Enhancing Museum Experiences Through Multisensory Design: A Qualitative Study from Visitors' and Curators' Perspectives

Yun Zheng[1, 2]

[1] Faculty of Humanities and Social Sciences, City University of Macau, Macau, 999078, China;

[2] School of New Media and Arts, Dongguan City University, Dongguan, 523000, China.

h22092110288@cityu.edu.mo

Abstract. With the rise of digital technologies and evolving visitor expectations, multisensory design has become a key factor in enhancing museum engagement. This qualitative study explores the impact of multisensory design on museum experiences through semi-structured interviews with twelve Generation Z visitors and one curator in China. Thematic analysis revealed that visitors are primarily driven by knowledge-seeking and leisure motives. In terms of multisensory design, although the visual experience is dominant, integrating multiple sensory channels can significantly enhance visitors' immersion and memory. The study also reveals an intense desire among visitors for interactive participation and emerging technologies, as well as the vital role of annotation quality and logical narrative in the overall experience. These insights provide empirical support for optimizing museum exhibition design, enhancing visitor experiences, and offering fresh perspectives for museum management and strategy. The findings enrich museum-related research and provide references for cultural institutions to meet public demands and enhance educational functions.

Keywords: Multisensory Design, Museum Experiences, Generation Z visitors, Thematic Analysis.

1. Introduction

Multisensory applications and research in museums have deep historical roots. From the openness to touch and taste in the 17th–18th centuries (Classen, 2020) to the strict restrictions of the 19th century (Leahy, 2016; Candlin, 2017), followed by gradual reopening in the 20th century, and up to today's active exploration, this trajectory demonstrates the profound influence of social contextual factors and the academic trend known as the "sensory turn" (Dudley, 2014). Many scholars have presented the potential problems of relying solely on visual design in museums. Although visual perception is the most basic and direct sensory experience and is also the starting point of the overall museum experience (Weil, 2002), long-term reliance on vision alone can lead to visual fatigue and is limited by visitors' physical conditions (Otter, 2008). Moreover, visitors generally have high expectations for the amount of information conveyed by exhibits and their simple explanatory texts. Traditional static, one-way modes of information transmission often fail to stimulate visitors' interest, resulting in a poor sense of accomplishment and experience in the museum and causing issues such as lack of concentration and reduced cognitive ability (Guo & Ai, 2018). Because it is challenging for visitors to interpret exhibits independently, museums need to assume the responsibility of interpretation and place greater emphasis on multisensory modes of cognition and expression, extending beyond the visual. This can help visitors better understand the cultural connotations behind the exhibits and employ appropriate technologies to enhance the narrative of exhibitions.

In recent years, younger visitors have become the mainstream audience in museums. According to data released by the National Museum of China (2024), visitors under the age of 35 now account for over 60% of museum attendees. It has become a pressing task and practical demand for museums to innovate exhibition formats, explore the consumption patterns of Generation Z, and better meet their needs. However, there is currently a lack of empirical research specifically focused on the experiences of young, multisensory-oriented museum visitors. Studies in some European museums indicate that young people are not the primary museum-going population, and research has primarily focused on how to attract more young people to visit museums (Crowley et al., 2014; Diez, 2021;

Komarac & Bešlić, 2021; Komarac & Ozretić, 2023), which does not align with the actual situation in China. Therefore, this study conducted semi-structured interviews to gather first-hand data from Generation Z consumers and employed thematic analysis to extract insights reflecting the visitation patterns and selection factors of Generation Z museum visitors. The study also explored their preferences for multisensory design, aiming to enrich research on multisensory experience design and provide references for curators to serve young audiences in the contemporary context better.

2. Research Design

This study took into account different stakeholders by dividing interview participants into two groups: Generation Z visitors and a curator. The purposes of the interview study include:

Clarifying the multisensory experiences from the visitors' perspective versus the visitors' experience feedback received by the curator.

Obtaining strategies and suggestions, from different stakeholder perspectives in the qualitative research, for further enhancing multisensory museum experiences.

2.1. Interview Procedure

Semi-structured interviews were used for data collection. To ensure interview quality while accommodating participants' schedules and geographic convenience, this study flexibly employed a combination of face-to-face interviews and online interviews via Tencent Meeting. For sample selection, a purposive sampling method was employed to contact potential participants in advance and provide them with complete information about the interview time, location, and mode. Informed consent was obtained from participants before the interview, and interviews were fully recorded. During the interviews, the author listened attentively and took detailed notes on key information, keeping each interview between 30 and 60 minutes in length.

2.2. Interview Sample Selection Criteria

This study used purposive sampling. The inclusion criteria for interviewees were: (1) members of Generation Z (born 1995–2009); (2) participants had visited a museum within the past three months, and (3) participants had good communication skills and could clearly express their views and experiences. Based on the research questions and objectives, an interview framework was prepared in advance, and a semi-structured interview outline was designed. The interview process remained flexible; questions were adjusted in order and depth according to participants' responses to elicit more valuable information. Ultimately, 12 participants were selected for interviews. The basic characteristics of the interviewees are shown in Table 1.

Table 1. Basic characteristics of interviewees (visitors).

ID	Gender	Birth Year	Education	Visit Frequency (per year)
V01	Male	1995	Master's	3-4
V02	Female	2005	Bachelor's	5-6
V03	Female	2000	Master's	12
V04	Female	1999	Ph.D.	3-4
V05	Female	2001	Master's	2
V06	Female	2001	Master's	3-4
V07	Female	1995	Bachelor's	3-4
V08	Male	1995	Master's	6-7
V09	Female	1995	Bachelor's	12
V10	Female	1995	Ph.D.	12
V11	Female	2002	Master's	12
V12	Male	2004	Bachelor's	1-2

In addition, guided by the research questions and approached from the perspective of practitioners, one curator was also invited to participate in the interview. The basic characteristics of this curator are shown in Table 2.

Table 2. Basic characteristics of the interviewee (curator).

ID	Gender	Age	Years Employed	Multisensory Exhibitions Responsible (approx)
C01	Female	35	3	9-10

2.3. Thematic Analysis

This study employed Braun and Clarke's (2006) six-phase thematic analysis for qualitative data analysis. First, on the day each interview was completed, the original interview audio was transcribed using a transcription tool, and the transcript was checked word-for-word, removing redundant content unrelated to the research questions. In the end, a text corpus of over 73,000 characters of interview transcripts was compiled. In this process, anonymization was performed concurrently: identifiable personal information of the visitors was removed and replaced with uniform codes (visitors labeled V01–V12, curator labeled C01), and any information that could reveal participants' identities was masked—organization names were replaced with "a certain type of museum" (e.g., "a certain provincial history museum"), and project-related information of the curator was disclosed with permission.

Second, after repeatedly reading and familiarizing with the interview texts, keywords or phrases related to the research questions were highlighted. An inductive coding approach was primarily used to assign initial codes to these highlighted contents (such as "visit motivation" and "audience preferences"), ensuring the codes remained faithful to the original meaning intended by participants. The data analysis was done manually (Kelle, 2004). Third, the analysis of codes began, considering how different codes could be combined to form overarching themes and mapping relationships among

codes, themes, and subthemes. Fourth, the preliminary themes generated were checked for accuracy in reflecting the data content and were optimized and adjusted as needed. Fifth, after all themes and codes were organized, the themes were named. To enhance the clarity and interpretability of the thematic coding, descriptive titles were added to each code. The complete thematic coding results and their relationships are detailed in Table 3. Finally, arguments addressing the research questions were proposed to summarize the study findings.

Table 3. Themes and codes.

Theme	Subtheme	Codes
Visiting motive	Visiting motivations	Knowledge acquisition: learning new knowledge during visits;
		Leisure and entertainment: visiting museums as a way to relax and unwind.
	Selection factors	Geographical location: proximity to the museum and convenient transportation;
		Scale and distinct features: large museum size, rich exhibits, and distinctive characteristics.
Multisensory design	Visiting experience	Visual hegemony: vision as the primary sense in exhibition design;
		Interest-driven: interest-driven visitation leads to more active and in-depth engagement;
		Deep immersion: multisensory experiences promote deep immersion;
		Environmental interference: negative effects of external environmental factors on the experience.
	Understanding & memory	Prior knowledge level: visitors' prior knowledge affects their understanding of exhibit content;
		Annotation quality: accuracy and richness of annotation content;
		Triggering associations: multisensory experiences strengthen visitors' ability to form associations.
	Audience preferences	Technology empowerment: using new technologies to create diversified visiting experiences;
		Interactive participation: engaging through interaction in the construction of knowledge and experience;
		Logical narrative: exhibits arranged according to thematic or conceptual logic.

3. Analysis Results

3.1. Theme 1: Visiting Motives

3.1.1 Subtheme 1: Visiting Motivation

(1) Knowledge acquisition

Knowledge acquisition was the most frequently mentioned need in the interviews; almost all respondents acknowledged the social learning function of museums. As a special interdisciplinary platform for acquiring knowledge, museums allow learners to engage directly with exhibits, interactive devices, and contextual designs, which stimulate their exploration of unknown fields. For example, V04 recalled an experience visiting a science museum and a planetarium, noting that they "provided knowledge that I rarely come across in everyday life, but which has a lot of practical value."

At the same time, V07 believed that "visiting museum exhibitions uncovers many interesting fields and knowledge that I had never known before."

Local museums present systematic historical narratives and exhibits, shaping a unique image of a city and providing visitors with a framework for understanding the city's developmental trajectory. They become the "first stop" for visitors to learn about the city's history and culture. This not only stimulated their interest and curiosity about the city but also enhanced the cultural identity of visitors. As a history enthusiast, V01 said, "Whenever I arrive in a city, whether for work or travel, I always start with its history." V08 described how "the museum in a certain city has strong local color and uniqueness; by visiting it, one can quickly understand the local historical development and get to know this city's unique image and appearance." Among these exhibits were the "Terracotta Warriors" (V05), "furniture, everyday objects, and clothing of people in the past" (V11), and "customs from birth, adulthood to marriage, and finally aspects of life including rituals" (V12).

(2) Leisure and entertainment

Museums typically have a quiet atmosphere and carefully designed exhibition spaces, offering visitors a brief respite from reality. This particular environment is favored by Generation Z students and working professionals, becoming an important way for them to relieve stress and enjoy leisure time. V04 believes that "a museum allows you to relax your body and mind away from studies, and indoor touring also conserve energy." V06 visits museums to pass the time, saying, "Sometimes I feel like I have not gone out for a long time, and there is nowhere else to go so that I will wander around the museum for a bit."

At the same time, the uniqueness of museums lies in their ability to both satisfy the need for personal solitude and provide rich opportunities for social interaction. "Exploring together" with friends or family in a museum not only enhances the fun of the visit but also, through knowledge sharing and emotional exchange, creates a deeper learning experience and emotional resonance. V02 mentioned that "my best friend will analyze the details of exhibit models very seriously; going to visit with her is a very high-quality experience." V09 and some friends who are mothers enjoy taking their children to museums, saying that "while learning and entertainment go hand in hand, it also burns off the children's energy and saves a lot of effort for the parents."

3.1.2 Subtheme 2: Selection Factors

(1) Geographic location

In terms of museum choice, participants mentioned that geographical location and transportation convenience are key factors influencing their decision. Museum “accessibility” is the primary condition for attracting the public, especially audiences not familiar with museums, to enter. Museums close to visitors are more easily integrated into visitors’ daily lives, increasing visitation frequency and the quality of the experience. For example, V04 mentioned that “in a certain city, the commuting distance within the city is quite long,” and V06 said that they would prefer to go to a museum that is nearby, “if it is too far, sometimes I will just be a bit lazy.”

Moreover, linking a museum with nearby recreational projects can create a comprehensive cultural travel experience. This not only enriches the itinerary by providing diverse cultural touchpoints and interactive experiences, but can also further enhance the city’s appeal as a tourist destination. For instance, as part of a key tourist destination, V03 said they “treat the museum as one of the attractions and visit it along the way.” V01 shared an example of a private museum located in a large shopping mall that also houses an aquarium and a cinema, noting that “there is food, drink, play and entertainment all in one place; it makes the experience much richer.”

(2) Scale and distinctiveness

The scale of a museum directly affects the depth of the visitor's experience and satisfaction. Larger museums can offer more diversified exhibition content and longer visiting times, satisfying visitors' desire to explore. Respondents generally indicated a preference for national or provincial museums because they are "large in scale" (V05), have "more scarce original artifacts" (V10), and have "larger collections and better exhibit layouts" (V03).

Additionally, the participants' descriptions reflect modern museum visitors' demand for diversity in exhibition content and form: monotonous exhibition layouts can easily cause aesthetic fatigue, while varied presentation methods can stimulate visitors' desire to explore. For example, V08 looked forward to seeing content that is "personalized, interesting, and vivid"; V01 likes "new ways of interaction"; V03 is more concerned with "blockbuster, internet-popular exhibitions."

3.2. Theme 2: Multisensory Design

3.2.1 Subtheme 1: Visiting Experience

(1) Visual hegemony

Most respondents viewed vision as the core entry point of the exhibition experience; this prioritization of vision corresponds to the sensory habits that Generation Z has formed in a digital media environment. As V01 stated, "Vision is the first sense, the most sensitive one." Notably, for visually impaired individuals, the visual experience can still provide corresponding perceptions. Curator C01 called for attention to the large group of people with low vision, saying, "They are not completely blind; they have some perception of light and visual awareness... Some of the lighting in museums can stimulate them and make them feel uncomfortable."

Although visual experiences can provide intuitive information and aesthetic enjoyment, they can also cause visitors' attention to focus only on the surface. Currently, the expectations of Generation Z for visual experiences are increasingly high, and enhancements through equipment and technology have significantly amplified the appeal of visual experiences. For example, V09 stated that "in situations with fewer crowds, a purely visual exhibition with reasonable curation can still create a sense of immersion." When combined with technologies like VR and 3D printing, "being able to see an exhibit 360 degrees... it will have a very strong visual impact" (V04), but "if the visuals are relatively simple, visitors may just glance over it without giving it much attention" (V02).

(2) Interest-driven

Regardless of the sensory combination, interest determines the level of engagement. If the exhibition content aligns with a visitor's personal interests or aesthetic preferences, they will engage deeply; otherwise, they will merely browse superficially, making it difficult for them to form lasting memories or emotional resonance. This characteristic is evident in the exhibits themselves, exhibit design, and multimedia presentation formats. V05, V06, and V07 all agreed that for purely visual exhibitions, it depends on whether the theme is interesting; if it is not very engaging, "there is no way to fully appreciate some of the history and culture" (V05). V08 noted that "some preset storylines and contexts in the curation limit visitors' freedom to explore." Therefore, only when the content of exhibits, presentation format, and interactive design align with visitors' personal interests and aesthetic preferences can their enthusiasm be effectively stimulated, thereby enhancing the exhibition experience and its cultural impact.

(3) Deep immersion

The design of multisensory channels can break the limitations of traditional static exhibitions. By simulating real scenarios or dynamic reenactments, multisensory design provides audiences with a completely new interactive experience. This experience not only enriches audiences' perceptions but also significantly enhances their intuitive understanding of the exhibits' context and cultural connotations. Among the multisensory museum designs experienced by the respondents, V08 reported that "multisensory designs can restore the scene that needs to be presented, allowing people to truly obtain the core information and deeply understand that piece of history." Exhibits such as paintings are often combined with technologies like 3D and AI, and respondents said they are "particularly vivid" (V07) and that "with added traditional-style music, the experience is quite good" (V09).

Additionally, in a museum environment, the dense presentation of visual information can lead to visual fatigue. By introducing other sensory channels, such as auditory, tactile, and olfactory, visual overload can be alleviated, and information processing efficiency can be optimized. Through the synergy of multiple senses, audiences feel as if they are immersed in a historical scene, allowing them

to experience the stories and cultural values carried by the exhibits more vividly and three-dimensionally. For example, V01 pointed out that some exhibitions were too long, causing "a bit of visual fatigue," and V02 said that "if the exhibition included some sounds or interactive devices, it would make people feel more relaxed and not so tired."

Although most respondents affirmed the appeal of multisensory elements, these need to fit the exhibition theme and content. Overwhelming stacks of sensory stimuli can cause cognitive overload, distracting attention and ultimately weakening the delivery of core information, thereby affecting the quality of the experience. V02 shared that "adding sound along with some lighting special effects together can make us more immersed in the whole scene. However, if vision, hearing, and touch are combined, it may be too much to divert attention." When dealing with new knowledge, V05 hopes that "when I am concentrating, I will not be disturbed by some loud sounds."

(4) Environmental interference

Respondents recalled that in past visits, unreasonable exhibition layouts and display designs were particularly prominent problems. This indicates a disconnect between the curators' professional perspective and the ordinary audience's needs. The traditional "artifact-centric" layout thinking overlooks the visitor's behavior trajectory, forcing them to stoop, bend down, or look down to view exhibits, which increases inconvenience. Participants reported common issues, such as "labels being too small" (V09), "exhibit boards placed too low" (V03), and "barriers blocking the view from too far away" (V01).

Secondly, respondents repeatedly mentioned unreasonable lighting design, which leads to a dark overall environment or severe exhibit reflections. Furthermore, many museum spaces are rather limited, and exhibition halls become crowded, lacking effective visitor flow guidance and management, resulting in poor visitation experiences. For example, "glass reflections are severe with many fingerprints" (V06), "dim lighting leads to confused traffic flow" (V03), and "when there are many people, you have to wait a long time to take a photo" (V12).

3.2.2 Subtheme 2: Understanding & Memory

(1) Prior knowledge level

Some museum exhibitions face the challenge of conveying overly specialized knowledge that exceeds the cognitive level of ordinary visitors. This leads to difficulties in understanding and memory overload, especially when explanations are lacking that relate to everyday life, which weakens visitors' interest in touring and learning. For example, V01 said that some information "already surpassed my previous academic or professional level, making it difficult to remember." In contrast, V04 stated that "I did not care much" about content that was difficult to digest.

Although many museums are now equipped with digital guide devices, the content is often too brief and lacks sufficient background information. Visitors, unable to keep up with the exhibition's narrative pace, are forced to interrupt their visit to search for supplementary information on their own, thereby breaking the continuity of their experience. Some exhibits "require a certain accumulation of basic knowledge" (V04), and "many small artifact did not be introduced" (V05). Combined with the fact that "annotations contain limited information" (V10), many felt they "need to search on their own to learn more" (V07).

(2) Annotation quality

One of the core functions of museums is education, and annotations are a crucial tool for achieving this goal. Many exhibits, due to their physical characteristics or historical context, cannot convey complete information directly. Annotations can compensate for these shortcomings by providing a more comprehensive perspective. However, unclear expression, obscure language, and excessively small text are common issues. V06 mentioned that "the font is too small; I need to use my phone to take a photo and zoom in" and also encountered some "characters on the annotation that I do not know." V09 pointed out that while some annotations have "a lot of text, I do not know what the author is trying to convey; it is like an AI's mindless rambling." V08 emphasized that visitors have limited time, and many existing annotations fail to meet the need to "get some core information in a short time."

(3) Triggering associations

Respondents described how multisensory experiences shape and integrate specific contexts. They noted that by combining visitors' existing knowledge with the exhibition context, one can effectively use contextual scaffolding to reinforce memory retention. V09 shared that certain melodies "can remind me of war-themed movies I have seen, which helps me understand the artists' motivation for creating these sculptures." V06 expressed appreciation for guided audio tours, saying they not only help visitors distill key points of the exhibits but also "directly connect with some of my current knowledge."

Tactile experiences can provide direct sensory feedback, enabling visitors to understand and remember the characteristics of exhibits more vividly. Many museums now include tactile descriptions in their exhibit labels, and visitors generally report that tactile cues can trigger relevant associations, further enhancing cognition. V02 mentioned, "for example, when the description says a trilobite has spikes, one can imagine that if my finger touches it, it would hurt." V06 said, "The description of a rough texture can link the exhibit to sandstone; sandstone surfaces also have rough textures and grains." For some abstract objects or those hard to touch in daily life, "for example, a fossil has extremely subtle features and requires powerful observational ability; if there were a replica model to touch, it would leave a much deeper impression than just a simple explanation" (V04).

3.2.3 Subtheme 3: Audience Preferences

(1) Technology empowerment

Respondents have high expectations for the use of emerging technologies (such as AR and VR) in museum exhibition design. However, the actual effect of these technologies may fall short due to design quality and insufficient content depth. V01 anticipated that "new technologies could break through the old approach of just lightly tapping and using touch, taking it to another level." V08, based on past experiences, considered that current technological presentations are not yet mature, stating, "In terms of the quality of visuals, expressiveness, or the integration of sound and lighting, there is room for improvement."

It is noteworthy that there is a risk of potential misuse of technology. In the more profound transformation of museums through digital means, a blind pursuit of sensory stimulation may lead to "form over content," deviating from the educational essence of exhibitions. V07 expressed disappointment in technology: "A certain overseas museum used 3D and VR technology in its exhibits, but it felt just like animation, with no real sense of three-dimensionality; taking photos with AR or virtual images also feels very 'fake', as if they are just doing it for the sake of doing it." V03 also mentioned that "a VR-related exhibition turned some artifacts in the museum into cute cartoon images and designed it as a game with stages, but I didn't know what its meaning was."

(2) Interactive participation

Modern exhibitions often limit tactile experiences, mostly allowing and encouraging them only in special circumstances. Almost all participants expressed a strong interest and curiosity in touching exhibits, and tactile experiences have become one of their favorite sensory experiences. This stems from "a strong impulse to reach out and touch to see what it is like" (V06), and "touch is very scarce and also very novel; it can leave a deeper, more unforgettable impression" (V08). However, some museums provide tactile experiences only in certain areas or for specific audiences; for example, "a certain museum has a section specifically for people with disabilities to experience touch, but other areas basically do not allow it" (V03).

To meet the needs of diverse visitors, some museums have developed interactive designs that cater to tactile experiences. Tactile experiences, through embodied cognition and emotional resonance, enhance visitors' learning outcomes and memory retention. V07 shared a "calligraphy copying game that uses a screen with a brush sensor to write calligraphy." V04 shared a planetarium experiment on "how to simulate the generation of force; after experiencing it, the impression of this experiment is deeper, and I understand its mechanism better." Curator C01 also shared a case from her planning along with audience feedback: "The model of a certain feathered dinosaur (Konglong) itself has no

warmth—it is made of rubber. I feel that when visitors touch it, they have an added subjective sensation; they will tell me that it feels warm to them."

Furthermore, young groups are more inclined to shift from "viewing" to "participating" when visiting museums; they are willing to make a memorable trip for novel experiences, and going to exhibitions together seems to have become a part of maintaining their social connections. V04 observed that "my friends prefer to go to botanical museums because some plants can be touched in some non-toxic conditions." V06 noted that "touch is something that feels immediately novel; everyone is very interested. Maybe someday, when we have free time, we will all go see it together."

(3) Logical narrative

The narrative structure and logic of an exhibition are key factors in enhancing the visit experience, helping visitors better understand and appreciate the exhibition content. Thematic exhibitions can present history in a story-like manner by focusing on specific events, objects, or groups, thereby enhancing the sense of immersion. For example, museums in some cities “comprehensively and systematically outline the major historical events” (V04), and “the design of the exhibition halls has a certain internal logic and narrative structure” (V08).

To effectively integrate narrative structure with multisensory design, it is also necessary to adjust the visitor flow within the exhibition, highlight key content, and consider visitors’ pacing and needs. V04 mentioned that some fixed storytelling processes were too rigid, causing “many parts where you have to go back and revisit on your own.” To address this issue, C01 “will make adjustments to the standard route in the exhibition hall… allowing visitors to have more time to touch, experience, and feel.”

4. Conclusion

This study, through interviews with Generation Z museum visitors and a curator, revealed the multidimensional mechanisms underlying the museum experience and its learning outcomes. The findings show that the museum experiences of Generation Z visitors have shifted from traditional knowledge acquisition to multisensory, interactive, and deep engagement. This shift not only reflects changes in the cognitive habits of young people in the digital age but also poses new challenges and opportunities for museum curation and operation.

First, the analysis of visit motivations indicates that Generation Z visitors not only regard museums as platforms for knowledge acquisition but also view them as important places for leisure, entertainment, and social interaction. This finding is consistent with situational learning theory (Falk & Dierking, 2016), where visitors' motivations, emotions, and social interactions jointly shape their museum experience. In this study, visitors shared knowledge and exchanged emotions with friends and family through museum exhibits, which further deepened their understanding and memory of the exhibition content. This kind of social interaction not only enhanced the enjoyment of the visit but also boosted learning outcomes through emotional resonance. Moreover, the museum's geographic location, scale, and distinctive features also became important factors influencing visit decisions, with visitors' choices being shaped by both the external environment and personal preferences.

Second, the importance of multisensory design in the museum experience has been widely acknowledged. Vision is often referred to as the "primary sense," as over 80% of external information is acquired through it (Mayer, 2009). In museums, traditional exhibitions rely heavily on visual displays. However, the introduction of multisensory elements significantly enhances visitors' sense of immersion and memory retention, transforming abstract knowledge into concrete experiences through embodied cognition. Diversified interactive participation and clear exhibition themes and logic are highly valued in multisensory museum experiences. Additionally, the interviews also revealed occasional over-reliance on technology, which may lead to the problem of "form over content"; the core function of a museum is education, and any technological means should serve this goal rather than dominating it.

In summary, this study still has limitations. First, due to objective constraints, the respondents may not have sufficient representativeness in key characteristics, and the sample size is relatively small. The respondents were mostly frequent museum-goers and enthusiasts with a generally high level of education. Future research can select research subjects more systematically, increase the sample size, and further improve the accuracy of the results. Second, this study is exploratory; in subsequent research, empirical studies can be employed to conduct confirmatory analyses of the identified influencing factors, the extent of each factor's impact on experience, and the relationships among different factors.

Moreover, the sample exhibited a gender imbalance, with females predominating. This may affect the generalizability of the results, as the findings tend to reflect the experiences and demands of female participants, making it difficult to fully cover the diverse perspectives of male and other gender groups. Finally, most respondents were students with limited spending power, which constrains the representativeness of the research subjects in contexts involving paid attractions, such as private museums, special exhibitions, and wearable technology devices. Future research could use broader recruitment channels, such as social media, interest groups, and themed events, to expand the sample, balance the gender and occupational distribution of respondents, and thereby improve the comprehensiveness and generalizability of the results.

References

[1] Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

[2] Candlin, F. (2017). Rehabilitating unauthorised touch or why museum visitors touch the exhibits. The Senses and Society, 12(3), 251-266.

[3] Classen, C. (2020). Touch in the Museum. In The book of touch (pp. 275-288). Routledge.

[4] Crowley, K., Pierroux, P., & Knutson, K. (2014). Informal learning in museums. In R. K. Sawyer (Ed.), The cambridge handbook of the learning sciences (2nd ed. ed., pp. 461–478). Cambridge University Press.

[5] Diez, A. S. (2021). Working to Create Value: Spanish Museums and the Challenge of Connecting with Generation Z. Museum International, 73(3-4), 44-53.

[6] Dudley, S. H. (2014). What's in the Drawer? Surprise and Proprioceptivity in the Pitt Rivers Museum. The Senses and Society, 9(3), 296-309.

[7] Falk, J. H., & Dierking, L. D. (2016). The museum experience revisited. Routledge.

[8] Kelle, U. (2004). Computer-assisted analysis of qualitative data. In U. Flick, E. von Kardorff & I. Steinke (Eds.), A companion to qualitative research (pp. 276-283). London: Sage.

[9] Komarac, T., & Bešlić, S. (2021). Uvid u percepciju muzeja i mogućnosti poboljšanja usluge muzeja: perspektiva studenata. Ekonomski pregled, 72(3), 358-376.

[10] Komarac, T., & Ozretić Došen, Đ. (2023). Understanding virtual museum visits: generation Z experiences. Museum Management and Curatorship, 1-20.

[11] Leahy, H. R. (2016). Museum bodies: the politics and practices of visiting and viewing. Routledge.

[12] Mayer, R. (2009). The science of learning: determining how multimedia learning works. Multimedia learning, 57-84.

[13] National Museum of China. (2024). National Museum of China Annual Data Report (2023).https://www.chnmuseum.cn/gbgg/202401/t20240122_265842.shtml

[14] Otter, C. (2008). The Victorian eye: A political history of light and vision in Britain, 1800-1910. University of Chicago Press.

[15] Ting Guo, & Xiaoqun Ai. (2018). The Research on User's Sensory Quality and Behavior Model of AR Museum Guided Application from the Perspective of Cognitive Load. Art & Design, (10), 94-97. https://doi:10.16272/j.cnki.cn11-1392/j.2018.10.017. (in Chinese)

[16] Weil, S. (2012). Making museums matter. Smithsonian Institution.