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THE INFLUENCES OF THE INTERACTIVE SYSTEMS ON MUSEUM VISITORS' EXPERIENCE: A COMPARATIVE STUDY FROM TURKEY

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Abstract

To the effect, technologically advanced interactive systems, settled in modern-day museums research new ways to offer a positive experience to the visitors and encourage them to return, using modern communication and learning tools. This paper examines user interaction applications of a recent digital cultural heritage exploration project concerning of the most popular three museums (Mardin, Şanlıurfa, Gaziantep Museums) that are located in different cities of the southeast region of Turkey. The project aims at enriching the visitor experiences through modern digital technologies. Main modules include 3D scanning of the artifacts, information screens and mobile interaction with Augmented Reality (AR). In this paper, it is explored and compared the visitor perceptions and experiences for three museums. For this purpose, two scales were used for data collection. In accordance with the first aim of the study, the scale adapted by Chung, Han & Joun (2015) which is to explain visitors' acceptance of based on the interactive systems. Secondly, Lee & Smith's (2015) multiple-item scale was used to measure tourists' visiting experiences at the selected museums. Moreover, the findings explain the influences of interactive applications on visitor experiences according to the museums and comparatively. The study supports that the interactive systems provide a functional role to learn about the heritage and manifest important practical implications for museums in relation to interactive systems.

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1. INTRODUCTION

New technologies allow the museum to imagine creating new experiences and digital technologies (virtual reality, augmented reality, mobile devices etc.) and the museum experience explores the ways in which mobile device and digital technology can be used to enhance and transform the visitors' experience of the museums (Bradburne, 2008). The trend is toward personal relevance and interpretations, interactivity, easy access and control of content to shape today's museum visitors' experience (Tallon, 2008). Museums have gradually acquired visitor-based roles instead of museum-based roles and therefore, the need for visitor studies has emerged (Weil, 2000; Sheng & Chen, 2012). The goal of the research described in this paper is to explore and compare the visitor perceptions and experiences for three museums which are located in different cities (Mardin, Şanlıurfa, and Gaziantep) of the southeast region of Turkey. Therefore, this study designed a questionnaire on museum visitor experience and perceptions using a quantitative approach according to the definition of experience by Chung, Han & Joun (2015) which is to explain visitors' acceptance of based on the interactive systems and Lee & Smith's (2015) multiple-item scale was used to measure tourists' visiting experiences at the selected museums.

2. LITERATURE REVIEW

As societies change from industrially-based to knowledge-based economies, lifelong and free-choice learning is gaining increasing attention (Falk & Dierking 2000). Hence, the informal learning sector and leisure settings will have an increasingly important role in society. Such leisure settings may include art, history and natural history museums, botanical gardens, nature centers, national parks, science centers, zoos, aquaria, historic houses, historic reconstructions, heritage and archaeological sites and commercial tourism facilities (Packer & Ballantyne, 2002). Although there are so many leisure settings, museums are probably the best known and most researched of all educational leisure settings. Museums are extraordinary places where visitors have an incredible range of experiences (Hein, 1998). Millions of people, young and old, alone and in groups, have some kind of museum experience every year. Falk and Dierking (2016) tried to understand why visitors go to museums, what they do there, and what they will remember is a significant challenge in their book entitled "the museum experience". They have conceptualized the museum visit as involving an interaction among three contexts; a) "personal context", b) "social context", and c) "physical context". While personal context includes the visitor's interests, motivations, concerns, varying degrees of experience in and knowledge of the content and design of the

museum, social context of the visit involve variations in behavior between different groups for example adults and children, young and old (Falk & Dierking, 2016). As to the physical context includes the architecture and "feel" of the building, as well as the objects and artifacts contained within. On the other hand, the objects and artifacts in the museums have been varied with the development of new technologies such a virtual reality, interactive systems or augmented reality applications (Wojciechowski, Walczak, White, & Cellary, 2004; Carrozzino, & Bergamasco, 2010).

2.1.Interactive Systems in Museums

Museums are increasingly creating interactive exhibits as a way to increase audience engagement. With the aid of new technologies museums have recently started to deal with the challenge of presenting their collections in an appealing and understandable manner. There is a growing interest in virtual museum exhibitions that make use of Web3D and augmented reality (AR) techniques (Liarokapis, Sylaiou, Basu, Mourkoussis, White & Lister, 2004). In the case of museum visitors with physical impairments in physical context Web3D and AR have the potential to 'minimise the effects of disability' (Liarokapis et al., 2004). According to Holdgaard (2011), there is no well-defined conceptualization for interactive museum: online museum, electronic museum, hyper museum, digital museum, cyber museum, web museum, virtual museum among others, are the many possible names for the new age museum. Regardless of the nomenclature, this can be distinguished in three main variants, with focus on content, communication and collaboration, that can also be fully connected with the museum's own museographic[2] tools (Geser & Niccolucci, 2012; Vaz, Fernandes & Veiga, 2018). Many interactive museums allow visitors to determine the order of presented information and whether they want to obtain more information concerning a specific area of interest (Haywood & Cairns, 2005). For example, interactive exhibit at the British Museum is a purely visual experience and is an interactive experience, featuring some of the most fascinating objects in human history (Britishmuseum, 2018). The general aim of these interactive exhibits like the British Museum is to allow for learning and entertainment (Falk & Dierking, 2000).

Museums are keen on presenting their collections in a more appealing and exciting manner to attract visitors (Wojciechowski et al., 2004). They have long dealt with unauthorized augmentations of their exhibitions, such as unofficial tours, but technology has opened up new possibilities for visitors eager to have a part in shaping the museum-going

[2] The systematic description of objects in museums.

experience (Katz, 2018). Especially with the rise of virtual and augmented reality technology with 2000s, museums have started to evolved towards the concept of simulation, of interactive visualisation of the different potential realities of historical and cultural information (Barceló, Forte & Sanders, 2000). The survey in Europe show that about 35% of museums have already started developments with some form of 3D presentation of objects (Salgado, O'Connor, Tsapatori & Soler, 2005). On the other hand, according to the results of V-must.net survey among museum directors (50 participants) in 2011, 40 % of the directors would have developed or would have been interested in developing a new virtual or augmented museums, and 57 % were interested in online 3D virtual museums (Pescarin, 2014). Jung, tom Dieck, Lee and Chung (2016) have determined that new technologies (i.e. virtual and augmented reality applications) in museums have a significant influence on visitors' experience which consequently induce the tourists' intention to revisit.

2.2.Museum Visitors' Experience

MacCannell argued that the tourist/visitor experience is authentic by nature because tourists or visitors inherently look for authentic experiences and "see that life [of the places visited] as it is really lived" (MacCannell, 1973, p. 594). Cohen also stated that tourist or visitors experience is a search for authenticity and an effort to escape from an alienated world (Cohen, 1979, p.180). On the other hand, Uriely suggested two epistemological approaches for examining tourist/visitor experiences (Uriely, 2005). First, from a modernist perspective, the tourism experience is beyond daily life and thus is an unusual experience. From a post-modernist perspective, tourist experiences, rather than being apart from everyday life, are embedded in and connected with everyday life (Lee & Smith, 2015).

The leisure experience, which includes tourist experience or museum visitors' experience from a wider perspective, variously labeled as "peak" (Maslow, 1968), "flow" (Csikszentmihalyi, 1975), "absorbing" (Tellegen & Atkinson, 1974), and "optimal" (Mannell, 1996). However, changes in the experience of leisure activities and periods of leisure history have frequently been driven by technological developments (Rojek, 2000; Bryce, 2001). When museums are considered as leisure activities, museum visitors' experience have also consistently changed depending on technological developments such an interactive systems or applications. People visit to museums for experiences that are enjoyable and personally satisfying, to relax and escape from the stresses of everyday life, and to improve their knowledge level. Through new technologies, museums can manage their collections better, offer unforgettable experiences to their visitors and exceed their physical limits by using

online distribution and communication channels (Parry, 2013). Hooper-Greenhill (2007) argues that experience and 'performance, in the sense of action and behaviour' are 'of vital importance to museums'. Individuals can create and transform their museum experiences into knowledge, skills, attitudes, values, emotions, beliefs, and senses. In this regard, new technological tools like interactive systems or applications also are helping to transform experiences that museums offer far beyond the museum's physical infrastructure (Soren, 2009).

3. METHODOLOGY

In this study, it is presented a framework to enable interactive museums to analyze and evaluate the behaviour of their visitors. In other saying, it is tried to reveal the influences of the interactive systems on museum visitors' experience. In accordance with this purpose, the most popular three interactive museums (Mardin, Şanlıurfa, Gaziantep Museums) located in different cities of the southeast region of Turkey was chosen. Face-to-face interviews by use of questionnaire form were conducted with visitors to these interactive museums in Turkey during eight weeks in June-July 2018. Two scales were used for data collection. In accordance the aim of the study, the scale adapted by Chung, Han & Joun (2015) which is to explain visitors' acceptance of based on the interactive systems. Secondly, Lee & Smith's (2015) multiple-item scale was used to measure tourists' visiting experiences at the selected museums. Two sets of questions were crafted for this survey. The first section of the questionnaire collected information about the visitor's gender, age, education level, occupation, visiting with whom, and a basic source of information for visiting to the museums. In the second part, respondents were asked to give their opinion on perceived usefulness (5 items), perceived ease of use (4 items), attractiveness contribution of interactive systems (2 items) and their experiences of visiting (9 items) the museums. A five-point Likert scale was used in the questionnaire, ranging from "5 = strongly agree" to "1 = strongly disagree". In total, 1200 questionnaires were conducted in the museums (Gaziantep=351, Mardin=365, Şanlıurfa=368). A total of 1084 were considered valid for analysis, representing an overall response rate of 90 %. Data were comparatively analyzed by SPSS 21 statistic package program.

4. FINDINGS

An on-site survey was conducted of Şanlıurfa Museum (Şanlıurfa/Turkey), Zeugma Mosaic Museum (Gaziantep/Turkey) and Mardin Museum (Mardin/Turkey) domestic visitors

who used the interactive AR applications. The museums are to be appropriate to evaluate the utilization of AR and visitor's perception toward AR for museums. Therefore, in this study, we focused on the AR applications of three museums and were chosen as the survey site. Four pollsters who majored in tourism served as field researchers to collect data during July, 2018. Totally 1110 visitor questionnaires were found appropriate for the data analysis in the research. Totally 1083 valid questionnaires were analyzed to access the findings. The Cronbach's Alpha value that stated to the reliability of the whole scale that is included 20 items under four dimensions is 0,946 (Şanlıurfa Museum), 0,855 (Zeugma Mosaic Museum) and 0,939 (Mardin Museum).

Table 1. Demographic Characteristics of the Visitors

		MUSEUMS					
		ŞANLIURFA		**ZEUGMA**		**MARDIN**	
		frequency	**%**	**frequency**	**%**	**frequency**	**%**
Gender	Male Female	188 179	51,1 48,9	172 179	49,0 51,0	184 181	50,4 49,6
Age	18-30 31-40 41-50 51-60 61 and over	226 69 50 18 5	61,4 18,8 13,6 4,9 1,4	109 125 70 30 17	31,1 35,6 19,9 8,5 4,8	218 92 30 16 9	59,7 25,2 8,2 4,4 2,5
Education	High School or below Bachelor's degree Master's/Doctorate	182 170 16	49,5 46,2 4,3	97 210 44	27,6 59,8 12,6	128 201 36	35,1 55,1 9,8
Employment Status	Employed Self-Employed Unemployed Retired Student	178 40 70 13 67	48,4 10,9 19,0 4,1 18,2	198 25 32 27 69	56,4 7,1 9,1 7,7 19,7	171 33 52 15 94	46,8 9,0 14,2 4,1 25,8
Travelling With	Alone With a partner Family/Relatives Friends	32 73 149 114	8,7 19,8 40,5 30,9	24 75 166 86	6,8 21,4 47,3 24,5	36 68 170 91	9,9 18,6 46,5 25,0
Information about Mardin Museum	Internet/Social Media Newspaper/Magazine Friends/Relatives TV/Radio Travel Agency	119 15 137 58 39	32,3 4,1 37,2 15,8 10,6	147 10 139 13 42	41,9 2,8 39,6 3,7 12,0	129 46 142 18 30	35,3 12,6 38,9 4,9 8,2
	Total	**367**	100 %	**351**	100 %	**365**	100 %

It was not found any item that needs to out from the scale according to the analysis. Table 1 includes the demographic characteristics of the visitors who responded to the survey. The results indicated that the age ranges of visitors are generally in the middle ages and male range is much more than the others and the most of the visitors have a bachelor degree or a high school degree. The majority of the occupational status of the visitors occur employee and

they prefer to travel with families or relatives. Finally, it is understood that most of the visitors had information about the museums through friends/relatives and internet/social media before traveling.

Table 2. Reliability Analysis and Item statistics

	MUSEUMS					
	ŞANLIURFA (N=368)		**ZEUGMA (N=351)**		**MARDIN (N=365)**	
Dimensions	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Perceived Usefulness Cronbach Alpha	**0,904**		**0,882**		**0,869**	
Perceived_Usefulness1	4,0978	,90785	4,1681	,86037	4,1205	,91191
Perceived_Usefulness2	4,1304	,84127	4,1823	,83209	4,1863	,90683
Perceived_Usefulness3	4,1495	,88089	4,2137	,86019	4,2247	,90720
Perceived_Usefulness4	4,2065	,82585	4,3105	,74287	4,2685	,90129
Perceived_Usefulness5	4,1766	,86014	4,2934	,73441	4,3041	,95394
Perceived Ease of Use Cronbach Alpha	**0,881**		**0,806**		**0,831**	
Perceived_Ease_of_Use1	4,1603	,80452	3,8547	,94353	4,2274	,88350
Perceived_Ease_of_Use2	4,0870	,89079	3,8575	2,30334	4,0247	,95039
Perceived_Ease_of_Use3	4,0788	,87769	3,8376	,94377	4,2110	,90596
Perceived_Ease_of_Use4	4,1223	,85054	3,9145	,94330	4,1836	,92091
Attractiveness Contribution Cronbach Alpha	**0,835**		**0,776**		**0,819**	
Attractiveness_Contribution1	4,1766	,86330	4,5584	,72220	4,1945	,92462
Attractiveness_Contribution2	4,2120	,87263	4,6695	,64068	4,3233	,90762
Experiences of Museum Visitors Cronbach Alpha	**0,934**		**0,869**		**0,907**	
Experiences_Museum_Visitors_1	4,4076	,68232	4,6838	,61852	4,4712	,85316
Experiences_Museum_Visitors_2	4,3967	,78486	4,6467	,67230	4,3945	,85996
Experiences_Museum_Visitors_3	4,3940	,77048	4,5499	,65657	4,4274	,76913
Experiences_Museum_Visitors_4	4,4457	,74357	4,4387	,77170	4,2959	,88337
Experiences_Museum_Visitors_5	4,4022	,79247	4,4501	,75380	4,2685	,91039
Experiences_Museum_Visitors_6	4,3533	,83857	4,4444	,76842	4,2904	,88208
Experiences_Museum_Visitors_7	4,3859	,78335	4,7009	,61781	4,2959	,89878
Experiences_Museum_Visitors_8	4,1630	,92824	4,5499	,77621	4,2082	1,03001
Experiences_Museum_Visitors_9	4,2772	,88544	4,8006	,47220	4,4904	,81067

The main findings of the study which show in Table 2, was focused on the findings of augmented reality that includes the opinions of the visitors who responded to the survey regarding experiences, usefulness, ease of use and contribution to the destination. According to the first part of the findings, the averages of perceived usefulness are very high for three museums but the usefulness values of Şanlıurfa is less than the others. The Şanlıurfa is the last opened museum among these museums and its development process is newer than the others. The low averages of the museum can be affected by this factor. Finally, the highest value of the first dimension for three museums that are showed in ¨Perceived Usefulness 4¨ in Table 2, is regarding the usefulness of the interactive implications. The interactive implementations

have been found functional for the understanding of the collections and effectiveness of their visit.

The second dimension of the findings is related to ¨perceived ease of use¨ of the interactive systems in the museums. According to the analyis, the averages of the Zeugma Museums are less than the others. The findings underline that the Zeugma museum should develop the ease of the interactive systems with some tools. The highest value of the findings is about the ease of use. The following results of the study include that the contribution of the interactive systems on the museums and tourism. It seems in Table 2 that the most valuable contribution of the interactive museum implications is for the city of Gaziantep. The last findings of the study were titled under the experiences of the museum visitors. The whole values of this dimension are very high for all museums and besides, the highest averages of findings are located in this part of the survey. Comparatively, the Zeugma museum has the highest values in this part according to the two museums. The museum has become one of the most popular museums of Turkey, particularly thanks to Çingene Kızı mosaic and this result can be resourced its collections that are based on rare and attractive mosaics.

5. CONCLUSION AND DISCUSSION

According to the 2015 Trendwatch Report, digitally mediated personalization and personalized learning are two global prominent trends in museums in recent years (Trendwatch, 2015). So museums are using augmented reality (AR) technology to their advantage. With augmented reality, museums are superimposing ther virtual world right over what's actually in front of you, bringing exhibits and artifacts to life in new ways (Billock, 2017). As QR codes, mobile phone guided audio tours, and smartphone apps have become widely used mobile features in museums all over the world, some museums are starting to explore ways to weave in more interactive and customized features that can enhance visitor experience (Ding, 2017). On the other hand, Yoon et al. (2012) stated that the enormous potential AR capabilities have on learning and assessment in enabling people to construct new understanding. In this regard, AR technology in museums are very important fun and learning tool for museums' visitors.

In this study, AR technology in three museums (Şanlıurfa, Zeugma and Mardin) is explored and the effects of this technology on visitors' experiences are comparatively examined. According to the results of the analysis, it is understood that the museum visitors were satisfied with the AR technology they used and the interactive applications based on AR affected positively on their museum experiences. Indeed, when the litearature is examined,

AR technologies have also been incorporated in museums to enhance visitors' experience by improving their interest, engagement, and access to information (Baber et al., 2001; Hall & Bannon, 2006; Damala et al., 2008; Carmigniani et al., 2011; Yoon, 2012). Therefore, it can be concluded that the results of the study are in parallel with the literature.

Museums enrich their visitors' knowledge, give them an understanding of historical value, and can simply give answers to various questions. Museums look for ways to improve their visitors' experience and AR or VR is one of the best ways in which that can be done. In the future studies, augmented and virtual reality technology can be compared in terms of visitor experiences. In addition to that, the visitor profile can be analyzed between museums where both are used together and museums where only one is used. Thus, the interactive applications used in museums and the impacts of these practices will be better understood.

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