360-DEGREE PANORAMIC VIRTUAL TOUR EXPERIENCE OF THE EPHESUS ARCHAEOLOGICAL SITE

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Abstract

The research aims to understand users' experiences of heritage sites presented through 360-degree panoramic virtual tour platforms. The Ephesus Archaeological Site was chosen as the study area. The study employed a qualitative research design, and interviews were conducted with 23 participants selected through purposive sampling. The data were coded using MaxQDA and analyzed through reflexive thematic analysis. The findings indicate that the virtual tour of the Ephesus Archaeological Site has deficiencies in its sensory and informational elements and that it offers an experience at the boundaries of usability. The study concludes that although users' experiences involve certain limitations, these limitations paradoxically contribute to strengthening their behavioral intentions. Users express an intention to recommend the virtual tour to others, as they perceive it as a tool for obtaining preliminary information. Moreover, the limitations of the virtual tour evoke curiosity among users, which in turn leads them to form an intention to visit the site in person. Future research could examine user experiences in virtual tours of other archaeological sites to explore their relationship with behavioral intentions. In this way, the role of site-specific real-world characteristics can also be identified.

Keywords: 360-Degree Panoramic Tour, Virtual Tour, Cultural Heritage Site, Ephesus Archaeological Site, Experience

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INTRODUCTION

The widespread use of the internet has enabled people to access a wide range of travel and tourism-related content effortlessly, at low cost and with high efficiency. The fact that presenting content in the digital environment is easier than it was yesterday has led to many outcomes, such as virtual tours (Panduputri, 2021). Virtual tours, which allow individuals to freely navigate a digitally created environment via the Internet (Durmaz, Bulut & Tankuş, 2018), are reaching increasingly wider audiences and gaining attractiveness thanks to the opportunities they offer (De Luca et al., 2022). The literature indicates that there are many types of virtual tours. 360-degree panoramic tours may be considered one type of virtual tour (Derman, 2012; Armutcı & Çalış, 2020; Halaç & Saatci İzci, 2021). These are created by linking multiple 360-degree photographs together and supporting them with interfaces and hotspots in a software environment (Utama, Wijanarko & Alfarobi, 2023). Since 360-degree panoramic virtual tours offer a more engaging visual experience compared to static images, they constitute an effective tool in tourism promotion (Osman et al., 2009), and today they are used across a wide range of areas such as destinations, cities, hotels, museums, and archaeological sites.

Individuals wish to explore not only the physical characteristics of the places they intend to visit but also what the experience of that place is like. Therefore, it can be stated that individuals' virtual tour experiences are important (Cho, Wang & Fesenmaier, 2002). It is noted in the literature that there are numerous studies on 360-degree panoramic virtual tours, and these studies generally focus on compiling related information (Ünver & Ulvi, 2022). However, in a systematic literature review, it is emphasized that research on such tours will continue to be an important need in the future (Gafar, Arif & Syefudin, 2022). Accordingly, this study can be considered significant, as it focuses on individuals' 360-degree panoramic virtual tour experiences of an archaeological site. In this context, the study first presents the conceptual framework of virtual tours and existing research on the subject. Then, the findings and conclusions regarding users' 360-degree panoramic virtual tour experiences are shared.

CONCEPTUAL FRAMEWORK

A virtual tour, a type of virtual experience, is defined as the experience of visiting a destination via computer (Cho et al., 2002). Another definition states that these tours are simulations of a real-world site that include multimedia elements (Alenazi & Demir, 2019). Participation in a virtual tour can be achieved using devices such as smartphones, computers, tablets, or virtual reality headsets (El-Said & Aziz, 2022). These tours can include elements such as audio, text, or three-dimensional models and offer users experiences based on 360° images and videos (De Luca et al., 2022). Virtual tours, also known as virtual walks (Jazbinšek & Hren, 2021), generally offer individuals convenience in terms of time and space. Therefore, individuals can experience the places they wish to visit at any time. Additionally, these tours enhance accessibility for individuals with disabilities or health conditions. Furthermore, they can

be less expensive than physical tours. Moreover, virtual tours have a low negative environmental impact (Retnosari, 2024; Dorokhova et al., 2025). On the other hand, the disadvantages of virtual tours include factors such as a lack of interaction in the user experience, technological and/or financial constraints, limited economic contribution to destinations, and potential health side effects in some individuals (Dorokhova et al., 2025).

In the literature, there are several concepts related to virtual tours. For example, it is emphasized that the terms "virtual tour," "3D tour," and "360 tour" are often used interchangeably, but that these terms have different meanings (Rodríguez et al., 2025). Researchers who support this view state that a "virtual tour" involves exploring a place in an immersive and engaging way. A "3D tour" is a three-dimensional digital representation of a place. "360 tour" provides a panoramic 360-degree view of the surroundings (Rodríguez et al., 2025). On the other hand, the term "360" can be seen used in conjunction with the concept of virtual tours in various studies in the literature (Gafar et al., 2022; Wu & Lai, 2022). Setiawan et al. (2020) stated that virtual tours can be presented using images, videos, or 3D models. Similarly, it has been emphasized that a virtual tour can be created using 360-degree panoramas (Dongre et al., 2022) and that these panoramic tours are a cost-effective form of virtual tour (Petousi et al., 2023). Therefore, it can be stated that the term "virtual tour" is conceptually an umbrella term. In this context, it can be inferred that 360-degree panoramic tours are a subtype of virtual tours created with 360-degree panoramic visual technology.

According to Rahaman et al. (2023), 360-degree panoramic tours resemble Google Street View, which is described as a highly useful tool due to its low cost, speed, and safety (Hernández & González, 2015). In these tours, 360-degree photos are linked together and presented to the user. This allows users to virtually explore the surroundings and discover more than with ordinary photos (Rahaman et al., 2023). These types of tours are typically designed to enable virtual access to collections offered by museums, historical sites, or cultural institutions (Rodríguez et al., 2025). When offered through low-technology platforms such as web applications, the public can easily access cultural heritage elements (Petousi et al., 2023).

Although this study centers on the 360-degree panoramic tour of an archaeological site, it is considered important to examine virtual museums presented through this type of format, since it has been stated that the 360-degree feature is frequently used in virtual museums (Gunawan & Lesmana, 2023). Indeed, in a bibliometric study on virtual museums, it was observed that "360-degree" features were used as a keyword, among other words, as a way to access articles (Aytekin & Aktaş, 2023). Therefore, it can be said that a 360-degree panoramic tour of an archaeological site and the way it is experienced are largely similar to those offered in virtual museums offered through this technology. In both cases, users may be able to experience a space they cannot physically access with similar opportunities in the virtual environment. Therefore, examining virtual museum studies created with 360-

degree panoramic tour technology in the literature is important for gaining insights into users' experiences.

Although the term "virtual museum" has been used in many publications since the 1990s, many alternative terms are still in use (Schweibenz, 2019). These alternative terms involve online museum, electronic museum, hypermuseum, digital museum, cyber museum, or web museum (Schweibenz, 2004; Schweibenz, 2019). However, to define it, virtual museums are generally defined as interactive electronic museums where users can navigate between rooms (Miller et al., 1992). According to another definition, these museums are based on information and communication technologies and enable the transmission of cultural heritage (Taranova, 2020).

The literature includes various studies on virtual tours and virtual museums presented in a 360-degree panoramic format. Generally, these tours can be said to be educational (Sürme & Atılgan, 2020) or to contribute positively to individuals' learning processes when used in education (Çınar et al., 2021; Rodríguez et al., 2025). Some studies focused on presenting people with virtual tours of a university campus (Daud et al., 2016; Ünver & Ulvi, 2022), a destination (Osman et al., 2009; Baura et al., 2018), a museum (Wiryawan & Nuraisyah, 2023), a historical hotel (Rahaman et al., 2023), or a church (Güleç Korumaz & Kilit, 2021). In this context, it is believed that such virtual tours can contribute to both the exploration and promotion of places.

Thanks to 360-degree panoramic tours, users can navigate and look around in virtual museums (Tjahjawulan & Sabana, 2015). Therefore, because the captured image provides only a partial sense of the space's atmosphere, the viewpoint in these museums is crucial (Gunawan & Lesmana, 2023). In this context, it can be argued that this is a technical element that directly affects users' virtual tour experiences. Furthermore, it has been reported that visual elements such as page layout, navigation, information display, color, texture, lighting, and shadow influence users' satisfaction, which in turn influences cultural engagement (Yu, 2025). Indeed, one study indicated that virtual tour satisfaction increases as the usability of the virtual environment increases (Sürme & Atılgan, 2020). In another study, the essential elements that should be included in the design of virtual museums offering 360-degree panoramic tours were highlighted in terms of users' experience. According to the study, virtual museums should offer sufficient information about the artifacts and enable users to get sufficiently close to them. Additionally, the resolution of the photographs should be effective. In other words, resolutions should neither be so low that they negatively impact quality nor so high that they create accessibility problems. Furthermore, the design elements of virtual museums should be cohesive, the typographic design should reflect the museum's identity and be legible, and the map and navigation designs should be functional. Finally, virtual museums should maintain their currency by taking into account the changes made in real museums, and these updates should be communicated to visitors (Kalıncı, 2015). Therefore, the fact that 360-degree panoramic tours can offer users similar experiences can be interpreted as an indication that these design principles may also apply to "virtual" archaeological sites.

Some studies have focused on users' experiences in virtual museums, which can be visited with a 360-degree panoramic view, compared to their experiences in real-world settings. For example, one study noted that the atmosphere during a real-world visit was more impressive. However, it was emphasized that while the virtual tour is beneficial in providing preliminary information about the museum, it is not motivating for an actual museum visit (Taşkıran & Kızılırmak, 2019). On the other hand, although similar findings were obtained in another study, it is noted that the content and functional limitations of the virtual museum spark curiosity in users about the real museum (Akgül, 2021). In this context, it is believed that 360-degree panoramic virtual tours do not have a one-sided impact on users. Although these tours do not always motivate the actual visit, they may increase users' curiosity about the real place. Similarly, in another study, points of interest belonging to often unknown or hard-to-access locations within a city were presented to users through a virtual tour. In the study, it was emphasized that the virtual tour had the potential to evoke users' curiosity, increase their interest, and provide motivation to explore the city (Petousi et al., 2023).

It can be observed that there are initiatives in Türkiye regarding virtual museums. These initiatives accelerated during the COVID-19 pandemic to enable people to access museums remotely (Çakan & Batu, 2024). For instance, the Republic of Türkiye Ministry of Culture and Tourism has presented numerous cultural heritage elements (museums, exhibitions, archaeological sites, etc.) to individuals under the title of virtual museums through 360-degree panoramic virtual tour opportunities (Kunt, 2023). Users can access cultural heritage elements via the web address https://sanalmuze.gov.tr/. This web address was created by the General Directorate of Cultural Heritage and Museums (a subordinate body within the Ministry of Culture and Tourism) (Kıvılcım & Çalışkan, 2022). This can be interpreted as allowing users to explore, experience, and even compare the virtual tours of different cultural heritage sites through a single website. However, Yeygel Çakır & Aktuğlu (2023) emphasized that this situation may negatively affect users' experience and prevent them from having a holistic experience. One study highlighted that users' satisfaction levels regarding the virtual museums on the aforementioned website are high. In addition, in the study, researchers stated that the virtual museum application is easy and convenient to use, but that informative content about the artifacts should be increased (Sürme & Atılgan, 2020). Similarly, another study reported that user satisfaction with virtual spaces on a related website was generally positive. Furthermore, the study noted that virtual tours were seen as an opportunity when visiting real museums wasn't an option, and that users were likely to revisit virtual spaces. However, it also highlighted some shortcomings in informational materials (such as audio or written narration and informational alerts) in virtual spaces, as well as the fact that the visuals were not realistic enough (Kıvılcım & Çalışkan, 2022). In another study, the features offered by different websites (https://turkishmuseums.com, https://muze.gov.tr, and https://sanalmuze.gov.tr) were compared. Nevertheless, it is emphasized that the virtual museum website (https://sanalmuze.gov.tr) meets the criteria for virtual tours. However, it is noted that compared to the others, only the virtual tours on the aforementioned website offer a zoom feature, although the image quality deteriorates when using it.

Additionally, deficiencies have been identified in areas such as personalization, audio options, guidance regarding cookies and privacy policies, and the ability to adjust font sizes (Cevher, 2024).

This research focuses on the virtual tour of the Ephesus Archaeological Site. The virtual museum website (https://sanalmuze.gov.tr) offers users two virtual tours of Ephesus. One is the Ephesus Archaeological Site and the other is the Ephesus Museum. It can be seen that studies focusing on the virtual tour of the Ephesus Archaeological Site are limited. For example, one study evaluated the Ephesus Archaeological Site and the Ephesus Museum. The evaluation emphasized that the images in the 360-degree panoramic tour of the Ephesus Archaeological Site reflect the conditions during the COVID-19 period. Furthermore, the absence of actual visitors in the images was considered a factor that facilitated access to information. Additionally, the presence of photographed cats was highlighted as reinforcing the feeling that the site is a living place. Finally, the study noted that while the virtual tour provided basic information about the site, its exclusive focus on landmarks made it difficult to grasp the entirety of the ancient city. In addition, the 360-degree viewing feature was found to enhance the effectiveness of the virtual tour (Doğan, 2025). In another study, cultural heritage elements featured on a virtual museum website were categorized, and the virtual tour of the Ephesus Archaeological Site was reported to fall into the category of historical museums. The study found that the inclusion of the terrace houses, which individuals can visit for an additional fee during a real-life visit, was beneficial. However, it was noted that the informational signs on the virtual tour were unclear, and some structures were not fully visible (Yıldız et al., 2022). In another study, a 360-degree video of the Ephesus Archaeological Site was viewed by participants using virtual reality glasses, and it was emphasized that this experience positively affected their travel motivation (Öngider & Yazıcı, 2020).

METHODOLOGY

The research aims to understand users' experiences of heritage sites presented through 360-degree panoramic virtual tour platforms. Considering the aim of the study, a basic qualitative research design was adopted in this study, which does not rely on a specific qualitative methodology but aims to derive meaning from individuals' experiences (Caelli, Ray & Mill, 2003; Merriam & Tisdell, 2016).

The Ephesus Archaeological Site virtual tour was chosen as the study area. This was influenced by the fact that the site had an 18% increase in actual visitor numbers in 2024 compared to the previous year (Bağış, 2025), ranked first among archaeological sites in Türkiye in the first eight months of 2025 (Tourism Today, 2025), and is listed on the UNESCO World Heritage List (UNESCO, n.d.). A 360-degree panoramic virtual tour of the Ephesus Archaeological Site is available at https://sanalmuze.gov.tr. Moreover, this virtual tour is one of the most prominent among the other tours on the aforementioned website (Kuzu et al., 2024).

The interview technique was chosen as the data collection method for this study. Generally, it is stated that there are three types of interview techniques (Corbin & Strauss, 2015). One of these, the

semi-structured interview technique, is widely recognized as an important tool in qualitative research and provides flexibility to researchers (Ruslin et al., 2022). In this context, a semi-structured interview technique was preferred in the research, and a form was prepared. The form included questions about individuals' tendencies to visit cultural heritage sites, their perceptions of virtual tours, their experiences with the Ephesus Archaeological Site virtual tour, and how the virtual tour shapes their behavioral intentions. In addition, expert opinion was utilized in preparing the interview form (Tutar, 2022). In line with the expert feedback, an additional question assessing whether the virtual tour provides information was included in the interview form. Thus, the final version of the form was created, and then ethical approval was obtained from the Social Research Ethics Committee of İzmir Kâtip Çelebi University (Approval No: 2024/10-03).

The study was conducted with a total of 23 participants selected through purposive sampling. 12 participants had previously visited the Ephesus Archaeological Site physically, while 11 participants had only experienced the site virtually. Throughout this process saturation was kept in mind (Creswell & Creswell, 2022). All participants experienced a 360-degree panoramic tour of the Ephesus Archaeological Site on a computer or tablet before the interviews. Participants were also informed that the data obtained from the interviews would be used only for scientific purposes, and with their permission, the interviews were audio-recorded. The interviews were conducted through a collaborative effort between the first and second authors. Although the second author conducted most of the interviews, the data collection process was supported by continuous feedback and discussions with the first author. To ensure data saturation, the first author conducted three additional interviews. Interviews generally lasted 15-20 minutes.

The recordings were transcribed, and each transcript was saved as a different Microsoft Word document. Participants were anonymized as P1, P2... P23. The first 12 participants (P1-P12) were those who had previously physically visited the Ephesus Archaeological Site. The others had only experienced the site virtually. The interview data were analyzed using reflexive thematic analysis within an interpretative perspective (Braun & Clarke, 2019). First, to ensure familiarity with the data, the transcripts were read, notes were taken, and then coding was performed. Given the numerous benefits of computer-assisted software for qualitative researchers (Bogdan & Biklen, 2007; Corbin & Strauss, 2015), the coding process was conducted using MaxQDA 24. The entire coding process was carried out inductively by the first author.

The academic and professional backgrounds of the researchers shaped the process of creating the final themes. The first and third authors have a scholarly interest in the relationship between tourism and technology. The second author completed a bachelor's degree in tourism guidance and therefore possesses knowledge of archaeological sites. In addition, each researcher experienced the Ephesus Archaeological Site at different times, both physically and 360-degree virtual tour, and interpreted these experiences through their own perspectives. In this context, the codes and initial themes were discussed

among all authors to elaborate interpretations and enhance the richness of meaning, from which the final themes were created. The themes are presented with direct quotations from participants' statements. Finally, behavioral evaluations were conducted for two participant groups. One of these groups had previously visited the Ephesus Archaeological Site in person and later experienced the virtual tour, whereas the other group had only experienced the virtual tour.

FINDINGS

Under the findings heading, participants' information, virtual tour perceptions, reflexive thematic analysis findings, and intergroup evaluations are presented in detail. Table 1 presents the information regarding the study participants.

Table 1: Participants' Information

Participant No	Gender	Age	Highest Level of Education Completed	Previous Virtual Tour Experience	Type of Visit to Ephesus
P1	Male	24	High School	Experienced	In-person + Virtual
P2	Male	23	High School	First Time	
P3	Male	25	High School	First Time	
P4	Female	25	High School	First Time	
P5	Female	24	Bachelor's Degree	First Time	
P6	Female	24	Bachelor's Degree	First Time	
P7	Female	30	Bachelor's Degree	First Time	
P8	Female	21	High School	Experienced	
P9	Female	37	High School	First Time	
P10	Female	23	High School	First Time	
P11	Male	27	Bachelor's Degree	First Time	
P12	Male	28	Bachelor's Degree	Experienced	
P13	Female	30	Bachelor's Degree	Experienced	Only Virtual
P14	Male	23	High School	First Time	
P15	Male	25	High School	Experienced	
P16	Female	38	Bachelor's Degree	Experienced	
P17	Male	22	High School	Experienced	
P18	Female	24	High School	First Time	
P19	Female	28	Bachelor's Degree	First Time	
P20	Male	24	Bachelor's Degree	First Time	
P21	Male	32	Bachelor's Degree	Experienced	
P22	Female	31	Doctoral Degree	First Time	
P23	Male	28	Master's Degree	Experienced	

According to Table 1, the gender of the participants was balanced. The participants were mostly in their 20s. Some participants (n=9) had previously experienced a virtual tour. The first 12 participants had experienced Ephesus both in person and virtually. Additionally, participants were also asked about the frequency with which they visited cultural heritage sites, such as archaeological areas, in their everyday lives. Almost all participants reported that they visited such sites only in the context of a tourist trip.

Participants' perceptions of virtual tours were investigated. Narratives of participants about the virtual tour were coded based on their statements. It was observed that participants touched on multiple

topics in the coding process. Therefore, a statement from the same participant was coded numerous times. The codes were then categorized by similar content. These findings are illustrated in Figure 1.

Figure 1: Participants' Perceptions of Virtual Tours

Video content (1)   360-degree immersion (1)
Website-based access (1)   Digital interface (1)   Cost-related concerns (1)
Online access (2)   Remote engagement (2)   3D viewing (2)   Internet-based access (2)
Image-based content (3)   Street View–style navigation (3)
Experience-Oriented Perspective

Participants' Perceptions of Virtual Tours

Function-Oriented Perspective

Obtaining preliminary information about a location (3)   Exploring locations that cannot be physically visited (3)
Examining a location prior to an actual visit (1)   Gaining an initial impression (1)
Visual satisfaction and informational gain (1)   Accessibility (1)

Device-Oriented Perspective

Computer (laptop/desktop) (5)
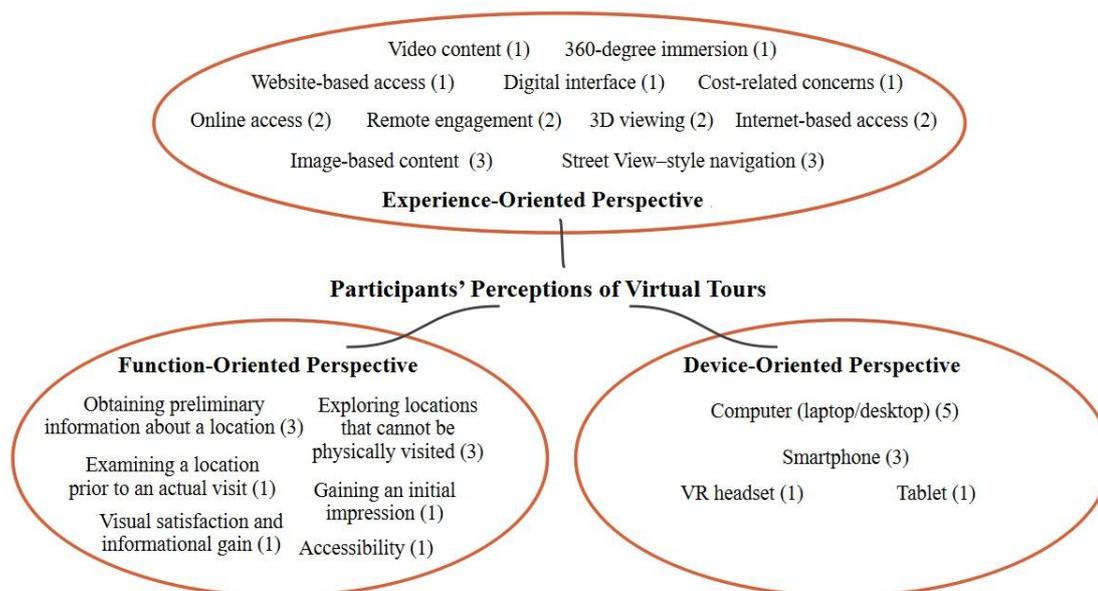Smartphone (3)
VR headset (1)   Tablet (1)

Figure 1 shows the virtual tour perceptions of participants in three categories. According to the experience-oriented perspective, participants generally regarded virtual tours as visually based, online, and street-view style. This finding is thought to be significant as it highlights the connection between virtual tours and 360-degree panoramic tours. From a device-oriented perspective, participants indicated that virtual tours were conducted through various tools such as computers and smartphones. Finally, from a function-oriented perspective, they regarded virtual tours as a way to learn about real locations and explore places they cannot visit.

Reflexive Thematic Analysis

This section of the research presents the findings of a reflexive thematic analysis. Based on the experiences of users, the authors created two main themes. Each theme is explained in detail and supported by quotes from the participants.

Theme 1: A Visual Experience with Sensory and Informational Deficiency: I See but I Don't Feel or Understand

This theme reflects the perception that the Ephesus Archaeological Site virtual tour offers a visual experience but falls short in sensory and informational aspects. As the participants stated, "*This virtual tour would be enough for people who just want to see*" (P1) and "*Here we are only presented with visuals*" (P8), indicating that the 360-degree panoramic virtual tour primarily offers a visual experience. However, participants reported that they could not access information about the site's structures and did not feel they were actually present during the virtual tour.

The narratives of participants center around the idea that the virtual tour appeals only to the sense of sight. For instance, one participant stated, "*I couldn't feel the history of that place. Since I couldn't get that feeling in the virtual tour, it actually felt as if I were just looking at a photograph while wandering around*" (P10). On the other hand, another participant remarked, "*You know when you look at a point, and then you slowly want to observe your surroundings? When I did this with the mouse, I truly felt as if I were there, as if I were turning my head and rotating around myself. I really enjoyed that*" (P19). These differing views indicate that some participants directly reflect their personal characteristics and expectations onto their experiences. Indeed, some participants place importance on the "sense of touch" due to their personality traits. P8's words, "*I am a person who likes to touch and feel by touching. This is not very possible in a virtual tour*", illustrate this situation. Some participants expressed that VR technology is necessary for a sensory experience. For instance, one participant stated, "*That can be achieved with VR technology, but apart from that, it is difficult because you will not be able to fully focus in any way. You are just looking, a single visual*" (P14). Another participant drew attention to the idea that a sense of being there could be achieved when different senses are offered together to users. The participant's statements are as follows:

> "*Only my visual sense was active during the virtual tour. For example, a sound effect would have been better. Perhaps background music or music representing ancient times while exploring ancient cities would have enhanced the experience. Of course, because the tour only appealed to my visual sense with limited resources, I couldn't fully feel like I was there. If it appealed to multiple senses, I might feel more like I was there*" (P7).

Regarding informational content, the absence of written or audio explanations during the virtual tour significantly limited the experience of participants. For instance, one participant expressed this situation with the statement, "*I couldn't get any information about the place we visited, where is this place? What is there? What does this stone, this column, or this picture represent?*" (P17). Additionally, it can be said that, as another participant stated, "*I think it would be much more beneficial to introduce the area with an AI while you're walking around here*" (P4), presenting narratives integrated with current technologies is important for positive experiences. On the other hand, some participant statements show that the importance attributed to informative elements is conveyed by associating them with virtual museums. For example, one participant stated, "*Any painting exhibition can be visited digitally, but I think such open-air sites definitely need to be visited in person. If it were an enclosed museum, I would still think it should be visited physically, but I wouldn't necessarily say definitely in that case*" (P12). This situation indicates that participants have different expectations regarding the virtual tour of open-air sites or archaeological areas. Similarly, another participant expressed this situation with the following words;

> "*I expected an audio component... I expected there to be a voice describing the place, because I think having a narrator is particularly important in ancient cities. For example, when it comes to paintings or artworks, I believe I have at least some knowledge, or I can interpret what I see when I look at them... but for an ancient city, having someone explain things is very important, because more than half of what you're looking at is already ruined*" (P22).

Additionally, some participants' narratives indicate that 360-degree panoramic virtual tours can be supported not only by written or audio elements but also by visual techniques. Participants' statements such as, "*There could be 3D renderings and animations of the structures. This way, we can obtain visual information about the intact state of the place*" (P21) or "*... I would actually like to know what the Ephesus Ancient City looked like before. Completed visuals could have enhanced my experience*" (P7) further emphasize the search for information, but also reveal the expectation that this can be achieved through visuals. Therefore, this situation indicates the need to enrich visual content with various informative elements to enhance the overall experience. Some participants emphasized that the virtual tour offers preliminary information about the environment and the location. One participant explained this as follows:

"*It actually gives me preliminary information about everything I will encounter when I go there. For example, is there a gift shop? Is there an indoor area? What should I wear depending on the season when I go? I mean, is there a place where I can take shelter if it rains or not? ... When you go there, you see everything from the entrance onward. So, thanks to this application, I know very well what I will be confronted with*" (P23).

When the participants' statements are evaluated as a whole, it is possible to conclude that they make sense of their virtual tour experiences through the lens of informational deficiency and limited sensory elements. In addition, the participants' narratives suggest that this virtual tour is perceived as a tool for preliminary information or initial familiarization.

Theme 2: An Experience at the Boundaries of Usability: I move around, but I lose my way and cannot see the details

This theme reflects that the virtual tour experience of the Ephesus Archaeological Site is shaped predominantly by limitations regarding usability. These limitations particularly concentrate on mobility. Participants expressed that the hotspots providing direction in the virtual tour did not offer sufficient accessibility. For example, one participant stated, "*I cannot access some areas, but if I were walking there myself, I would examine the places I want to see. This is somewhat more restrictive for me*" (P9). In addition, participants stated that they experienced a loss of direction in the virtual tour due to the site being a large open area. Accordingly, elements such as the absence of any route or map created a sense of being lost among participants. One participant expressed this situation with the following statements:

"*In my opinion, this system is already designed for smaller spaces. Nothing else has been added to this archaeological site, nor has it been specifically designed for this location. I'm saying this because this system might be sufficient for examining specific objects or artifacts in a closed space. However, in such a large environment, you miss a lot of detail and get lost in the spaces. Perhaps a route could be created with a mapping system, marking the visited places, and enabling you to move within a scenario*" (K22).

The inconsistency in the clarity of the visuals, as well as the inability to sufficiently zoom in on the details of the structures or on the informational signage in the environment, emerged as another pattern that limited participants' experiences. Participants' explanations such as "*There is a problem with the visuals. Some parts are blurry, and we cannot clearly see every place we want. The texts were*

not readable either" (P16) or "*Normally in Ephesus there are boards that provide specific information about that area or that structure, but I cannot even get close enough to read those boards. For instance, there are also inscriptions inside the library. I already cannot read them, but I would have liked to see them more clearly*" (P3) indicates this situation.

Some participants found the features of quick access buttons and short introductory videos for certain structures in the virtual tour to be helpful. Participants' narratives, "*It was good to be able to navigate directly to the designated sections under headings. It prevented us from wasting time trying to navigate there in vain*" (P20), and "*Visually, there were videos on some structures. We had the opportunity to see more of the sculptures and carvings on the ancient structure. Frankly, I liked that*" (P13), illustrate this point. Furthermore, some participants commented on the positive aspect of the virtual tour, noting that it provides access to the terrace houses section, which normally requires an additional entry fee. One participant, although finding this situation positive, nevertheless emphasized the limitations in terms of mobility. K3 stated, "*There are terrace houses, but they are normally paid. It was nice to see the inside of that place, but I was very confused inside. I felt like I was constantly spinning in a circle*".

Finally, some participants cited the virtual tour's lack of up-to-dateness as an additional limitation. For example, one participant stated,   "*Unfortunately, it didn't offer a similar experience to my previous visits. I realized the tour wasn't up-to-date*" (P7). Another participant's statement, "*Ephesus is a place that looks beautiful even at night. You can even go and tour at night. There could have been a button on the website to toggle between day and night*" (P15) emphasizes, on the one hand, this refers to the inclusion of the site's current on-site features; on the other hand, it involves presenting these to users through technical add-ons.

When the participants' narratives are evaluated as a whole, it indicates that the participants make sense of their virtual tour experiences largely through the boundaries of their usage features, and these limitations become one of the main elements that shape the flow of the experience.

The Relationship between Participants' Virtual Tour Experience and Behavioral Intentions

Following the reflexive thematic analysis, evaluations regarding the relationship between participants' experiences and behavioral intentions are presented under this heading.

Although participant statements focus on the fact that both the presentation of information and the sensory elements in the virtual tour contain certain limitations, these limitations nevertheless led them to become curious about the real site. Indeed, the role of the virtual tour in providing "preliminary information" appears to be influential in fostering this curiosity, as reflected in one participant's remark: "*As preliminary information, it truly arouses curiosity in a person*" (P14). In this regard, the curiosity expressed by participants emerges as a factor that strengthens their intention to visit the actual site. Participants stated, "*Not because the tour was very impressive and encouraging, but because it was*

rather insufficient …" (P15), and "*The shortcomings in the virtual tour actually sparked my curiosity… I mean, it definitely made me want to go and see it on-site and to learn something about the civilizations that once lived there. Since I did not get what I expected from the virtual tour, it created a desire to visit*" (P13).

On the other hand, one participant associated the unique characteristics of the site with the intention to visit the actual site, rather than a lack of information. In other words, the physical and atmospheric elements of the cultural heritage attraction, for which a virtual tour is created, can be decisive in encouraging physical visits. The participant's explanations are as follows:

> "*Seeing how magnificent and detailed the structures were on the virtual tour made me want to experience it in person. However, this could also have the opposite effect. Visualizing, through this technology, a place that has high cultural heritage value but appears less spectacular may also create the perception of Why should I even go there? I believe the purpose of the virtual tour is not to pique curiosity but to enable those who don't have the opportunity to visit to gain the same experience and knowledge as if they were there*" (P21).

Among participants who had previously visited the Ephesus Archaeological Site physically, some expressed an intention to revisit the actual site after the virtual tour. This intention was shaped by participants' recollection of their past visits or a renewed sense of longing for the place following the virtual tour. Participants articulated this situation by stating, "*I did not have Ephesus in mind before, but it brought it back to my mind now*" (P3) and "*I will visit ... I realized that I missed the place*" (P11). In this context, although certain shortcomings were mentioned regarding the virtual tour, the experience appears to strengthen the desire to revisit the site among those who have already been there, while also fostering an intention to visit for the first time among participants who have never visited before. Overall, it can be stated that there is no notable difference between participant groups in terms of their intention to visit.

Additionally, since participants evaluated the virtual tour as a tool for "preliminary information/initial familiarization," they expressed an intention to recommend it to people who are unfamiliar with the Ephesus Archaeological Site or who do not have the opportunity to visit, so that they can gain an initial understanding of the place. For example, one participant stated, "*In general, I would recommend it. For instance, with this platform, before going, you can open it and take a look, create a route, or obtain preliminary information about what you will encounter when you arrive, so I think it is useful*" (P4). Therefore, whether it is the group that first visited the site physically and then experienced the virtual tour, or the group that experienced only the virtual tour, it can be stated that all participants tend to recommend the virtual tour to others.

CONCLUSION

This research focuses on users' experiences with the 360-degree panoramic virtual tour of the Ephesus Archaeological Site. First, participants' perceptions of the virtual tour were examined. Based on the findings obtained, it was concluded that participants perceived the virtual tour as a tool for making

pre-visit evaluations about a location and for providing access to locations that cannot be visited in real life. In addition, it was also concluded that participants perceived the virtual tour as a 360-degree panoramic tour. Therefore, it can be inferred that there is no distinct perception regarding virtual tours presented with different features.

Users' experiences are shaped around two themes. The first of these is manifested through the deficiency of sensory and informational elements in the virtual tour. Users frequently described that the virtual tour offered only visual content. Therefore, it was concluded that the use of solely visual components in 360-degree panoramic virtual tours is a factor that weakens the sense of presence. This situation is thought to stem from users' experience of the virtual tour through computer/tablet devices. Indeed, one study emphasized that head-mounted displays provide a higher sense of presence compared to tools such as flat screens or hand-held displays on 360-degree panoramic platforms (Shinde et al., 2023). However, it was concluded that, alongside the type of devices to be used, users need additional sensory elements that complement the visuals in enhancing their sense of presence and in enabling them to have a positive experience in this study.

Another factor related to users' experiences has been the informative components. The study shows that the 360-degree panoramic virtual tour of the Ephesus Archaeological Site does not provide users with sufficient information. This result parallels the findings of studies conducted within the scope of different virtual tours created with similar technology in the literature (Sürme & Atılgan, 2020; Kıvılcım & Çalışkan, 2022; Cevher, 2024). In this regard, it can be stated that, in general, 360-degree panoramic virtual tours are not fully adequate in providing information. However, since a general idea of the environment and space can be obtained, it has been concluded that this virtual tour is perceived by users as a tool for "*pre-information / preliminary familiarization*." Similarly, it has been emphasized that this virtual tour provides basic information but, by focusing only on landmark structures, makes it difficult to understand the ancient city as a whole (Doğan, 2025). Moreover, it is seen that in the study, participants' narratives regarding the informative components were expressed in relation to virtual museums. Therefore, this situation is thought to point to a different topic of discussion. Another finding of the study is that, since the artifacts exhibited in virtual museums are generally holistic and relatively well-preserved objects, it may be possible to derive a certain meaning even without any information. In contrast, because most of the physical remains in archaeological sites are ruined or fragmented, the absence of historical, archaeological, or content-oriented informational elements in virtual tours prepared for these areas may restrict users' processes of making meaning. In this context, the study concludes that informative components are among the main factors shaping users' experiences, particularly in virtual tours of archaeological sites.

The second theme was created from the limitations in use. According to the findings obtained, it has been concluded that there are limitations regarding mobility in the 360-degree panoramic virtual tour of the Ephesus Archaeological Site. Users stated that they could not sufficiently approach the places

they wanted, the information panels, or the structures within the virtual tour. In addition, it has been concluded that the images in this virtual tour generally do not have good resolution and that the virtual tour does not present the real site in an up-to-date manner. Therefore, this result reveals that, just as certain requirements are emphasized in virtual museum design (Kalıncı, 2015), these elements should also be present in virtual archaeological sites. In this way, it can be argued that users' experiences can be improved. In the study, the inclusion of the terrace houses, which require an additional entrance fee during a physical visit, in the virtual tour was highlighted as a positive aspect. This result parallels the findings of a study in the literature (Yıldız et al., 2022). Furthermore, the presence of hotspots that enable rapid access to certain areas in the 360-degree Ephesus Archaeological Site virtual tour, as well as short videos providing details of some structures, was also concluded to be elements that contribute positively to the experiences of users.

The study concludes that although the experiences of users contain certain limitations, these limitations function as factors that strengthen their behavioral intentions. Therefore, the study reveals that participants generally intend to physically visit the Ephesus Archaeological Site after the virtual tour. This result parallels the findings of some studies (Akgül, 2021), while differing from others (Taşkıran & Kızılırmak, 2019). It is thought that this situation stems from the physical characteristics of the place for which the virtual tour was created. Indeed, although some participants stated that they wanted to physically visit the Ephesus Archaeological Site due to the lack of information in the virtual tour, it was also indicated that this outcome could be influenced by the site's own characteristic features. Additionally, previous research reported that viewing a 360-degree video of the Ephesus Archaeological Site through virtual reality glasses positively influenced participants' travel motivation (Öngider & Yazıcı, 2020). Similarly, the results of the present study suggest that 360-degree panoramic virtual tours accessed via computers and tablets can also positively affect travel motivation. Overall, it is thought that the 360-degree feature plays a central role in shaping users' travel motivation. In addition, it was concluded that participants intended to recommend the virtual tour to individuals who are unable to visit the site physically or who are simply curious about it, as they considered it a tool for pre-information / initial familiarization. No remarkable difference was observed between the participant groups (those who completed the virtual tour after previously visiting Ephesus physically and those who only completed the virtual tour) in terms of their behavioral intentions.

This study is considered to contribute to the literature on 360-degree panoramic virtual tours. As emphasized by Gafar, Arif, & Syefudin (2022), research focusing on such tours is expected to be important in the future. In addition, it is known that studies on 360-degree panoramic virtual tours generally concentrate on virtual museums. In this regard, the fact that the present study focuses on an archaeological site is regarded as significant. Moreover, although it is noted that there are many studies on 360-degree panoramic virtual tours, these studies are generally reported to focus on compiling related

information (Ünver & Ulvi, 2022). In contrast, the present study provides insights into how 360-degree panoramic virtual tours are interpreted and made meaningful by users.

In line with the results of this research, practical contributions to the development of the 360-degree panoramic Ephesus Archaeological Site virtual tour are as follows;

- Informative components should be incorporated into the virtual tour. These components may be presented through audio narration, written explanations, or visual techniques that illustrate past lifeways. Since such techniques appeal to users' senses, they are also important for enhancing the sense of presence. Additionally, users' interaction and experience can be enhanced through AI tools via an add-on such as "Talk to the Archaeological Site" or "Chat with the Archaeological Site" in 360-degree panoramic tours.

- Mobility within the virtual tour should be improved. Users should be able to sufficiently approach the structures and existing information panels.

- The virtual tour should be updated. For example, nighttime tours are currently organized at the Ephesus Archaeological Site, and offering a nighttime view in the virtual tour could increase visitors' curiosity and interest in the site.

- The quality of the visuals in the virtual tour should be improved.

- Since the Ephesus Archaeological Site covers a large area, the virtual tour should include a map that shows users where they are at any given moment.

There are certain limitations in this study. The evaluations of the experiences of users were based solely on the 360-degree panoramic virtual tour of the Ephesus Archaeological Site. Future research may have participants experience virtual tours of different archaeological sites created with similar technology. It is thought that this would enable a comparison of user experiences and allow an examination of whether differences among the physical sites represented virtually influence users' intentions toward visiting those sites.

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NOTES

1- In the creation of the final manuscript, AI tools were used solely to support language editing and refinement, as the authors are not native speakers of English.