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Virtual and Augmented Reality Technologies to Enhance Tourists' Knowledge of Rural Tourism Destinations

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Abstract

The world acknowledges that rural tourism has a significant positive impact on society. Additionally, rural tourism contributes to the improvement of the community's social fabric. Developing intelligence, a growing desire to learn, and rural knowledge were the primary determinants. The purpose of this paper is to examine the applicability of augmented and virtual reality to rural tourism. Despite the importance of virtual reality and augmented reality for understanding the tourist experience being emphasized in a number of studies, there have been no previous efforts to improve tourism knowledge in rural tourism. In an effort to theoretically examine the knowledge of tourists in rural tourism, this study examines the effects of augmented reality and virtual reality technologies on the visitor experience.This study contributes to the fields of virtual reality and augmented reality through its comprehensive approach to development.

Key Words: Rural Tourism, Technology-Enhanced Experience, Virtual Reality, Augmented Reality, and Visitor Learning

Introduction:

Tourism in rural areas not only contributes to the economic growth of the community, but also heightens ecological, social, and cultural awareness of the surrounding environment. One of the most effective means of combating poverty and restoring a high standard of living in communities is rural tourism. No attempt has been made to compare the growth of rural tourism to that of other types of tourists.

If rural tourism makes use of virtual reality technology, travelers will have a novel way to experience geographical conditions and will be able to transcend time. Additionally, rural tourism can incorporate information wings for the purpose of advancing the industry's growth, promotion, and publicity.

The application of virtual reality technology to rural tourism significantly contributes to the expansion of rural tourism. As a result of the emergence of new technological possibilities for reshaping the visitor experience, numerous studies have begun to examine the advantages of utilising Virtual Reality (VR) and Augmented Reality (AR) in rural and cultural tourism. (Chung, Lee, Kim, & Koo, 2018; Jung 2018, Chung &Leue, 2015;Fidas&Avouris, 2018). Since the majority of research in this field has been exploratory, it is unlikely that Augmented and Virtual Reality should receive some sort of approval.

Due to the exploratory nature of the majority of previous research, it is unlikely that a recommendation to invest in AR and VR would be applicable from an adherence standpoint.

An important question remains as to whether such technology would aid callers in connecting with rural tourism and its culture or detract from the experience as a result of the new digital sub-case between the tourist and the rural life object or technological barriers that impede trade.

Similar developments must be meticulously planned to give tourists the impression that they are significant and appealing. In the context of rural tourism, tourism literacy experience is highlighted as a crucial factor in determining whether or not individuals will visit rural tourism destinations.

Existing Understanding of Rural Tourism

Small hotels should be aided in growing and becoming more competitive and profitable by rural tourism. Employing young students for small hotels and providing student workers, temporary or

part-time employees, and interns to hotels can provide a foundation for new employees while allowing locals to enjoy tourism industries. Additionally, they can facilitate networking and collaboration with other organisations and agencies (Rosamarin,2004).

There are numerous types of rural tourism, but they all share a focus on adapting to non-urban locations, where visitors can find an abundance of enticing activities. A primary objective of rural tourism is to promote the region's social and economic development. (Millie, Nitashree, 2012).

Rural tourism provides individuals with an experience and a connection to their physical and social surroundings. It also links them to the past and influences the future (Scannell& Gifford, 2014). A significant portion of the feelings and emotions tourists experience is a personal connection to the place of origin (Low & Altman, 1992). Additionally, cognitive factors such as memory, significance, and knowledge enable people to approach a location (Scannell& Gifford, 2010).

Tourists now have real-time access to virtual locations via audio, text, and video (Harmon, 2015), and thus technology enables people to travel in electric vehicles that neglect personal attachment, but this should be considered because people desire emotional equilibrium. (Gustafsson, 2014).

Virtual reality is frequently defined using technical terms, such as the use of computer-generated, three-dimensional worlds in which users can interact and move using one or more of their senses (Gutentag, 2010). But from the consumer's perspective, the most essential factor is how people feel (Steyr, 1992). But from the consumer's perspective, the most essential factor is how people feel (Steyr, 1992). Virtual reality is gaining popularity in the tourism industry, and it could enhance the trip prior to or after arrival.

Thus, virtual reality can be used to promote or enhance a tourist destination. It can also be used to change people's plans, such as telling others about a location or expressing a desire to visit it (tusyad et al., 2016; Jung et al. ., 2017).

Tourist Experience

Based on early psychological research (for a comprehensive review, see Jantzen, 2013), experience has been one of the most important aspects of tourism research to investigate (eg,

Sims, 2009; Tan, Kung, &Luh, 2013; Tsour, Yen, & Hsiao, 2013; Zajchowski, Schwab, & Dustin, 2016; for a review see Scott et al. .,2017).

This is due to two factors. First, rural and cultural tourism experiences are essential to the rural cultural tourism industry, as experiences are the primary economic value of tourism and add a substantial amount of economic value (Pine & Gilmore, 1998).

Second, academics are interested in the tourism experience, both because it is the primary draw for tourist destinations, rural sites, and cultural sites associated with tourism, and because it has a clear link with psychological well-being and quality of life (Frederickson, 1998).

Elements that affect the experience of the visitor

Because academics are interested in the tourist experience, they seek the essential components of an experience. Scott and his colleagues (Scott & Lay, 2017) examined the physical context of the heritage site or destination and discovered that there are multiple candidates for the experience's environment. The emphasis is on our mental resources. Sends it to stimuli that are deemed more significant. Participation is a person's level of interest and personal relevance to the offers on a site or destination. Engagement is a complex concept involving a variety of mental processes that all relate to being "in the moment." Immersion is the sensation of being surrounded by an alternate reality. Virtual reality and video games are the best places to study immersion (Ermi and Myra, 2007).

The final related concept is cognitive absorption, which is similar to the concept of flow (Csikszentmihalyi, 1990). There are five dimensions to cognitive absorption: time dissociation, attentional focus, increased enjoyment, personal control, and curiosity.

Beyond these well-established pillars of tourism experiences, there has been a recent increase in the recognition of the importance of emotions in remembering and creating tourism experiences (Lee, Scott, & Walters, 2014; Scott 2018), Skavronskaya et al., 2017). Hooper-Greenhill et al. (2003), among others, investigate, within the context of cultural tourism, the factors that contribute to enhanced memory and comprehension of new information. Bond discovered that visitor participation was a significant factor in enhancing knowledge retention (2014). The significance of audience involvement in creating a memorable educational experience.

Hooper-Greenhill et al. (2003) asserted that one's emotions have a positive influence on one's motivation to learn, whereas one's knowledge influences the formation of one's attitudes and values. This viewpoint is consistent with the indicated emotional attachment and with Kolb's definition of learning as "*the process whereby knowledge is formed through the transformation of experience*" (Kolb, 1984). Minocha, Tudor, and Tilling (2017) argue that students' emotions are intertwined with their learning experiences and that the learning process is comprised of both reflective observation and active exploration, both of which influence the entire learning experience. Although the Experiential Cycle (Kolb, 1984) is a useful tool for investigating how technology can enhance the learning experience, it also emphasises the significance of understanding which factors impact the student's learning journey. To fully comprehend what it means to learn, one must first recognise the influence of one's emotional state on both immediate experience and theoretical knowledge of the process. Incorporating technological aids into education was viewed as an opportunity to reimaging academic potential. Bond (2014) argued that the act of implementation alone was insufficient to have a significant impact on the educational outcomes of users. In its place, user interaction must be meticulously planned in order to increase learner engagement with the provided content and retention rates. This sentiment was echoed by Stewart (2014), who argued that technological aids should increase students' concentration and determination to succeed. The logical next step in the evolution of these tools is research into the ways in which new technologies such as augmented and virtual reality might improve education while travelling to other cultures.

AR and VR

Since becoming accessible to the general public through devices such as the Oculus Rift, Google Cardboard, and Magic Leap Lightwear, augmented reality and virtual reality have received considerable attention. According to Bonetti, Warnaby, and Quinn, AR and VR have been utilised in a variety of business contexts in the past (2018). Despite the fact that both types of technologies are sometimes grouped under the term "mixed reality," it is important to note that each has a unique method for producing VR advancements and should be considered separately for development and application. The definition of augmented reality (AR) is the projection of electronic data onto the user's field of vision using devices such as smartphones, tablets, and

wearable's such as AR glasses (Rauschnabel& Ro, 2016). Marker-based AR and GPS-based AR are the two primary components of augmented reality. While GPS-based real-world augmentation appears to be the most logical way to use augmented reality in tourism, some argue that the accuracy and processing power of existing devices are insufficient to project meaningful augmented reality overlays that enhance the tourism experience (Gherghina, Olteanu and Tapus, 2013). On the other hand, it was believed that marker-based AR enhancements were the most user-friendly type of AR enhancements because they are activated by "markers" that connect virtual content to specific objects or photos. In addition to mobile-based AR applications, site-based AR was considered as a third type of AR, using fixed installations in specific locations such as theme parks and retail stores to enable virtual augmentations for users (Williams &Mascioni, 2017). As opposed to AR, VR completely immerses the user in a computer-generated virtual environment (Tussyadiah, Wang, Jung, & Tom Dieck, 2018). Due to the large number of demonstrations and applications, both in the form of computer-generated animation and 360-degree virtual settings, interest in virtual reality has increased, particularly in the gaming and entertainment industries. Nonetheless, despite the increasing number of use cases at theme parks and other tourist destinations, it has not had a significant impact on the consumer market relative to expectations and forecasts (Abrash, 2016). The underlying causes could be the limited value that VR use Cases AR, VR, and Previous Studies in Rural Tourism Virtual Reality Applications currently provides or the previously restricted accessibility for consumers due to the need to wear VR glasses or VR-enabled headsets such as the Samsung Gear VR or Google Cardboard with high-end smartphones.

In addition to marketing, entertainment, education, accessibility, and historical preservation, virtual reality applications are now used for a much broader range of purposes than originally anticipated (Virtual Reality Society, 2017).

Marketing is one of the most significant travel industry applications of virtual reality. Due to the intangible and inaccessible nature of tourism experiences, both suppliers (who must convince tourists to visit a destination) and consumers have difficulty (making a decision about where to travel). Without the need for co-location, immersive virtual reality provides the opportunity for tourism marketers to provide prospective customers with the most accurate experience of a trip (Barnes, 2016). When used as a marketing tool, virtual reality can help transmit experiences,

increase awareness and buy targeting, and even improve the perception of the location (Griffin et al., 2017).

Entertainment In addition to serving as a tool for tourism promotion, virtual reality systems can also function as commercial and entertaining tourist attractions (2014). The Museum of Fine Arts in Boston, Massachusetts (Bulencea, 2016) and as a platform for displaying art (such as the Doge's Palace in Venice) are examples of museums and art galleries that are utilising virtual reality technology to add enjoyment and increase traffic. Virtual reality offers an interactive form of "edutainment" and can provide a museum or gallery with a point of differentiation and a competitive advantage (Izzo, 2017).

Education In addition to being a source of entertainment, virtual reality has significant educational potential. Because it takes advantage of the user's natural spatial perception capabilities, a virtual reality model can be an effective means of conveying voluminous amounts of information (Najafipour et al., 2014). The use of virtual reality applications can facilitate the transfer of knowledge. In the tourism industry, mobile virtual reality applications can be used to bring destinations' histories to life (Butt, 2017).

Accessibility The visitor's desired location may be too far away, too expensive, too inhospitable, too dangerous, too fragile, or no longer exist. In addition to providing the best alternative in such circumstances, virtual models can also facilitate unique interactions with fragile historical objects or other elements that cannot be manipulated in real life (Najafipour et al., 2014). Virtual reality increases the accessibility of destinations by enabling travellers to virtually visit and experience places and activities that are inaccessible to the general public due to financial or physical constraints. Virtual reality can eliminate several obstacles to travel, including safety, expense, and physical limitations. Google Earth VR, for instance, can take users on a 3D tour of virtually any location, from Table Mountain in South Africa to glaciers in Argentina (BusinessLine, 2017).

According to Wiltshier and Clarke (2016), the use of technology to view special sites can compensate for the destruction of the destination's characteristics by large numbers of visitors. In the case of the Chinese Dai people, the design of an interactive virtual experience enables tourists to immerse themselves in their cultural heritage without negatively impacting the environment (Peng et al., 2015)

Augmented reality software In addition to providing practical information, such as data on accommodations, attractions, museums, and monuments, augmented reality applications also provide personalised information based on the user's preferences and context. Location-based mobile augmented reality (AR) applications have begun to play a significant role in the tourism industry due to the increasing popularity of smartphones. These applications provide visitors with access to contextual information about locations and tourist attractions, thereby enhancing their understanding of the area. Through the use of location-based mobile augmented reality (AR) applications, users are given the opportunity to discover new places by superimposing additional layers of location-based information on top of their current surroundings and saving collections of their favourite points of interest (POIs) using this information (Chen, 2014). The following is a synopsis of some of the ways in which augmented reality is being used in the tourism industry: (Digital Tourism Think Tank, 2017).

An Enhanced Booking Experience - By pointing their smartphone at specific pages of Inquire, Popular Science, or Time, readers can access additional multimedia content. This new generation of cutting-edge advertising could also be applied to tourist catalogues, brochures, leaflets, and other paper-based promotional materials. Hotels, casinos, and theme parks, as well as special events and virtual roller coaster rides, could become a reality to give tourists a better idea and impression of what they seek (Digital Tourism Think Tank, 2017).

The restaurant offers augmented services; the AR experience is based on a projective AR system. Customers can interact with the table by choosing their own table theme, ordering from a multimedia menu, or watching a live video from the kitchen. Utilizing the abundance of tables and walls as canvases, these augmented applications provide a physical space for collaboration and an interactive virtual information display on the computer (Ozdemir and Kilic, 2022).

Augmented reality transportation systems are ideal for guiding tourists through unfamiliar environments. Navigation and route finding was one of the earliest AR applications. Augmented screens have all the tools you need to make manual and automatic navigation easier on the brain. The first Augmented Reality uses in the tourism industry involved navigation and signage.

Augmented Reality as a Marketing Tool (ARM): Augmented reality facilitates augmented reality marketing, a specialised form of marketing (ARM). AR is an innovative and cutting-edge method utilised by many businesses to develop marketing campaign strategies. The application

of AR combines online and print advertising. Therefore, the AR application can be utilised in a significantly more effective manner to reach and interact with these audiences (Shabani and Hassan, 2017). It may appear that augmented reality device applications (apps) have a positive impact on marketing, particularly as a potential tourism and hotel marketing campaign. Nevertheless, augmented reality as a marketing campaign must receive sufficient attention for its development in order to realise its potential to meet a variety of tourist demands (Celtek, 2020).

Proposal structure

The framework extends Kolb's (1984) Experiential Cycle to determine the impact of AR and VR implementations on the visitor's learning experience. Therefore, the visitor's emotional investment in the learning experience is tied to the visitor's concrete experience, which Kolb and Kolb (2005) define as the visitor's sensory and post-sensory experience.Emotions are therefore necessary to strengthen the impact of the entire learning experience and must be well understood to prevent the induction of negative emotions that detract from the overall learning experience.

In addition, we propose that the level of visitor interaction with the tourism product encourages experimental behavior. Active experimentation has a greater impact on the learning experience when visitors are more engaged. Therefore, the deployment of augmented reality and virtual reality has the potential to alter the level of visitor engagement by delivering an interactive user experience.

In addition, augmented reality could create tools to enhance reflective observation through virtual enhancements. As abstract conceptualization in the Experiential Cycle (Kolb, 1984) was regarded as an internal process, it will not be further examined in this paper. To develop and use AR and VR technologies in a meaningful way within the context of cultural tourism, it is necessary to comprehend the benefits that this technology will provide to the end user. When implementing augmented reality and virtual reality in the context of cultural tourism, it is crucial to understand the underlying tourist motivations for visiting the site. The development of potential applications should not occur in a vacuum, but rather in support of tourist goals and not in isolation from the experience as a whole.

Discussion

Through a discussion of the impact of virtual reality (VR) and augmented reality (AR) technology as well as the paradoxical effects that result in the context of cultural tourism, the purpose of this paper was to investigate the factors that influence the visitor experience in the context of cultural tourism.

Customer-Centered Visitor Experience Design's Importance

The Importance of Creating a Visitor Experience That Is Centered on the Customer As was mentioned before in this article, an increasing number of tourists are looking for genuine and enlightening experiences during their travels. Despite the fact that different tourist groups may have different expectations about the depth of significance and authenticity (McKercher et al., 2006),it appears that authenticity and meaning are, in many cases, more in the eye of the beholder, the visitor. According to Wang (2000), many tourists seek existential authenticity in the places they visit. This suggests that it is not so much the objective authenticity of the tourism product that is significant, but rather how it enables individuals to create their own unique and meaningful authentic experience. This implies that when presenting the tourist item, special consideration must be given to how it creates meaning for the visitor, how it connects to their values, and how it allows them to construct their own version of the encounter. This is where customer-centric design and especially so-called user empathy become crucial: determining what truly matters to the visitor on a level the visitor may not be conscious of (Kouprie&Visser, 2009). This level of understanding enables AR/VR designers to create emotionally engaging layers that enhance the cultural tourism experience.

Technology Implementation Objective: Design of emerging consumer technologies such as AR/VR must be meaningful

Technology Implementation Objective: The design of new consumer technologies such as augmented reality and virtual reality must be purposeful. Consistently, technology has improved the quality of human life by making processes more efficient, convenient, and accessible. When examining the early stages of consumer technologies up until their widespread adoption, a recurring pattern emerges (Van Spiegel, &Vergragt, 2017). While early research focuses on the

capabilities of a new technology to gain a comprehensive understanding of how it operates, later research focuses on the potential value the technology can provide. With AR and VR research in mind, it is time to investigate how the technology will benefit consumers, industry, and other stakeholders, as well as to consider the unique value propositions that may be realised through the development of significant AR and VR applications. While companies are still responsible for designing and orchestrating consumer experiences in meaningful ways through proper understanding of customer needs and wants, a shift toward co-creating value by peers—particularly with technologies interactive consumption devices such as augmented reality and virtual reality—means that visitor participation is essential to the goal of shaping the cultural tourism experience. This notion was supported by Prebensen (2013), who stated that customers must participate in the process of value creation in order to create meaningful experiences for themselves. To encourage application use and ultimately influence the cultural tourism experience, however, the value that AR and VR promise to deliver must be properly comprehended and contextually relevant to the tourists. Despite the fact that a number of studies suggest that augmented reality and virtual reality may offer opportunities in the context of cultural tourism, it is unclear at what stage of their trip visitors seek out this technology and what the commercial and non-economic benefits are for other stakeholders. Numerous papers (Han, Tom Dieck, and Jung, 2018; Tom Dieck and Jung, 2018) have addressed the technological obstacles that are still apparent with AR and VR technologies; therefore, they will not be discussed in detail here. Nonetheless, it should be understood that technological obstacles, such as inconsistent engagement, are not only impediments to user participation but also detrimental to the tourism experience. In an industry that portrays itself as committed to "experiences," a small bug in a guest app could be significantly more detrimental than a disappointing AR or VR experience. To comprehend how and where augmented reality and virtual reality will influence the tourist experience, it is necessary to comprehend the entire journey. Therefore, we propose that contextual information is essential for defining and planning the added value of AR and VR upgrades.

Contribute to an increase in the use of EEG and physiology in addition to reflective indicators for measuring experiences.

Use of EEG and physiology to quantify tourist experiences is increasing. With the use of EEG and Physiology, it has become clearer that emotions play a significant role in shaping the tourist experience and making travel more engaging. Meaningful events are unforgettable (Li et al., 2014; Moyle et al., 2017; Skavronskaya et al., 2017). In turn, this has prompted scholars to investigate which instruments for measuring experience capture the emotional dimension of experience most effectively (Li et al., 2014). The most prevalent research strategy to date has been post-experience self-reports in the form of questionnaires or interviews. However, it may be questioned whether relying solely on these standard research methods is the most effective method for measuring the emotions that comprise memorable experiences. It has been suggested (for a comprehensive discussion, see Larsen & Fredrickson, 1999) that self-reports naturally fail to adequately capture the underlying emotional dynamics of events (Larsen & Fredrickson, 1999). Tourism researchers are increasingly employing biometric (physiological) measures and recordings of brain activity to overcome these methodological limitations and more accurately capture the ebb and flow of emotions as an experience unfolds (wristbands). This technological advancement enables precise measurements of tourists' emotions as they freely explore a destination or cultural heritage site; as a result, it has become an accessible and affordable research tool for tourism professionals. As a result, researchers in our field are increasingly employing these tools. Kim and Fesenmaier (2015), for instance, measured the SCR of two Philadelphia heritage tour participants and correlated a qualitative descriptive analysis of this data with their verbal descriptions of the experience. Li et al. (2012) analysed HR and self-reported emotions when tourists interacted with macaques in a natural park in China and found that both indicators suggested positive responses to these interactions. In the large-scale study of museum visitors that Trondle and her colleagues carried out (Tschacher et al., 2012), they continually assessed HR and SCR in more than 500 visitors while recording their specific position.It allowed them to create "emotion maps" of the museum's floor plan (Trondle, Greenwood, Kirchberg, &Tschacher, 2014) and identify emotional responses to particular artworks (Trondle&Tschacher, 2012). Electroencephalography (EEG) recordings successfully measure emotional responses as well (Hajcak, Weinberg, MacNamara, &Foti, 2012; Harmon-

Jones, Gable, & Peterson, 2010). They offer greater precision than the physiological measurements described in the preceding paragraph, but they are applicable only in a laboratory setting. Our research team is currently attempting to validate the use of frontal EEG alpha asymmetry In the field of experiential research, a continuous EEG-based measure of positive and negative emotions was developed and used by Harmon-Jones et al. (2010). For the purpose of this investigation, research participants were provided with Samsung VR Gear and asked to watch a series of short videos in virtual reality. The length of these films ranged from three to fourteen minutes.There are considerable relationships between valence scores and frontal alpha asymmetry, as demonstrated by preliminary analyses. These results validate the EEG as a technique for studying, with sub-second resolution, the succession of good and negative emotions throughout an experiencing episode without the need for self-reports. As previously indicated, one of the primary drawbacks of EEG as a tool for detecting emotions during a tourist experience is that it can only be captured consistently in a laboratory context.

Conclusion

The objective of this article was to examine the connection between AR/VR and the visitor experience of Rural tourism attractions. Rural tourism institutions are increasingly implementing technologies such as AR and VR. Academic research on these experiences is in its infancy and needs theoretical development. Building on Kolb's (1984) experiential cycle, we have proposed a theoretical model to understand the AR/VR visitor experience in the context of Rural tourism. This model implies the need to continue investigating suitable methodologies to measure these experiences. Biometric methods such as EEG and wearable measurement of the physiology of peripheral emotions are particularly promising here. Furthermore, additional research is needed to develop existing theories of cultural tourism to keep pace with the technological landscape. The AR/VR technologies discussed the software they use and the rural tourism experiences they can support are becoming more accessible and therefore more widespread. It is reasonable to predict that AR and VR will soon be seen as common dimensions of cultural tourism experiences. We urge academic research in rural tourism to keep pace.

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