

UNDERSTANDING AUDIENCES FOR IMMERSIVE AND INTERACTIVE MUSEUM AND GALLERY EXPERIENCES AND CULTURAL EXCHANGES

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ABSTRACT

The advent of immersive and interactive technologies has facilitated the growth of the museum and gallery sector by offering a variety of new experiences. In the UK and China, in particular, the museum and gallery sector lies at the heart of the creative industries and makes a significant contribution to cultural growth. Both countries have recognised the impact of such technologies on the growth of the sector and have actively sought opportunities to use them for bilateral collaboration. However, the interest in immersive and interactive technologies among museum and gallery audiences remains underexplored, as do their preferences and behavioural patterns with respect to such technologies. This study discusses the key findings of user research, exploring the awareness, experiences and preferences of current museum and gallery audiences regarding (i) immersive and interactive museum and gallery experiences and (ii) the cultural exchange between the UK and China.

Keywords: Experience design, Museum and gallery experiences, Immersive and interactive technologies, Virtual reality, Design methods

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1 INTRODUCTION

The museums and galleries sector, the centre of the UK and China's creative industries, has experienced considerable growth in recent years, making significant contributions to both countries' cultures, societies and economies (NHM, 2019a; SSTM, 2020). Notably, the advent of immersive and interactive technologies has enabled the growth of the sector by offering various experiences that increase the number of on-site and online visitors (China Daily, 2019; NHM, 2019b; Rea, 2019). For example, immersive and interactive museum and gallery experiences provide audiences with a real, tangible experience that enables them to step into another world (Cornacchio, 2021). In addition, they allow storytelling to be conducted in a dialogical approach that helps audiences to navigate the historical content (Allen et al., 2020), creating a privileged means for communication between exhibits and viewers. In doing so, they play an essential part in making culture accessible to mass audiences (Carrozzino & Bergamasco, 2010). Above all, immersive and interactive technologies have 'saved time' by allowing museums and galleries worldwide to connect with their audiences remotely during the lockdowns caused by the pandemic (Ng, 2021). Recognising the impact of immersive and interactive technologies on the growth of the museum and gallery sector, the UK and China are actively exploring opportunities to use these technologies to create bilateral collaboration in this sector. Furthermore, as China is seen as a key market for UK creative exports, several UK museums and galleries (such as the Natural History Museum and the Science Museum in London) successfully cooperate or attempt to engage with their Chinese counterparts (Charr, 2021; Science Museum, 2020). In parallel, in China, the 'Belt and Road Association's initiative encourages Chinese businesses in the creative industry to network with the UK businesses (BRA, 2021) and accelerate the global expansion of China's major museums and galleries. These efforts have influenced the co-creation of two cutting-edge immersive installations in the National Gallery space in London and the Natural History Museum in Shanghai in 2022 (StoryFutures, 2022). However, despite strong interest in and efforts to use immersive and interactive technologies for improving the museum and gallery experiences in both countries, there is still no concerted effort to understand the current and emerging trends in audience perception, consumption and behaviour in the sector in the UK and China. In particular, an emphasis on the use of extended reality (XR) technologies and applications, including virtual reality (VR), augmented reality (AR) and mixed reality (MR), and cultural exchange between the UK and China has been missing. Therefore, this research primarily discusses the key findings of user research exploring the awareness, experiences and preferences of the current museum and gallery audiences regarding (i) the immersive and interactive museum and gallery experiences and (ii) cultural exchange between the UK and China.

2 METHOD

The research comprises three interrelated parts: (i) exploration, (ii) examination and (iii) analysis and comparison. The first phase focused on a review of the literature and case studies using content analysis to understand immersive and interactive technologies in the museum and gallery sector. Particular attention was paid to case studies identifying similar and different tendencies in the use of immersive and interactive technologies across museums and galleries, notably in the UK and China. The data collected through the literature review and case studies were analysed in a content analysis approach. The analysis revealed salient topics, such as museums and galleries audiences' (i) current experience with and perception of the immersive and interactive technologies used in museums and galleries and (ii) interests in cultural exchange, that could not be explored in depth based only on the literature review and case studies. The topics were used to design an online questionnaire survey in the second stage. The survey aimed to gather at least 100 valid responses from participants in different age groups (from 18 years to over 65 years) selected randomly in the UK (n=50) and China (n=50). The survey was promoted via social media platforms in the UK (e.g. LinkedIn and Facebook) and China (e.g. WeChat). In total, 142 responses were obtained from the UK (n=70) and China (n=72), representing six age ranges (18–24, 25–34, 35–44, 45–54, 55–65 and over 65 years) (see Figure 1).

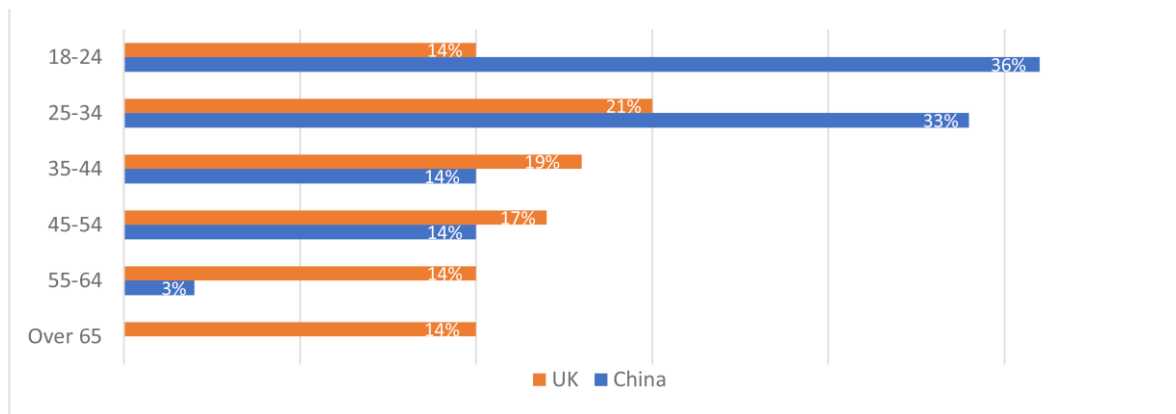


Figure 1. Number of respondents, according to age range in the UK and China

Lastly, the data collected via the questionnaire survey was analysed using both quantitative and qualitative analysis. A Microsoft Excel spreadsheet was used for closed questions with multiple answers, and content and thematic analyses were performed for the open-ended questions, considering the following five key themes: (i) audiences' awareness of museums and galleries, (ii) museum and gallery experiences, (iii) immersive and interactive museum and gallery experiences, (iv) expectations for immersive and interactive museum and gallery experiences and (v) interests in the cultural exchange between the UK and China. These themes were set up to address the lack of data on the current and emerging audience consumption and behaviour in the museums and galleries sector, particularly on using Extended Reality (XR) technologies and applications, including VR, AR and MR in the UK and China. The key findings for the UK and China were then compared to explore similarities and differences. In addition, some of the results were compared to observe details, taking into account the two different sampling sizes with varying ranges of age and gender (i.e. female and male). Figure 2 presents an overview of the research process.

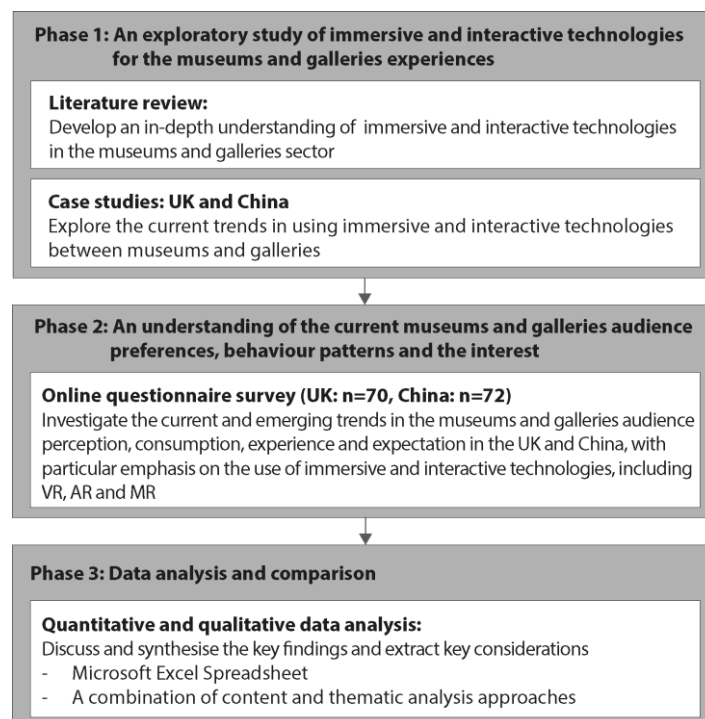


Figure 2. Research process

3 KEY FINDINGS AND DISCUSSION

3.1 Audiences' awareness of museums and galleries

To investigate UK and Chinese audiences' awareness of museums and galleries, this research explored three subjects: the audiences' (i) preferred type of museums and galleries for visiting, (ii) way of collecting information about museums and galleries and (iii) interests outside the museum and gallery sector.

The audiences in the two countries displayed similar preferences regarding the types of museums and galleries to visit and their interests outside the museum and gallery sector. For example, approximately half of UK and Chinese participants showed common responses in their preference for visiting art museums and art galleries. Interestingly, UK audiences in the 55–64 age group strongly preferred visiting history museums to other groups. Outside the museum and gallery sector, tourism was the theme in which participants in the two countries were most interested (UK: 16%, China: 28%). Crafts were also the most exciting for Chinese audiences (28%). Although tourism was the most interesting area for audiences in both countries, different preferences were observed between other age groups. For example, in the UK, tourism was reported as a major domain of interest for most age groups except for participants aged 35–44, who preferred festivals/events and sports, and those aged 45–54, who favoured crafts. However, participants in the 18–25 age group selected entertainment (alongside tourism) as their area of interest, and those in the 25–34 age group showed interest in various areas, including other opinions. In contrast, in China, tourism was reported as a major interest for the 55–64 age group, publishing for those groups 45–54 years and 35–44 years, crafts for the 25–34 age group and entertainment for participants aged 18–24.

The UK and Chinese audiences also differed in collecting information about museums and galleries. This information was mostly collected in the UK through online searches and visiting websites (50%); in China, social media platforms (58%) were the most used tool. Interestingly, none of the respondents in the UK reported collecting the information through TV channels or other methods. In contrast, some Chinese respondents stated that they obtained the information from TV channels and other tools such as the WeChat platform and map applications. Looking at the responses by age group in both the UK and China, participants under the age of 44 years mainly collected information through social media platforms and museum and gallery websites. Meanwhile, those over 45 years (especially in the UK) sought information primarily via online searches but also through recommendations from family and friends, particularly for those over 65 years of age in the UK. However, this avenue was not explored by participants aged over 65 years in China.

3.2 Audiences' museum and gallery experiences

Exploring the audiences' museum and gallery experiences was crucial to understanding the key factors influencing their visits to museums and galleries. The research identified some similarities in terms of the audiences' (i) frequency of visits to museums or galleries (before and after the pandemic), (ii) key motivation for visiting, (iii) important aspect of visiting, (iv) key aspect that enhances the experiences and (v) preferences between interactive digital and traditional experiences. Regarding the audiences' frequency of visits to museums or galleries (before and after the pandemic), the results demonstrate that the pandemic had a decisive impact on their visits to museums and galleries. UK and Chinese participants reported visiting such institutions 3–4 times a year before the pandemic (UK: 53%, China: 42%); after the pandemic, they visited museums and galleries once (UK: 30%, China: 33%) or twice (UK: 27%, China: 24%) per year. Personal achievements (e.g. learning, relaxing, spending time, having fun, etc.) were identified as the key motivation for visiting museums and galleries by the UK and Chinese respondents (UK: 59%, China: 47%), followed by spending time with friends and/or family. In contrast, conducting research or school assignments and entertaining out-of-town visitors were the least essential motivations for visiting museums and galleries. The most important factor when visiting a museum and gallery, mentioned by about two-thirds of participants in the UK and China samples, was the content of the exhibitions/displays. Around 70% of the participants in both

countries similarly described text information (e.g. labels on art pieces, descriptive panels), video installations and interactive screens providing information as enhancing aspects.

The comparison of the UK and Chinese audiences' preference between interactive digital experiences and traditional experiences showed that respondents in the two countries had a positive attitude towards interactive digital experiences (UK: 47%, China: 68%). Among the reasons for this positive perception of interactive digital experiences, respondents reported that digital experiences (i) allow the audience to have innovative and novel experiences that are more exciting and engaging and (ii) increase the audience's ability to understand the content in the exhibition by promoting accessibility and interaction with the content. At the same time, respondents with less positive attitudes towards interactive digital experiences stated that they prefer direct interaction and communication through real objects at museums and galleries over digital experiences (this primarily concerned people aged over 45 years in the UK). Although the age analysis did not reveal any significant differences in UK and Chinese audiences' preference between interactive digital experiences and traditional experiences, an interesting finding emerged from the gender analysis. In the UK, around half of female respondents preferred interactive digital experiences, but in China, 70% of male participants preferred these (see Figure 3).

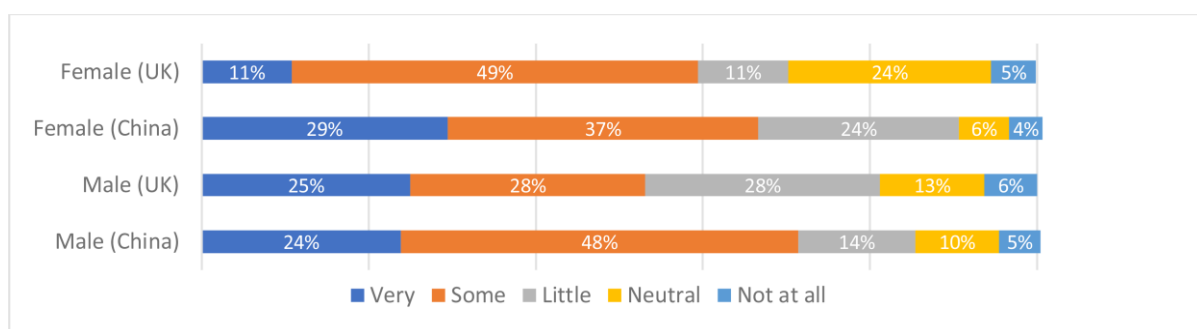


Figure 3. Preference between interactive digital experiences and traditional experiences by gender

3.3 Immersive and interactive experiences in museums and galleries

Immersive and interactive museum and gallery experiences were observed by exploring four subjects: (i) awareness of and (ii) experiences with immersive and interactive technologies from museums or galleries, including (iii) difficulties faced in using the technologies and (iv) improvements that can or should be made from the UK and Chinese audiences' perspectives.

A high rate of awareness of the immersive and interactive technologies used in museums and galleries was found among both the UK and Chinese respondents. Four optionable answers were presented: (a) 3D screens and projections, which allow the audience to feel a unique atmosphere, (b) self-led AR, which allows the audience to engage in some activities using individual digital devices, (c) interactive with VR, which is used to reconstruct and preserve the artwork in its original form through VR headsets. These technologies were identified based on the literature reviews and case studies. In the questionnaire, the participants could select multiple answers. Overall, UK and Chinese audiences were aware of the existing immersive and interactive technologies, in particular 3D screens and projection (UK: 81%, China: 90%), interaction with VR (UK: 80%, China: 82%) and self-led AR (UK: 70%, China: 75%). Most age groups in the UK and China knew about 3D screens and projections, AR, and VR equally. However, in the UK, 30% of respondents over 65 years of age did not know about or had never heard of it and, in China, in the 55–64 years age group, participants were only aware of 3D screens and projections. No data was collected for participants aged over 65 years on this topic.

Although similarly high awareness of the immersive and interactive technologies used in museums and galleries was similarly observed among the UK and Chinese audiences, their experiences differed. More than 90% of the respondents in China had experience with 3D screens and projections, while

only 50% of UK respondents did, and 21% of the UK respondents reported never engaging with any of the interactive and immersive technologies when visiting museums and galleries.

In addition, UK and Chinese participants' responses regarding the key obstacles they experienced when using immersive and interactive technologies in museums and galleries also differed. For example, half of the UK respondents singled out instructions for AR and VR content as the main obstacle, while 56% of Chinese audiences chose the use of AR and VR devices (e.g. using AR applications or wearing VR headsets). A similar difference also emerged from the gender analysis: more than half of UK female respondents experienced difficulties understanding the instructions for AR and VR contents, while more than half of Chinese female participants reported difficulties in the use of AR and VR devices as a key obstacle to engaging with immersive and interactive technologies. Figure 3 shows the main obstacles to experiencing immersive and interactive technologies depending on gender. In addition, UK respondents mentioned the hassle of long waiting lines to use the technology, equipment not working properly and the fact that the technology had become outdated after three years. Meanwhile, Chinese respondents cited hygiene concerns, the comfort of the devices and the redundancy of the instructions.

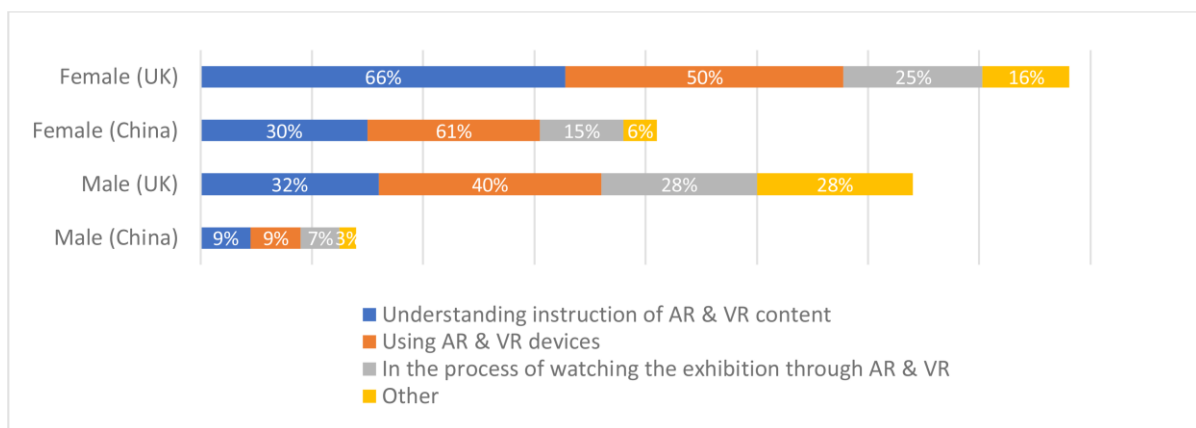


Figure 4. Obstacles encountered when using immersive and interactive technologies in museums and galleries by gender

Considering the audiences' experience with immersive and interactive technologies, especially the difficulties encountered when using them in museums and galleries, the following improvements were called for the most by the UK and Chinese audiences (see Figure 4): (i) providing a better explanation of AR and VR content, (ii) providing better instructions on how to use AR and VR devices, (iii) offering more experiences using immersive and interactive technologies and (iv) employing diverse immersive and interactive technologies. Other opinions included making the instructions more concise and the functions more practical and creating a hybrid experience by linking technology to physical exhibits.

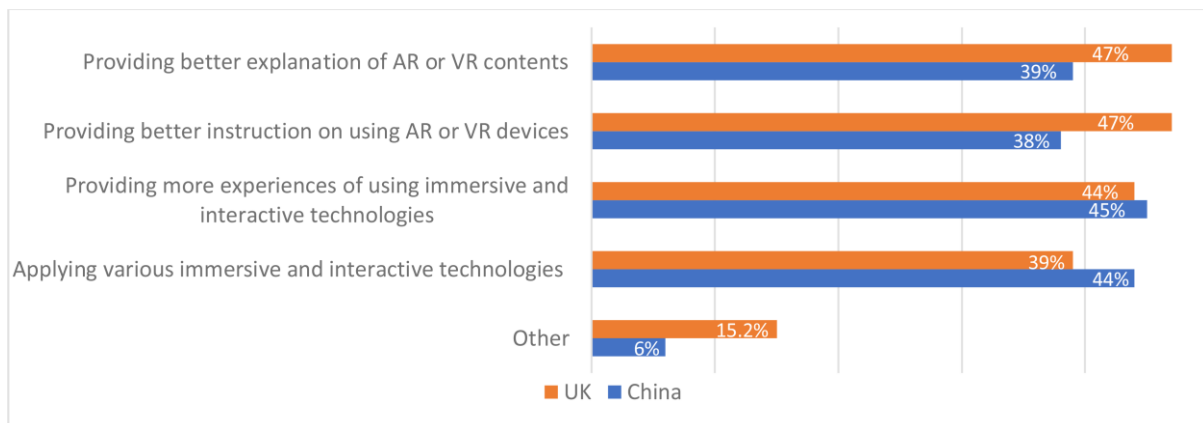


Figure 5. Improvements to the immersive and interactive technology experience in museums and galleries

3.4 Expectations for immersive and interactive museum and gallery experiences

Exploring audiences' expectations for immersive and interactive museum and gallery experiences helps to understand key considerations in developing such immersive and interactive experiences. Thus, it was important to investigate audiences' (i) expectations and (ii) preferences regarding these technologies.

Two-thirds of respondents in the UK and China had positive expectations regarding the use of immersive and interactive technologies to improve museum and gallery experiences. In particular, most respondents aged 18–25 years in the UK and China shared similarly positive expectations. In contrast, a very low rate of positive expectations was observed among Chinese audiences over 55 years old compared to UK audiences. In addition, different rates of positive expectations were identified among female and male audiences in the UK and China. For example, in the UK, female participants had more positive expectations than males, but in China, male respondents showed more positive attitudes (see Figure 6).

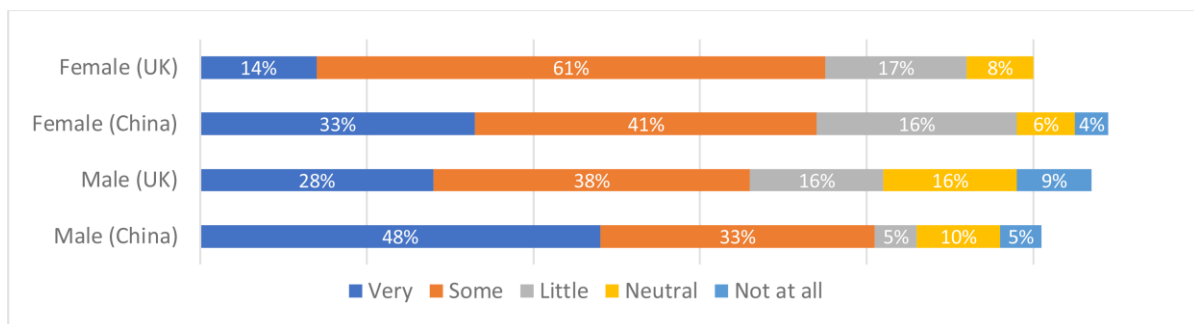


Figure 6. Positive expectations regarding the use of immersive and interactive technologies for improving museum and gallery experiences by gender

The respondents recognised the positive impact of immersive and interactive technologies for improving the museum and gallery experience for the following reasons: the use of immersive and interactive technologies (i) provides audiences with opportunities to participate in the exhibitions, (ii) interact with the exhibits to make audiences observe the latter more carefully and increase their ability to understand the content, and (iii) offers a more interesting and new experience of viewing the exhibits by allowing the audience to experience certain content that cannot be offered physically. In contrast, respondents who showed a less positive attitude pointed out the following aspects: (i) some audiences still prefer to look at the real object because this allows them to be affected more easily, (ii) existing museum and gallery experiences using immersive and interactive technologies provide limited experiences and (iii) limited experiences and the steps required to use immersive technologies often negatively affected audiences in terms of knowledge scalability.

Participants in the UK and China chose 3D screens and projections as their preferred media for experiencing immersive and interactive technologies in museums and galleries, followed by mobile devices (e.g. smartphones and tablets). However, compared to other respondents, UK respondents in the 18–25 age group exhibited a greater preference for immersive applications (e.g. VR headsets). Moreover, three participants in the UK had no preferences regarding the devices, and no responses were collected for participants over 65 years of age in China. Slightly different preferences were observed between female and male audiences in the UK and China. For example, female participants in both countries preferred 3D screens and projections, male respondents in China had the same preference as their female counterparts, but male audiences in the UK favoured mobile devices.

3.5 Interest in the cultural exchange between the UK and China

Lastly, this research explored the interest of audiences in the cultural exchange between the UK and China, observing (i) whether the audiences have experienced UK/Chinese cultural content from

museums and galleries in the UK and China, (ii) their opinion of the use of immersive technologies for improving the cultural exchanges, and (iii) what they want to explore from different cultures.

Most of the UK and Chinese participants expressed positive opinions regarding the use of immersive technologies for improving cultural exchange, except for those over 45 years of age in the UK and those over 55 years in China. Immersive and interactive technology can be a crucial driver for facilitating cultural exchange between the UK and Chinese museum and gallery sectors. The respondents who recognised the positive impact of immersive and interactive technologies on cultural exchange between the UK and China cited the following reasons: (i) immersive and interactive technologies allow audiences to experience different cultures in many ways, lowering cultural barriers and helping them to understand other cultures better, (ii) They also provide an element of entertainment, making the process of understanding and storing information easier and more meaningful than traditional methods. Additionally, (iii) these technologies make it easy to deal with in-depth details and allow better access to people who are unable to physically visit certain locations, which can also influence broader perspectives, improving economic and tourism opportunities. These opinions were mostly shared by the age groups under 45 years (18–24, 25–34, and 35–44 years). In contrast, the participants who evaluated the impact of using immersive and interactive technologies for cultural exchange between the UK and China less positively (i) do not understand how immersive and interactive technologies can influence cultural exchanges because of their limited experiences with the technologies, (ii) doubt that these technologies have a significant effect in this area when compared to politics and commerce, and (iii) believed that technology exchange is not cultural exchange. These opinions were particularly prevalent among participants older than 45 (45–54, 55–65 and over 65) age groups).

The research also identified several key issues in the current cultural exchange between the UK and China from the audiences' perspectives. For example, in both countries, participants—especially those over 35 years (35–44, 45–54, 55–64 and over 65 age groups)—pointed out the lack of opportunities to experience different cultural content from museums and galleries in each country, including a collaborative museum or gallery in an international context. Most UK and Chinese respondents who had experienced exhibitions of UK/Chinese culture from museums and galleries reported a lack of methods to experience the different cultural content from museums and galleries in the two countries. Audiences primarily experienced the different cultures of museums and galleries through text information (e.g. labels on art pieces and descriptive panels). Moreover, most respondents in the UK and China who had experiences with the UK/China cultural content from museums and galleries indicated that they encountered challenges in exploring detailed information about UK/Chinese culture or artefacts. However, differences in the answers by age groups were found in the UK sample. For example, participants aged 35–44 answered that understanding Chinese culture or artefacts was their main challenge; in contrast, those over 65 found these boring or unattractive. Respondents aged 55–64 years cited both of these challenges at the same time.

Concerning the worth of experiencing different cultural exchanges from museums and galleries, audiences in both countries provided similar answers, stating that understanding the different cultural contexts was the worthiest, followed by understanding the different histories and improving their knowledge of culture and arts. Interestingly, those aged 45–54 years in the UK had a similar rate of responses about experiencing more interesting and attractive artefacts and understanding the different cultural contexts. Moreover, audiences in the UK and China had different responses regarding the key aspect of the experience that the audiences would like to have with UK/Chinese content in museums and galleries. For example, in the UK, half of the respondents stated they would like to experience content related to history, and more than a third chose art. In particular, age groups 25–34 and 35–44 years showed a high rate of interest in experiencing Chinese content about history. However, the 18–24, 45–54, and 55–64 age groups chose art as the Chinese content they wanted to experience the most. In contrast, all age groups in China equally expected everyday aspects, arts, and history from UK content.

Lastly, this research observed the expectations and preferences of the audience for future collaborations in the museum and gallery sector between the UK and other countries (especially China). Most audiences in the UK and China reported wishing to see/explore/experience different

cultural contexts and histories. In the UK, participants aged 25–34 and over 65 years exhibited a different preference for future collaboration in the museum and gallery sector between the UK and other countries (including China) compared to other age groups. According to their answers, both age groups have the same rate of preference for more interesting and attractive artefacts and different cultural contexts/histories. However, in China, all age groups show a greater preference for different cultural contexts/histories.

4 CONCLUSION

The study aimed to understand audiences' awareness of experiences with and preferences for immersive and interactive museum and gallery experiences and cultural exchanges, relying on a questionnaire survey conducted in the UK and China. The findings revealed similarities between UK and Chinese audiences in the motivations for and important aspects of visiting museums and galleries, positive attitudes regarding using immersive and interactive technologies for museum and gallery experiences and improving cultural exchanges. They also exhibited a shared preference for museum and gallery experiences using immersive and interactive technologies that they want to experience in the future. Additionally, the audiences pointed out similar issues in engaging with immersive and interactive technologies for museum and gallery experiences and cultural exchange, such as a lack of experience with the technologies and the lack of methods for experiencing the different cultural content proposed by museums and galleries. At the same time, some differences were found depending on sample characteristics (i.e. countries, age groups and gender) regarding the methods employed for collecting information about museums and galleries, preference between interactive digital and traditional experiences, awareness of the immersive and interactive technologies used in museums and galleries, obstacles encountered when employing immersive and interactive technologies in museums and galleries and the key aspect of the experience that the audiences would like to experience different cultural content in the museums and galleries, among others. The findings of this research could be used to develop museum and gallery experiences with immersive and interactive technologies and cultural exchanges as they provide key considerations regarding the preferences of different age and gender groups. Thus, they can help to maximise the impact of immersive and interactive technologies and cultural exchanges in improving museum and gallery experiences. However, because the research focused on audiences' perspectives on immersive and interactive technologies and cultural exchanges, some practical insights and experiences of relevant stakeholders in the creative business, museums and gallery sectors were not explored. Therefore, further research is recommended to identify current trends and understandings of key research topics via practitioners in the creative business, museums and galleries.

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