visitors' attitudes and experiences with the Tesla Chatbot in the context of varying educational levels, as individuals with higher levels of education may interpret the educational and interactive content differently.

To assess visitors' familiarity with artificial intelligence, prior use of AI tools, and experiences with chatbots in cultural institutions, respondents rated their agreement with a series of statements on a five-point Lik-

ert scale (1 – Strongly disagree, 2 – Somewhat disagree, 3 – Neutral, 4 – Somewhat agree, 5 – Strongly agree). The results, presented in Table 1, indicate that the majority of participants were familiar with AI concepts, had used AI tools in daily life, and found the Tesla Chatbot to be accurate, relevant, and technically easy to use during their museum visit. Negative responses were minimal, suggesting a generally positive perception of the chatbot's functionality and user experience.

Table 1. *Respondents' Perception of AI and Tesla Chatbot (statements 1-6)*

Statement	1 – Strongly disagree	2 – Somewhat disagree	3 – Neutral	4 – Somewhat agree	5 – Strongly agree	Mean
1. I am familiar with the basic principles of artificial intelligence.	5 (1.6%)	12 (3.9%)	35 (11.4%)	128 (41.8%)	126 (41.2%)	4.2
2. I use artificial intelligence tools in my daily life.	4 (1.3%)	15 (4.9%)	40 (13.1%)	130 (42.5%)	117 (38.2%)	4.1
3. I have used chatbots in museums or other cultural institutions.	6 (2.0%)	18 (5.9%)	50 (16.3%)	135 (44.1%)	97 (31.7%)	3.9
4. The Tesla Chatbot provided accurate, relevant, and useful responses.	2 (0.7%)	5 (1.6%)	22 (7.2%)	128 (41.8%)	149 (48.7%)	4.4
5. The Tesla Chatbot was easy to use during my museum visit.	3 (1.0%)	6 (2.0%)	18 (5.9%)	120 (39.2%)	159 (52.0%)	4.4
6. I experienced no technical difficulties while using the Tesla Chatbot.	4 (1.3%)	8 (2.6%)	20 (6.5%)	125 (40.8%)	149 (48.7%)	4.3

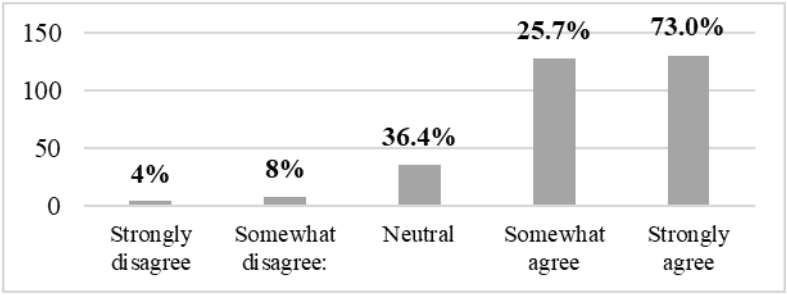
The mean scores from Table 1 indicate a very positive attitude among respondents toward the Tesla Chatbot and their interaction with artificial intelligence. Statement 1, concerning the respondents' familiarity with the fundamental principles of artificial intelligence, received an average score of 4.2, indicating a predominant level of agreement among respondents regarding the AI fundamentals. Very few respondents expressed disagreement or neutrality.

A similar trend is observed for the use of AI tools in daily life (Statement 2), with a mean score of 4.1, indicating that a significant portion of respondents are actively engaged with digital technologies and AI, which may facilitate their interaction with the chatbot in the museum. With respect to the utilization of chatbots in museums and other cultural institutions previously (Statement 3), the mean score is marginally lower at 3.9, indicating that museum chatbots remain a relatively novel concept for many visitors.

Scores pertaining to the Tesla Chatbot itself (Statements 4–6) are even higher, ranging from 4.3 to 4.4. This finding suggests that the respondents found the chatbot to be accurate, relevant, and user-friendly, with minimal technical challenges. It is noteworthy that the chatbot interface received high ratings for ease of use and the absence of technical issues, indicating that it is intuitively designed and accessible to a broad spectrum of visitors.

The subsequent chart illustrates the percentage distribution of respondents' responses to the seventh statement: *Using the Tesla Chatbot made my museum experience more interactive* (Graph 1).

Figure 1. *Respondents' views on using the Tesla chatbot to enhance museum interactivity*



The distribution of responses to the seventh statement demonstrates a strongly positive perception among visitors. The majority of respondents expressed a favorable response to the statement, with 41.8% selecting "Somewhat agree" and 42.5% selecting "Strongly agree." These results indicate that the chatbot effectively enhanced the interactivity of the museum experience. A mere fraction of respondents expressed disagreement, with 1.3% strongly disagreeing and 2.6% somewhat disagreeing. Meanwhile, 11.8% maintained a neutral stance. The findings indicate that the Tesla Chatbot is perceived as a highly engaging tool that effectively transforms the conventional museum visit into a more interactive and immersive experience. The substantial proportion of favorable responses lends credence to the hypothesis that the chatbot enhances visitor engagement and enriches the overall museum experience.

Table 2. *Descriptive statistics for responses to seventh statement*

Measure	**Value**
Mean	4.27
Median	5
Mode	5
Standard Deviation (SD)	0.86

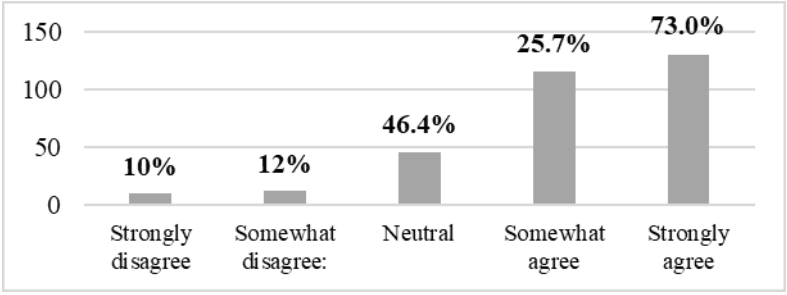
The statistical measures for the seventh statement clearly indicate a strong positive response from visitors. The mean score of 4.27 indicates that, on average, respondents agreed that the chatbot enhanced interactivity. The median and mode are both equal to 5 (Strongly agree), indicating

that a considerable proportion of visitors selected the highest rating, thereby underscoring pervasive enthusiasm. The relatively low standard deviation of 0.86 indicates that responses were predominantly concentrated at the higher end of the scale, suggesting a general consensus among participants that the Tesla Chatbot effectively enhanced the museum experience, making it more engaging and interactive.

In response to the statement, "Interacting with the Tesla Chatbot enhanced my understanding of Tesla's inventions," the majority of respondents reported a positive impact of the chatbot on their comprehension. The results of the survey indicate that 45% of the participants selected the option of "Strongly agree," while 40% selected "Somewhat agree." These results suggest that interaction with the chatbot effectively deepened the participants' understanding of the inventor's work. A smaller proportion of respondents, approximately 10%, maintained a neutral stance, indicating a moderate effect for this demographic. A negligible percentage of respondents expressed disagreement, with 3% selecting "Somewhat disagree" and 2% selecting "Strongly disagree." The findings underscore the efficacy of the Tesla Chatbot in augmenting the educational value of the museum experience for the majority of visitors.

Figure 2 presents the distribution of respondents' answers to the eighth statement.

Figure 2. *Respondents' views on using the Tesla chatbot to enhance museum interactivity*



Regarding the eighth statement, "I consider the Tesla Chatbot an innovative addition to the museum's exhibits", the majority of respondents perceived the chatbot positively. Out of 306 participants, 122 selected *Strongly agree* and 116 chose *Somewhat agree*, indicating that most visitors view the chatbot as a valuable and innovative enhancement to the museum experience. A smaller group of 46 respondents remained neutral, suggesting that they neither agreed nor disagreed with the statement. Only a minimal number of participants expressed disagreement, with 12 selecting *Somewhat disagree* and 10 selecting *Strongly disagree*. Overall, these results highlight that the Tesla Chatbot is widely regarded as an innovative and engaging addition to the museum's exhibits.

Table 3. *Descriptive statistics for responses to eighth statement*

Measure	Value
Mean	4.15
Median	4
Mode	5
Standard Deviation (SD)	0.91

The descriptive statistics for the statement "I consider the Tesla Chatbot an innovative addition to the museum's exhibits" indicate a generally positive perception among respondents. The mean score of 4.15 indicates that, on average, visitors concurred that the chatbot signifies an innovative enhancement to the museum experience. The median of 4 (Somewhat agree) indicates that at least half of the respondents evaluated the statement positively, while the mode of 5 (Strongly agree) underscores that this was the most frequently selected option. The standard deviation of 0.91 indicates that responses were predominantly concentrated around the higher end of the scale, with only a small proportion of participants expressing disagreement. The findings of this study corroborate the prevailing perspective that the Tesla Chatbot is regarded as a valuable and innovative addition to the museum's exhibits.

Table 4. *Visitor engagement and experience with the Tesla chatbot (statements 10-12)*

Statement	1 – Strongly disagree	2 – Somewhat disagree	3 – Neutral	4 – Somewhat agree	5 – Strongly agree	Mean
10. Using the Tesla Chatbot encouraged me to further explore Tesla's work.	3 (1.0%)	8 (2.6%)	25 (8.2%)	135 (44.1%)	135 (44.1%)	4.3
11. The Tesla Chatbot made my museum visit more enjoyable and engaging.	2 (0.7%)	5 (1.6%)	20 (6.5%)	120 (39.2%)	159 (52.0%)	4.4
12. Thanks to the Tesla Chatbot, I spent more time in the museum than planned.	4 (1.3%)	10 (3.3%)	38 (12.4%)	145 (47.4%)	109 (35.6%)	4.1

An analysis of the mean scores presented in Table 4 reveals a predominant positive perception of the Tesla Chatbot among museum visitors. Statement 11, which states, "The Tesla Chatbot made my museum visit more enjoyable and engaging," received the highest mean score of 4.4, suggesting that the majority of visitors found the chatbot to significantly enhance their overall museum experience. Statement 10, "Using the Tesla Chatbot encouraged me to further explore Tesla's work," also achieved a high mean of 4.3, indicating that the chatbot effectively stimulates curiosity and motivates visitors to deepen their understanding of Tesla's inventions and legacy.

Statement 12, which states, "Thanks to the Tesla Chatbot, I spent more time in the museum than planned," received a slightly lower mean score of 4.1. While the results remain predominantly positive, they do indicate that, while the chatbot contributed to increased engagement for a significant number of visitors, the effect on time spent may vary depending on individual interests or prior familiarity with the exhibits. The mean scores above 4 indicate a consistent trend toward favorable evaluations, thereby confirming that the Tesla Chatbot has a meaningful impact on visitor engagement, enjoyment, and exploratory behavior within the museum.

Table 5. *Respondents' perception of the Tesla chatbot's influence on museum recommendation and return intention*

Statement	1 – Strongly disagree	2 – Somewhat disagree	3 – Neutral	4 – Somewhat agree	5 – Strongly agree	Mean
13. I would recommend visiting the museum because of the Tesla Chatbot.	3 (1.0%)	5 (1.6%)	28 (9.2%)	120 (39.2%)	150 (49.0%)	4.35
14. I believe the Tesla Chatbot is a significant attraction for museum visitors.	4 (1.3%)	6 (2.0%)	35 (11.4%)	125 (40.8%)	136 (44.4%)	4.28
15. My experience with the Tesla Chatbot inspired me to return to the museum.	4 (1.3%)	6 (2.0%)	30 (9.8%)	118 (38.6%)	148 (48.4%)	4.33
16. I believe the Tesla Chatbot will attract more visitors to the museum.	5 (1.6%)	10 (3.3%)	40 (13.1%)	130 (42.5%)	121 (39.5%)	4.18

The mean scores in Table 5 indicate that respondents generally hold very positive views regarding the Tesla Chatbot's influence on their museum experience, particularly in terms of recommendation and return intention. Statement 13, which asserts that a visit to the museum is recommended due to the presence of the Tesla Chatbot, received a mean score of 4.35, indicating a pronounced propensity among visitors to recommend the museum based on their experience with the chatbot. Statement 15 (My experience with the Tesla Chatbot inspired me to return to the museum) received a mean score of 4.33, indicating that the chatbot not only enhances the visitor's experience during a visit but also motivates them to plan future visits.

It is evident that other statements in the table have also received elevated mean scores. Statement 14, which posits that the Tesla Chatbot is a significant attraction for museum visitors, has a mean score of 4.28. This finding suggests that respondents perceive the chatbot as an important feature of the museum's offerings. Statement 16, which posits that the Tesla Chatbot will attract more visitors to the museum, received a slightly lower score of 4.18. However, it still reflects a generally positive perception of the chatbot's role in drawing public interest. The high mean values demon-

strate the Tesla Chatbot's effectiveness in increasing visitor engagement, satisfaction, and loyalty, thereby supporting the hypothesis that interactive AI tools can significantly enhance the museum experience.

Table 6. *Respondents' Perception of Enhanced Tesla Chatbot Functionality*

Statement	1 – Strongly disagree	2 – Somewhat disagree	3 – Neutral	4 – Somewhat agree	5 – Strongly agree	Mean
17. A voice feature for the Tesla Chatbot would improve communication.	5 (1.6%)	8 (2.6%)	35 (11.4%)	130 (42.5%)	128 (41.8%)	4.2
18. Multimedia content in the chatbot's responses (videos, animations, graphics) would aid understanding of Tesla's inventions.	4 (1.3%)	7 (2.3%)	30 (9.8%)	125 (40.8%)	140 (45.8%)	4.3
19. The Tesla Chatbot would be more engaging as an avatar, hologram, or robot.	6 (2.0%)	10 (3.3%)	40 (13.1%)	128 (41.8%)	122 (39.9%)	4.1

The mean scores in Table 6 indicate that respondents generally perceive the addition of enhanced functionality to the Tesla Chatbot positively. Statement 17, which posits that the incorporation of a voice feature in the Tesla Chatbot would enhance communication, received a mean score of 4.2, indicating that respondents perceive the inclusion of a voice option as a potential means of rendering interactions more intuitive and accessible.

Statement 18, which asserts that the incorporation of multimedia elements, such as videos, animations, and graphics, into chatbot responses would facilitate comprehension of Tesla's inventions, received the highest mean score of 4.3, signifying substantial support for the integration of multimedia components to enhance understanding and engagement. This outcome is indicative of visitors' appreciation for interactive and visually enriched educational content.

Statement 19 (The Tesla Chatbot would be more engaging as an avatar, hologram, or robot) has a mean of 4.1, indicating that respondents generally favor enhancing the chatbot's visual dynamism and immersiveness, though to a lesser extent compared to multimedia enhancements.

The findings point to the potential benefits of augmenting the Tesla Chatbot's functionality with voice, multimedia, and visual components, suggesting that such enhancements could lead to a notable increase in visitor engagement and interactivity. This observation lends support to the hypothesis that the incorporation of advanced interactive features can serve to further enrich the museum experience.

Table 7. *Respondents' attitudes toward chatbots as a standard Feature in museums*

Statement	1 – Strongly disagree	2 – Somewhat disagree	3 – Neutral	4 – Somewhat agree	5 – Strongly agree	Mean
20. I would like chatbots to become a standard part of interactive content in other museums.	3 (1.0%)	6 (2.0%)	28 (9.2%)	125 (40.8%)	144 (47.1%)	4.32
21. Chatbots can significantly enhance museum experience.	2 (0.7%)	5 (1.6%)	30 (9.8%)	128 (41.8%)	141 (46.1%)	4.33
22. Chatbots can contribute to a modern approach to education in museums.	3 (1.0%)	7 (2.3%)	35 (11.4%)	130 (42.5%)	131 (42.8%)	4.27

The mean scores in Table 7 demonstrate that respondents overwhelmingly support the incorporation of chatbots as a standard feature in museums and recognize their potential to enhance the visitor experience and educational value.

Statement 20, which posits the adoption of chatbots as a standard component of interactive content in other museums, received a mean score of 4.32, indicating a strong preference among visitors for the broader implementation of such technology within cultural institutions. Statement 21 received a slightly higher mean of 4.33, reflecting the perception that interactive AI tools can meaningfully improve engagement, interactivity, and overall satisfaction during museum visits.

Statement 22 (Chatbots can contribute to a modern approach to education in museums) received a mean score of 4.27, indicating that respondents recognize the pedagogical potential of chatbots. This suggests that respondents support innovative educational strategies and modern learning approaches within museum contexts. The findings of this study demonstrate that visitors not only value the Tesla Chatbot as a distinctive interactive instrument but also perceive chatbots as a beneficial augmentation to contemporary museum practices, particularly in terms of enhancing the visitor experience and supporting educational objectives.

DISCUSSION

The findings of the study provide considerable evidence in support of the prevailing hypothesis that the implementation of the Tesla Chatbot has a substantial impact on enhancing visitor satisfaction, thereby potentially contributing to an increase in museum attendance. Across all measured dimensions: namely, accuracy, usability, interactivity, engagement, and educational value, the chatbot received overwhelmingly positive feedback from museum visitors, indicating its effectiveness as an interactive digital tool.

In consideration of the H1 hypothesis, which posits that visitors perceive the Tesla Chatbot as accurate, relevant, easy to use, and free of technical difficulties, the data provides substantial support for this hypothesis. The mean scores for statements assessing accuracy and relevance (Statement 4: Mean = 4.4), ease of use (Statement 5: Mean = 4.4), and absence of technical difficulties (Statement 6: Mean = 4.3) demonstrate that the majority of visitors found the chatbot reliable and user-friendly. The number of negative responses was negligible, thereby corroborating the prevailing satisfaction with the tool's functionality. This finding indicates that the Tesla Chatbot demonstrates the capacity to meet fundamental usability and reliability criteria, which are imperative for ensuring positive visitor experiences within the context of a museum.

For H2 hypothesis, which examines the chatbot's capacity to act as an interactive educational tool, the results from Statement 7 (Using the Tesla Chatbot made my museum experience more interactive, Mean = 4.2) and Statement 8 (Interacting with the Tesla Chatbot enhanced my understanding of Tesla's inventions, Mean = 4.3) indicate that the chatbot effectively increases visitor engagement and understanding. Visitors reported that the interactive features enabled them to explore Tesla's legacy in greater depth, thereby confirming that AI-based tools can facilitate learning and stimulate interest in scientific heritage.

The H3 hypothesis focuses on the chatbot's influence on the overall museum experience, including extended stay and visitor loyalty. The high mean scores for recommendation (Statement 13: Mean = 4.35), inspiration to return (Statement 15: Mean = 4.33), and perception as a significant attraction (Statement 14: Mean = 4.28) indicate that the chatbot positively affects visitor satisfaction and fosters loyalty. Furthermore, respondents posit that the chatbot may attract additional visitors (Statement 16: Mean = 4.18), thereby suggesting a more extensive impact on museum attendance and audience engagement. These findings are consistent with the conclusions of previous studies indicating that interactive digital tools can enhance visitor experience and encourage repeat visits.

With respect to H4 hypothesis, which examines enhanced functionality through voice, multimedia, and visual options, the data indicates strong visitor support for such features. The mean scores for the potential addition of voice functionality (Statement 17: Mean = 4.2), multimedia content (Statement 18: Mean = 4.3), and avatar/hologram representation (Statement 19: Mean = 4.1) indicate that visitors believe these enhancements would further increase interactivity and engagement. These findings suggest that enhancing the capabilities of the chatbot can enrich the learning experience, appeal to diverse audiences, and render museum visits more immersive and memorable.

Finally, H5 hypothesis addresses the perception of chatbots as a standard component of interactive content in museums. The mean scores for statements regarding standardization and educational value (Statements 20–22: Means = 4.27–4.33) indicate that respondents overwhelmingly support the integration of chatbots as a regular feature of museum experiences. Visitors recognize the potential for chatbots to modernize educational ap-

proaches and provide innovative methods for engagement, reinforcing the view that AI-based tools can complement traditional exhibits.

It is imperative to acknowledge the limitations of the study. Initially, the study was conducted within a single museum, which limits the generalizability of the findings to other institutions and contexts. The data were collected through a questionnaire, which is based on visitors' personal impressions. This method leaves room for subjectivity and does not allow for insights into the long-term effects of such a digital experience. It is imperative to acknowledge that this study is pioneering within the regional context, as it lacks a comparative framework with similar research. This limitation restricts the extent of conclusions that can be drawn and the broader interpretation of the results.

CONCLUSION

The findings of this study indicate that the Tesla Chatbot is not only a technically reliable and user-friendly tool but also an effective instrument for enhancing interactivity, educational value, and visitor satisfaction. The data gathered substantiates all five specific hypotheses, thereby suggesting that AI-powered chatbots signify a substantial advancement in the realm of digital museology. This advancement holds the potential to exert a favorable influence on museum attendance and visitor loyalty. These findings emphasize the necessity for cultural institutions to adopt interactive AI solutions, thereby aligning with the evolving expectations of contemporary audiences.

Furthermore, the study underlines the potential of AI chatbots to facilitate the transition from conventional museum exhibits to contemporary digital experiences. The Tesla Chatbot has been designed to provide visitors with personalized, interactive, and contextually relevant information. The primary benefits of this approach include the enhancement of engagement and the facilitation of a deeper understanding of complex scientific concepts. This approach not only enhances the learning experience but also makes museum visits more memorable and meaningful, particularly for younger and tech-savvy audiences who expect dynamic and interactive content.

The affirmative reactions to prospective enhancements, including voice interaction, multimedia integration, and visual representation through avatars or holograms, suggest that further development of chatbot functionality could augment its educational and experiential impact. These features have the potential to cater to diverse learning styles, increase accessibility, and foster a more immersive and inclusive museum environment.

The considerable support for the standardization of chatbots as a component of interactive museum content suggests the potential for such tools to become an integral element of contemporary museology. Cultural institutions that adopt AI-driven solutions do so in order to respond to evolving visitors’ expectations. Furthermore, this adoption of new technologies by academic institutions positions them as innovative and forward-thinking

entities, capable of attracting a broader audience and promoting sustained engagement. In light of these findings, the incorporation of conversational chatbots, such as the Tesla Chatbot, emerges as a promising avenue for enhancing visitor satisfaction and the overall effectiveness of museum education and outreach programs.

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TRANSFORMISANJE MUZEJSKIH ISKUSTAVA POMOĆU ČETBOTOVA ISTORIJSKIH LIČNOSTI: STUDIJA SLUČAJA ČETBOTA NIKOLE TESLE

Rezime

Integracija veštačke inteligencije u kulturne institucije menja način na koji posetioci doživljavaju i interaguju sa kulturnim nasleđem. U radu se predstavlja studija slučaja chatbota Nikole Tesle, prvog chatbota zasnovanog na istorijskoj ličnosti u muzejskoj praksi, koji je predstavljen u Muzeju nauke i tehnike u Beogradu. Za razliku od generičkih konverzacionih agenata, ovaj chatbot je baziran na biografiji Nikole Tesle i osmišljen je tako da odražava jezičke stilove njegovog vremena, pružajući posetiocima autentičnu i edukativnu interakciju sa naučnikom. Studija istražuje pedagošku i iskustvenu vrednost ovakvih chatbota, naglašavajući njihovu sposobnost da unaprede učenje, podstaknu angažovanje i pojednostave složene naučne ideje za različite publike. Kvantitativna analiza obuhvatila je 306 odraslih posetilaca Muzeja Nikole Tesle u Beogradu, sa fokusom na interaktivnost, edukativni uticaj i zadovoljstvo posetilaca. Rezultati pokazuju da chatbot obogaćuje iskustvo posetilaca, pozicionirajući se kao inovativan alat digitalne muzeologije koji povezuje očuvanje kulturnog nasleđa sa interaktivnim obrazovanjem.

Ključne reči: digitalna muzeologija, veštačka inteligencija, kulturno nasleđe, interaktivno obrazovanje, kulturna informatika.