

**GOOGLE GLASS CREATIVE TOURISM EXPERIENCE:
A CASE STUDY OF MANCHESTER ART GALLERY**

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ABSTRACT

Due to the novelty factor of Google Glass, specifically in Europe, only few research attempts were made of the potential of Google Glass. The present study aims to explore visitor's first time usage behavior of Google Glass within the cultural context. In total, 29 Art Gallery visitors tested the Google Glass prototype application "Museum Zoom" and took part in an interview. The data were analyzed using content analysis and revealed that among all age groups, the majority of visitors had a favourable opinion regarding the usage of Google Glass within Art Gallery settings. This exploratory study revealed that users were able to quickly adjust to the novel interaction and generally perceived the device to enhance the Art Gallery visitors experience though the provision of additional content and easy to use as well as social networking functions. Although technological issues remained, participants were curious to interact with the device.

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INTRODUCTION

Google Glass has not officially launched, yet the media attention is immense. Being a cutting-edge technology and not available for general sale results in only few research attempts being made of the potential of Google Glass within the cultural heritage background. Ferguson (2013) and Rhodes and Allen (2014) highly acknowledged that Google Glass will change the way visitors experience museums as Google Glass offers possibilities to create unique experiences. In addition, Han et al. (2014) investigated the application of augmented reality (AR) within the urban heritage context and revealed the enormous potential of enriching tourists' experience of destinations and cultural attractions. Due to the novelty factor of Google Glass, the potential opportunities of Google Glass for cultural context are literally unexamined and therefore this exploratory research aims to explore and understand art gallery visitors' first time usage of Google Glass.

LITERATURE REVIEW

Creative Industry and Tourism

The creative industry has become a buzzword of the 21st century in developed nations, believed to foster sustainable economic growth by linking numerous industries from technology to culture and creativity (UNESCO, 2013). While the approach of building the creative economy has just accelerated over the last decade, the GDP of creative

economy's share has already made an impact in the national economy of the UK (5.8%), U.S. (3.3%) and Australia (3.1%) (UNCTAD, 2010). The UK is hence regarded as the World Leader of Culture and Media with exports in the creative sector exceeding 4.0% and creating 8.0% of UK employment. In 2007, the revenue generated from the creative sector in the UK was measured to exceed GBP 67.5bn. Other countries, such as the U.S., Australia and South Korea are following closely, while the creative sector gains more importance as national strategy for sustainable development. Many destinations and cities worldwide have shifted their focus towards becoming known as a “creative city” by channeling their strategies towards new and innovative ideas that enhance the overall tourism experience (Richards & Wilson, 2006). According to Tan et al. (2013, p. 155) creative tourism can be defined as the activities related to tourists’ “opportunity to develop their creative potential through active participation in courses and learning experiences which are the characteristic of the destination where they are undertaken”. Entertainment, education and experience are considered three major parts of creating a sustainable creative tourism experience (Tan et al., 2013).

Wearable Computing and Google Glass

Over the past years, there has been a trend towards the development of ever-small computers resulting in the popularity of tablets and smartphones. This trend moved on to computing devices that can be worn on wrists or even through head mounted displays whereby an optic is placed on a glass frame in front of the eye in order to create a virtual image for the user thus, projecting an augmented reality into the real world (Lucero et al.,

2013; Rhodes & Allen, 2014). Recently, with the development of different kind of smart watches and glasses, wearable technologies have improved drastically. Wearable computing devices have been created for a number of years; however the strong developments in sensor technologies allowed the creation of non-invasive and unencumbering devices (Kahn, 2013). As a result, wearable computing as known today is shrinking in size and increasing in accuracy and thus, these new and emerging devices are considered easy to use and useful compared to their earlier counterparts (Kahn, 2013). McNaney et al. (2014, p. 1) acknowledged that “one of the major recent wearable computing breakthroughs is Google’s new ‘eyewear computer’, expected to be commercially available in 2014, referred to as Glass”. Simply said, Google Glass is a wearable computer with a head-mounted display on the right side of the eye. Google Glass allows users to interact through a simple touch pad on the side of the head. Users swipe down to exit an application, or forwards and backwards to move along the timeline. In addition, Google Glass can be operated through voice command activating it through saying “OK Glass”. Google Glass is a new and innovative technology that is not available in Europe or for general sale to date and therefore, users have not had a chance the experience Google Glass. Also other wearable glasses are still in their infancy with only a small number of prototypes available. Therefore, it is difficult to assess the potential of wearables such as Google Glass. In addition, Han et al. (2014) revealed that augmented reality within the urban heritage context has not been thoroughly investigated and revealed that particularly privacy issues in regards to Google Glass might have important implications.

Wearable-enabled Museum and Art Gallery Experience

According to Ebling et al. (2013, p. 18), devices with enhanced capabilities such as Google Glass may bring augmented reality into the museum environment pointing out that “visitors might see visual annotations as they look at artifacts”. This idea already stems back to 2002, when Sparacino researched “real-time sensor-driven understanding of visitors’ interests for personalized visually-augmented museum experiences”. The capabilities of Google Glass as an enhancer for culture was confirmed by Rhodes and Allen (2014) who acknowledged that the usage of Google Glass will be particularly enriching for the museum experience as there is literally no distraction for other visitors if refraining from using verbal commands. Due to being new on the market, there are not many applications for Google Glass or wearable devices in general however, Ferguson (2013) described Google’s latest Glassware application that has the potential to influence the way tourists explore culture, heritage and destinations. Han et al. (2013) confirmed that augmented reality can be a useful tool in order to enhance heritage tourism as it allows the production of content into visitors’ immediate surroundings. In addition, Grinter et al. (2002, p. 1) argued that “since museum visits are frequently social in nature it is not enough to design a usable and useful system for individual visitors. The design challenge becomes, in part, a question of understanding what visitors want to share when they visit museums”. Marty (2012, p. 28) studied the emergence of information systems within the heritage context and identified that “it is no longer sufficient to provide access to limited resources inside the museum; today’s visitors expect unlimited access to information resources, where they want it, when they want it”.

METHODS

The present study aims to explore visitors' first time usage behavior of Google Glass within the context of Manchester Art Gallery. The initiative to utilize Google Glass as an enhancement tool for visitors within Manchester Art Gallery and to promote the city of Manchester as an "innovative city" started in 2014 as a cooperation between Manchester Metropolitan University, Manchester Art Gallery and 33 Labs. Being among the first in Europe to test Google Glass in an Art Gallery environment the test of the Museum Zoom (Figure 1) application in April 2014 aimed to explore visitor's first time usage behavior of Google Glass within the art gallery context. Figure 2 displays one example of information visitors' received while trying Google Glass at a painting within Manchester Art Gallery.



Figure 1. Participant at the Google Glass Art Gallery Test



Figure 2. Google Glass Art Gallery Test Application

A prototype application for Google Glass was developed whereby information of one painting was implemented. The study was conducted on 10th and 11th of April 2014 at Manchester Art Gallery. In total, 29 art gallery visitors experienced the application. Purposive sampling method was used to collect data and Table 1 shows the profile of participants. While half of the participants were recruited within the Art Gallery itself, the other half were recruited through social media efforts by the Manchester Art Gallery.

Prior to the experiment, basic functionalities of Google Glass such as voice command, swiping, taking pictures and sharing functions were demonstrated by the researcher and projected onto a smartphone screen for the participant to follow. After this demonstration, participants were asked to use Google Glass to explore their first time usage behaviors. Then the experiment moved on to the testing of the application in front of one painting by George Stubb to experience Google Glass within the Art Gallery environment. Participants took a picture of the painting, shared it with the Museum Zoom application and were then able to see three cards of further information about the painting, the artist as well as related paintings. Information was provided in form of text

and audio. Figure 2 shows an example of one of the cards participants were able to see through Google Glass. After the test, participants were asked to fill in a short demographic questionnaire and participate in an interview. The obtained data were analyzed using content analysis and key themes from the interviews emerged.

Table 1. The Profile of Participants

Participant	Gender	Age	Awareness of Google Glass	Technological innovativeness
P1	Male	30-39	Yes	Moderately
P2	Female	Over 60	No	No
P3	Female	Below 20	No	Moderately
P4	Male	20-29	Yes	Moderately
P5	Male	20-29	Yes	Moderately
P6	Male	40-49	Yes	Moderately
P7	Female	20-29	No	Moderately
P8	Female	Over 60	Yes	Yes
P9	Male	Below 20	Yes	Moderately
P10	Female	20-29	Yes	Yes
P11	Female	Below 20	No	No
P12	Female	Below 20	No	Moderately
P13	Male	50-59	Yes	Moderately
P14	Female	20-29	Yes	Moderately
P15	Male	20-29	Yes	Yes
P16	Female	20-29	Yes	Yes
P17	Male	40-49	Yes	Yes
P18	Male	30-39	No	No
P19	Male	30-39	Yes	Yes
P20	Female	30-39	Yes	Yes
P21	Female	30-39	Yes	Moderately
P22	Male	20-29	No	Yes
P23	Male	20-29	Yes	Yes
P24	Male	20-29	Yes	Yes
P25	Male	30-39	Yes	Yes
P26	Female	20-29	Yes	Moderately
P27	Female	50-59	Yes	No
P28	Female	60 and above	No	No
P29	Male	20-29	Yes	Moderately

FINDINGS

While all participants were first time users of Google Glass, perceived personal technological innovativeness ranged from low over moderate to high as can be seen in Table 1. In addition, the majority of participants was aware of the availability of Google Glass or at least heard about it. After analyzing the interviews, the following themes emerged within the Google Glass application test at the Manchester Art Gallery.

Novelty

It was evident that all participants were curious of Google Glass and its capabilities. Participants who were generally aware of Google Glass through articles on the Internet and other media were highly curious of trying the novel gadget, while participants who were not aware of this device were mostly pleasantly surprised about the application and perceived possibilities that the device offered. Despite all participants trying Google Glass for the first time, it was noticeable that all participants were enthusiastic and excited of wearing and interacting with the device and participants pointed out the social media attention they would receive in their circles (P3, P9).

However, since it was still limited in functions and applications, it was considered the pure novelty factor. Although participants who were less technology savvy required assistance with the interaction (P2, P6), all participants had a positive attitude towards the usefulness of the device within the art gallery environment as well as for other day-to-day activities.

Others mentioned in particular to be curious of how Google Glass would benefit and contribute to the everyday life of people (P13, P15, P16). Thus, it is very important to create meaningful applications that have the potential to enhance daily activities. However, while participants were interested in the device, it was evident that most people did not have any expectations. Whereas most participants were surprised by the functions within and interaction with the application, P6 and P7 pointed out that although its functions and potential were interesting, it did not trigger emotional excitement. P12 further added that it was still considered unnatural to communicate with Google Glass.

Numerous participants claimed that they did not use technology while visiting art galleries or other tourist attractions (P4, P5, P6, P7, P12, P25, P26 and P27). Audio guides were commonly regarded as impractical to use within the museum and art galleries.

Although participants were aware of attraction specific applications that were available to download on the personal mobile device, it was not used frequently among participants. Thus, participants who were regular visitors of the Art Gallery claimed to be highly interested in the ways Google Glass would provide information to the visitor and enhance the overall tourist experience. This is concurred with Ferguson (2013) as well as Rhodes and Allen (2014) who acknowledged Google Glass to have the potential to highly impact the way visitors experience museums and art galleries in the future. On the other hand, Grinter et al. (2002) identified that an understanding of visitor requirements and desired information is important in order to develop meaningful applications.

Functions

Although each participant was introduced to the operation of the gadget before the research process, it was found that most participants were struggling with the interaction with Google Glass during the first two to five minutes. It was identified that participants in general were not confident and felt rather shy using the device as they required time to get used to the interaction. This was dependent on experience and knowledge of mobile gadgets and applications. Some participants (P4, P11, P16, P27) stated that they were confused at first as having a computer screen in front of the eye was considered new. However, most participants quickly learned how to interact with the device and the menu format when the general functions were explained by the researcher (P3, P5, P6, P8, P14). Once participants understood the menu format of the device and how to interact with it, most of them pointed out that they were eager to try various functionalities and learn more about the device and its potential (P3, P4, P9, P10).

Ease of Use

One of the difficulties during the test was the necessity to reboot the device multiple times in order to assure smooth interaction. P9 noted that the device was heating up, while none of the participants argued that it was becoming inconvenient to continue wearing. While it was solely a technological issue, it was identified that it had an effect on the confidence of interacting with the device particularly for participants who were less technological savvy (P1, P9, P12, P18). Therefore, smooth operation and interaction

with the device was considered a key requirement for applications running on Google Glass in order to avoid a lack of user experience. Similar concerns were raised by P1, P7 and P18 when they ended up in the wrong menu while interacting with the device, as they felt disoriented. Others however, who were confident using technology took remarkably less time to get accustomed to using Google Glass and were taking initiative to ‘play around’ the functions of the device (P3, P4, P7, P14, P15). Regardless of their age, participants acknowledged that they understood the functions of the device better as the test progressed and were able to interact more smoothly as time passed by.

Google Glass was built on the provisional tap and swipe function as well as reacting to voice commands in order to interact with the device. While those gestures were considered natural, it was evident that not all participants were comfortable swiping and tapping the frame next to their right eye. Particularly people, whose hair was covering a large part of the frame, pointed out that they struggled with the proper swipe registration, as it was inconvenient to continuously pull back their hair in order to avoid miscommunication with the device (P4, P21, P23). P7 however argued that due to the natural gestures that people were already accustomed to through current smartphones and other mobile devices, Google Glass was easy to use once people got familiar with it. P13 on the other hand argued that it was still considered ‘too bothersome’ to access information using Google Glass. In general however, participants stated that they enjoyed interacting with Google Glass and P8 pointed out that the device was not intrusive or disturbing in any way when receiving information or simply wearing it. On the other hand, P16 mentioned that the device should be adjustable in size to increase its

wearability and comfort. P19 further noted that a slight headache was apparent which could result from the first time usage of the device such as wearing regular glasses for the very first time, but should be investigated further as Google Glass becomes a mass market product in the near future.

Contents

Information access in the device was received through the Google Glass prism forming the screen in front of the right eye and the bone-conducting speaker through the glass frame, as the additional earpiece was not used for research purposes. Although participants acknowledged the novel technology through vibrations in the skull, some participants perceived it to be ‘too quiet’ for use in the outdoor environment (P1, P2, P21 and P23). It was evident that participants though positively surprised about the bone-conducting speaker as a method of restricting people in the immediate surrounding to listen to auditory content coming through Google Glass, preferred having an earpiece instead as sound was considered ‘unclear’ in a noisy environment (P1). Furthermore, participants whose primary language was not English noted the possibility of receiving auditory information in their mother tongue, alternatively having the possibility to adjust the speed of voice in order to avoid missing information (P1). It was pointed out that auditory information in the museum was similar to audio guides, while participants preferred the information through Google Glass due to the possibility of personalizing information to their interest and the possibility of receiving visual information respectively (P4, P7). While it was dependent on each individual audio guide and site,

participants argued common audio guides to overload information and slow down the tourist experience, resulting in restless time being spent at the museum or art gallery (P7, P8). Although audio guides have become a common gadget in the museum and art galleries, participants pointed out that Google Glass offered an opportunity to replace audio guides in the future. However, P8 and P22 stated that clear indications should be evident noting the start and end of auditory information as for the test, longer pauses in the auditory information was considered confusing. In addition, all participants agreed that until it becomes mainstream, tutorials should be provided in order to teach visitors' how to use Google Glass and its applications.

With regard to the visual content presented through the screen in the prism, some participants found it hard to focus on the screen, and therefore they had to close the left eye in order to avoid distractions in the surrounding (P4, P11). P11 pointed out that full attention was required in order to interact and receive information through the device. P21 on the other hand argued that due to the position of the prism slightly above eye level, it was perceived to take time to get used to "looking up" while being occupied with the surrounding. This was supported by other participants (P19, P25, P28) who claimed that paying attention to the surroundings while interacting with Google Glass might be challenging. In addition, they acknowledged that it might become more distracting rather than supporting daily activities. While Google Glass and other wearable computing devices are being developed with the idea of non-invasive gadgets (Kahn, 2013), it was obvious that acceptance and implementation into day-to-day activities still require further investigation. P5 on the other hand pointed out to be very interested in the content that

could be projected through the screen, as it was perceived to have the ability to be highly personalized.

Social Media Networking

Finally, six participants (P1, P4, P13, P24, P26, P29) pointed out that they particularly liked the possibility of sharing the paintings they liked to their Google+ circle. In fact, it was considered one of the most important aspects of the application. P1 pointed out that the sharing was a good opportunity however, should not be limited to Google+ or e-mail accounts but to a variety of different social media networks. This was confirmed by P29 who acknowledged that social interaction is nowadays the most important element when it comes to new technologies and also P3 confirmed that she would love to post the information about the painting on Instagram or Facebook. P13 stressed that he particularly liked the “interactiveness” of the application, providing the functionalities to share and be socially active. Considering the importance of social media on users’ daily lives, this trend and desire of being able to share the art gallery experience with the circle of friends is not a surprise. P26 went even further to say that she loved the idea of sharing the art gallery experience; also to be reminded afterwards about all the paintings. However, other contradictory opinions were raised. For instance, P15 pointed out that he does not like to share information on social media, particularly when it comes to his private life. Instead, he stated that he rather likes to keep this information to himself and he furthermore raised his concern that art galleries should remain traditional without the implementation of cutting-edge technologies. On the contrary, P13 confirmed that he

likes the combination of old paintings and new technologies. Overall, having a new technology such as Google Glass with the potential to remember paintings through the sharing function, either to social networks or to the own e-mail account or diary, was considered as immensely useful. P17 agreed that all content looked at should be saved on the devices or shared via social networks. Furthermore, P19 had the idea, if friends have looked, shared or saved paintings in the application, it could be recommended to the social circle of friends. This adds another dimension of social interactivity and recommendations through the sharing function. Overall, it was agreed that in today's time, sharing of information is very important and is also highly desired within the art gallery environment.

DISCUSSION AND CONCLUSION

This exploratory study found that Google Glass can provide benefits for the creative tourism industry. Tested in the art gallery environment, visitors could be offered an enhanced experience through the overlay of information on paintings or statues. Overall, Google Glass offers an opportunity to provide richer content to the visitors. While participants comprised of a variety of age groups and technological awareness, it was found that users were able to quickly adjust to the novel interaction method of Google Glass and generally perceived the device to enhance the art gallery experience as well as potentially support daily activities. Although technological issues still remained, such as limited hardware capacity and unstable application, participants were curious to interact with the device. In particular, the possibility to share content about the art gallery

experience with friends via social media was considered as immensely important. Overall, audio guide was regarded as highly impractical to use as well as cumbersome. Therefore, Google Glass might be an ideal alternative for technological implementation and enhancing visitor experience within art galleries. In addition, although participants were aware of art gallery specific applications that were available to download on the personal mobile device, it was not used frequently among participants. Thus, participants who were regular visitors of Manchester Art Gallery raised an interest in the ways Google Glass could provide information to the visitor and enhance the overall tourist experience. This is supported by Ferguson (2013) as well as Rhodes and Allen (2014) who acknowledged that Google Glass has the potential to affect the way visitors experience museums and art galleries in the future.

Nevertheless, the study also identified a number of drawbacks. The application 'Museum Zoom' as well as the Google Glass device were both only prototypes and therefore the heating up of the device and crashing or freezing of the application was a problem that some participants experienced. As this has ultimately influenced the way these participants experienced Google Glass, smooth operation and interaction with the device is considered a key requirement in order to avoid a lack of user experience. In addition, also other drawbacks were acknowledged by participants including audio reception in noisy surroundings and distraction through device interaction while performing daily activities. Nonetheless, the majority of participants confirmed the potential of Google Glass to add value to the art gallery experience through the augmentation of information. The opportunities of integrating Google Glass and enhancing the experience do not stop

at the art gallery; potential application could be in other tourist attractions within the wider creative tourism context.

Limitations and Future Research

There are a number of limitations within the present study. The qualitative and exploratory nature of the study make it difficult to replicate the research thus, the findings cannot be generalized. In addition, the Google Glass Museum Zoom application was only tested on one painting and the inclusion of more paintings or an entire art gallery may influence visitors' first time usage behavior. Based on the findings of this exploratory study, future research can further focus on Google Glass within the art gallery environment in order to develop a theoretical framework. Furthermore, it is recommended for future research to focus on cultural learning experience. Finally, the usage of control groups may add value to future research. The experience of visitors without Google Glass could be compared to the experience of visitor with Google Glass which would provide important indications of the importance of Google Glass as an enhancer of the art gallery experience.

As outlined in the methodology section, the present study recruited participants directly in the art gallery as well as through social media. Further research could put a stronger focus on the differences between visitor groups; for instance, those gallery visitors who are technological savvy and voluntarily want to try out cutting-edge technologies and those who consider themselves moderately to low innovative. In addition, future research could explore the opportunities of Google Glass within other cultural heritage, museum

or more broadly tourism contexts in order to investigate the full spectrum within creative tourism. In addition, the usage of a more scientific and rigorous approach in measuring Google Glass visitor experience through the usage of tracking devices might provide more insight into the actual usage behavior, user requirements as well as acceptance.

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