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Assessing the Prospects of the Integration of Mobile Device Applications in the Victoria and Albert Museum's Educational Framework

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**Assessing the Prospects of the Integration of Mobile Device Applications
in the Victoria and Albert Museum's Educational Framework**

An Interactive Qualifying Project
submitted to the Faculty of
WORCESTER POLYTECHNIC INSTITUTE
*in partial fulfillment of the requirements for the
degree of Bachelor of Science*

By

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ABSTRACT

The Victoria and Albert Museum desired research regarding the concept of enhancing education through technology and the usefulness of handheld device applications in a museum setting. Previous studies suggested that mobile device applications enhanced learning. Our team used this research, surveys, and an educational benefit analysis and determined the effectiveness of the technology in educating visitors and their feelings on it. Our analyses demonstrated that participants' learning improved and they felt inclined towards expanding the technology throughout the museum.

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EXECUTIVE SUMMARY

As time has progressed, technology has only advanced further and further and infused itself into every possible venue. Even museums have sought a way of enhancing their visitors' experiences through technology, whilst ensuring they received a quality educational experience with their entertainment. By embedding new technologies into a museum setting, exhibits take on a whole new vigor. Mobile device applications in particular appear useful in enhancing visitor's learning experiences. As of yet, science-oriented museums have mostly integrated these technologies. However, many art and design museums have shown interest in integrating such technologies. The Victoria and Albert Museum (the V&A) for instance, found the prospect of implementing mobile device applications intriguing. Thus our group, as a temporary part of the V&A, worked towards determining the benefits and drawbacks of including mobile device applications in the museum. The museum emphasized though that while these devices may entertain, they should have a primary focus upon improving the educational experiences of patrons. The V&A saw little merit in an application that did not effectively educate visitors.

First, our group collected and analyzed data on mobile device applications' at other, similar institutions. During this process we assessed the learning benefits users experienced while utilizing the application. The studies we examined demonstrated the effects their specific devices had upon the users' learning experiences. We also created a series of research questions (objectives) for focusing the project. We answered these questions through interviews, surveys, personal meaning mapping (PMM), and documentation research. Our group posed the following questions:

- What does the V&A want to accomplish for its visitors?
- What types of mobile device applications currently exist in other institutions? Do they successfully enhance their visitors' learning experiences?
- What kinds of mobile device applications best suit art and design museums like the V&A?
- How could mobile device applications affect the learning experiences of visitors?
- Will visitors use the application? Will staff members accept it?

Our interviews with museum staff members helped us determine the exact needs of the V&A in creating an application as well as their reasoning for not creating one before. Our surveys provided immediate data on visitor thoughts about such devices as well as reflected their opinions on whether or not the museum should develop a mobile device application. Our PMMs conducted within the V&A's temporary Quilts exhibit compared and contrasted learning within the exhibit both without technology and with the mobile device created for the exhibit.

The Victoria and Albert Museum shows an interest in a mobile device application, which enhances the learning experience of visitors in the museum galleries. Discovering what application best suits the museum was determined through an analysis of current museum technology, focusing on The British Museum's tour and map application, and the Tate Modern's tour application. Through the analysis of these applications, and PMMs we can conclude that the integration of an application into the museum will enhance the learning experiences of visitors. With the analysis of our General Visitor Survey we discovered that visitors want to see the application in the V&A and that they feel comfortable using the application. Through our interviews we can conclude that staff is generally acceptant of an application and are currently waiting for the "perfect" application.

CHAPTER 1: INTRODUCTION

Thomas Edison's patent for the Means for Transmitting Signals Electronically, in 1891, initiated over a century of collective interest in the concept of gathering information through mobile technology. Edison's idea for facilitating practically instantaneous access to information through mobile technology instigated a technological phenomenon, in which someone can retrieve information in a matter of seconds from across the world at any given time. Cell phone usage for communication purposes in particular reflected these developments in mobile technology. Recently, mobile technology filtered into museums where its developments work in enhancing their visitors learning experiences (Edison, 1891).

Understanding the benefits of mobile device technology, the Victoria and Albert Museum (V&A) desired our team's investigation and understanding of the role and utility of mobile device applications, in addition to their ability to enhance the learning experiences of gallery visitors. However, it remains imperative that the V&A retain its traditional learning atmosphere in the exhibits and galleries in order to primarily focus the visitor's attention upon the various media, rather than the application's features. With these objectives in mind, the museum cautiously approached the incorporation of mobile device applications into its exhibits.

The progression of the digital revolution and the increasing use of the Internet forever changed how people learn. The Internet and other digital technologies provide an opportunity for self education without leaving the comfort of home. Capitalizing upon this new movement, high tech and digitally enhanced displays only increased in popularity in museums. These enhancements include mobile devices with applications, computers, video and audio guides, the internet, and other multimedia. Interactions with these digital technologies enabled the visitor to deepen their learning experience within the museum.

For example, a mobile device application could engage visitors through brief quizzes while viewing a gallery. By participating in the quiz, visitors may retain more of the information presented, all whilst enjoying an additional challenge from the quiz. Art and design museums like the V&A cautiously approach the steps of incorporating digital technology into exhibits, yet they face resistance from both staff and visitors who wonder if the additional technology would hinder the experience of viewing the exhibits.

When considering the addition of mobile device applications, the museum must remember that any new technology integrated into the V&A must be integrated as seamlessly as possible. The addition of a mobile device application should only enhance the learning

experiences of visitors within the museum. The application must not distract from the integrity of the exhibits or cause a significant difference in the intellectual and emotional experience of viewing objects within the galleries. With the successful addition of a mobile device application, the museum can provide an exhibit-label alternative and perhaps a more effective means of learning through individual interaction with a mobile device. Exhibit labels aid visual learners, unlike mobile device applications that engage visual, auditory, and hands-on learners. Mobile device applications also provide the opportunity for additional interaction through mini quizzes, detailed tours, designer or artist interpretations, as well as other enlightening details unavailable from static displays.

While considering the V&A's interests and goals, our group developed our own project goal. Our goal was to provide the Victoria and Albert Museum with a thorough analysis of mobile device applications, and subsequently assessed their ability in enhancing the learning experiences of visitors within the V&A. For the proper accomplishment of our goal, our group first determined why the V&A would have considered creating such an application, and how an application could have benefited the learning experiences of visitors. We then observed the different forms of mobile device applications currently in use by other, similar institutions, and determined what aspects of the widely adapted technologies best suit art and design museums. Lastly, through surveys and observations of museum visitors, we deduced whether or not the use of mobile device applications enhanced the already world renown exhibits of the V&A.

CHAPTER 2: LITERATURE REVIEW

We researched and attained knowledge of the characteristics of museums' visitors in hopes of developing our final recommendations. Sufficient data proved whether or not moving forward with mobile device application research benefited the museum. We included a brief history of the Victoria and Albert Museum and set the context for the discussion. Next, we analyzed visitor learning in a museum setting, museum demographics, mobile device applications designed for museums, and what mobile device applications the V&A currently held on site. We concluded with a discussion of the pros and cons of the installation of additional mobile device applications within the Victoria and Albert Museum.

The Victoria and Albert Museum (V&A) understood the benefits of mobile device technology and found the concept worthy of exploration. The V&A was always interested in using new and different media to enhance visitors' learning experiences. Also, mobile device applications could have delivered more information than a display, as well as continued the learning experience beyond the physical museum visit. Thus they desired an investigation by our team, in hopes of understanding the role and utility of mobile device applications, furthering their ability to enhance the learning experiences of gallery visitors.

2.1 Background

British aristocrats founded the V&A in 1852 as the Museum of Manufactures, creating a more permanent exhibit for the arts. Under this title, the museum promoted the industrial and decorative arts. The aristocrats established the museum for the purpose of showcasing several exhibits from the Great Exhibition of 1851. Like other museums, the V&A's collections and institutions partially compiled their exhibits through donations by private benefactors, but government funding purchased the bulk of the collections (The Victoria and Albert Museum, 2010).

The Victoria and Albert Museum experienced many changes in its early years. For example, the museum first went by the name the Museum of Manufactures. After a short stint at the Marlborough House, The Museum of Manufactures moved to South Kensington and changed its name to the South Kensington Museum in 1857. However, Queen Victoria did not officially open the museum to the public until 22 June 1857. On 17 May 1899, during the

laying of the foundation stone of the Aston Webb building as well as during her last official public appearance, Queen Victoria renamed the South Kensington Museum the Victoria and Albert Museum, and the title remains the same to this day (The Victoria and Albert Museum, 2010).

After ten years of construction, the museum moved into the then newly constructed Aston Webb building. Officially opened in 1909 by King Edward VII and Queen Alexandra, the public regarded it with amazement due to its sheer size and elegance. In 1913, construction began on the East Block of the London Science Museum, and initiated the split between the art and science exhibits (Science Museum, 2010).

The buildings of the Victoria and Albert Museum withstood the mass destruction of World War II, and most of the museum's collections endured as well, unharmed within a Welsh slate quarry. Empty galleries served as cafeterias and schools for evacuated persons and service men. At the end of the war, the V&A displayed the "Britain Can Make It" exhibition in its empty galleries for two months, hosting 1,432,369 visitors, before the permanent collections moved back in (Council of Industrial Design, 2010).

After 1983 the museum continued its growth with the intent of keeping with current culture and design. With the never ending goal of staying up to date with public desires, the V&A created a partnership with the Baltimore Art Museum, and exported their Grand Design Program to North America. The Grand Design chronicled the history of the Victoria and Albert Museum as well as inspired museum growth and development elsewhere in the world. The design introduced the concept that museums should motivate manufacturers and designers, which resulted in examples of artistic distinction and established the arts as its own subject. In the program, the V&A described museums as "engines of social improvement and education" (The Victoria and Albert Museum, 2010).

In 2001, The Victoria and Albert Museum launched FuturePlan; a restoration plan that remains in effect until 2011, and hopefully ensured better-displayed galleries and exhibits. In theory, FuturePlan remodeled any outdated sections of the museum, and met modern visitor's expectations of the museum facilities. If implemented correctly, the plan's initiative made more information readily available for visitor. Thus, the Victoria and Albert Museum sought new techniques for presenting information in a more effective and interactive manner. The plan provided guidelines for displaying exhibits and for using interactive media in the Victoria and Albert Museum (The Victoria and Albert Museum, 2010).

The FuturePlan also motivated many of the recent renovations in the museum. Upgrades ranged from the restoration of the façade of the Aston Webb building, to the renovations of the galleries. Many other updates included the integrations of the theater and performance collection, the jewelry collection, the Sackler Center for Arts Education, and the John Madejski Garden. The Victoria and Albert Museum Design Team transformed these galleries and spaces, in hopes of bringing the museum into the 21st century (The Victoria and Albert Museum, 2010).

Our study of mobile device applications fell under the FuturePlan. As more and more museums started integrating hand-held devices into their exhibits, the V&A felt that they must keep updated on the latest technologies. Our role then lay in investigating the utility of such devices and their effects upon visitors' learning experiences. Through our surveys and subsequent analysis we determined the value of implementing these mobile application devices in the V&A. Our research contributed to the larger, aforementioned FuturePlan, which planned on eventually renovating out of date sections in order to enhance the overall museum's quality.

2.2 Learning in the Museum

Enhancing the learning experiences of the V&A's visitors remained the crucial factor in considering any new additions, and took a tremendous amount of planning. The V&A considered furthering the learning experiences of visitors their primary goal. Mobile device applications could potentially have helped in this endeavor and thus deserved more research on their effects. The group provided the Victoria and Albert Museum with an analysis of mobile device applications, and their current status amongst other museums. Once completed, we assessed their effectiveness in enhancing the learning experiences of visitors within the V&A. Our contribution to the FuturePlan in the V&A began with an analysis of the museum's current mobile device applications, and ended with our recommendations on how mobile applications benefited and enhanced the visitor learning experience.

2.2.1 Educating Visitors

Museums extended to great lengths in hopes of determining the public's wants and needs within a museum setting. Museums typically attracted tourists and patrons from all over the world. However, according to Jocelyn Dodd, director of the Research Center for Museums and Galleries at the University of Leicester, residents whom live in close proximity to the museum constituted their primary clientele. Institutions such as the V&A reached out

to these surrounding communities, and adapted to ever changing visitor expectations. The Victoria and Albert Museum exemplified this in its temporary Quilts Exhibit, which they brought to the museum in hopes of attracting mature women, a crucial demographic of museumgoers. Understanding the interests of the community crucially affects a museum's success at attaining and retaining customer loyalty to the museum and prompting repeat visitation (Dodd, 1999).

Facilitated and *unfacilitated* learning constituted two main categories in understanding education in a museum setting. An educator typically mediated facilitated learning in the museum, providing theories, knowledge, and discussions of the exhibits for the public (Hein, 2006). Former Director of Research of the Department of Museum Studies at the University of Leicester, Eilean Hooper-Greenhill, defined the role of a museum educator in a facilitated setting in her book *The Educational Role of the Museum*: "The role of a museum educator is indeed in the facilitation of active learning through the handling and questioning of objects, and through discussions linked to concrete experiences" (Hooper-Greenhill 1999b). These educators provided a primary resource for information, as they led guided tours, and imparted knowledge of museum exhibits not on display. Unfacilitated learning, on the other hand, Hooper-Greenhill described as "active learning," which also focused on the individual person rather than on the overall community. Hooper-Greenhill identified the main challenge facing visitors as arising from touring without an educator and misreading the data. Patrons could have misinterpreted exhibits, or missed their relevance within the entire museum. However, determining the most effective process that most benefits the community proved indeterminable as of yet (Hein, 2006).

According to our research, public interest waned in learning in a formal setting facilitated by an instructor or scholar. This presented a challenge. Maintaining full involvement and interest remained important, especially when pleasing an audience with a large range of demographics. Working with adults and children in the same setting presented a particularly difficult problem in delivering the information in manners that piqued the interest of both parties. For example, younger demographics typically lacked the necessary background knowledge for understanding a topic targeted towards a more adult group. Specifically, children found understanding historical time periods a difficult concept. As a result, they may have lost some pertinent information. On the other hand, adults may have passed over the less complicated information more suitable for children. Through life experiences, people developed specific interests, and in discovering these, the museum could

have selected the best method of effectively targeting a range of age groups. Success required matching customer interest with what the museum provided (Jensen, 1999).

2.2.2 Keeping the Visitor Engaged

Most museums bombard visitors with information as soon as they have passed through the grand entrance, assaulting their attention from the beginning. The V&A worked towards inspiring the individual's curiosity and meeting expectations about the museum upon entry as well. In successfully capturing visitors' curiosity and interests early on, patron's subsequent museum interaction should have resulted positively. However, if the topics throughout the exhibits appeared repetitive, and could not hold a viewer's attention, the individual's curiosity may have decreased. The Victoria and Albert Museum strove for holding curiosity at peak levels. If the museum succeeded, the visitors would have left with a heightened knowledge resulting from what they observed during their visit (Falk & Dierking, 2000).

A research professor at the University of Toronto, Erminia Pedretti, used the term "issue-based" in describing the practice of installing controversial displays and pulling an "intellectual and emotional response" from the audience in her publication, *Challenging Convention and Communicating Controversy: Learning through Issue-Based Museum Exhibitions* (Pedretti, 2007). She believed unfacilitated, "issue-based" exhibits engaged the viewers even more than facilitated exhibits. Once visitors emotionally or personally responded, they developed a new or renewed interest in the subject, and tied more personally into the experience. In utilizing an issue-based exhibit, the museum must have once again understood its audience. The V&A investigated the cultural, economic, and political issues concerning its visitors, and accounted for these features when developing exhibits. When considering the renowned reputation of the museum, curators may have felt reluctant implementing such an innovative exhibit, but they may have found the added unique attraction well worth the risk (Pedretti, 2007).

By stimulating debate and discussion, museums took important steps towards creating a more successful learning experience for the visitor. Discussing a topic encouraged better recollection of the exhibit and a positive museum experience, crucial when creating an issue-based exhibit. Mobile device applications could have helped prompt discussions of certain topics. For example, an application could have asked the user a critical thinking question pertaining to an exhibit. If in a group, this may have sparked a discussion between all users.

Applications also could have provided the user with additional information that the exhibit could not. Most exhibit descriptions displayed basic information about an artwork because of space limitations and may have excluded important, thought provoking details (Pedretti, 2007).

2.2.3 Educating with Unfacilitated Exhibits

Originally, unfacilitated approaches appeared only beneficial for museums containing scientific exhibits. However, with their success, and the arrival of cheap and user-friendly digital technology, museum research teams began investigating how implementing these hands-on approaches into art and design museum settings could work. An unfacilitated teaching approach benefited visitors in that they could view desired exhibits at their leisure without feeling rushed by the facilitator. As Hopper-Greenhill described in *The Educational Role of the Museum*, “the educational goal [is] self-liberation” (Hooper-Greenhill 1999b). The participants avoided the loss of interest by only viewing material that they found interesting. Their personalized tour via a mobile device application prompted a better understanding of the desired material and improved their learning experiences.

Keeping the visitor engaged during education presented another challenge for the Victoria and Albert Museum. The museum acquired the ideas and concepts originally designed for a science museum setting, and must tailor fit them into an art and design museum. Hooper-Greenhill stated that in learning a new topic some visitors must work in hands-on activities, making the information more tangible, increasing understanding. Listening to, or watching a video, did not sufficiently aid some individuals in absorbing the material and retaining it for an extended period of time. In her writings, Hopper-Greenhill mentioned how the average viewer did not read an entire description of an object. This especially held true in a museum such as the V&A because of its overwhelming size and number of collections. For increasing the holding power of exhibits, Hopper-Greenhill suggested hands-on interaction with the objects. This helped trigger visitors’ interests in a once un-stimulating subject, and may have left them with a longer lasting memory of the subject matter. Since the museum could not have applied a hands-on approach to all exhibitions, a mobile device application provided an alternative. Though not hands-on with the actual collection, an application ideally replaced such activities through its interactive capabilities (Hooper-Greenhill, 1999a).

A museum could have enhanced exhibits beyond unfacilitated learning and self-education through designing hands-on activities. Sue Allen, of the Exploratorium of San Francisco, believed in incorporating more interactive exhibits, and museums making sure those visitors walked away with enhanced learning experiences through unfacilitated learning (Allen, 2007). Finding the appropriate interactive engagement challenged museums with avoiding drawing too much attention away from the exhibit itself. Multiple studies explored finding this balance and focused on the benefit of hands-on learning and other possibilities. Unfacilitated learning stimulated the mind beyond simply what the exhibit displayed, while the viewers further involved themselves within the exhibit.

Though providing visitors with engaging exhibits helped, not every exhibit should have incorporated interactivity. The viewer could have perceived large-scale use of interactive exhibits as sensory overload. In addressing this issue, museums look at the target audience of the exhibit and understood how they preferred experiencing the exhibit. In turn, the museum decided how they wanted patrons interacting with the exhibit, whether by independent discovery or the facilitation of discovery. Either way, museums should have evaluated every exhibit for whether or not unfacilitated interaction, likely through the means of digital technology, needed incorporation (Allen, 2007).

Implementing unfacilitated learning within a museum setting always felt like a pertinent topic worth discussion. The museum could never have eliminated the use of facilitated learning due to the large population of museum visitors that still enjoyed, and more importantly, expected this method of education. Guided tours should have always worked into a museum's experience and covered the "preferred-formal-learning" demographic. We kept in mind this preferred environment and looked into the possibility of implementing a mobile device application into an art and design museum setting that attracted both formal and informal learners (Hooper-Greenhill 1999).

2.3 Identifying the Victoria and Albert Museum's Plan

The head of Gallery Interpretation, Evaluation and Residencies at the V&A, Juliette Fritsch, discussed the Victoria and Albert Museum's current methods of displaying exhibit descriptions, as well as new creative opportunities for the museum, in her article, *The Museum as a Social Laboratory* (Fritsch, 2007). She cited John H. Falk and Lynn D. Dierking, Sea Grant Professors in Free-Choice Learning at Oregon State University, regarding the V&A's model for redesigning a museum. Fritsch wrote that, "Their model

integrates three contexts of personal, physical and social into a central interactive experience, the development of which they proposed as key to designing museum exhibitions and experiences that communicate appropriately and effectively” (Fritsch, 2007). She hinted that museums must consider these imperative topics when designing a successful museum exhibit. The Victoria and Albert Museum also considered the Durbin and Wilk’s model (Fritsch, 2007). This model emphasized the need for adding employees onto the concept teams working on new gallery developments. It also argued for the necessity of a “Gallery Educator,” who would provide the team with information during the design phase, regarding how people learn and how interactivity should incorporate into the gallery or exhibit. Without this position on the concept team, many institutions would have fallen short of reaching their full potential of providing optimum interaction between visitors and exhibits (Fritsch, 2007).

Fritsch continued and compared science and non-science museums on the basis of how effectively they utilized their exhibits. She explained, “Science museums and centers have been at the forefront of developing a front-end-formative-summative cycle of evaluation for decades” (Fritsch, 2007). Though already commonplace in science museums, the incorporation of interactivity proved difficult in direct application in a non-science environment such as the V&A. Fritsch asserted that certain interactive displays felt out of place at the Victoria and Albert Museum but the concept of visitor interactivity and hands-on displays remained essential in enhancing the learning experiences of visitors (Fritsch, 2007).

The Victoria and Albert Museum already successfully incorporated technological displays such as *Style Guide* desktops and *How Was It Made?* documentaries into their exhibits. Yet the V&A held no evaluations on the effectiveness of these facilities in delivering information to museum visitors, and in turn how they contributed to the overall state of the museum. This lack of investigation and feedback clarified the necessity for a strong and solid justification in determining if the technology benefits the visitor (Fritsch, 2007). From our observations of the technology within the V&A, we found the *Style Guides* positioned poorly throughout the museum, and thought that visitors could have utilized them more effectively in other locations. Locating many of them proved difficult, and we often discovered them unintentionally. Not only did guide locations not work, but we felt the museum should have mended the unsatisfying quality of these devices as well.

Fritsch made a valid point, regarding the necessity of taking the individual experience and making it enjoyable for the entire community. She stated that the majority of existing exhibits within the V&A focused towards individuals or pairs; however, the museum should

have considered group education when they researched the integration of a mobile device application into the Victoria and Albert Museum (Fritsch, 2007).

2.4 Scope of Technology in the Museum

Our project built on the Victoria and Albert Museum's current FuturePlan project, which addressed the museum's desire of keeping up with the push towards digital technology within the museum exhibits. Museums addressed this increasing demand for technology for maintaining any hope of focusing on the evolving audience and remaining an educational destination for museumgoers. They understood that the addition of digital technology should not have taken away from or distracted the visitor from the deeper meaning behind most of the exhibits or artworks, but rather enhanced the viewing experience. Understanding this principle proved useful when researchers looked at the integration of a mobile device application (Tondreau et al., 2005).

2.4.1 Using Personal Mobile Devices

Dr. Mohamed Ally, of the **Centre for Distance Education at Athabasca University**, stated in his book, *Using Mobile Technologies for Multimedia Tours in a Traditional Museum Setting*, that citizens completely control what, where, when, and how they want their education and entertainment (Ally, 2009). He stated that, "Mobile learning through the use of wireless mobile technology allows anyone to access information and learning materials from anywhere and at any time" (Ally, 2009). This observation motivated educational institutions in keeping up with ever changing technological progression. In accordance with our hypothesis, Ally realized that institutions such as the Victoria and Albert Museum understood the importance of integrating modern technologies into their own exhibits. Commonly, individuals and corporations competed with one another in acquiring the newest and most advanced media technologies possible. Ally argued for supplying individuals with technology on their own individual mobile devices. This innovative and unique option could have appealed to businesses and institutions alike. The "nomadic learner and worker," as Ally concluded, could have accessed the learning materials from anywhere in the world, while they also received a more personalized experience. Ally admitted that the current state of mobile learning benefits an educational environment that promoted more immediate and long distance learning. However, this point only related in situations where the visitor desired instantaneous information above and beyond that offered by the concrete exhibits (Ally, 2009).

Supporting Ally's declaration, John Traxler, the director of the Learning Lab at the University of Wolverhampton, claimed, "mobile learning will support a wide variety of conceptions of teaching." Providing visitors with a unique learning experience within the museum remained the overall goal. Walking into a 12.5-acre museum would have overwhelmed most patrons. Using his or her own mobile device though, opening up an application with a completely interactive map and layout, would have helped them when navigating through the museum, and ensured that they targeted the specific galleries that interested them. This also meant freeing visitors from the constraints of a facilitated, guided tour.

The same visitors then could have begun exploring the museum, and may have started reading a plaque on the wall, containing a brief overview of the item on display. If they desired more information on the subject, they could have accessed it by referring back to an application on their mobile device. Visitors could have also played a game or interacted in an activity that pertained to an exhibit (Traxler, 2009). Patron's experiences would have felt more personalized, like what Ally described. When learners took education into their own hands in an organized and fully developed manner, they developed an alternative educational method for themselves on a personal level (Ally, 2009).

2.4.2 Fixed and Interactive Technologies

Assistant Director for Collections Information at the J. Paul Getty Museum in Los Angeles, Kenneth Hamma, addressed the use of mobile device technology within a scholarly setting in his publication, *The Role of Museums in Online Teaching, Learning, and Research* (Hamma, 2004). Hamma described the possibilities of integrating technology such as a Personal Digital Assistant (PDA), as well as the expansion of online learning. He stated that although museums remained traditionally conservative, key opportunities arose within these establishments for integrating the use of mobile technology in both special exhibits and permanent collections. The author hinted that certain mobile device technologies "may achieve greater interoperability among libraries, museums, and institutional archives" (Hamma, 2004). For example, some technologies helped visitors look up digital layouts of publications at a library or in-depth descriptions of certain artworks when visiting a museum. Hamma further elaborated on his proposed concept and discussed how a visitor at one museum could have accessed information from another educational facility for additional background (Hamma, 2004).

Hamma also referenced mobile technologies that could integrate into a museum, ideas that ran parallel with Ally's approach. However, Hamma discussed the possibility of the museum supplying the visitors with a PDA rather than the individual accessing the information themselves through their own mobile device. The Victoria and Albert Museum would rather not provide the visitor with a museum-owned device, but prefers the idea of creating an application for the visitors' own devices. This application could have contained information such as daily events, demonstrations, interactive maps, electronic tours through audio recordings, and video demonstrations (Hamma, 2004).

2.4.3 Mobile Device Capabilities

With the ever-growing capabilities of technology, mobile devices have embedded themselves even more into our daily lives. Twenty years ago, calling a friend from almost anywhere seemed like an amazing feat. But today, people check their bank statements from across the world on a device that fits in the palm of their hands. These newly developed and continuously advancing technologies have the potential of greatly impacting the educational world. Learning has transitioned farther and farther outside of the classroom and into the learner's preferred environment, which has made for more personal and collaborative learning experiences. The seamless integration of these technologies into education presented a challenge, as people may not have recognized learning with mobile device as educational at all. Mobile devices can respond to data unique to its location, time, and environment all within the museum setting. Mobile devices can also link with one another through a shared network that allows visitor interaction; however, the technology still leaves room for individuality focusing on personal interests (Naismith, 2006).

Mobile device applications support all types of learning styles. Learning styles can break down into these 6 different learning categories:

- Behaviorist – activities that promote learning as a change in observable actions.
- Constructivist – activities in which learners actively construct new ideas or concepts based on both their previous and current knowledge.
- Situated – activities that promote learning within an authentic context and culture.
- Collaborative – activities that promote learning through social interaction.
- Informal and lifelong – activities that support learning outside a dedicated learning environment and formal curriculum.

- Learning and teaching support – activities that assist in the coordination of learners (Naismith, 2006).

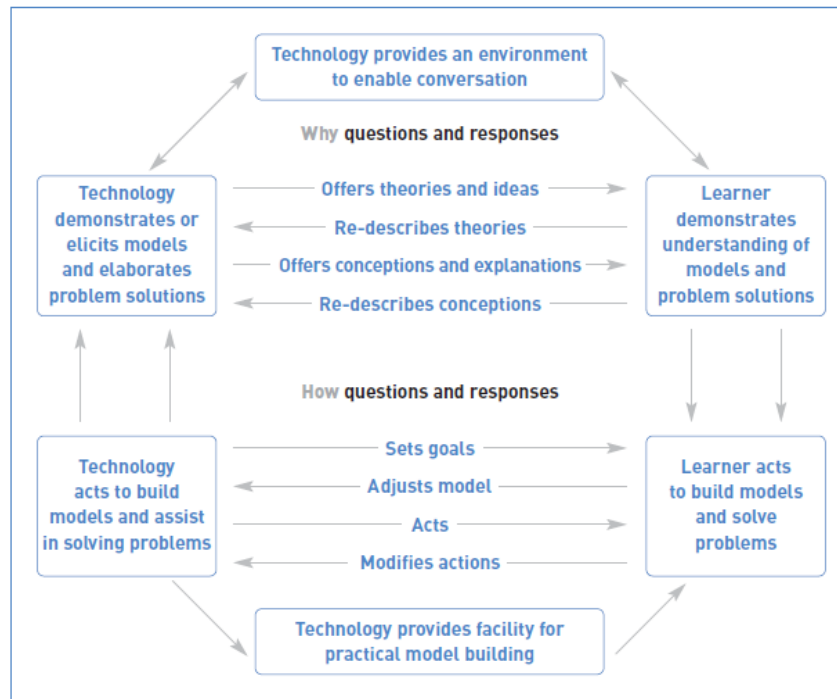


Figure 1 Role of technology in supporting conversational learning (Naismith 2006)

This Figure 1 shows how mobile devices responded to user inputs, like a human being would. The technology provided the visitor with an environment conducive to conversation or interaction. Users could then have gained an effective understanding of the information provided by the technology, in addition to the other users around them. Once they reached an understanding, the technology prompted and assisted in the visitor’s ability in problem solving and met program goals (Naismith, 2006).

Theme	Key Theorists	Activities
Behaviourist learning	Skinner, Pavlov	<ul style="list-style-type: none"> • drill and feedback • classroom response systems
Constructivist learning	Piaget, Bruner, Papert	<ul style="list-style-type: none"> • participatory simulations
Situated learning	Lave, Brown	<ul style="list-style-type: none"> • problem and case-based learning • context awareness
Collaborative learning	Vygotsky	<ul style="list-style-type: none"> • mobile computer-supported collaborative learning (MCSCCL)
Informal and lifelong learning	Eraut	<ul style="list-style-type: none"> • supporting intentional and accidental learning episodes
Learning and teaching support	n/a	<ul style="list-style-type: none"> • personal organisation • support for administrative duties (eg attendance)

Table 1: An activity-based categorisation of mobile technologies and learning

Figure 2 An activity-based categorization of mobile technologies and learning (Naismith, 2006).

Figure 2 above describes what activities each learning style or “theme” learns through. Although one may not include mobile device applications in these activities, this technology offers an extreme personal experience in correct usage (Naismith, 2006).

2.4.4 Successful Implementation of Mobile Technology

Various costs arose when integrating mobile device learning developed in any environment. Not only do the devices, software, and network hardware initially cost a lot, but on-going costs of technical support and other hidden fees added up as well. Museums should have considered how often and willingly visitors use the technology by the time they decided on its implementation. They should also have executed a pilot run and observed how useful and easy visitors found the devices before they integrated them into the museum. Those creating the mobile device application should have analyzed visitors’ opinions on the usability of the devices (Naismith, 2006). They should have also discerned if visitors found the technology suitable for the learning task at hand. They also must have identified advantages and disadvantages of the technology before making a decision on integrating the technology into the museum (Naismith, 2006).

2.5 Museum Demographics

We explored the learning styles of various demographics of museum patrons in hopes of understanding the desires of the groups of visitors. A comprehension of different learning styles helped us in determining the traditional methods of education that an art and design

museum employs, as well as more recently developed methods. A combination of the two would have ensured a beneficial learning experience for the majority of the visitor population. With a focus on age, gender, and visitor behavior, we determined which demographics related most significantly in the Victoria and Albert Museum's efforts in updating their exhibits and applications.

2.5.1 Age

As the Baby Boomer generation continued aging, society made adjustments in all realms and accommodated their needs, from increased healthcare services, to making buildings more easily accessible. Museums made similar adjustments in hopes of facilitating learning for an aging population in museums. Today, one in eight people have claimed an age of 65 or older. By the year 2034, that number will climb to one in five. Museums played and will continue playing an important role in the increase in demand for services and entertainment for the retired population (Merritt, 2008).

Simple museum renovations accommodating for this, included designing displays with larger print, and making exhibits more navigable with a wheelchair or a walker. The Baby Boomer generation also provided a valuable resource for museums as far as gaining additional volunteers and creative minds on museum staff. Because an older age set preferred a more facilitated, interactive learning experience, once the Boomers gravitated towards spending time volunteering for museums, they applied that preference. The primary audience for museums enjoyed this style of learning (McIntyre, 2005).

On the other hand, museums should have spent more time developing exhibits for a younger age set, the future generation of museum visitors. By implementing more family-friendly exhibits and activities into museums the V&A could have inspired a new generation of customers. In finding a way of appealing to the iPod generation, exhibits should have integrated unfacilitated opportunities, so visitors could have traveled at their own leisurely pace. Increasingly audience-centric strategies of learning continued developing in recent years, as a means of drawing younger crowds into museums. Not all younger people experienced museums as children, and this demographic may not have contained any prior background in the arts. Thus, new methods of engaging them through displays and exhibits increased the utility of the experience, and kept them coming back as a new demographic of regular customers (McIntyre, 2005).

Playing into the younger generation's affinity for video games, the Smithsonian American Art Museum offered an alternate reality game to visitors, the first prominent museum in the world to do so. Patrons accessed their game, *Ghosts of a Chance*, in the museum as well as in their homes through Facebook, Google, and on phones. This variation in availability also focused on the increase of younger generations visiting the museum (Cembalest, 2010). By making it available through multiple forms, the museum ensured that visitors did not forget about the game after leaving the museum.

After continued play at home, the visitors may have revisited the museum more often, or recommended new customers through word of mouth. These kinds of displays benefited visitors in that they no longer merely acted as viewers of the exhibits, but participated. This made the experience more memorable and tangible for the customer, which critically worked in creating customer loyalty. If the visitor did not participate, the only reminder that they may have retained from the museum could have consisted of a postcard from the gift shop. Through alternate reality games, the museum entered into the home of the visitor, remaining a tangible presence (Cembalest, 2010).

2.5.2 Gender

As stated by Elizabeth Merritt, the Founding Director of the Center for the Future of Museums in her publication, *Museums & Society 2034: Trends and Potential Futures*, museums primarily target demographics with higher levels of education, yet when considering potential attendees, the "new gender gap" develops into a key component in determining the demographics worth consideration (Merritt, 2008). Today, women outnumber men on most college campuses by a 3:2 ratio. Women also receive twice as many professional and doctorate degrees as men. With no sign of a change in this trend, museums considered the higher volume of female attendees when changing the structure of their exhibits and displays (Merritt, 2008).

That being said, a more family oriented exhibit would have provided additional support for mothers. Considering children's inherent lack of patience or attention spans that facilitated learning habits would have required a more unfacilitated presentation that might have served more appropriately. In addition, as museums played an important role in the informal education system, they also worked hard at meeting and exceeding the increased expectations that educated mothers encouraged in their children (Lu, Yu, & Liu, 2003).

Other studies suggested that men and women expected different technologically advanced facilities when learning. These indicated that men and women gravitate towards distinctively different roles in the online learning environment, especially as pertained to computer-mediated communication (Lu et al., 2003). Transferring this difference in learning styles aligned with a more unfacilitated learning structure as well. Therefore, the gender gap made a difference when considering both the types of exhibits for mothers, as well as the learning styles of men as opposed to women (Lu et al., 2003).

2.5.3 Learning Behavior

Morris Hargreaves McIntyre, a creative and intelligent arts management consultancy in Manchester, UK, conducted a study in 2005 on the different behaviors of visitors in museums. They first identified four “modes” for separating visitors into a hierarchy in terms of “how objects are selected and what type of interpretation they require” (McIntyre, 2005). These four groups included Browsers, Researchers, Followers, and Searchers, each with their own specific criteria that pertained to the display and interpretation of objects within an exhibition (McIntyre, 2005).

The study further characterized these “modes” into reactive and proactive behaviors. Browsers and Followers fell under the reactive category (see Figure 3), which related to traditional learning experiences within the museum, and potentially included an experience consisting of a more tangible, interactive and hi-tech approach. Searchers and Researchers, on the other hand, enjoyed museums that provided a deeper level of engagement, mostly through scholarly, in-depth tours and other facilitated means. Using the information provided by Morris Hargreaves McIntyre, the Victoria and Albert Museum identified the primary “modes” that visited the museum and then determined the learning method, facilitated or unfacilitated, worth expanding upon (McIntyre, 2005).

Figure 3 Categorizing How People Browse Information in a Museum (McIntyre,2005)

	REACTIVE		PROACTIVE	
Context Why they engage	Browser Awe and wonder: Visually arresting Famous Intrinsic appeal	Follower Points of engagement and connection Promised experiences or outcomes Themes and narratives	Searcher Need to be able to locate objects of interest Signposts to contextual information if required	Researcher As Searcher plus: Ability to search for particular items Detailed provenance Links to academic sources of information, publications Location of related collections
Content What they engage with	Just enough objects to look at Headline information to catch attention	Enough objects to constitute themes (some objects could repeat) Enough information to develop themes	All objects in the collection Enough information to identify and distinguish objects of interest Clear description and explanation	As Searcher plus: Links to similar collections Authoritative, scholarly commentary Physical/technical data
Experience How they engage	Impact on the senses Involving - interactives	Mix of media to involve in themes: Lo-tech, eg. Information sheets Hi-tech, eg. Audio, video, 2D graphics, animation, zoom	User friendly way of accessing information Glossary or key to jargon and codes Pictures Information to take away	Functional, uncluttered way of accessing information Pictures Information to take away

Museum directors created exhibits in a way such that they accommodated a wide array of learning styles for viewers. This immediately affected the way that the audience absorbed the material of the display. That said, the creators of new applications must have identified these learning styles in their visitors and translated those styles back into the layout and content of an exhibit (Serrell, 1996).

The core of a learning style emerged from people’s genetics, past experiences, and the demands and opportunities of their present environment. However, under different circumstances, individuals could have switched from one learning style to another; whichever they found more comfortable for the environment. Thinking about these styles helped museum practitioners accept the task of motivating their visitors as a primary responsibility. This encouraged the display of galleries’ information in a range of multiple displays, suited to various tastes (Serrell, 1996).

In her book, *Exhibit Labels*, founder of Serrell & Associates and AAM Centennial Honor Roll of “Museum Champions” honoree, Beverly Serrell, described four identified styles of learning. The first group consists of imaginative learners. This group learned by listening and sharing ideas, and preferred an interpretation of information that encouraged further social action. Analytical learners comprised the second group, and they preferred an interpretation that provided facts and sequential learners. Common sense learners learned by experimenting with things first hand, learning, feeling, and doing, and looked for solutions in the process.

Experimental learners, the last classification of learners, learned new information through imaginative trial and error (Serrell, 1996).

Exhibitors could potentially have guaranteed a varied audience by supplying their visitors with all options. This would have ensured that no one group felt isolated. Museumgoers may have picked and chosen what exhibits they preferred most, based on what learning style fit their personality in the environment. However, galleries must have made these choices clear and apparent to visitors. Regardless of what choices the visitors ultimately made, the potential of making a choice would have made the experience a more enjoyable one as a whole. Exhibitors compared ideas and messages on the potential of the gallery, and selected the most appropriate learning styles (Serrell, 1996).

Several subsections of laying out information existed. They involved the physical and conceptual layout of the exhibit, the environment and experiences, and the social aspects of visiting an exhibition.

Information should have commenced in a sequenced or un-sequenced order. These choices reflected the visitor's preference for managing the physical space of a gallery. Some people used the recommended order of the exhibit laid out for them. This ensured that they did not miss any of the information. Floor plans with one way flows and numbered exhibits accommodated this preference. On the other hand, some visitors may have preferred free flow layouts. The visitors may have skipped ahead or backtracked, without one forced path. While a layout may have existed, visitors could ignore it, and not felt rushed by other visitors following the set path (Serrell, 1996).

Galleries could have encouraged either pace controlled exhibits and non-pace controlled exhibits through their layouts. Some audiences saw the appeal in exhibits that have a built in time structure. This could have manifested in the form of a video or audio tour, where the visitor clearly understood the time span. Others may have rather controlled their own pace, skipping over one exhibit, while lingering on another. This type of person would have felt too constricted by a paced exhibit (Serrell, 1996).

Some visitors learned best through concrete experiences, such as feeling, doing, and seeing real objects or models. Visitors applied their own assumptions, observations, and experiences in using concrete objects, and created a longer lasting memory. For this group, long, detailed, and numerous labels could have sometimes interfered with their ability in creating their own perspective on the item. Other visitors may have learnt best through abstract ideas. For this group, labels on the exhibits, in addition to more in depth information through brochures, guidebooks, or catalogs proved sufficient. Museums have typically made the amount of abstract

information in any special exhibition equal the percentage of visitors who considered themselves abstract learners (Serrell, 1996).

Different groups of visitors preferred different levels of engagement in an exhibit, dividing them into either active participators or vicarious watchers. This in turn led to the decision on how hands on the displays must be. Some people liked participating directly in the exhibits, and hands on, interactive elements utilized this. Hands on exhibits typically held appeal across a broad range of ages, learning styles, and abilities. Those in the middle of the field comprised the next group. These people may have liked watching someone else try an activity or demonstration, vicariously experiencing its benefits through a companion (Serrell, 1996).

Museum directors considered how much the visitor read during their visit. The orientation of the information played into this. Labels should have appeared obvious and legible, but the visitors may have passed over the labels and preferred reading a brochure, or forwent the additional information entirely. These written materials helped visitors enhance a nonverbal concrete experience, and questioned the expectations they may have had, and facilitated their ability in making a connection with prior knowledge and feelings. Nonverbal communication, through illustrations and photographs, could have reached people who did not rely on textual information. These graphics reinforced and created new dimensions in both verbal and concrete experiences (Serrell, 1996).

The overall environment of the gallery influenced the complete experience of the visitors, especially regarding their concentration ability, relaxation levels, and the noise level of the exhibit. Some people required an area of contemplation, rather than a high density, sensory overload. For example, they found reading a label challenging when a video played nearby. On the other hand, some people had no problem multi tasking, and focused their attention on one thing amid a room of bustling activity. The ambiance of the gallery also played into the total effect of the exhibit. Changes in mood through lighting, color, texture, and sound may have varied the nature of the concrete experiences in nonverbal ways (Serrell, 1996).

Exhibitors should not have thought that they could “trick” the visitor into adapting into a learning style unfit for them. Regardless of what model of instructional design a museum uses, from structured sequences to open ended layouts, exhibits could not have “controlled” people. Different kinds of exhibits encouraged or discouraged different aspects of behavior so that some visitors felt more comfortable with than others, but museums could not have forced guests into acclimating within the structure. This reinforces the notion that museum owners should have thoroughly known their key demographics, and created a display and environment that provided them with the most satisfactory experience possible (Serrell, 1996).

2.6 Applying a Mobile Device Application in the V&A

Mobile device applications provided anything from digital maps to augmented reality programs. Though the capabilities of a mobile device application strictly enhanced the visitor's experience, the infinite capabilities and tools of the application should not have taken away from or distracted the visitor from the exhibit or artwork. Visitors may have entered their individual interests into an application, which provided them with a personalized guided tour through the museum. However, the main benefits acquired through the use of mobile device applications remained limited when in the context of a large art and design museum such as the Victoria and Albert Museum. Tools and capabilities of an application distinctly designed for the Victoria and Albert Museum included:

- Guided tours for the visitor throughout the museum reflecting
 - Individual visitor interest
 - The museum's expert judgments about important information
- Interactive digital maps allowing for easier navigation through the museum
- Interactive games or media increasing visitor interest in exhibits

2.6.1 Mobile Device Interactivity

In recent years the use of mobile device technology developed into a standard option for visitors enhancing their touring experience. For example, the Tate Modern Museum in London not only implemented a mobile device touring application by Antenna Audio, but also offered a game called *Tate Trumps*, targeted towards young adults and children. Visitors used an iPhone or iPod application, provided by the museum or downloaded at home, and competed with each other in one of three modes. These modes consisted of Battle, Mood, and Collector. These available options created the appeal of the game regarding various visitor interests. The Tate Modern designed this game and hoped the visitor may engage with the modern art, rather than simply viewing it, with only the limited written information offered. (Klopfer, Perry, et al. 2003).

The Tate Modern's game *Tate Trumps* resembled the Boston Museum of Science's prototype game *Mystery in the Museum*. This game at the Museum of Science involved visitors engaging with pocket PCs as they traveled through the museum, searching for clues with the end goal of discovering a missing artifact. Both of these games engaged visitors and

encouraged the discovery of different aspects of the exhibits, such as size and performance in a points battle scenario, something they otherwise might not have considered. These activities appeared successful in terms of visitor interaction and encouraged visitors thinking about and discussing aspects of the exhibit otherwise disregarded. However, considering both of the museums' visitor demographics and the exhibit's content remained important. A fast paced game seemed less suitable for the V&A, reflecting upon the prestigious image the museum likes conveying. According to our sponsor Juliette Fritsch, the V&A would have found a game of *Tate Trumps* caliber far too distracting and radical. It is better suited for the collections in the Tate Modern Museum, which consists mainly of contemporary works, often viewed as a more radical form of art. Conversely, the V&A's galleries mainly encompassed decorative art and design. Though *Tate Trumps* may not have directly applied to the Victoria and Albert Museum, we still felt that the interactive characteristics of the application related in constructing a model suited for decorative art and design exhibits (Klopfer, Perry, et al. 2003).

2.6.2 Pros and Cons of Mobile Device Applications within Museums

The low cost and ease of implementation certainly benefited the integration of such technology in an institution like the V&A. Although costs may have appeared high, this resulted from initial start up expenses for the Victoria and Albert Museum. The long-term costs actually fell relatively low when they considered the fees inherent with such services for patrons. Museumgoers would likely have purchased the additional services, as the application increased the overall satisfaction the visitor could have gained from the exhibit. Also, when temporary exhibits visited a museum, or the software needed updating, the renovation process simplified with the mobile device applications all on the same network. Not only would this aspect have saved the museum money, but it also could have helped save time and man-hours better applied elsewhere in the museum (Schmalstieg, Wagner 2005).

Despite the many upsides of installing a mobile device application, some difficulties also could have arisen in implementing such a technology into the Victoria and Albert Museum. The sheer size of the Victoria and Albert Museum, and the vast number of objects located at the museum presented issues when creating an application as successfully as other current applications at similar institutions. Full range wireless access remained another challenge for the Victoria and Albert Museum because of the age and size of the building. The difficulty of creating this program, without over-estimating the capabilities of the mobile device application, also concerned the museum. However, the potential remained for the

implementation of data based applications, which would have allowed the pulling of data by mobile device applications from a server while the visitor used the application, rather than containing all the data on the device itself. By using a server, the large size of the program should not have negatively affected anything (Schmalstieg, Wagner 2005).

2.7 Conclusion

Understanding the background concerns of the Victoria and Albert Museum crucially affected the ability of comprehending the demographics and needs of the community in the museum. The V&A determined what methods and educational approaches appeared appropriate for the visitors when they considered the application of new technology. With a better understanding, the V&A could have provided a more enhanced learning experience for all who visited the museum regardless of demographics.

In pleasing their community, the Victoria and Albert Museum must have determined which style of mobile device application benefited and complimented its atmosphere most. Providing the visitor with the best learning experience possible remained the ultimate goal of the V&A, which may have included the use of technology. As Glenn Lowry, Director of the Museum of Modern Art in New York City stated, “we can make ourselves more user-friendly, but ultimately one of the key experiences of visiting a museum is that moment of standing in front of an object. Suddenly you’re responding to something physical, real, that changes your own perspective. And great museums will always do that, as long as we get people through the doors” (Cembalest, 2010). Our team felt the need for further research on mobile device applications, and for work performed on generating a concept for the best learning experience possible. Through mobile device applications, the museum could have created an environment that ultimately aided in the overall learning experience like never before.

3.0 METHODOLOGICAL APPROACH AND TOOLS

In approaching our task, our group decided upon the various methods in which we would execute our research. We worked towards providing the Victoria and Albert Museum with an analysis of mobile device applications and assessing their ability in enhancing the learning experience of visitors within the V&A. We researched and evaluated the prior questions, which provided an overall breakdown of our project. These research questions also represented an outline of our methods section (see Introduction or Appendix).

3.1 Methods

Our research involved several different methods. By utilizing as many appropriate methods as possible we attempted lessening the room for error as much as we could. Different methods applied to our different questions yet all cumulated into our eventual conclusions. A description of each of our methods follows:

3.1.1 Research and Observations

In working towards accomplishing our objectives, we researched and evaluated visitors' interest in using mobile device applications within the Victoria and Albert Museum and other similar institutions. Our observations of these institutions provided us with a better understanding of what types of technology, with a focus on mobile device applications, museums have used. Research suggested that mobile device applications enhanced the learning experience of visitors through interactive activities. Application interaction may have included mini quizzes for a visitor after viewing a gallery, games which developed from specific artwork, or interactive tours of collections and exhibits. We observed these other institutions as patrons, experiencing the museums as normal visitors would. We also explored some of their own research as well into topics related to ours, searching for useful references for our own studies. The V&A's Quilts exhibit also served as a source of observation. We found a comment book where visitors left their opinions on the mobile device application. This assisted in determining whether visitors would use mobile device applications in the V&A.

3.1.2 Survey

Through surveying visitors, the group developed a better understanding of visitor preferences towards the integration of mobile device applications within the V&A. The results of the survey helped determine whether or not the V&A's community of learners desired mobile device applications. If the data had shown no desire for the applications, our group would have researched why. On the other hand, if the data showed an interest in mobile device applications, our group would have further analyzed the type of application best suited for the V&A.

We conducted the General Visitor Survey at multiple locations throughout the museum. We asked visitors if they would participate in a short anonymous survey, helping the museum better understand its visitor population. They received the survey verbally while the facilitator wrote down their responses. The group collected eighty General Visitor Surveys in which we asked each visitor a series of sixteen questions. The survey helped us gain a better understanding of visitors' preferences in accordance with using mobile device technology, using technology within a museum and whether or not they would have liked to see the technology available within the V&A (See Appendix D for survey, Appendix E for data results).

From the General Visitor Survey we determined:

- The usefulness of the current paper map
- Visitors' comfort levels with touch screen devices
- Visitors' desires for an interactive tour and interactive map
- Visitors' preferences for a mobile device application
- Visitors' preferences of how the V&A should provide the application
- The general visitors' demographics (related to mobile device applications)

We conducted surveys in the utmost and professional manner by providing visitors with the option of taking the survey, reading questions in an unbiased tone, and providing the visitor with a comfortable experience while surveyed.

3.1.3 Interviews

Interviews with the staff of the Victoria and Albert Museum also proved an essential research tool. Interviews helped our group and the V&A understand the benefits and downfalls of incorporating mobile device applications into the museum and consider the potential development of an application. Also, the interviews helped us establish the V&A's ultimate goals for their impact upon visitors. The group interviewed the Web Production Manager, Mark Hook and Head of Gallery Interpretation, Evaluation and Resources, Juliette Fritsch. In our interviews we asked many questions regarding both the museum specifically as well as more generally the use of technology.

3.1.4 Personal Meaning Mapping

We looked at conducting Personal Meaning Mapping (PMM) at the Quilts Exhibit as our final method of research. We used PMMs because they evaluated the “big picture” in regards to a specific concept, learning with and without mobile devices. In the Quilts Exhibit, we evaluated how much a visitor learned while going through the exhibit. Before entering the exhibit, we determined if the subject would use the iPod application rented from the museum (user) or not (nonuser). For both circumstances we gave the visitor, users and nonusers, a blank page with the word “Quilts” circled in the middle and had them write down everything (in black ink) that came to mind when thinking about the word quilts. The surveyor then interviewed the visitor and prompted him or her, asking why they wrote what they did (red ink). Once finished, they received instructions and we requested they meet the surveyor at the end of the exhibit. When exiting the exhibit, we gave the user or nonuser the same sheet they previously wrote on with “Quilts” in the middle, and once again requested they write down any changes or additions to the PMM (blue ink). Finally, the surveyor interviewed (green ink) them again, determining the visitors' reasons for elaborating or changing what they had previously written. The difference in the material learned by nonusers and users and the effects of mobile device applications on the learning experiences of visitors provided the basis for our PMMs. By comparing the before-and-after results, researchers formed a conclusion concerning the content learned within the exhibit. By applying the analysis of PMMs in the Quilts Exhibit with the mobile device applications, we determined the

application’s contribution in the learning experiences of visitors. (See Appendix B Personal Meaning Mapping Examples)

The group recognized the importance of preventing bias when gathering useable data. The PMMs involved analyses of visitors who did and did not use technology. Since our group analyzed the effects of digital technology on the learning experiences of visitors, bias easily fell towards the analyses of the people who used technology. The group member who did the PMM analysis prevented this by shuffling all the PMMs together, distributing ‘with technology’ and ‘without technology’ randomly together. We continued this randomization of the PMM analyses through the entirety of the study.

As stated by Anthony Lelliott of the University of Witwaterstrand, one must realize when analyzing PMMs no “correct” way of scoring PMM data exists. Some have suggested that PMM analysis predominantly determined quantitative data rather than qualitative data, which further explained why a “correct” procedure for analysis might not exist. Endless ways of grouping and analyzing collected terms existed. We originally divided our terms into extent, breadth, depth, and mastery categories, based on four dimensions of learning. Once we began our data analysis, we determined a better style of grouping. Our team began our PMM analysis by organizing all the terms from our PMMs into three groups: novice, intermediate, and expert for the three stages of quilt makers. We put the words that related to a novice or beginner quilt maker in the first category. Within the novice category, we rated the terms on a point scale of 1-5, the Intermediate category 10-14, and the Expert category 11-15. This increasing point scale helped us show the increasing importance of terms that the visitors used, which showed how their knowledge accelerated from breadth to depth to mastery after visiting only half of the quilts exhibit. The following demonstrates how we organized the words into ascending order of importance within one of the three designated skill levels (Lelliott 2006) (See Appendix B Personal Meaning Mapping Analysis).

5	History and Family
4	Work and Motivation
3	Embellishments
2	Utilities
1	Aesthetics

After we organized all the terms we analyzed each PMM individually, seeing what people learned through a comparison of their results from the first run of the PMM to the second. We accomplished this fairly quickly as we had already entered all the terms from every PMM into a spreadsheet; we simply searched

the spreadsheet for the corresponding term and points. Once we found and noted all the terms and points, we added up the points for the first and second part of the PMM and subtracted what they knew from what they learned. We added the differences of those who used technology with one another, and then separately added the difference of those who did not use the technology. When we found these two individual sums, we compared them for an overall conclusion (See Appendix B Personal Meaning Mapping Analysis).

We included an example of a PMM (PMM #5) analysis as an illustration of the kind of research we performed in gathering our results (see Appendix). For PMM #5, the visitor wrote down four terms for the initial interview and we categorized them as follows:

Fabric- This term worked as an embellishment and fit under the novice category based on the simplicity of the term. It lacked detail and the visitor did not elaborate or explain the term. A term in the novice category receives a score of 1-5 because it acts as embellishment (refer to the previous figure) which ranks 3rd in ascending order, it received **3 points**.

Patterns- This term also falls into the embellishment and novice category. Patterns also received a score of **3 points**.

Family-If the visitor did not elaborate on this term, it would have been placed in the novice category. However, through further questioning, the visitor expressed how it is a family tradition and she is a multiple generation quilter. She also expressed her reason for quilting. Due to this detailed explanation we placed the term family under the Expert category. Family received **15 points** as an Expert term that fell under the history and family category.

Hobbies- With quilting clearly determined as a hobby, it no longer could classify as a beginner term; however did not quite fit into the expert category so we placed it in the Intermediate category. Referring back to the previous explanation, we linked back and showed that the visitor quilted as a hobby because of family interest and tradition. Hobbies received a score of 10 because it fell under the family section (top point value in ascending order) in the Intermediate category.

Adding all four of the point values, we determined that this visitor scored **31 Points** in the initial interview.

During the second interview process, this particular visitor did not exhibit having gained a substantial amount of knowledge from the exhibit. She provided only one term and one comment on the mobile device application, irrelevant to the data analysis.

History- After further questioning, the visitor gave a specific example of what type of history she learned (where certain quilts were made). Because she could provide an explanation of history, this term fell into the Intermediate category and subsequently received **10 points** under the History and Family section (the highest point value).

We calculated both the before and after values and subtracted from one another (previously known information from learned), **10-31**. This particular visitor scored a **negative 21 points** for information learned in the Quilts exhibit. At this point, the group member performing the data analysis would have looked at the demographics on the backside of the sheet and entered the data into a spreadsheet. For the sake of interest, we recorded our visitor in this example as a woman whose age fell between 35-44 years. Our visitor used the mobile device application, had no problems while using it, and claimed they learned the most from the device. Because PMMs work best as quantifiable data, individual PMM analyses hold little value. However, 30 PMMs together proved very useful in a more detailed analysis. In addition, on the back of the PMMs, there are a series of multiple choice questions dealing with demographics and visitor satisfaction. These questions were the last thing to be discussed before the visitors went on their way.

3.1 What does the V&A want to accomplish for its visitors?

Prior to answering any other questions we felt the importance in determining exactly what the V&A strove for in just exploring advancement options for the museum. We derived our answer mainly by conducting interviews with members of the V&A staff.

3.1.1 Interviews

Comprehending what the V&A wanted for its visitors began with understanding what the museum valued most. Our team felt that conducting interviews would successfully accomplish this task of uncovering the root motivations of the museum. We conducted two major interviews and uncovered the various motivations of the V&A as well as the reasons why they began considering implementing new technologies into the museum. Our team interviewed Juliette Fritsch, Head of Gallery Interpretation, Evaluation and Resources and Mark Hook, Web Production Manager. Our interviews were designed to determine:

- What the V&A researched thus far on the subject

- Whether or not any mobile technology currently exists
- What the V&A desires in accomplishing the creation of a mobile device application
- Whether or not mobile device applications can help the V&A accomplish its larger goals

3.1.2 Contribution to Overall Goal:

Our interviews contributed mostly to our overall understanding of the inner motivations of the V&A. While no one person could ever fully speak for all the opinions of the staff, both of the people we selected were each the head of their own departments which would be closely involved in the development of an application. Because of their high status, they easily represented a general consensus on how the museum felt.

3.2 What different types of mobile device applications currently exist for museums and are they successful in enhancing the learning experience of visitors?

The V&A valued exploring mobile device applications and their role in improving the learning experience of visitors through the development of a more interactive approach in education within the museum. However, the museum did not want technology distracting visitors from the exhibits or the traditional museum experience. Our group researched other surrounding museums, already using such mobile device applications in their exhibits.

3.2.1 Research and Observations

From observations of other educational institutions similar to the V&A, our group developed an understanding of what technology works best in an art and design museum such as the V&A. This understanding suggested the possibility of successful integration of mobile device applications within the V&A. From recommendations made by our liaison, Juliette Fritsch, we created a list of educational institutions for visiting, evaluating the current technology. We observed and/or researched:

- The British Museum
- J. Paul Getty
- The National Gallery
- The Museum of London

- The Natural History Museum
- The Science Museum
- Tate Modern
- Victoria and Albert Museum

When visiting these institutions, the group observed them as visitors, rather than as museum consultants. We experienced the technology like any other visitor so we could determine which technology would have worked best within an art and design museum. Our group then decided which forms of technology would work most effectively within the V&A.

In determining the effectiveness of this technology, we obtained research from some of the above listed institutions. We sifted through existing survey and interview data from the British and Tate Modern museums; wondering whether or not mobile device applications improved visitors' learning experiences. If these museums had not produced satisfying results, we may have performed our own surveys and/or personal meaning mapping exercises within these institutions.

3.2.3 Personal Meaning Mapping, Questionnaire, and Comment Book

The PMM analysis showed whether visitors learned more with the mobile device application than without it. If the PMMs showed if visitors learned most through the use of technology this would have determined the success of mobile device applications in the eyes of the V&A, who wanted the best learning experience possible for its visitors. The last question on the questionnaire and visitor comments in the comment book assisted the group's understanding on visitors' opinions regarding whether or not the Quilts Exhibit mobile device application helped them learn the most information during their visit.

3.2.4 Contribution to Overall Goal

By obtaining information and research from other institutions that had successfully integrated their own mobile device applications, our group found this technology successful, and suggested further research from the collected data.

3.3 What types of applications suit an art and design museum like the V&A?

We first observed several institutions to better our knowledge of what technology can be used in museum settings. This research led to a final conclusion of what technology would best fit in the V&A. We then looked into technology previously used at the museum as well as referenced our interviews for the V&A's standards for applications. Lastly, we look at our PMM questionnaire for a visitor's perspective on the Quilts Exhibit's application. If a positive outlook on the application was perceived by the users, then we could conclude the Quilts Exhibit application as an ideal one for the V&A.

3.3.1 Research and Observations

Research conducted within the Victoria and Albert Museum's research library consisted of examining the kinds of technology currently used in other art and design museums. We researched these technologies with the intent of discovering other technologies besides applications that could suit the V&A. If other museums previously decided against certain types of applications or technologies, we would have based our conclusion upon this research rather than conducting research of our own. Through our examination of this research we created more specific and focused surveys, specifically regarding data we would rather have known. The intuitions that we researched are as follows:

- Science Museum
- Natural History Museum
- Supreme Court Building

Survey

Our group also took interest in the visitor's thoughts on using the technology elsewhere in the museum through the General Visitor Survey. Observing and questioning let our group gather on-site data pertaining to the use of mobile technologies within the Victoria and Albert Museum. Our team also analyzed the overall success of this style of application within the museum.

3.3.2 Interviews

Interviews with Juliette Fritsch, Head of Gallery Interpretation, and Mark Hook, Web Production Manager, provided us with data concerning the type of application that best fit into the V&A.

3.3.4 Personal Meaning Mapping Questionnaire

Results from the PMM questionnaire provided us with an understanding of how V&A visitors reacted towards mobile device applications, which showed whether or not they sought integration of such technology.

3.3.4 Contribution to Overall Goal

By surveying visitors in the museum, our group determined what styles of applications the visitors preferred in the V&A. This aided our team in our interpretation of the responses towards mobile device applications amongst the visitor demographics at the V&A. The research and observations portion provided us with ideas of what technologies are not suitable for the V&A. Finally, Juliette Fritsch and Mark Hook offered their own opinions on what applications would best fit the V&A. Tying all three methods together, we were able to come up with final recommendations of a mobile device application for the V&A.

3.4 How could a mobile device application contribute to the learning experiences of visitors?

As the national art and design museum, the V&A needed extensive research done before it could have considered the implementation of a mobile device application. Our group contributed to this through an extensive evaluation of the PMMs and staff interviews.

3.4.1 Personal Meaning Mapping

By conducting PMMs at the Quilts Exhibit, our group evaluated how mobile device technology improved visitors' learning experiences in the exhibit when compared with someone who did not use the technology. We applied the same process as described in detail previously to all the PMMs. The differences between the two reflected the changes that occurred within the exhibit. Also by observing the PMM questionnaire, the group could have determined visitors' thoughts on how the mobile device applications assisted their learning experience at the V&A.

3.4.2 Interviews

Interviews with Juliette Fritsch, Head of Gallery Interpretation, and Mark Hook, Web Production Manager, gave the group an understanding of how the staff would like seeing applications stimulate the visitors. Through an in-depth series of questions, we came to a conclusion on how mobile device applications affect users' learning experiences.

3.4.3 Contribution to Overall Goal

Accomplishing these tasks provided our group with a better understanding of visitors' opinions on the implementation of mobile device applications. The PMM analyses proved quite essential in uncovering the precise educational benefits of implementing technology. They gave a primary example we could control and observe closely. The interviews proved imperative to understanding how a mobile device application would benefit the visitor learning experience at the Victoria and Albert Museum. By asking Juliette Fritsch and Mark Hook essential questions pertaining to this research question, we were able to develop a concrete conclusion.

3.5 Will visitors use an application? Will staff accept an application??

The Victoria and Albert Museum valued its visitors' opinions and views on the potential of using mobile device applications. Our group determined if visitors would have preferred the technology spread throughout the entirety of the museum by surveying visitors with our General Technology Survey, and attempted avoiding the bias of visitors who previously experienced the technology. We then determined if the staff would accept an application primarily through interviews with V&A staff members Mark Hook and Juliette Fritsch.

3.5.1 Survey

The observation/questionnaire of the V&A's temporary Quilts Exhibit as well as the General Technology Survey our group conducted provided us with the necessary data for determining if visitors within the museum would have utilized the application (See Appendix E General Visitor Survey Analysis). Our conclusions from these visitor surveys and observations allowed our group a better understanding of what visitors wanted within the

museum concerning technology as well as the visitors' potential of using a mobile device application within the museum.

3.5.2 Interviews

Interviews with Juliette Fritsch, Head of Gallery Interpretation, and Mark Hook, Web Production Manager, educated us on what caliber of application the V&A deems worthy of integration.

3.5.3 Contribution to Overall Goal

We conducted a General Technology Survey throughout the V&A. The survey results revealed the V&A's visitors' reactions and opinions on the implementation of such technology into the Victoria and Albert Museum. We also conducted two interviews which successfully concluded the V&A staff's opinion on the implementation of a mobile device application.

CHAPTER 4: RESEARCH FINDINGS

After following the outlined procedures found in our Methodological Approach and Tools chapter, our group developed answers for the research questions that guided our endeavor. In answering each question, we employed different aspects of our research which have been outlined by the methodology. Addressing all of the research questions worked towards drawing an ultimate conclusion and subsequent recommendation on whether or not the V&A should install mobile application devices within their museum. Through our research and analysis we determined that mobile device applications benefited the learning experiences of visitors. Our PMM analyses, General Visitor Survey, staff interviews, museum applications research, and our studies on other museum's technologies all contributed to our overall findings and ability in answering the questions we originally developed.

This section is divided up first by research question with an immediate answer or conclusion thus following. The conclusion is then supported by one or several of our methodological approaches pertaining to the question at hand.

4.1 What does the V&A want to accomplish for its visitors?

Our research developed an answer to this question primarily through interviews with members of the V&A. As stated previously, we conducted two primary interviews concerning the various motivations of the V&A and what they felt they should do for their visitors. Our team interviewed Juliette Fritsch, Head of Gallery Interpretation, Evaluation and Resources and Mark Hook, Web Production Manager. Several themes about what the V&A wanted accomplished reoccurred during our interviews. Enhancing visitors' learning experiences as well as catering to different learning styles arose as crucial motifs. Also both interviewees saw the value in the museum developing relationships with visitors that continued after their tours. They shared the same fear that implementing the technology could distract visitors' focus from the displayed objects. Finally, making a downloadable application rounded out the primary goals of the V&A. A downloadable application held appeal because it would have reduced costs and assimilated easily into the museum. Our interviews follow thusly.

4.1.1 Juliette Fritsch Interview

In order to find out more about the V&A's goals for its visitors concerning a mobile device application, the group turned towards our sponsor and V&A Museum's Head of Gallery Interpretation, Evaluation, and Residencies, Juliette Fritsch. Fritsch's team held responsibility for three areas of work in the V&A. Their first duty involved working on gallery developments in a core project team from a learning and interpretation perspective. The team's second duty involved addressing all visitor research within the V&A, except for the marketing research. Lastly, the team managed the Artist and Residence program. Ms. Fritsch's status coupled with her distinct knowledge of the learning behaviors of visitors in museums made her an invaluable resource for evaluation.

Fritsch voiced many strong opinions and addressed several topics concerning mobile device applications. When asked why the V&A desired the incorporation of a mobile device application into its exhibits, she made it clear that the visitors held top priority, "We're always interested in how you can use different media to achieve the interpretive goals that deal with particular narratives, learning experiences and other particular experiences that you want visitors to have." "Media," such as mobile device applications, contributed to the learning experiences of visitors mainly by delivering large amounts of additional information undeliverable by fixed displays. Yet this raised the question of whether or not visitors really

desired vast amounts of additional information, because in the end, they came for the object on display the museum and not the text or audio supplements.

Fritsch expressed another positive attribute of handheld devices as their ability of developing visitors' relationships with objects beyond the physical visit to the museum, "I think the other thing that is most interesting about mobile device applications is to do with the relationship beyond the physical visit to the museum and how mobile technology could be used to look at that and develop that." Much like the Museum of Natural History's new Darwin Exhibit, which utilized innovative scan-card technology allowing visitors access to additional information from the comfort of their own home, the V&A sought similar features through an application.

4.1.2 Mark Hook Interview

In search of additional staff's perspectives on the V&A's goals for its visitors concerning mobile device applications, the team turned to Mark Hook, V&A Web Production manager. Hook's team oversees the implementation of online exhibit information and website only exhibits. Hook ultimately seemed supportive of our endeavors in researching the role of technology in the museum. He also saw the promise in implementing such applications and enhancing visitors' learning experiences. Hook expressed that his colleagues in the IT and the web design teams have shown much interest in reaching out to physically disabled visitors who cannot visit the V&A for themselves. They felt that a way of experiencing the benefits of the museum should exist for everyone, regardless of their abilities. 20 million people have visited their website every year but only 3 million ever actually make it to the museum. Hook felt that despite the situations that hinder people from visiting due to geographical or financial reasons, the museum should not forsake them. The new website helped bring more of the V&A to the computer screen so that such individuals could enjoy the museum for themselves.

4.2 What different types of mobile device applications currently exist for museums and are they successful in enhancing the learning experience of visitors?

Because of the expense and resources needed for implementing traditional hardware devices for audio tours, museums have not always shown great interest in investing in mobile devices. In the last several years, the popularity and widespread use of the iPod has opened

another option for museums in delivering information. This option cost less than traditional methods because the museum required less hardware since visitors could have brought their own devices into the museum (Billings, 2009). Our group observed and researched other institutions, in addition to the V&A itself, with a focus on museums in London and determined the advantages and disadvantages of various types of mobile device applications. We discovered that other institutions had implemented interactive tours and maps, as well as games and picture time capsules. The levels of success varied by application and institution but overall, patrons seemed open to the technology and gained valuable knowledge from their use. For our research we either experienced firsthand or simply researched several museums' applications. We examined the following institutions:

- The J. Paul Getty Museum
- The National Gallery
- The British Museum
- Tate Modern
- Museum of London
- Victoria and Albert Museum

We did not actually experience the J. Paul Getty Museum or the National Gallery in person; we only relied upon research from documents. The other museums though, we visited and observed ourselves.

We also examined the V&A and the technology made available to it. In our research on the V&A we conducted PMMs and gathered results that depicted the educational effects of the mobile device applications. The PMM itself and the questionnaire on the reverse side both gave us an understanding of not only how much they learned but also their reaction to the experience and even their demographics. Our team also looked at the comment book where patrons reflected on their visit. Overall, this research supported our earlier findings on the various modes of technology available as well as the realization that mobile device applications did in fact enhance visitors' learning experiences.

4.2.1 The J.Paul Getty Museum Application

The J. Paul Getty Museum tested two museum devices against each other. One a touch screen handheld device, and the second a "traditional" museum audio guide device.

They compared the devices and determined if visitors preferred a touch screen multimedia guide to an audio guide with a keypad and audio stop entry system. The visitors seemed confused by the layout and user interface of the touch screen handheld device. The museum admitted that it threw together the interface and content for the handheld quickly and inexpensively in comparison to the audio guide (J. Paul Getty Museum 2008).

The museum study recommended that they reconfigure the touch screen device so it included a keypad, making it more like the traditional audio guide with audio stops. Users did not prefer the touch screen device however reacted enthusiastically when considering making improvements to it. Users wanted a handheld device containing as much content as the audio guide rather than an abridged audio version for families. Visitors used the on-screen map along with the *What to See* guide, however visitors repeatedly tapped the screen on the on-screen map expecting an expanded view of the gallery. The *What to See* guide used “blue bursts” or “gold diamonds” to highlight stops, however the wall text and object labels did not display these. Users compared the device unfavorably to the Apple iPhone because of the commonness of such mobile devices (J. Paul Getty Museum, 2008).

The museum noted that the keypad audio stop system enhanced the gallery experience, while the hand held device took more away from visitor experience than it contributed. The handheld device created a “treasure hunt” situation where users searched the gallery for the displayed or described image. The museum also noted that visitors tried, often unsuccessfully, figuring out which work of art the narrator was talking about. Neither device created the dialogue between parent and child the museum sought. Although the results remained inconclusive on this point, parents showed interest in the “togetherness” of the family guide experience. The researchers noted that users found the traditional audio guide simpler, allowing them more time reading text and looking at the exhibits, as opposed to the handheld which required more effort operating and therefore took away from the exhibits. They evaluated the content of the two audio players; however we considered the data invalid because they abridged the handheld so much for testing (J. Paul Getty Museum, 2008).

4.2.2 The National Gallery Application

Merging old age art and design with new age leading technology presented one of the major challenges in creating an application for Apple’s iPhone or iTouch devices. The two areas did not mix easily, thus they remained untried in what Elena Lagoudi of the National Gallery, United Kingdom, considered a “‘traditional’ museum” environment. The National Gallery, one of the first to do so, successfully created an application that provides visitors

with first-hand experience while they used the application both within the museum and while at home (Lagoudi 2010).

The National Gallery's partnership with Antenna Audio facilitated an easier creation of an application. Both the museum and Antenna Audio wanted Apple's devices incorporated into museums, capitalizing on the iPhone application market in Europe and the United Kingdom. Antenna Audio first approached the National Gallery because of their practically entirely copyright-free collections. Because of this, creating the application cost considerably less. The only costs associated for Antenna Audio arose from application development, staff, and cost of copyrighted music. From the Gallery's side, the staff used in creating the application and management of the project made up the cost. Both the Gallery and Antenna Audio viewed this as an opportunity for revolutionizing the field of technology within the museum and providing users museum access at home (Lagoudi 2010).

The construction of their application began with the analysis of their existing podcasts and their popularity, not only of their own but those of other museums. The analysis of the podcasts directly reflected visitors' interest, as well as provided a familiar setup for visitors. With this unique idea of creating a museum application for an iTouch or iPhone device and the increased popularity of such devices, this partnership created the application, which resulted in huge success. The museum's application *Love Art* released with great success in 2008. When the museum reevaluated the release in 2009, they learned that "it had reached over a quarter of a million downloads" (Lagoudi 2010). They then researched and found that "only 10% of the 90,000 applications currently in the App Store [of iTunes] ever exceed 10,000 downloads," which suggests just how much visitors enjoyed their program (Lagoudi 2010).

The museum set up guidelines during the creation of the application, ensuring that the application did not consist of random assortment of data but rather free flowing, smooth, relevant data. These guidelines consisted of; encouraging exploration, creativity, free choice, variety of voices in audio, and ease of use of the application. Their applications consisted of data from the following existing technology in the National Gallery:

- The Grand Tour: mobile phone and download tour (2007)
- Be Inspired: in-gallery audio tour (2007)
- ArtStart: in-gallery interactive kiosks (2004)
- Transcriptions: student collaborations (Ongoing)

This current technology provided less information for gathering for the application as well as the use of information already proven successful. With this application and the addition of the feel and atmosphere of the podcasts, the new application took off.

The museum did not create *Love Art* for giving visitors guided tours, providing locations of art, or for using it as a map but created it in hopes of enabling access for visitors outside of the gallery to popular paintings and art. Creating the application using Apple's iTouch and iPhone devices allowed for the enhancement of the visitors' view of the art with tools such as the touch-to-zoom function, a responsive touch-screen, and a high-resolution image display. Observing reviews left on iTunes App store revealed a positive experience using the application with very few negative feedbacks (Lagoudi 2010).

Extending access to the collection:

"Simply a wonderful, well thought out app. Once I started browsing, I could not put it down! I really hope that others will follow: Louvre, Mo MA, etc. I cannot afford to see these works in person; however, this app felt like a guided tour!" (Lagoudi 2010).

"Edifying, entertaining, always beautiful and sometimes humorous; I love it. I can tour the London museum on my lunch break from here in Indianapolis Indiana! It takes up a lot of room on my 8 gig but it is worth it" (Lagoudi 2010).

Meeting tonal values:

"This is so dense and inspiring, so many ways to look at art, play with artworks, this is really addictive. I wish other museums could have this, will it come soon?" (Lagoudi 2010).

"Not only is this one of the most well done apps on the store, but it also doubles as a killer wallpaper app (nice bonus!) I'm really amazed by the art, execution, and performance." (Lagoudi 2010).

Fostered engagement and encouraged a visit:

"I am amazed by how nicely designed this app is and the richness of the information contained. There are videos on the background and story for several painters and their art, including Leonardo da Vinci, Vincent Van Gogh, Sandro Botticelli, Rembrandt, Jan van Eyck, Velazquez, etc. I shall have to visit the National Gallery when I go to London." (Lagoudi 2010).

“It's great that they offered multiple perspectives. I like hearing from the curators and art historians but it's brilliant to invite artists and authors to share their thoughts. Makes me want to go back to London. I hope they will continue to update the app with more works. Well done!” (Lagoudi 2010).

Example of use in and out of Gallery:

“FINALLY, an app for museums – I've been waiting a long time. I love using this both in and out of the gallery. The images are great; love the pinch zoom to see the details of a painting. Most of all I love hearing the audio and learning secrets about all the paintings. Hope more museums catch on and get one of these.” (Lagoudi 2010).

The major negative feedback collected concerned the large file size of the application, the limited number of paintings that they could zoom in on, and the lack of an academic tone (Lagoudi 2010). The first few weeks after the release of the application demonstrated constant increases in downloads until the museum initiated a price for the application. After this, the application sales steadied out with a consistent number of downloads and upgrades each week. Offering the application for free increased the general use of the application however the museum needed the revenue so it could pay the costs of production. Despite the significant decrease in use of the application after they established a price, international users still showed interest (Lagoudi 2010).

The National Gallery showed interest in exploring the utilization of GPS and navigation tools in their gallery but they felt unsure of how successful this endeavor would prove. In the future they see the value in evaluating the effectiveness of using the iPhone for this style of application and the worth of development (Lagoudi 2010).

4.2.3 The British Museum Application

The British Museum uses a handheld touch screen device that offers users a variety of options while going through the museum. It contains a selection of guided tours for specific exhibits, a map, a keypad, and the keypad and map together. Each give users a more efficient way of getting around the museum, whether the guided tour or the keypad, which let the user type in the number of an exhibit and then they received information. When using the keypad along with the map, users easily navigated the museum. The tour stoppes at a series of locations throughout the exhibit and offers more information about the pertinent objects, such as videos, images, audio clips and additional text information. The child version of the device

offers the same features but also contains a series of games for entertaining the child when not going through the exhibit. Korean Air sponsored the device and Antenna Audio created the application.

The British Museum developed a mobile device application within the museum that visitors rented near the main entrance. This device offers visitors self-guided tours throughout the museum, an interactive map and games for children. The museum provides an application on the device for use by children under the age of 12. They separated this application from the adult version, yet they work on the same device. The museum recently evaluated these devices through a series of self-conducted questionnaires, user tests and semi-structured interviews (The British Museum, 2010).

Analysis of Self-Administered Questionnaire of Mobile Device Technology

The self administered questionnaire consisted of twenty-three questions. These questions focused on who used the device, why they used it, their difficulties while using it, and content of the device application. During the administration of the survey they made only one member of the group complete it. This survey had no intention of collecting data about the group as a whole but rather the individual who returned the device. They assumed that the visitor filling out the survey used the device. A total of four hundred and twenty-five individuals filled out the survey for The British Museum (The British Museum, 2010).

In evaluating the gender of those who rented the application The British Museum established an approximate 50:50 ratio between men and women who rented and filled out the self-questionnaire. This result resembles the overall gender demographic of the museum visitor; with 52% female visitors and 48% male. When considering age, the museum discovered that 87.8% of visitors renting the device fell between the ages of nineteen and fifty-four years old. The largest age group within this range lay between the ages of twenty-five and thirty-four years. The British Museum's data demonstrated a decrease use of technology as age increased; with users aged fifty-five and older only making up 7.6% of the users surveyed. Figure 1 displays users of the device compared to age of the user (The British Museum, 2010).

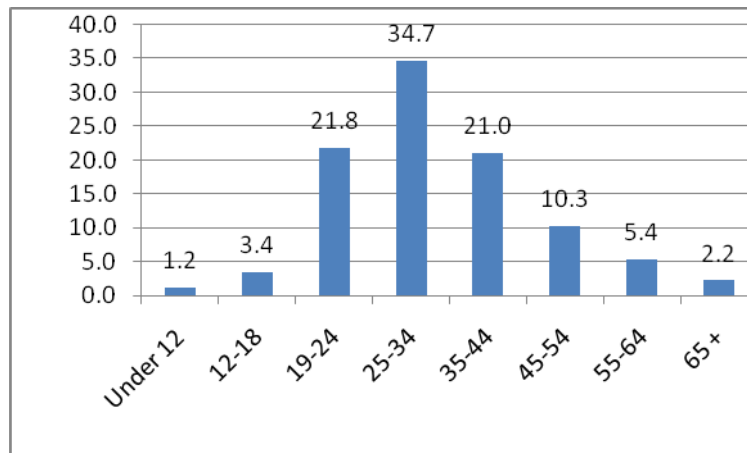


Figure 4 The British Museum hand held device, user age demographic (The British Museum, 2010)

Table one demonstrated that first time visitors made up the majority of the visitors who used the device at 68.7% of the user population. Infrequent visitors ranked second highest with 11.4% of the users while visitors who had visited in the past year ranked third with 7.2% of users (The British Museum, 2010).

Understanding the inclination of first time visitors towards using the mobile device, selecting the information from the exhibits for use in the device focused on the patrons who visited The British Museum in the past twelve months. These visitors made up 24% of the overall museum population; however, out of those who used the handheld device only 7.2% counted as repeat visitors within the past twelve months. Following the general statistical analysis of the general visitor demographics, if they evaluated 425 visitors, 102 visitors would have counted as repeat visitors within the last twelve months (24%). However established, the survey only found 31 repeat visitors within the last twelve months (7.2%). Establishing this insinuated a 30.4% decrease in repeat visitors who used the device compared to the amount who should have based off of the general museum population statistic (The British Museum, 2010).

However, when viewing new visitor data in this way, analysis demonstrated that 291/425 (68.7%) of visitors used the technology, but the general museum statistic suggested that only 217 (51%) visitors should have used the technology. This increase in use, when compared to the general statistic, demonstrated that new visitors showed much more interest in using the technology than repeat visitors. Either because they viewed the application and

found it unhelpful or they felt comfortable with the museum and did not need the aid of the technology showing them around the museum (The British Museum, 2010).

Table 1: Visitor use of Technology and repeat visits to The British Museum (The British Museum, 2010).

	<i>% of Device users</i>	<i>% of museum visitors</i>
Yes, I have never been to the British Museum before	68.7	51
No, I have visited before but more than 5 years ago	11.4	10
No, I have visited between 2 and 5 years ago	7.0	6
No, I have visited between 1 and 2 years ago	5.7	8
No, I have visited in the past 12 months	7.2	24

When determining how much visitors used the technology while in the exhibit we estimated how long they used the device in comparison against how long they spent in the museum. On average visitors thought that they spent 82% of their time in the museum using the mobile device. This high percentage demonstrated that the visitor spent the majority of their visit either viewing the screen or listening to an audio clip. This limited what the visitor saw in the museum to the displays in the device. Because of the large size of the museum, we drew a conclusion from this on the predictability of the most popular exhibits viewed by the visitors with technology. Many visitors did not spend a lot of time away from the device which limited the exhibits that they viewed. Figure 2 below demonstrates time spent in the museum and using the guide with relation to age (The British Museum, 2010).

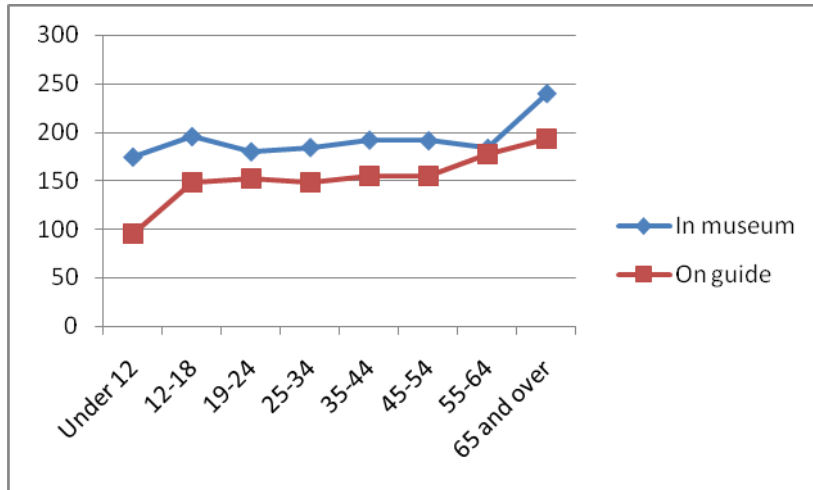


Figure 5: Minutes in museum/using device by age (The British Museum, 2010).

The examination of visitors' motivation in wanting the devices for rent mainly focused on visitors who wanted a deeper understanding of the exhibits and objects. Almost half of those who responded took the device because they have typically used these types of devices at other museums. These constituted the two main reasons visitor had for renting the device. At 7.1%, visitors who did not like reading plaques or brochures visitors made up the lowest reasoning for renting the device. However, ages and reasons for trying the device directly related. Figure 3 demonstrates this (The British Museum, 2010).

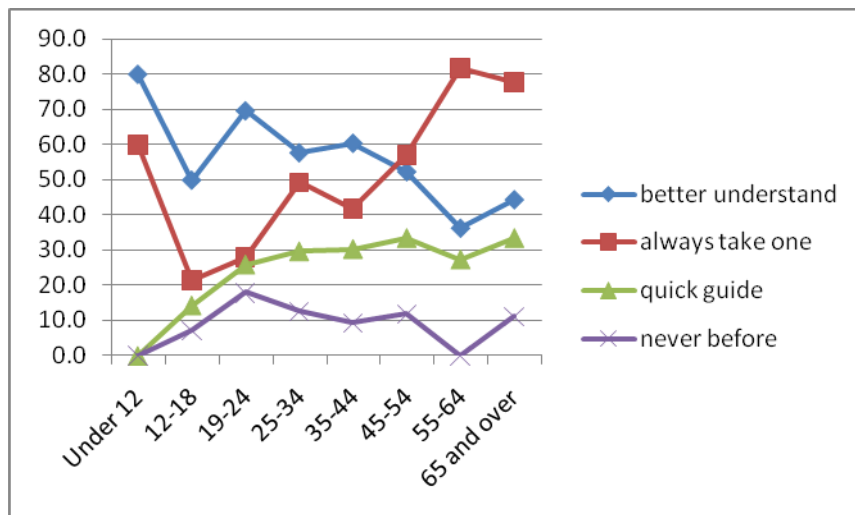


Figure 6: Reasons to rent device to age (The British Museum, 2010).

The younger the visitor, the more interest they showed in using the device for a better understanding of the exhibit and the objects listed. As age increased, more visitors showed

more interest in a quick guide of the museum rather than displaying the curiosity of the visitor striving after more information about the exhibitions. Along with the reasons why people rented the device for the exhibit also came the awareness of the guide. 31.3% of visitors who rented the device expected there to be a device in the museum when they arrived along with the 8.5% of users who saw the device advertised on the website. With advertisements and visitor expectations alone, devices like these received public attention (The British Museum, 2010).

When determining what features are worth supplying for the visitors in developing an application, the difficulty lay in determining what they would and would not use. The British Museum supplied their visitors with guided tours, keypad numbers on exhibits, keypad and map together and a how to guide. The keypad let visitors type in numbers found on the plaque of a specific object. They could then have used the feature along with the map or together and found specific highlighted objects in the museum. The guided tours grew in popularity amongst visitors, taking in 68.9% of visitor responses. The keypad, along with the keypad and map feature came in slightly behind with more of an emphasis on the use of only the keypad without the map feature. Figure 4 below demonstrates how people used the device. In this question they had the ability of choosing multiple answers; therefore, people could have used one of the guided tours as well as the keypad feature during their visit (The British Museum, 2010).

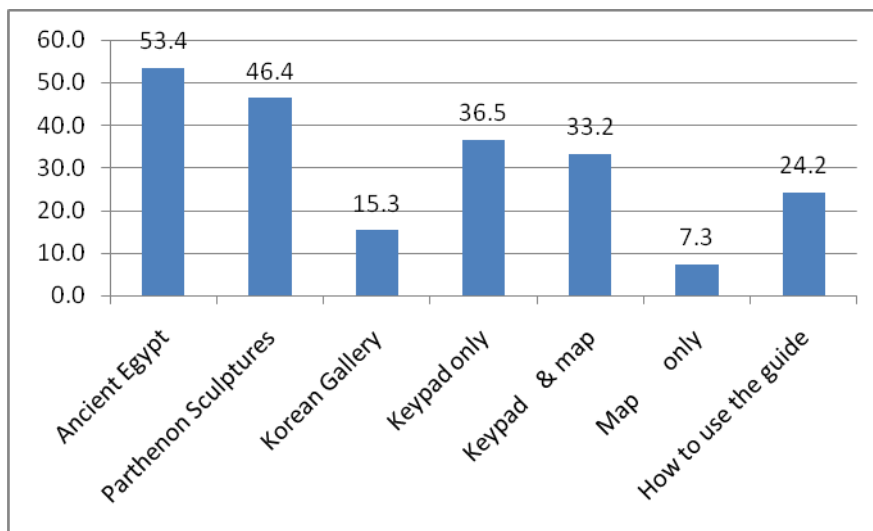


Figure 7 Usage of Device by feature (The British Museum, 2010).

The creators worked towards ensuring that the visitor experienced no difficulties while using the device, however as everyone learns at different levels when using technology

and have different levels of familiarity with it, experiencing no difficulties at all seemed impossible. Just over half of the individuals in the British Museum experienced no difficulties while using their device. Associating objects on the screen with objects in the galleries made up the major reason for difficulties in using the device. This only constituted 10.6% of the users of the device while 3.8% of users found the device just stopped working for them (The British Museum, 2010).

The British Museum's Adult Guide

During the individual evaluation of the handheld guide, researchers selected nine adults for the study. The researchers observed the individuals while they experienced the Ancient Egypt tour. While taking the tour, the researchers had the subjects complete several tasks throughout their participation in the evaluation. During the evaluation and after completing the task, the subjects found the guide “fun to use” and would have recommended it to a friend. While using the device, the individuals discovered the instructions to be unclear when locating specific galleries and following the map. This was determined when the visitors could not locate room 95. Many could not simply rely on the device, but used museum signage, staff and maps as well. The difficulties in finding rooms or items did not show a decrease in enjoyment of the device or their time spent in the museum however (The British Museum, 2010).

When evaluating the device itself, younger viewers disliked its bulky quality and said it “should be more like my iPod Touch.” Many users also had difficulties with changing the volume and brightness when they received the device. Headphone comfort also developed into an issue along with the multiple wires associated with the device. One user who did not like the headphones wanted the option of using their own headphones (The British Museum, 2010).

Delay in the touch screens also created an issue for users of the device. The screen did not seem sensitive enough for users and many found that when they selected an item they experienced an unnecessary delay before it brought up the next page, audio clip or image. Many times this resulted from the user clicking on links multiple times and slowing the device down or when an audio clip may have finished the sound but the clip may have not actually ended. These issues did not seem to affect the visitor usage of the device but museums should eventually mend them (The British Museum, 2010).

The welcome screen and message users viewed on beginning their journey with the device helped them understand what the device offered and how they should have used it.

Some decided though they would “be able to learn how to use [the device] as they went along.” Many users considered the length too long and choose disregarded it (The British Museum, 2010).

Options on the device such as rewind, fast forward, and back buttons grew essential for an enjoyable experience using the device. They discovered that the device should not limit the number of pages the user can go back because this only confused them, especially when the user experimented with the device without really understanding the concept of a homepage or a home button that will bring them back to the main page. Many did not understand the rewind and fast forward buttons when using the audio clips. Several users just used the back button and listened to the whole clip again (The British Museum, 2010).

The content of the device carries just as much importance as its ease of use. The popularity of the guided tours inspired research into determining the reasoning behind this and subsequently understanding why people wanted the device. Viewing the options that people selected from, visitors believed that the guided tours offered the most guidance as well as provided them with a personal guide through the museum with little effort on their part. Because of the guided tours popularity and success, users believed that tours should vary more as well as include more objects on the interactive map. Some issues arose with the tours, however these appeared very minor compared to the benefit they offered the visitors. Users considered the guided tour the best option for the device because of its clear directions and animated maps that provided an extra level of guidance. The interactive map greatly interested most users. Many used them for figuring out where their location in the museum as well as object locations within the exhibit. The map gave users many more difficulties while they used it but once they experienced the guided tour before using the interactive map, they felt much more familiar with the setup of the map and how the device worked (The British Museum, 2010).

Museum visitors’ high expectations of devices before they even enter the museum challenge museums in developing exhibits with the most up to date technology possible. Many believed that the device they rented at the museum would include features found in GPS systems for navigation, or touch screen functions found in the iPod touch and iPhone. These expectations demonstrated that users wanted high tech devices as well as devices that offered interesting data in addition to guided tours and maps. They also expected high-resolution pictures that they can zoom in on when going through the exhibit as well as maps that offer easy functions that did not confuse them or prevent their viewing the objects. People also desired the ability of “dragging” the map for seeing a different area. Arrows

commonly function as scrolling buttons but many times they do not display efficiently and users miss them entirely (The British Museum, 2010).

The British Museum's Children's Guide

Evaluating the children's guide resembled the evaluation of the adult guide. Researchers evaluated fifteen children who used the device, ranging between the ages of 4 years to 11 years old. Most of them had used a touch screen before using The British Museum device. They completed a series of tasks and received evaluations on how well they completed them, what they struggled with and what the child expected out of the device. When creating the device for children, they considered the length of tours, especially with younger children as they grow bored and tire easily. Many times the children got restless staying at one exhibit, therefore when parents used the guide along with the children they repeatedly fell behind. The parents believed the device appropriate for the ages of 5-11 years old and kept the children entertained well enough. Games and age appropriate information found in the guide increased children's interest in exploring the exhibits and using the guide. Parents believed that the device made children look at the objects and increased their interest in what they viewed as well as in exploring the museum (The British Museum, 2010).

Children using the guide required a much simpler setup than the adult version, and because of this many times children needed a more detailed explanation the technology worked. Many of the children using the device struggled in the beginning but eventually understood how it worked and no longer required assistance. None of the children struggled using the touch screen. However, the unresponsiveness of the screen evaluated by the adult tests also presented itself in the children's application. The children typically learned the interface easily enough, either on their own or with an adult's assistance; even if they struggled in the beginning they eventually adapted. Many of the children felt comfortable following the guided tour and the majority led their group on the tour. Two variations of group interaction arose when children used the device. They either worked in a group, finding objects and discussing the exhibits, or the children isolated themselves even if they went through the museum in a group. If the children engaged in the tour and rather than the interactive games, they listened to all of the commentary that the guided tour provided. The games provided entertained for the children, many children wanted more games and found them fun and enjoyable (The British Museum, 2010).

4.2.4 Tate Modern's Applications

The Tate Modern mainly focused on the use of handheld devices and did not use any other forms of technology throughout the museum. They offered the iPod touch and the Dell Axium for rent to all visitors and each had their own application that provided the visitor with an enhanced experience throughout the museum. The Dell Axium led visitors on a guided tour with an interactive map of two floors of the museum. The tour guided them throughout the exhibit as well as provided additional information at each stop. Some stops gave additional images so viewers could focus on specific details rather than just the big picture. The iPod Touch application provided visitors with a new experience while going through the museum. Visitors played an interactive game of trumps in this application. Depending on the game version they played (battle, mood and collector), they collected a series of works of art throughout the museum using the application. Once they finished, they either could battle with family or friends also using the application or against the computer. Each game mode provided the visitor with different views and directions for looking at the art and lasted between thirty minutes and an hour or they could have chosen unlimited play, whichever the user had time for. Antenna Audio created both applications for use on touch screen devices.

A pioneer in the systems of interactive multimedia guides, the Tate Modern museum began their initial investigation into these multimedia guides in 2002. Since then, they introduced these guides as a fully-fledged tour through their galleries first (Proctor, 2007).

In 2006, the Tate Modern first launched a mobile device campaign that let users dial into an application from their personal cell phones, from which they could hear an audio about the various exhibits. This application facilitated audio tours for visitors who may not necessarily have had prior experience with traditional methods of audio tours. However, it posed a particular problem, as facilitators found determining the costs of the calls almost impossible, because of the international patrons whom may have experienced roaming charges. The original take up rates of the initial trial stood at a disappointing 3.6%, only a fraction of the take up rates for more traditional audio tours for similar headlining exhibits (Proctor, 2007)

Internationally, the business model for cell phone tours remained a challenge, as long as mobile network providers mediated the value. Uncertainty surrounds this method. Can cell phone tours remain an overhead for museums, dependent on sponsorship and grants for funding, or can they evolve into an affordable medium for a significant population of visitors

and revenue-generating for museums along the lines of traditional audio tour rentals (Tate Modern, 2010)?

Following a thorough analysis of program users, the Tate Modern developed a profile of likely users of the mobile application at the museum:

- slightly more educated
- local
- younger
- repeat visitors
- visiting alone
- with a contract

This information helped the Tate Modern develop a second tier device, in the form of a handheld computer (Tate Modern, 2010).

The system let visitors hold a small computer while they walked through the galleries. It also let users take part in interactive games, listen to audio commentaries, and play art-related music. Fans raved about the benefits of the device, and its ability in enhancing the viewing experience of the visitor, stretching beyond what a single piece of artwork offers (Tate Modern, 2010).

Original plans designed the device for museum-goers ages 16-25, targeting visitors in the museum who may not have had prior exposure to modern and contemporary art. Original results presented even more favorable usability, as all groups embraced the device, from families with younger children, school groups, individuals, to adult visitors. Other positive reviews followed, including high rankings from all groups of users. The museum consistently looked at new and innovative ways of developing and perfecting the system. User comments included “The best part was the audio-visual which involved you with certain pieces so at times you felt like dancing or laughing - it evoked more emotion” (Proctor, 2007).

Critics stated that the device could have potentially distracted the viewer from the content of the gallery. The Tate Modern took this into very careful consideration when designing the applications. The multimedia device delivered information in brief segments, so the viewer’s focus consistently returned to the artwork on display. In addition, the device promoted a sense of genuine debate, by incorporating a wide spectrum of voices, opinions, and ideas of modern art. This gave the viewer ideas of a proactive way of learning, showing them a new side of art (Proctor, 2007).

In addition, the multimedia device offered a certain degree of flexibility to the user. They gave the user access to the information at their own pace, in the order that they chose.

This avoided the problem of crowd control, which sometimes posed an issue with more conventional, static computer terminals. The museum utilized the multimedia devices alongside the longstanding and award winning audio tours, which reflected the museum's dedication in continuously developing and adapting to new generations of technologies (Tate Modern, 2010).

Additional research pointed towards the effectiveness of the multimedia devices. Evaluation proved that users spent a longer amount of time in the galleries, and 87% of users stated that the device improved their experience. Rave reviews included: "Informative, entertaining and fascinating and gives out more intensity (given that I am not a professional and tend to get distracted when I wander without a guide). Good idea!" "A fantastic addition to the Tate Modern Experience. I really liked the extra information, history and music," and "utterly fantastic (Tate Modern, 2010)."

Concurrent with the assumption made by many museum professionals, audio accompaniment as an interpretation of exhibitions significantly impacted both the level of understanding of the material, as well as the level of appreciation the viewer walked away with. Analysis also asserted that museums should not force mobile devices upon visitors. Although adoption rates grew marginally during the start up years of the program, numbers have shown that more users will widely accept the programs as time continues (Tate Modern 2010).

4.2.5 The Museum of London's Application

The Museum of London offered an interactive answer to history buffs that longed for seeing their city streets as they once stood in years long past. Their application, dubbed "Streetmuseum," gave users the chance of viewing historical photographs at a number of spots in various parts of London. Instead of confining its visitors in the museum walls, Streetmuseum took them on an exciting trip into the past (Cullimore, 2010).

Other applications and projects have attempted laying historical photographs over modern ones. However, "Streetmuseum" managed augmenting reality in real time, the first museum application having done so. Hundreds of images from the Museum of London's vast collection came to life through the application, from the Great Fire of 1666 to the infamous swinging sixties of London's streets. Creating the device proved a difficult task, as throughout time, many streets in the city of London have disappeared or the street names have changed (Cameron, 2010).

The founders of the application, creative agency Brothers and Sisters, made use of geo tagging and Google Maps by taking users on their journey with their iPhones and a GPS. Streetmuseum led users to marked places on a map. Once the user stood in front of the landmark or building in question, he or she clicked the “3-D View” button on their device. The application recognized the location and overlaid a historical photograph over the live feed of the location, instantly transporting users into the past. Tapping the image provided the user with textual information, supporting the current scene (Cameron, 2010).

Museum Director Jack Lohman still raved about the application, and said that, *“This app allows the present and the past to collide and share their secrets. Streetmuseum opens up the city in new and exciting ways. The launch of the Streetmuseum app is an exciting development for the Museum of London”* (Cullimore, 2010)

Streetmuseum represented only one tier in the Museum of London’s attempt at delivering new and exciting ways of viewing historic pieces of art to old fans and fresh visitors alike. The museum will soon open a series of new galleries, complete with increasingly interactive exhibits, film, and changing displays, much to the delight of their audience (Cameron, 2010).

This fun and educational application stands as a great example of augmented reality utilized in a practical and useful manner. Rather than simply pointing out historic locales around the city, the integration of historic photos into the live AR view left the user feeling both engaged and entertained. The app also worked as city-wide mobile marketing for the Museum of London, which encouraged users along on their journey in the museum's galleries. Other museums in historic locations should consider jumping on this bandwagon, and following in the way of Streetmuseum (Cameron 2010).

4.2.6 Victoria and Albert Museum’s Application

Museums could employ almost any technology imaginable in their exhibits in this modern technological age. The V&A itself has used various forms of technology in its past and most recently developed an application for its Quilt’s Exhibit. Our team analyzed the results of the implementation of the application by administering PMMs. These uncovered the amount that visitors actually learned from using the application. Furthermore, we observed a comment book where visitors gave their honest opinions as a way of determining whether or not the application succeeded. All three of these elements worked together in

developing a thorough understanding of not only what types of technology existed but also their level of success in enhancing visitors' learning experiences.

The application used in the museum's temporary Quilts Exhibit displayed more detailed information about specific quilts, not provided by exhibit displays or video clips. The device let users move even closer to the quilts with high-quality images focusing on details of the quilt's stitching patterns and color choices. The device did not restrict users to a specific tour or order of viewing quilts, but let them gather information about any quilt they wished and provided them with audio, video and additional text information about the specific quilt. The museum titled the application *Quilts 1700-2010: A close-up stitch-by-stitch look at British quilting* and shared details with the visitors concerning three centuries of quilting in British history along with various interviews with the creators of selected quilts. The application has a three star rating on iTunes, and many users who experienced the exhibit with the application wrote positive feedback in the comment book, where users could add their comments once they returned the rented device at the V&A. Antenna Audio created the application specifically for this temporary exhibit at the Victoria and Albert Museum.

During our administration of the PMMs, we surveyed 15 visitors with technology and 15 without technology (30 total). Part of the PMM questionnaire asked about what resource helped the visitor learn most within the Quilts exhibit: Looking at the quilts, reading the information panels, or using the mobile device application. For those who did not use the technology, eleven of the visitors claimed they learned most from looking at the quilts which left four who felt they learned most from the information panels. Although looking at quilts seemingly dominated over the information panel, we only surveyed 15 visitors without technology. If we gave more visitors the PMM, the outcome could have changed substantially and counteracted or even reversed the results. Out of the 15 visitors surveyed with technology, all 15 claimed the mobile device application helped them learn most. Just like visitors without technology, if we administered more PMMs perhaps the results would have changed; however, a response of 100% seemed a rather domineering result. We feel that if we administered more PMMs, visitors would still have felt the technology helped them learn most because our actual analysis of the PMMs supported that assertion that the visitors who used mobile device applications learned more than those without.

The PMM analysis also showed that visitors learned much more with the mobile device application than without it. Every visitor who used the technology during their visit in the Quilts Exhibit claimed that the mobile device application helped them learn most from the exhibit. This data paralleled our PMM knowledge analysis that showed, on our own point

system, that visitors with technology scored 136 points higher than the visitors who did not use technology. Our PMM analysis proved this particular application successful in the eyes of the V&A who wanted the best learning experience possible for its visitors.

Successfully integrating an application into the entirety of the V&A requires creating a practically flawless application. The V&A used a mobile device application in their temporary quilts exhibit, despite not fulfilling all of the museum's high standards. This application has shown great success in enhancing visitors' learning experiences in the Quilts Exhibit. However, Antenna Audio, the creator of the application, provided users with the option of writing in a comment book as evidence of their reactions. We viewed this comment book, and included copies of some of the pages in Appendix C. The comment book demonstrated a majority of positive feelings for the application and its use on the iPod Touch. Some comments from the book, both positive and negative, follow:

“The exhibition is utterly & inspiringly illuminated by this audio tour.”

“The iPods were great and very easy to use - eventually”

“Hello! Great exhibit but the fiddly iPod guide was horrible, please bring back regular audio guides.”

“Touch screen very hard to maneuver wanted tour time. Commentary good.”

“Very good – audio added well – new technology helps.”

“Great idea – first time I've ever used an iPod!! Not easy to use but excellent commentary.”

Many of the negative comments suggested that despite the pleasant tour, the device did not fulfill their needs. However, creating a web-based device spread over multiple platforms would have eliminated this issue because the visitor would have the tour on their own device.

4.3 What types of applications suit an art and design museum like the V&A?

After we thoroughly examined various technologies available in other museums, we set ourselves at determining what sort of application, based off of the technology observed, would best apply within a museum such as the V&A. Through our observations as well as research into earlier studies on the subject, we concluded that a guided tour and map combination would benefit the V&A the greatest. This resulted from our impressions that limited interactivity would serve their purposes the best. This meant that they would not include games, quizzes, scavenger hunts, or in-depth videos. Visitors did not show as much of an interest in simply a map application; therefore the museum should still include the guided tour option along with an interactive map.

4.3.1 Existing Technology in other Institutions

The team observed technology at other institutions during our first week in London. Some of these institutions had technology reminiscent of the V&A while others employed very different methods. The observations we gathered provided us with an understanding of existing devices and the styles of technology that have worked in a museum setting. We visited various museums, ranging in styles and distribution of technology usage. We visited the:

- Science Museum
- Supreme Court
- Natural History Museum

Science Museum Technology

The science museum showed us the widest range of technology. However, most of this technology would not have applied well within the Victoria and Albert Museum. We felt that the advertisements of the technology in the front entrance of the museum actually revealed the most important pieces of innovation. It immediately raised the visitors' awareness of the technology and displayed how they could use the touch screen standalone devices. Beyond the advertisements, informational touch screen panels provided users with an assortment of information separated into floor plans, events, pieces particularly worth seeing, index, hands on experiences and what's new in the museum. Visitors especially enjoyed the interactive videos with button selections for the information the individual wanted. Giving the visitor the option of learning specific information gave the user more

control over their visit and thus made it more enjoyable. Touch screens gave the visitors multiple options in gathering information from the exhibit. Many explained how the object came into being as well as its intended use or purpose.

The Science Museum mainly focused on the education of children rather than adults; therefore they found ways of particularly communicating information to them. The Science Museum attempted solving this problem by creating a series of interactive videogames and quizzes for the children. These games and quizzes encouraged children's participation, but also had the potential of interesting adults as well. Lastly the museum provided traditional audio phones with information about the exhibits as well as movies about the exhibit, making the information more understandable and more enjoyable.

Supreme Court Technology

The Constitutional Reform Act established The Supreme Court on 1 October 2009. As a new institution in London, the Supreme Court developed a room explaining who they were, what they did and why they existed to the general public. The technology within this room included an interactive touch screen timeline that covered the years 1215-2009, discussing court history and other relevant information. We found the device user friendly though it contained no menus yet provided a lot of information with very simple interaction. The other touch screen device, called *Be a Justice*, strongly encouraged interactivity. This program let individuals view court cases and make their own decisions on the rulings of the cases. Depending on their choice, they received explanations of the answers. This activity attempted keeping the visitor engaged and interested as long as possible.

Natural History Museum Technology

The Natural History Museum attempted a method of making information portable for visitors in their Darwin Exhibit. Visitors received cards with barcodes on them so they could use them with a series of touch screens throughout the exhibit. Once they read through the information they had the option of scanning their card so they could retrieve the information online at home. We found the concept interesting but gathering the information on their website proved too confusing. Museums could work the concept though and reach great success.

Victoria and Albert Museum Technology

The technology within the V&A has slowly spread throughout the entirety of the museum. They felt that implementing the technology encouraged more knowledge about the objects in the exhibit, as long as it did not take away from the style and environment of the

exhibit. Different variations of technology existed throughout the museum, including their style guides, touch screen panels, audio phones, designer interfaces, and films. Style guides basically acted as computers spread throughout the museum, and each computer provided the user with information about the exhibits around the device, yet these computers sat just outside of exhibits, in adjacent hallways and rooms. Exhibits contained touch screens within them that provided information usually on objects specific to the exhibit or events that the objects contributed to. Audio guides resided periodically through the exhibits so visitors could hear clips of information as well as watch a movie with audio, without disturbing the other visitors of the museum. Also in some of the exhibits the style guides and touch screens offered design interfaces. For example, the Design a Ring Interface located in the Jewelry Exhibit. This allowed visitor interaction with the jewelry in a more personal tone, as well as emailed the designs of the rings to their personal computers.

4.3.2 Addition of Mobile Technology into the V&A

When implementing any kind of digital technology into a facilitated setting, new jobs need creation, unless the extra work unloads onto other existing departments. The V&A considered creating the following tasks and jobs in their decision on the implementation of the technology (Naismith, 2006).

- A technical promoter whom promoted the technologies benefits in an appealing fashion.
- A promoter in power who passed on the word of the technical promoter to people higher up at the V&A.
- If the museum integrated the mobile device applications, the V&A also needed technology experts in coping with equipment failures and system improvements.
- Training for (ongoing) technical support for the staff members in the museum so that they could have assisted with visitors when necessary.
- Considered the use of mobile technologies in supporting collaborative and group learning.

Mobile devices have only grown ever more popular with adults, adolescents, and children. In providing the best learning experience possible, museums have created customizable products as learners relate better that way. By providing visitors with a learning opportunity using the device that they use every day, the V&A would have given the visitor a

very personalized experience that integrated seamlessly into their own comfort zone and style (Naismith, 2006). Through reading the Quilts Exhibit comment book and seeing the results from the PMM questionnaire and analysis, visitors both preferred and learned more with mobile device applications. The Quilts Exhibit application did not intrude and retained lots of data. It had a voice-guided tour through the exhibit where the visitor could see or hear more about a certain quilt by simply typing in the quilt's number into the device. This application had a limited interaction, which made the visitor not focus all of their attention on the device, but towards the quilts. It did this through the use of still pictures, not videos, and an audio guide that prompted an examination of the physical quilt for certain details being discussed. This style application suited the V&A best in terms of interactivity and educational capabilities. However, they must have ensured that the educational activities could include these technologies productively. The scope of learning activities that technology presented visitors with had endless possibilities. These endless possibilities provided the V&A with the opportunity of discovering the "perfect" application for the V&A.

Interviewing Juliette Fritsch emphasized the V&A's strive towards the "perfect" application, "I think it has to do with how well designed the application is and I think that museums haven't really got it right so far." The V&A observed both the Tate Modern and British Museum's devices and concluded that both institutions focused too much on the technology itself and what it could do, rather than if it fit the museum's needs. Fritsch used the term "wiz-bangy" in describing the first round of handheld devices launched by the Tate Modern Museum back in 2003, which not only included an application with games, but also a "compose your own soundtrack" tool. The V&A considered an application with too much interactivity inappropriate due to the museum's aim of keeping visitors' attentions focused on the displayed objects and not so much on the learning supplement.

Unlike the Tate Modern and British Museum, the V&A would rather not supply visitors with a handheld device containing the application, but instead just a downloadable application for their own devices. Along with not offering a device, Fritsch expressed the V&A's preference for not charging visitors' for the download, "I don't think you could charge for them. It's an ethical issue. We are a public museum and we shouldn't make some information only available to people who can pay for it."

Fritsch's final comment on the subject of a suitable application for the V&A dealt with overall design. She boosted the idea of an audio tour-based application, "We know that from all kinds of different interpretation of methods, the one that people like the most is the effect of a one on one tour leader and in some ways an audio tour could mimic that." When

using such a design for an application, visitor's lingered longer typically and at least initially felt like they learned more (Fritsch, 2010).

4.3.3 Victoria and Albert Museum Mobile Device Options

Museums have implemented mobile guides in hopes of creating a more interactive experience for the visitor. The institutions developed these guides as a way of providing supplementary information for visitors, as well as attracting a new demographic of visitors into the museum. These devices better linked the visitors' pre-, during-, and post-visit experience. This concept particularly interested institutions such as the V&A, who already focused on providing a more complete visitor experience through their website. But providing and managing these mobile guide devices has challenged institutions, especially those attempting development in house. The cost presented the primary challenge; maintaining the hardware, content creation, and updating content all contributed to the expense. However, surprisingly, institutions that have purchased guides reportedly find the process not too challenging. This showed the low entry barrier for these mobile guides (Petrie, 2010).

Another option existed however for providing mobile guides. The institutions could have offered a mobile device application available for download within the building. The majority of institutions foresaw an increase in downloads to visitors' personal mobile devices within the next five years. This linked with hardware improvements made practically standard on all Smartphones. Evolutions such as more powerful processors, increased storage space, and integrated wi-fi allowed institutions the ability of adding features such as videos, links to community sites, and unlimited amounts of downloadable content onto their applications. These institutions also foresaw a significant increase in their in house development ability within the next five years. Institutions have implemented these evolutions slowly as most museums, such as the V&A, waited for better-established technology, seeing if it "stuck" before they invested large amounts of time and money into developing the technologies (Petrie, 2010).

However, the institutions used caution because as technology changed so did visitors' expectations. The new technologies that infiltrated into visitors' daily lives influenced their experiences during their visits. Visitors' expectations also varied by demographics. For example, visitors under the age of 35 grew up using the Internet and mobile technologies so they expected a certain level of technology integrated into their visit. A simple audio guide may not have satisfied these visitors' expectations. Younger visitors typically preferred a

multimedia tour while older visitors did not see the benefit of anything more than a simple audio tour (Petrie, 2010).

Institutions such as the V&A felt they must proceed with caution when integrating new technologies into their buildings. The V&A in particular would not have compromised the atmosphere of the museum or taken attention away from the exhibits. They sought a mobile guide that complimented their museum, not one that detracted from the visiting experience (Petrie, 2010). As stated, the mobile device market continually changed and evolved. In the year 2009, in Western Europe, Smartphones comprised one in four of all cell phones, and that number should double by 2014 (Petrie, 2010). Smartphones simply referred to the mobile phones that offered advanced computing ability and extra features that take it beyond the comparatively primitive functions of regular mobile phones. They actually could compare more easily to small computers rather than phones.

The V&A discovered that one in three of their visitors owned some type of Smartphone. These visitors actively participated with this technology by taking photographs, sending/receiving text messages, and accessing the internet. Age largely correlated with visitor usage of the technology. Visitors under 35 took pictures with their phones twice as often as visitors over 55. This same concept of age translated into visitor usage of a mobile device application. While visiting a museum, the majority of visitors preferred using a multimedia tour than participating in any social media. Visitors under 35 used a mobile device application much more often than those over 55 (Petrie, 2010).

Siobhán Thomas, of the Institute of Education, University of London, UK, completed an analysis of the Victoria and Albert Museum's current high-tech interpretive devices in 2007. She evaluated why people used these devices and their expectations of them. An analysis of the V&A's current technology helped in determining whether or not the use of mobile technology proved useful within the Victoria and Albert Museum and if the device aided the visitor. Any visitor dissatisfaction evaluated while using the high-tech interpretive devices concerns the evaluation of the effectiveness of mobile device technology in the V&A (Thomas, 2010).

An overall analysis of the devices showed that a majority (96%) of visitors believed the high-tech interpretive devices essential in an enjoyable and educational experience. These devices provided the visitor with more detailed information otherwise unavailable. One visitor that Thomas interviewed said,

“I think people are lazy. These devices can be a little easier than taking time to sit in front of a piece and read. The technology makes it seem more contemporary. People are more inclined to use them. I think they give you more information than you would be able to get from a written description” (Frequent visitor, female, 55 to 59)” (Thomas, 2007).

This frequent visitor of the V&A articulated a lot of problems with integrating technology into a museum. One of them lay in the way technology can pull away from an exhibit. People felt less disposed for viewing plaques and displays if the available technology felt easy and especially when museums located the technology far away from the objects. Many of the visitors wished that they could have viewed the technology and the objects at the same time and brought the two together and increased their knowledge gained about the exhibit. Overall when dealing with any object in an exhibit, 94% believed that the technology should have integrated closely with the object. However, the main problem of distracting visitors with the technology when placing the device close to the objects arose again. Only three people out of the twenty-six interviewed believed that the technology needed distance from the objects. Thomas then explained how, when discussing high status works of art, the numbers changed. During the interviews he discovered that “38% of visitors felt it was appropriate to position a high-tech interpretive device next to the object, 58% said high-tech devices should be separate from the object and 4% felt the device shouldn’t be used at all” (Thomas, 2007).

Thomas discussed the use of audio, video and text in these high-tech interpretive devices. Many visitors appreciated having video clips that described the object they viewed, especially when the video concerned how the object came into being. The visitors enjoyed all of the videos throughout the museum but when asked what could make them better, they commonly brought up the use of sound. One first time visitor explained,

“The videos are very good, good info, you can understand how the figures are made. It’s really nice. I think you can learn a lot. It would have been easier, though, if there was sound (First time visitor, creative industries, female, 25 to 34)” (Thomas, 2007).

Youth visitors and visitors whom spoke English as their second language found that the use of audio increased their comprehension of the information and provided them with a better museum experience. Further interviews with visitors demonstrated that they expected sound

from many of the devices. Some visitors felt surprised that sound did not coincide with the video or touch screen devices. Visitors stressed the importance of video and claimed that it added a dimension of education not achieved with just text alone (Thomas, 2007).

During our interview with Mark Hook on the V&A's interest in the integration of a tour based mobile device, he made it clear that the V&A already expressed some interest in such technology. He said he thought "the reason the V&A is interested in a tour based application is because the V&A has already seen results from it. There has been a large uptake for technology from visitors in certain exhibits." Hook stated he personally felt that if a mobile device application tour had come into creation, it should have included several different tour options. He emphasized that sparking "creativity and inspiration" in visitors constituted a top priority in the creation of a successful V&A application. Hook provided us with some aspects of interactive tours that he felt would have interested the V&A. Supplementary tours; this option included pictures in the application of objects that the V&A could not have necessarily provided on display for various reasons such as space.

- Highlights- This type of tour covered exhibits and displays considered the most important or famous in the V&A. These most likely interested visitors who came to the V&A for a particular exhibit.
 - Ground floor tour- A tour that did not require the visitor using stairs or lifts because of preference or physical ability for those less mobile.
- Hidden highlights - Kept visitors away from crowded areas for those who wished for a quiet museum visit. Monitored visitor locations through the communication of the mobile devices. All visitors could have taken the same tour, however the device sent visitors in different directions or paths based on traffic patterns.
 - Semi tailored- Tours where visitors chose a time limit (hour, 30 min, etc), which created deadlines that needed meeting.

During our interview with Mark Hook, he also discussed the V&A's interest in a digital interactive map. Although he assured us he could not have spoken solely on behalf of the V&A, he happily voiced his opinion. Hook stated that people seemed most interested in online and electronic maps rather than a paper copy. He provided his opinion on which digital map features would have integrated most successfully. He greatly supported "where you are" styled maps. This style of map showed the device location and then gave visitors directions to

another location in or near the museum. Examples of this include the: shortest path to the exit, nearest café, nearest toilets, closest shopping opportunities, locations of other exhibitions, and closest emergency exits.

The V&A informed us through our interviews that they opposed the idea of providing any of the actual mobile devices, and understood that age acted as an important factor in predicting visitors downloading the application to their own mobile device (Petrie 2010). Our results though encouraged further exploration into these issues. We found that a majority of visitors would welcome the technology as long as it made itself friendly to the user. When determining what types of applications the visitors would like implemented in the Victoria and Albert Museum we questioned the possibilities of an interactive tour, a digital map, and just the general instating of a mobile device application. A majority of visitors answered “yes” in regards to the creation of any application whether a guided tour or an interactive map. 78% believed in the utility of an application despite not knowing aware of what types of applications in consideration. Between an interactive tour and digital map, the guided tours received the most welcoming response among visitors surveyed, with just over 71% in favor of the guided tour. Figure 7 demonstrates the overwhelming selection of “yes” answers when asked about mobile applications and types. This overwhelming selection of “yes” begged the question of whether or not age or gender has a preference in mobile applications and types. Comparing gender of respondents, we could not see a significant difference except when respondents answered if they would find a digital map useful. Females demonstrated a 50:50 ratio, while males demonstrated a 60:40 ratio in favor of a digital map being useful.

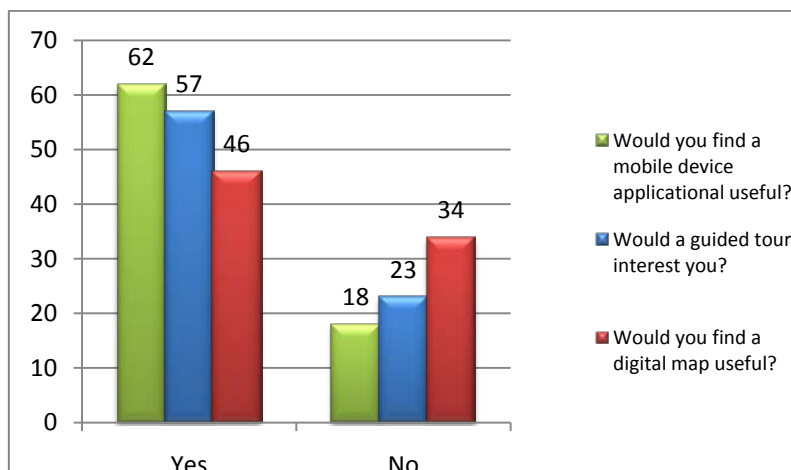


Figure 7 Creation of a mobile device application. Yes or No.

Comparing age of respondents and how they answered these questions demonstrated a want for technology among the younger population but also showed that people over the age of forty-four also would like technology available for visitors. Respondents who said they would find a digital map useful, constituted about 60% under the age of forty-five. The 60:20 ratio of respondents believing a digital map would have demonstrated that older populations still found interest in using technology. This same ratio also existed for respondents who stated interest in an interactive tour. The use of technology may still rest in the younger generations, however interest in technology can arise among the older generations (45+).

4.4 How could mobile device applications affect learning experiences of visitors?

In answering this question, we focused the PMMs primarily and supplemented with our interviews and research on other institutions. Our analyses of the PMMs showed that visitors retained more information while using the mobile device applications. All visitors whom responded, “I have nothing else to say” after touring the exhibit did not use the mobile technology. Every visitor who used the mobile device application came back the second time with increased knowledge or interest. The majority of visitors with an increased knowledge and interest in the use of the mobile device application reflected upon the same exhibit highlights. They most commonly discussed family histories of quilt making and the politics expressed through the quilts. Only the mobile device applications displayed these topics, proving that the visitors retold these facts after their visit, clearly learning them through the use of the technology. Our interviews of staff members also provided us with their understanding of how the V&A and its staff felt they should educate their visitors.

The analysis of the PMMs and interviews assisted in the determination of whether or not the museum should look into providing a mobile device application, and if visitors would find it useful. The current application in the Quilts Exhibit did not meet the desired quality of an interactive application that the V&A wanted; however, the analysis provided us with an approximate idea of whether mobile device applications enhanced the learning experiences of visitors. We ultimately determined that they did enhance the visitors’ learning experiences.

4.4.1 Personal Meaning Mapping Results

After the analysis, our group rendered the data, which resulted in our conclusion on whether mobile device applications benefited the learning experience of visitors. From the difference in points between what visitors knew and learned, we determined how much

overall the visitors learned during their visit both with and without technology. By analyzing the differences between the groups, we showed how much more information one group of visitors retained over the other group of learners. We found the following values:

User Type	Points
Nonusers	-190
Users	103

The numbers above came from our own scale, which we developed primarily for PMM analysis of the V&A's Quilts exhibit (Please refer to our methodology section 3.1.4 and our Appendix A for further explanation of our point scale). The -190 points meant that the value of the terms for what they learned fell much below what they already knew. Conversely, the positive 103 points based on our point scale, showed that terms learned by visitors using technology carried more value than those they initially knew. No overall ranking based on how much or how little the group of visitors learned existed. The purpose of these numbers lay in creating an overall comparison of those who used technology and those who did not use the technology.

Our data concluded that overall, mobile device applications assisted in the visitor's learning by a value of 170 points. Although this may seem like a blowout for mobile device applications, several parts of our data collection and analysis may have contributed to faulty or bias data, even though we took great lengths in avoiding it.

The visitors we questioned that used the technology, even those who had difficulties using it, said nothing but good things about the application and its educational value. The visitors even filled the Quilts exhibit comment book cover to cover with almost nothing but positive comments regarding the application. This demonstrated that if visitors came away from an exhibit where they paid their own money for device rental, and still found satisfaction to the point of expressing it to us and through the comment book, it showed that visitors would most likely have used an application outside the exhibit as well. Those over the age of 55 made up 22 of 30 visitors, an unexpected demographic in support of the integration of such technology. The last question of the questionnaire asked the visitors where they learned the most from: looking at the quilts, reading the information panels, or by using the mobile device application. 15 out of 15 visitors who used the technology all stated that they learned most through the use of the mobile device application. This made up the highest percentage for this question, as 100% of the technology group and 50% of the total visitors.

4.4.2 Personal Meaning Mapping Inaccurate Data

We must acknowledge potential reasons for faulty results; no matter how well we collected and analyzed the data. Our group agreed on a few areas where we could have analyzed data inconsistently just as a human error. For example, error could have occurred during the setting up of the PMM analysis and the categorization of words or designation of the point scale. No single, completely effective way existed for analyzing PMMs. Our team took input from our sponsor, advisers, museum faculty, and other resources, and made an informed decision on how we would effectively analyze our data. Only one group member performed the categorization and analysis as a way of lessening potential mishaps. After we completed the analysis, the selected group member detailed why they did the categorization and analysis the way they did, backed with reasoning. We then adjusted our analysis of the PMMs from there.

In four instances visitors with no technology claimed they had nothing else worth saying after their tour through the exhibit. Possibly these four visitors did not say anything because they simply did not learn anything worthwhile; however, they possibly could have not felt like participating in the PMM for a second time and thus told us they did not learn anything. This would then result in faulty data. In one separate instance we believed that we received faulty data that resulted positively for mobile device applications. When we approached one particular visitor, she initially refused the PMM because she believed that since she had already seen the quilts exhibit, she thought she knew everything; however, at the end of the exhibit, she approached us and insisted on telling us everything new she had learned from the mobile device application and how much it helped her learn. She supplied us with very valuable data, but she did not take the PMM properly so arguments on both sides could come up with reasons for keeping or disregarding the data. The three instances where the visitors had nothing else to say were tallied as negative points totaling to negative 176 points. Visitors who used technology had two instances with questionable data, which we tallied to a total of positive 28 points. When we took out these two potentially faulty statistics, we got the following result:

User Type	Points
Nonusers	-14
Users	122

The numbers above came from our own scale we developed primarily for PMM analysis of the V&A's Quilts exhibit (Please refer to our methodology section 3.1.4 and our Appendix A for

further explanation of our point scale). The -14 points meant that the value of the terms for what they learned fell below what they already knew. In turn, the positive 122 points showed, based on our point scale, visitors learned much more valuable terms through the technology than what they initially knew. As stated before, no overall ranking system on how much or how little the group of visitors learned existed. These values seemed slightly more comparable. This hinted that if we gave a larger number of PMMs, and similar results supported these potentially faulty ones or opposite results contrasted them, then it would have had a corresponding effect on the data. Either way in our case, it seemed that those who used mobile device applications during their visit learned more than those who did not use the technology.

Enforcing the results of our PMM analysis, our interview with Juliette Fritsch discussed how applications could contribute to the learning styles of visitors. Fritsch stated, “I think it’s a way of addressing different learning styles and a way of presenting information in a kind of more complex way, yet seemingly not complex.” Fritsch provided visual and audio material and its complexity as an example, “You can say a lot through a combination of visual and audio (AV) that would be impossible to explain through labeled text.” Though the V&A already had audio and video points in many of its galleries, they lacked levels of personalized learning and interactivity that mobile device applications offer visitors.

When interviewing Mark Hook, he felt that first of all, mobile device applications could have enticed visitors who resisted learning. By using a fun application, they would have taken in the information without really even realizing it. These applications could even aid traditional learners by laying out precisely the most important elements of the exhibits. Furthermore, applications allow for more personalized learning experiences which would most likely impact the visitor even more due to its relevance in their outside life. Lastly, Hook felt that by stimulating visitors with the applications they could in turn encourage the desired for further learning.

4.4.3 Conclusion

Our group concluded that the mobile device applications positively affected visitors’ learning experiences in comparison to those who did not use the technology. When we combined all of our collected data we saw how much more visitors that used technology learned. Even when removing the potentially faulty data, visitors who used the technology still learned more than those without it. Although no right or wrong way of analyzing PMMs existed, we performed our analysis consistently and prevented all the possible bias we could for the best possible results.

4.5 Will visitors use an application? Will staff accept an application?

In determining whether or not visitors would use an application, we decided that a survey would give us a sufficient idea of the general public's sentiments on the matter. Conducting the General Visitor Survey throughout the museum gave the group the opportunity of understanding visitors' opinions on the use of technology and their preferences in using mobile device technology. We also discovered their views on using technology with a museum in general and whether or not they would have liked seeing the technology made available within the V&A (See Appendix IV for data results). Overall we found that across the demographics, most visitors responded favorably to the mobile device applications and desired its implementation in the museum.

Our interviews with Hook and Fritsch helped us determine the stance most characteristic of the staff regarding the integration of a mobile device application. Both of them agreed on the fact that the V&A maintains incredibly high standards for any application that they could potentially use throughout the museum. They also concurred though that the museum would implement an application once they found one that perfectly integrated into the environment. Both thought that once the V&A actually decided on an application, the staff would accept it because it already met such high standards. Any application that the V&A chose would have already gone through thorough evaluation so the staff members would most likely trust in the museum's decision.

4.5.1 Survey

Demographics

Maintaining even demographics felt pertinent in conducting the survey and gathering the data. These steps ensured that opinions from different demographics reflected evenly in the data analysis. Figure 1 demonstrated our data collection, in regards to gender; the ratio appeared almost 50:50.

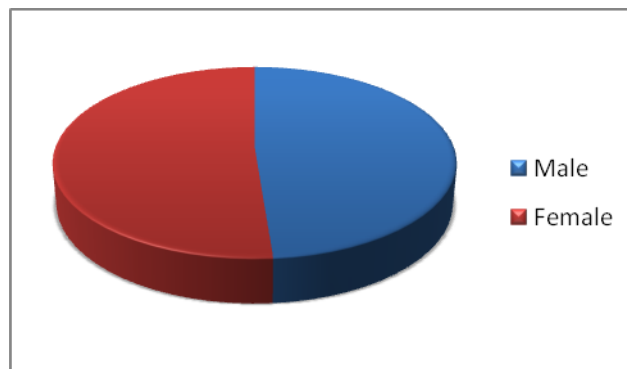


Figure 1: Gender Demographic

Comparing all survey questions to gender, we could not see a significant difference between male and female respondents. Along with even gender demographics, we also considered age. Figure 2 demonstrated a general balance of all age groups accounted for. We lacked data primarily in the age groups of fifty-five and older, especially between the ages of sixty and sixty five. We believed that this resulted from the time period that we administered the majority of our surveys, during half term, when there an increased number of students visited the museum. Even with this data we still determined if specific age groups had preferences in using the technology within the museum.

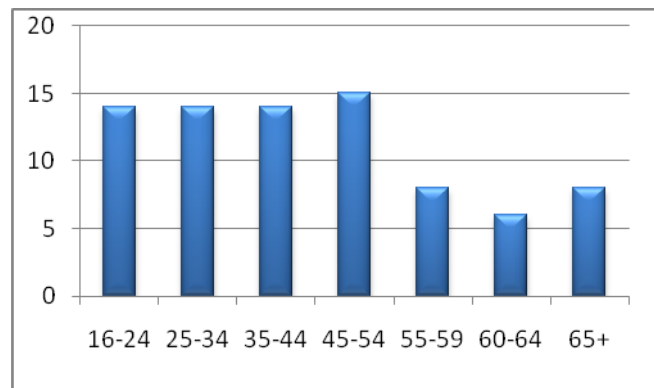


Figure 2: Age Demographic

Visiting the V&A

Repeat visitors constituted 56.58 % of the visitors we surveyed. Of those considered repeat visitors, the majority had not visited the museum in the past three years. Almost 30% of visitors though had already visited within the last three months while 16.28% of visitors surveyed visited within the past year. Figure 3 below demonstrated the span of repeat visitors ranging from 3 months to more than three years ago. Determining when people last visited the museum held just as much importance as determining how long they had been in the museum. The majority of the visitors surveyed had explored the museum for one or two hours prior to our survey. Less than 15% of the visitors spent an hour or less in the museum. This meant that the majority of the visitors surveyed experienced the museum for an extended period of time.

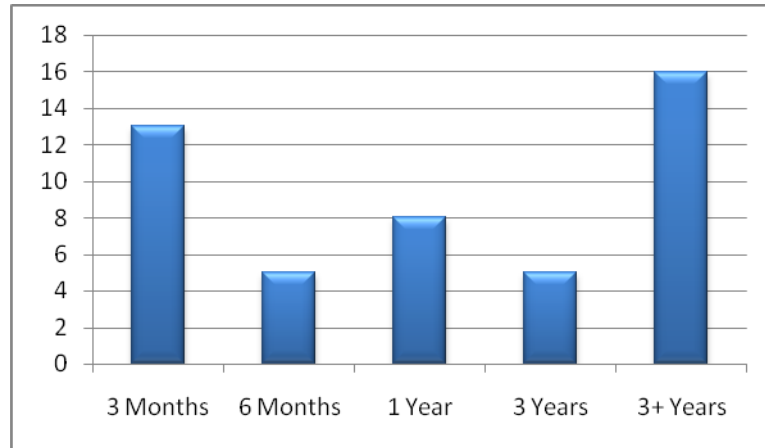


Figure 3 When was your last visit to the V&A?

Navigation

Successful navigation through the museum directly related to the enjoyment of the visitor. Almost half of the visitors surveyed felt comfortable finding their way through the museum by using either the complimentary paper map or through other means of navigation. About 40% of visitors had difficulties in their navigation through the museum, while only ten out of the eighty visitors surveyed did not have an opinion on the subject either because they enjoyed just wandering throughout the museum or they did not mind getting lost. Out of the sixty-three who used or saw the map, about 54% did not find the map useful while going through the museum. Those who did not find the map useful also struggled in navigating through the museum. The visitors who did not like the map and struggled navigating constituted about 55% of visitors surveyed, consisting of eighteen out of the total thirty visitors who struggled with navigation throughout the museum.

Touch Screen Devices

When observing current technology at other institutions we determined that touch screens presented data and information in a new and interesting way to visitors within a museum. We took this idea and had visitors rank their comfort and familiarity in using touch screen devices such as iPods. Almost 82% felt very comfortable with using a touch screen device (values ranging from 7-9), demonstrated in Figure 4. This comfort in using the technology allowed the museum the ability of looking further into touch screen applications and their potential role in the museum. Determining if age played a role in respondents comfort with using a touch screen device, we discovered very little difference when comparing age ranges of sixteen to forty-four and forty-five and older. However, when we

compared those who doubted their ability in using the technology (values ranging from 1-3) we noticed an increase of respondents over the age of thirty-four.

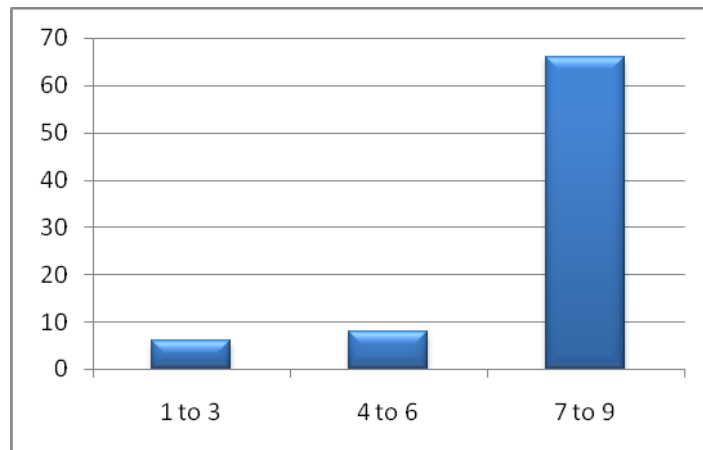


Figure 8 How comfortable are you with touch screen devices? (Range 1-9)

Individuals could have felt comfortable with the technology but did not use it frequently enough for a complete understanding of how it worked. About 46% believed that they used this technology constantly, while only about 21% did not have a device at all and thus did not use the technology. This familiarity with using the technology allowed the museum's experimentation with more options and exploring of the possibilities of an application. Figure 5 demonstrated how often visitors surveyed believed they used touch screen devices.

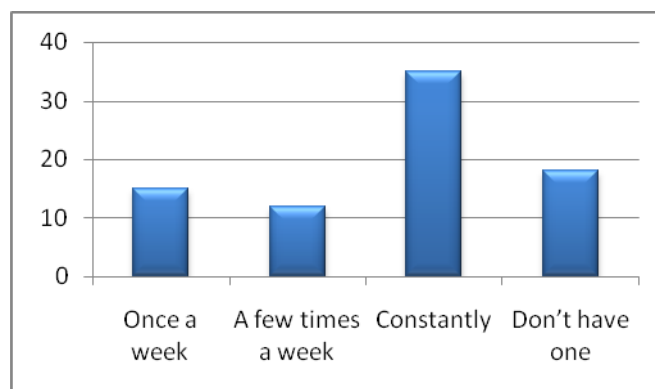


Figure 5 How often do you use touch screen devices?

Taking data from Figure 5 and comparing these respondents to their age we could see an interesting trend as age increased. Figure 6 below demonstrated the percentage of those who determined that they used technology constantly, and those who did not have a device. Figure 6 demonstrated as age increases, respondents who used touch screen devices constantly decreased. Respondents who did not have devices of their own greatly contributed to this. An

increase in respondents who did not have a device as age increased also appeared in Figure 6. Values demonstrated in the 55-59 and 65+ age groups did not follow the trend set by the other age groups, we believed resulted because when given the question, “How often do you use mobile touch screen devices?” many did not select the option “do not have a device” because the question listed it as the last option available.

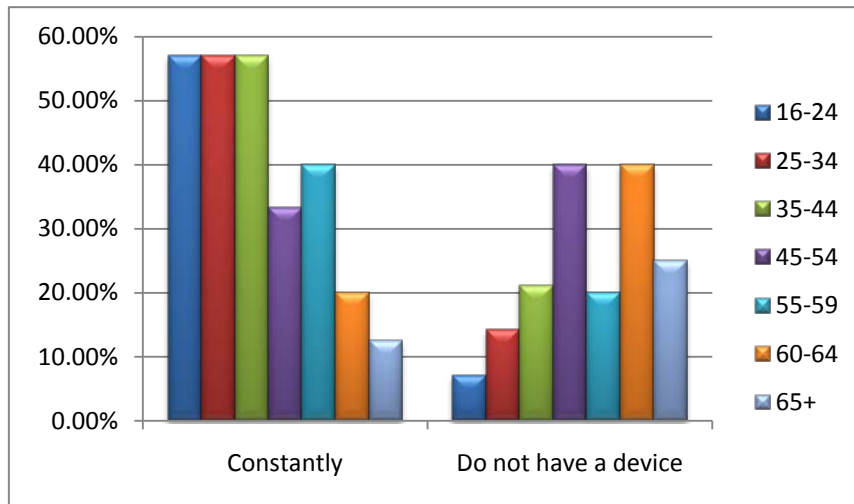


Figure 6 Respondents who use touch screens constantly by age

Using Technology in the V&A

In determining if the visitors would use an application within the Victoria and Albert Museum we asked visitors two questions. First we asked if the individual would like the technology available to visitors and then we asked if the visitors would feel comfortable using the technology within the museum. Our data demonstrated that the visitors surveyed desired the creation of a mobile device application and wanted it readily available to visitors. Visitors also claimed that they would feel comfortable using the technology within the V&A. Considering this overall positive response to the prospect of new technology, we concluded that the individuals surveyed enjoyed the technology in the museum and would have experienced few problems using the technology. Figure 7 demonstrated the visitors’ preferences in providing the technology and their comfort level of using the technology within the V&A.

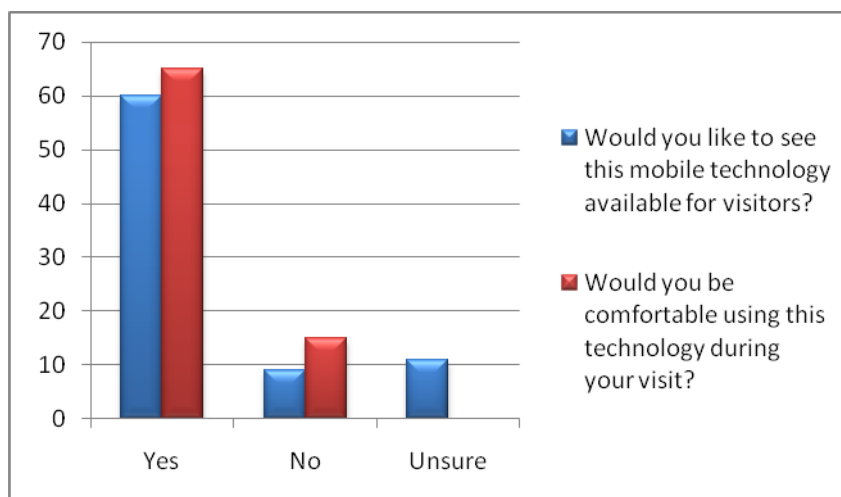


Figure 7 Preference to and usability of technology within the V&A

Once we determined that the majority of surveyed visitors believed that they would like the technology available to visitors, we wondered if any relation between the ages of the respondents and those who answered yes existed. However, all respondents showed interest in the availability of technology in all age groups. Between the ages of sixteen and forty-four we had a total of forty-two respondents; of those respondents, 69.05% wanted the technology available to visitors. Of more interest, 81.58%, or thirty-eight of the respondents aged forty-five and older, wanted the technology available for visitors. Once we determined the desirability of the technology, we then inquired into how they would rather use the technology, in hopes of coinciding with the museums desire of not providing a device but rather a mobile device application available for free download. Over half of the visitors responded that they wanted the application on their own device. We thoroughly explained their ability of downloading the application onto their own devices. Those who did not want a download chose so because either they did not have a capable device or they never wanted the technology anyways. This group consisted of about 23% of visitors that wanted a rental device from the museum and another 23% that stated they would not use the application or rent a device even if the museum provided them.

4.5.2 Interviews

Juliet fritsch

Fritsch felt that both visitors would use an application and that staff members would accept it as well. Referring to visitors' utilizing the application she said, "I think they would, to be honest." She continued, saying that, "We think that an application is something that visitors expect to have as an option. Ten or twelve years ago, visitors were unsure whether or

not museums should have a simple audio tour, now they just expect an audio tour.” These expectations fed into the V&A’s reasoning for exploring the possibility of implementing such technologies into their exhibits. She also thought that the staff would support the applications as well, saying that, “If the design is right and practical as well as financial issues are overcome, then yes.” If the V&A developed an application that met the astronomical standards they placed upon themselves, then both visitors and staff members alike would most likely not just accept it but welcome it.

Mark Hook

Hook thought that visitors would appreciate an application due to the feedback the V&A has received over the years. Most visitors have welcomed the chance at engaging in a more personalized experience at least once. Hook also seemed very supportive of a V&A mobile device application; however, he made it clear that the V&A has waited so far for the perfect style application.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Through our detailed research and analysis, our team concluded that mobile device applications benefit the learning experiences of visitors as well as provide them with a personal experience in the museum. Through our literature review we developed an understanding of learning in a museum, different technologies in a museum, and general museum demographics. Once we established this background we could then comprehend the applications of technology, and the possibilities of integrating technology into a museum. Interviews with the staff of the V&A provided us with an understanding of what the V&A wanted out of an application. From these interviews we concluded that the Victoria and Albert Museum desired an understanding of the role and usefulness of mobile device applications, and their ability in enhancing the learning experience of visitors in the museum galleries. Our further research, once we established this background and the V&A’s goal, consisted of observations of other institutions technology, personal meaning mapping (PMM), surveying, staff interviews, and additional studies and research conducted outside the V&A.

Understanding current technology and how it applied to museums developed our understanding of what applications would best fit the V&A and how visitors would interact

with an application. Through observations and research we developed an analysis and review of various institutions throughout London and elsewhere. We visited and researched J.Paul Getty Museum, National Gallery, British Museum, Tate Modern, Museum of London, Science Museum, Victoria and Albert Museum, and the Supreme Court. Observing institutions that did not have mobile device applications helped develop our understanding of the potential for a new application. Once we understood this, we focused our research and analysis on three institutions that used mobile device applications: The Museum of London, Tate Modern, The British Museum. Of course, we also examined the V&A's own temporary Quilts Exhibit application. We focused our research though on understanding mobile device applications currently in use at other museums throughout London. From these observations and research we learned that a game application like the Tate Modern's application would not work for the Victoria and Albert Museum. However, the interactive map provided by the Tate Modern and the tour and interactive map application by The British Museum seemed like an acceptable type of application for the V&A. Once we determined this, we then observed the Quilts Exhibit application in the V&A, and decided that it appropriately fit the style best for the V&A and so we conducted further research and determined its educational benefits for visitors and how visitors enjoyed the application.

Determining the learning benefits of the Quilts Exhibit application, we conducted personal meaning mapping analysis. The analysis of the PMM's determined that the application educated the visitors more than just going through the exhibit with no digital assistance. From the analysis of the PMM's we determined that the application increased visitors' knowledge and understanding of the exhibit as well as provided the visitor with a more structured and informative visit. Determining the educational benefit of the application as well as determining visitors' use of the application both remained important. We drew an important conclusion that although we analyzed the PMMs and found that visitors learned more, the visitors themselves also could identify how much they learned with the mobile device application, which carried through onto the PMM questionnaire. Through the Quilts Exhibit application comment book, we determined that the majority of visitors enjoyed the application; however, many of the visitors struggled using the iPod Touch. This encouraged the fact that the V&A would rather not provide a mobile device to visitors even more.

Conducting the General Visitor Survey let us gather visitors' opinions on their interest in the integration technology and personal preference on potential styles of applications. From our General Visitor Survey we concluded that the majority of respondents would like a mobile device application in the V&A. Both visitors and the V&A would enjoy the option of

letting visitors download an application to their own devices. Visitors also seemed most interested in some styles of interactive guided tour; however visitors would also an interactive map available as well through a mobile device application.

As a group, we hoped that our recommendations to the V&A, initiates the processes necessary for creating an application for the entirety of the museum. From our findings we believed that this formed next step in enhancing the visitor learning experience at the V&A, and provided the visitors of the V&A with a new and informative way of visiting the museum. Creating a museum wide application not only benefits visitors in the museum, but if done correctly they can provide visitors with access to museum gallery information from home. Integrating an application into the museum forms the next step in creating an enhanced learning experience, providing them with a more personal visit and extra information they normally could not have received from traditional information panels.

5.2 Recommendation

Museums have valued technological advancements in communicating information, more specifically the implementation of mobile device applications because of their ability in enhancing their visitors' learning experiences. Past research demonstrated that using mobile device applications enhanced learning and provided users with more personal experiences within the museum. Based on these findings, we developed an understanding of the usefulness of existing applications and the educational benefit of using an application within a museum. The Victoria and Albert Museum had no mobile device application available for visitors so we recommended that the museum should create an application. Our analyses supported this recommendation and further recommendations that we made. These analyses demonstrated that participants showed an increase in learning while using the technology as well as an interest in an application among visitors of the V&A.

Providing visitors with an application means that the V&A also supplies the visitor with more knowledge than they would otherwise have access to. The museum should make a web based application available for its visitors. Having a web-based application lets the device use less memory as well as provides capabilities far beyond the limits of the device being used. If the museum wants a web-based application, they must update their wireless throughout the museum. Updating the wireless provides limitless opportunities for an application, like possible location recognition, larger file size, and GPS style directions of navigating through the museum. A web-based application lets the museum provide an

application with limitless amounts information to the visitor. The user can download the information as they go through the museum rather than contain the entirety of the information on a device limited by memory space. The application must also translate into various languages so more visitors can better their experience at the museum.

Application content must prove useful to the visitor as well as be educational and easily accessible. Providing visitors with an application with only an interactive map does not give the visitor an educational and enjoyable experience. Visitors want more than just a map that helps them get around, they want applications that benefit their experience at the museum. Therefore, if the museum provides visitors with an application it must consist of a guided tour as well as an interactive map. Also, the guided tour the museum creates should prevent the issue of the applications deterring visitors from viewing objects in the exhibit. Audio tours should contain images and short video clips for enhancing the objects within the exhibit as well as showing details about the object otherwise unseen. The application must reach a balance between education and entertainment for any success. Without this balance the visitor may focus on the application too much and not fully appreciate the object at hand. Some sources have recommended against games, quizzes or in depth videos about the objects or exhibits in the application, for eliminating distractions.

Tours on the application must still allow the visitors a personal and enjoyable experience. The museum should make multiple tours available to visitors, with varying lengths and options once the tour begins. Each tour should cover major points of interest throughout the museum as well as include tours which infrequent visitors to the museum would not normally find interesting. The options of skipping portions of the tour or pausing the tour when visitors develop an interest in an object would maintain a personal experience for the users visiting the museum. Each tour should have various time constraints, allowing a visitor time constrained tours if wanted, as well as using the tours as a guide throughout the museum.

Providing an interactive map in the application lets visitors get around the museum successfully with reduced confusion. The interactive map in the application should let the visitor locate specific points of interest throughout the museum. Those of interest include:

- Toilets
- Exits
- Shops
- Dining areas

- Elevators
- Disability accessible areas

As well as points of interest, once the museum updates their wireless throughout the museum the application could then provide a location service so devices can determine their location in the museum and provide the visitor with directions to the nearest point of interest. If the museum cannot update wireless, then they must provide directions from major locations in the museum to key points of interest. They should create a simple, easily legible map that provides points of interest and important items in the exhibit.

REFERENCES

- Allen, S. (2007). Exhibit design in science museums: Dealing with a constructivist dilemma. In L. D. Dierking, J. R. Falk & S. L. Foutz (Eds.), *In principle, in practice museums as a learning institution* (pp. 43-56). Lanham: AltaMira Press.
- Ally, M. (Ed.). (2009). *Using mobile technologies for multimedia tours in a traditional museum setting*. Edmonton, AB: AU press, Athabasca Univeristy. Retrieved from http://books.google.com/books?id=Itp60WteuJsC&lpg=PA247&ots=5WIUK5DUrf&dq=museum*%20visitor%20experience%20technology&lr=&pg=PP1#v=onepage&q=museum*%20visitor%20experience%20technology&f=false
- Billings, Scott (2009). Upwardly Mobile Museums Practice. Issue 46, 30-34.
- Cameron, Chris (2010). Museum of London's Streetmuseum App Puts Historic Photos in Perspective. http://www.readwriteweb.com/archives/museum_of_londons_streetmuseum_app_puts_historic_photos_in_perspectives.php
- Cembalest, R. (2010). Reshaping the art museum, 04/5/2010.
- Council of Industrial Design. (2010) *BCMI introduction*. Retrieved 04/07, 2010, from http://vads.ahds.ac.uk/learning/designingbritain/html/bcmi_intro.html
- Cullimore, James (2010). Museum iPhone App Provides Window on the Past. <http://www.itproportal.com/portal/news/article/2010/5/21/museum-iphone-app-provides-window-past/>
- Dodd, J. (1999). Whose museum is it anyway? museum education and the community. In E. Hooper-Greenhill (Ed.), *The educational role of the museum* (pp. 131-133) London ; Routledge.
- Edison, Thomas A. *United States Patent Office. Means for Transmitting Signals Electronically*. Patent No. 465,971 December 29, 1891.
- Falk, J. H., & Dierking, L. D. (2000). *Learning from museums : Visitor experiences and the making of meaning*. Walnut Creek, CA: AltaMira Press.
- Fritsch, J. (2007). *The museum as a social laboratory: Enhancing the object to facilitate social engagement and inclusion in museums and galleries*. Kings College, London. 30 March 2007. <http://www.kcl.ac.uk/content/1/c6/02/37/02/Fritsch.doc.pdf>

- Hamma, K. (2004). *The role of museums in online teaching, learning, and research*. Retrieved May 3, 2004, from <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1146/1066>
- Hein, G. E. (2006). Museum education. *A companion to museum studies* (pp. 340-352-Chapter 20) Oxford: Blackwell Publishing.
- Hooper-Greenhill, E. Learning from *learning theory in museums*. In E. Hooper-Greenhill (Ed.), *The educational role of the museum* (pp. 137-145) London ; Routledge, 1999.
- Hooper-Greenhill, E. (1999a). Learning from learning theory in museums. In E. Hooper-Greenhill (Ed.), *The educational role of the museum* (pp. 137-145) London ; Routledge.
- Hooper-Greenhill, E. (1999b). Museum learners as active postmodernists: Contextualizing constructivism. In E. Hooper-Greenhill (Ed.), *The educational role of the museum* (pp. 67-73) London ; Routledge.
- J. Paul Getty Museum. (2008). J. Paul Getty Museum Hand Held Evaluation, Office of International Research, The J. Paul Getty Trust.
- Jensen, N. (1999). Children, teenagers and adults in museums: A developmental perspective. In E. Hooper-Greenhill (Ed.), *The educational role of the museum* (pp. 131-133) London ; Routledge.
- Klopfer, Eric. (2003). Mystery at the Museum- A Collaborative Game for Museum Education. *Teacher Education Program, Massachusetts Institute of Technology*, 1-5. <http://education.mit.edu/papers/latest/Mystery%20at%20the%20Museum-%20CSCL.pdf>
- Lagoudi, E. and C. Sexton (2010), Old Masters at Your Fingertips: the Journey of Creating a Museum App for the iPhone and iTouch. In J. Trant and D. Bearman (eds). *Museums and the Web 2010: Proceedings*. Toronto: Archives & Museum Informatics. Published March 31, 2010. Consulted June 16, 2010. <http://www.archimuse.com/mw2010/papers/lagoudi/lagoudi.html>
- Lu, J., Yu, C., & Liu, C. (2003). Learning style, learning patterns, and learning performance in a WebCT-based MIS course. *Information & Management*, 40(6), 497-507. DOI: 10.1016/S0378-7206(02)00064-2
- Lelliott, Anthony (Information Gathered 2010), *Data collection outside and inside the classroom: Personal Meaning Mapping*. Marang Centre for Maths and Science Education, School of Education, University of the Witwatersrand. <http://wiredspace.wits.ac.za/bitstream/handle/10539/4482/Lelliott%20paper%20sent%20pdf.txt?sequence=1>

- McIntyre, M. H. (2005). Museums and heritage show: Never mind the width feel the quality.
- Merritt, E. (2008). Center for the future of museums: Museums & society 2034: Trends and potential futures.1, 04/05/2010.
- Naismith, Laura. (2006). Report 11: Literature Review in Mobile Technologies and Learning. University of Birmingham. www.futurelab.org.uk/research/lit_reviews.htm
- Pedretti, E. (2007). Challenging convention and communicating controversy: Learnign through issue-based museum exhibitions. In L. D. Dierking, J. R. Falk & S. L. Foutz (Eds.), *In principle, in practice museums as a learning institution* (pp. 121-135). Lanham: AltaMira Press.
- Petrie, Matthew (2010). Case Study Evaluation of FuturePlan Interim Ceramic Gallery Executive Summary. Fusion Research + Analytics LLC.
- Petrie, M. and L. Tallon (2010). The Iphone Effect? Comparing Visitors' and Museum Professionals' Evolving Expectations of Mobile Interpretation Tools. In J. Trant and D. Bearman (eds). *Museums and the Web 2010: Proceedings*. Toronto: Archives & Museum Informatics. Published March 31, 2010. Consulted June 16, 2010. <http://www.archimuse.com/mw2010/papers/petrie/petrie.html>
- Proctor, Nancy and Silvia Filippini-Fantoni (2007). Evaluating the use of mobile phones for an exhibition tour at the Tate Modern: Dead end or the way forward? Antenna Audio Ltd. New Product Development. <http://www.eva-conferences.com/sites/eva-conferences.com/files/public/active/0/08-Filippini-Fantoni.pdf>
- Schmalstieg, Dieter. (2005). A Handheld Augmented Reality Museum Guide. Graz University of Technology. 1-2. http://www.iadis.net/dl/final_uploads/200506P003.pdf
- Science Museum. (2010). *A brief history of the science museum*. Retrieved 04/07, 2010, from http://www.sciencemuseum.org.uk/about_us/about_the_museum/history.aspx
- Serrell, Beverly (1996). Exhibit Labels: an interpretive approach. AltaMira Press, A division of Rowman & Littlefield Publishers, Inc. Walnut Creek, CA. http://books.google.co.uk/books?id=wgKGCj63YiwC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- Spotlight Mobile. *We build mobile apps of the highest quality*. Retrieved 4/24/2010, 2010, from <http://www.spotlightmobile.com/>

Tate Modern (Received 2010). Tate Modern Multimedia Tour Research and Evaluation.

<http://www.tate.org.uk/modern/multimediatour/reseval.htm>

Tate Modern (Received 2010). Tate Modern-Multimedia Tour.

http://www.thetalkingwalls.co.uk/PDF/TateModern_multimedia.pdf

The British Museum (Received 2010). BM Report, Multimedia Guide Survey and Analysis. Document unpublicized and provided by The British Museum, May 2010.

The Victoria and Albert Museum. (2010) (a).

150 facts about the V&A for the 150th anniversary. Retrieved 04/07, 2010, from

http://www.vam.ac.uk/collections/periods_styles/features/history/vanda_150/150facts/index.html#early

The Victoria and Albert Museum. (2010) (b).

Finding information on the history of the V&A and the schools of design. Retrieved 04/09, 2010,

from http://www.vam.ac.uk/nal/findinginfo/info_history/index.html

The Victoria and Albert Museum. (2010) (c). *FuturePlan.* Retrieved 04/09, 2010, from

<http://www.vam.ac.uk/futureplan/index.html>

The Victoria and Albert Museum. (d). *A grand design.* Retrieved 04/09, 2010, from

http://www.vam.ac.uk/vastatic/microsites/1159_grand_design/intro.php

Thomas, Siobhan (2007). How do visitors perceive the relationship between high-tech interpretive devices and objects in galleries?

Tondreau, J. T., Rackliff, N. E., Parker, K. E., MacDonald, J. B., Sanbonmatsu, J., & Salazar, G. F. (2005).

National art library -- services and expansion. Worcester, MA: Worcester Polytechnic Institute.

Traxler, J. (2009). In Ally M. (Ed.), *Mobile learning: Transforming the delivery of education and training.* Edmonton, AB: AU press, Athabasca Univeristy.

APPENDIX A PERSONAL MEANING MAPPING ANALYSIS

Before Exhibit					
Novice		Intermediate		Expert	
3	feathers	8	embroidered	13	layers
3	fabric	8	patchwork	13	little stitches

3	patterns	8	stitching	13	designs
1	pretty fabric	10	hobbies	14	Work
1	shape	6	art form	13	useful stitching
1	beauty	8	hand sewn	14	sore fingers
1	colorful	10	Community	14	money
4	creative	9	Giving to others	12	Utility
1	beautiful	10	English	12	Duvets
2	gentle	10	America	14	reason
2	cozy	10	history	15	pilgrims
			the future		
2	warm	10	generations	15	family heritage
2	warmth	9	College course	15	mayflower
2	bed	7	decorative	13	sections
2	comfort	6	art	14	local problems
2	warmth	7	bedspreads	13	log cabin
2	comfortable	9	machine work	15	Feminism
5	friendship	10	early years	14	unfinished
5	home	10	American	14	hard work
4	love	10	modern	13	different textures
4	caring	10	Contemporary	13	mixing fabrics
4	admiration	8	pieced	13	geometric shapes
4	desire	8	spot	14	precision
					surfaced
1	colorful	8	textiles	14	embellishments
3	flowers	8	embroidery	12	appliqué
3	floral	8	padding	14	commitment
1	pretty	9	recycling	14	perseverance
1	soft	9	abstract designs		
2	blankets	10	family interest		
5	antique	10	memories		
5	old	10	ancestors		
4	sewing	9	long evening sewing		
3	hexagon	9	rewarding		
1	multicolored				
3	materials				
5	women				
5	childhood				
2	story books				
1	love for color				
4	precise				
		1 to 5		6 to 10	
				11 to 15	

After With Technology 181

Novice		Intermediate		Expert	
5	family	9	skill	15	Quilt maker skill because of no electricity
5	domestic	10	history	15	Family Heirlooms

1	beautiful	10	Modern quilts	15	Personal History
2	useful	8	fabric and techniques	15	personal family events
5	history	9	Length of time	15	Revolutions
4	skill	10	England Heritage	15	events expressed through quilts global and local
5	modern	10	historical importance	15	patriotism
3	fabrics	9	quilts used as social tool	15	event celebration
1	decorative	10	history expressed passed through	15	described modern quilt maker what quilt makers do and how long it takes to make
3	patches	10	generations	15	inspiration
3	triangles	9	recycling	14	location of quilt maker
3	large	9	techniques	15	perseverance
		9	purposeful	14	Carolina brunswick betrayed by husband
		9	time	15	quilt maker history

1 to 5

6 to 10

11 to 15

After Without Technology

113

Novice		Intermediate		Expert		Nothing else to say- 4
1	clustering	8	materials	15	political references	0
1	fashion	9	meaning	15	christenings	0
5	family	10	feminism	15	industrial revolution	0
5	women	9	geography	15	family history	0
4	love	10	politics	15	family	
2	scale coziness intricate	10	use of text with memories	15	family heirlooms	
1	curves	10	preserved	13	paper used as backing	
1	color richness	10	new vs old	14	change in social status	
2	comfort	8	change in materials			
4	time	9	value was little virtue			
2	warmth	10	clever story and politics			

1 to 5

6 to 10

11 to 15

5	History and Family
4	Work and motivation
3	Embellishments
2	Utilities
1	Aesthetics

Use Tech	Points	Total	Learned Most	Age
no	14-14	0	quilts	65+
no	52-51	-1	panels	25-34
no	20-48	28	quilts	55-64
no	71-65	6	quilts	16-24
no	30-0	-30	panels	35-44
no	55-43	-12	panels	25-34
no	30-35	5	panels	55-64
no	21-45	24	quilts	45-54
no	25-13	-12	quilts	55-64
no	25-20	-5	quilts	55-64
no	57-24	-33	quilts	45-54
no	74-0	-74	quilts	65+
no	72-0	-72	quilts	55-64
no	24-20	-4	quilts	55-64
no	43-36	-7	quilts	55-64
no	47-44	-3	panels	35-44

-190 **Polluted data removed: -14**

Use Tech	Points	Total	Learned Most	Age	Using Technology
yes	23-0	-23	device	55-64	Had difficulties using the technology
yes	45-96	51	device	55-64	
yes	37-13	-24	device	55-64	
yes	40-54	14	device	35-44	
yes	31-10	-21	device	35-44	
yes	15-27	12	device	65+	
yes	0-48	48*	device	65+	refused first but learned so much "exper
yes	45-53	8	device	65+	Had difficulties using the technology
yes	53-20	-33	device	65+	
yes	15-46	31	device	65+	Had difficulties using the technology
yes	50-54	4	device	65+	
yes	44-0	-44	device	65+	Had difficulties using the technology
yes	18-44	26	device	35-44	
yes	16-67	51	device	65+	
yes	32-35	3	device	55-64	

103 **Polluted data removed: +122**

APPENDIX B PERSONAL MEANING MAPPING (PMM) EXAMPLES

20 → 48

black

No. 1

to make exacting white matching, precise cutting & stitching

④ Precise

⑩ interested in the history of quilting

① I love colour

③ accompanying Mum today!

Quilts

⑤ I hadn't realised how industrialisation and new laws had affected the availability of fabrics.

⑥ I much preferred the modern abstract works of art rather than traditional patchwork.

⑤ I felt some v. salient points were made by Tracy Emin

⑧ person whose quilt was made from nappies!

- Saw works of art, was expecting bed covers

- Come with her mother and this isn't her style but liked it

blue

Surveys: 65
Time: 12/45
1:30

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device

4-9
14 → 14

No. 2

Hard work but very rewarding

Beginner → hard to learn
↓
✗ hands hurt

feels very accomplished after hard work + completion

Quilts

- Has been to several exhibits w/ friends
- Just started quilting
- Has heard great things about the Quilts Exhibit "something different"
- Involved in quilting club with several friends

Very interesting

bridal gown → materials → history of quilts → good
 - (clothing) panels aren't very large → lots of waiting
 - panels aren't very large → exhausting
 enjoyed it very much wasn't displayed very well "not clear" some space twice.
 too many of same quilts
 very busy reading info panels.
 quilting
 precise with quilting
 her teacher

Surveyor: Brent
Time: 12:45

2:37

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

Did not use the handheld device

Where did you feel you learned the most information from?

Viewing Quilts

Information Panels

Hand Held Device

21 → 45

No. ~~3~~ 3

⑧ Patchwork — what they're made up of

⑩ modern — horrible

⑦ bed spreads — has one

⑩ exhibition → contrast new vs. old

③ feathers — inside quilts — simply came to mind

⑨ Value → little value

⑪ family history → heirlooms

① Soft

② Warm — childhood mother used to put one on at night

① fashion → surprised

Quilts

★ reorganize so a clear comparison new to old can be established
→ would be better

Surveyor: Nick
Time: 12:54
1:15

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

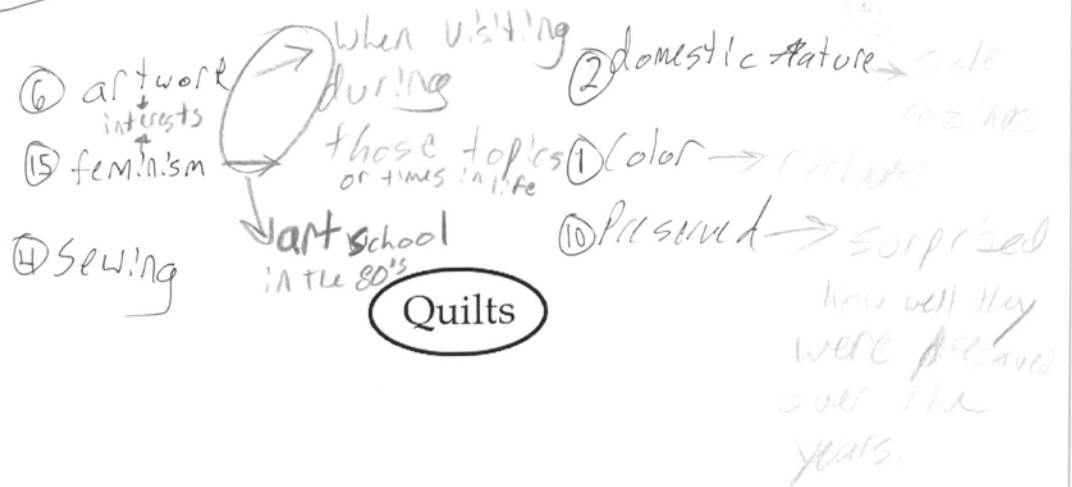
- ~~Have difficulties while using it?~~
- ~~Have no problems while using it?~~
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- ~~Hand Held Device~~

25 → 13

No. 4



Surveyor: Nick
Time: 12:54
1:30

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

Did not use the handheld device

Where did you feel you learned the most information from?

Viewing Quilts

Information Panels

~~Hand Held Device~~

- (31 → 10)
- ③ fabric
- ③ Patterns
- ⑤ family → Mom has done quilts & tradition for children
- ⑩ Hobbies → interest

Quilts



Surveyor: Wick
 Time: 1:45
2:50

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age
 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
 Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device

50 → 54

No. 6

① ^{color} color
 ⑬ shape
 ⑭ reason
 ⑮ fabric
 9 design

— makes quilts, family history

Reasons - Historical

Quilts

⑩ Well preserved

- History → enlightening
 ⑮ - revolutions & so personal.
 - people made quilts for a reason

⑩ block designs → used today

① different colors & designs
 ⑤ triangles
 ⑮ - no electricity - amazing

- mounting should raise the back for vision

Surveys: Nick
 Time: 1:42
2:43

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age 16-24 25-34 35-44 45-54 55-64 ⑥5+ Prefer not to say

Gender Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device.

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device

- Quilts can be used for personal ^{weddings} ~~work~~ and worldly history → Mary Howe + Penn family
 - Great Depression → quilts from sacks + newspaper

(13) 37 → **WORK - Her Job**
 counts her work to be useful + beautiful
 Quilting is much larger outside of London
 - personal quilter (work)
 Las Vegas but Quilt stuff
 her business is solely quilt - made
 mind → specimens

(14) **BEAUTY**
 believes quilts should be both beautiful and useful
 - uses makes quilts used for baby blankets and other covers
 - does not like modern quilts as much as older styles

(10) **UTILITY**
 both art and useful
 makes quilts for babies, beds
 quilting in a group
 communication with other quilters
 talk and help with other quilters

(12) **COMMUNITY**
 social aspect
 Williamstown
 - quilt shop
 - specimens!
 - small same with pieces
 - Applique is awesome "zoom-in feature"
 - humankind → there are errors → hand made
 • emphasis on fitness of sewing
 (13) sick child + utilitarian design of quilt
 - missed beauty of sewing + silk
 - no warmth quilts → miss utility
 - what are the "backs" of the quilts
 • Exhibit has missed it
 • talked about it but can't see it
 show an application maybe?
 "like iPad b/c you can see & zoom on images" - excellent

- originally used to ^{of taking} ~~remember~~ ^{remind} ~~quilt~~
 - Quilts Exhibit is "inland of" be range from 1710-2010
 No. 7 unheard
 - Quilting was used as a social - tool
 - women used to sit around and quilt + socialize for hours - not so much my more

Applications are excellent
 museum - "more interactive the better" - likes iPad

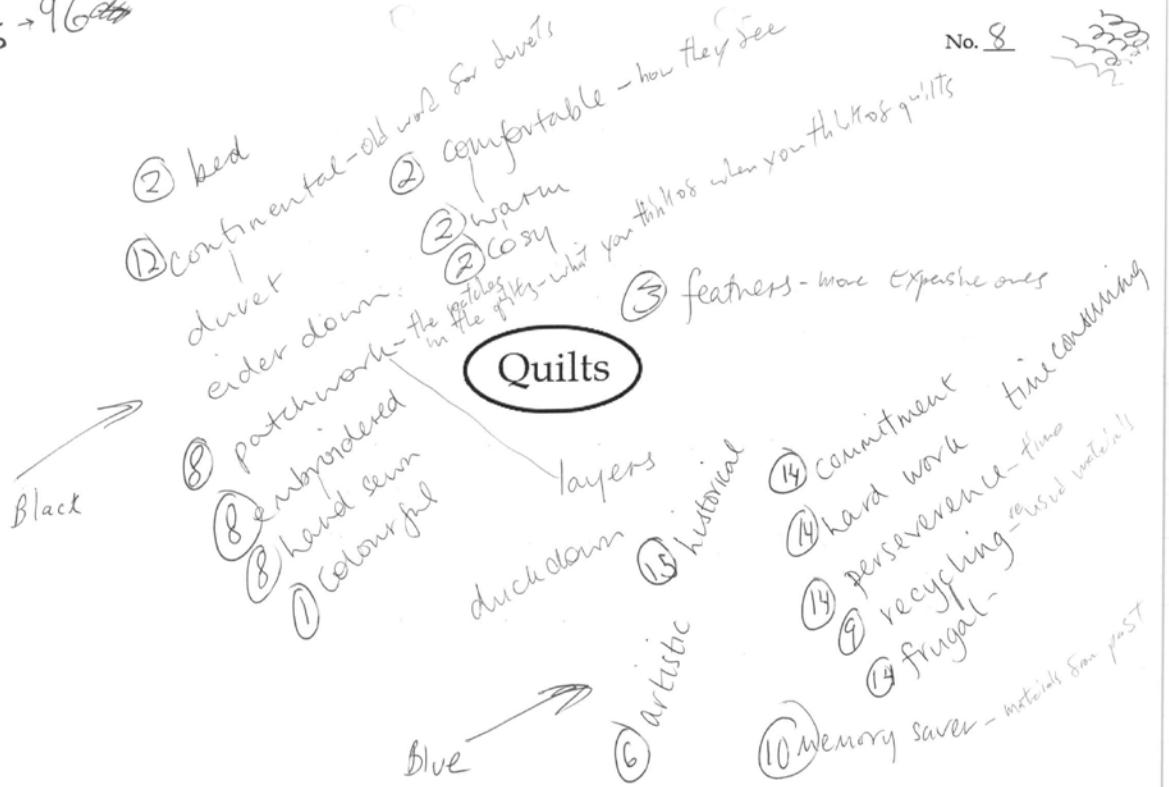
has been traveling the world for the past few months
 - Australia
 • Plymouth plantation look-alike
 • saw woman ^{Quilting} discussion fabric to and struck up quilting wallpaper

Surveyor: EJ
 Time: 1h
 Date: 2/3/17
 Age: 3:55
 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say
 Gender: Male Female
 While using the hand held device did you:
 Have difficulties while using it?
Have no problems while using it?
 Did not use the handheld device
 Where did you feel you learned the most information from?
 Viewing Quilts
 Information Panels
Hand Held Device

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

45 → 96

No. 8



Surveyor: ES

Time: 3:05
3:53

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

Did not use the handheld device

Where did you feel you learned the most information from?

Viewing Quilts

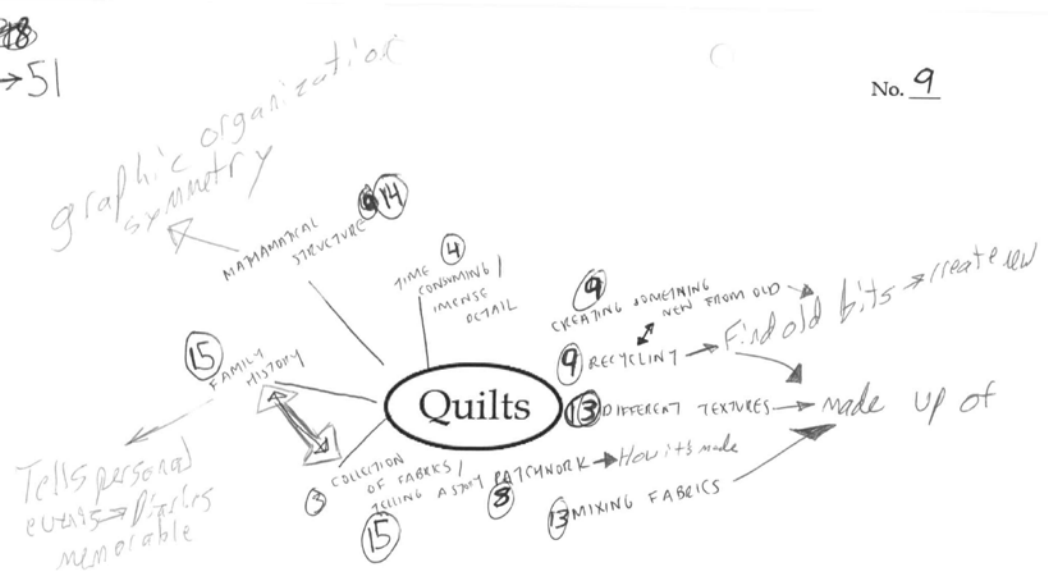
Information Panels

Hand Held Device

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

52 → 51

No. 9



Surveyor: Nick
 Time: 1:10
1:30

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age: ~~16-24~~ 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender: Male Female

While using the hand held device did you:

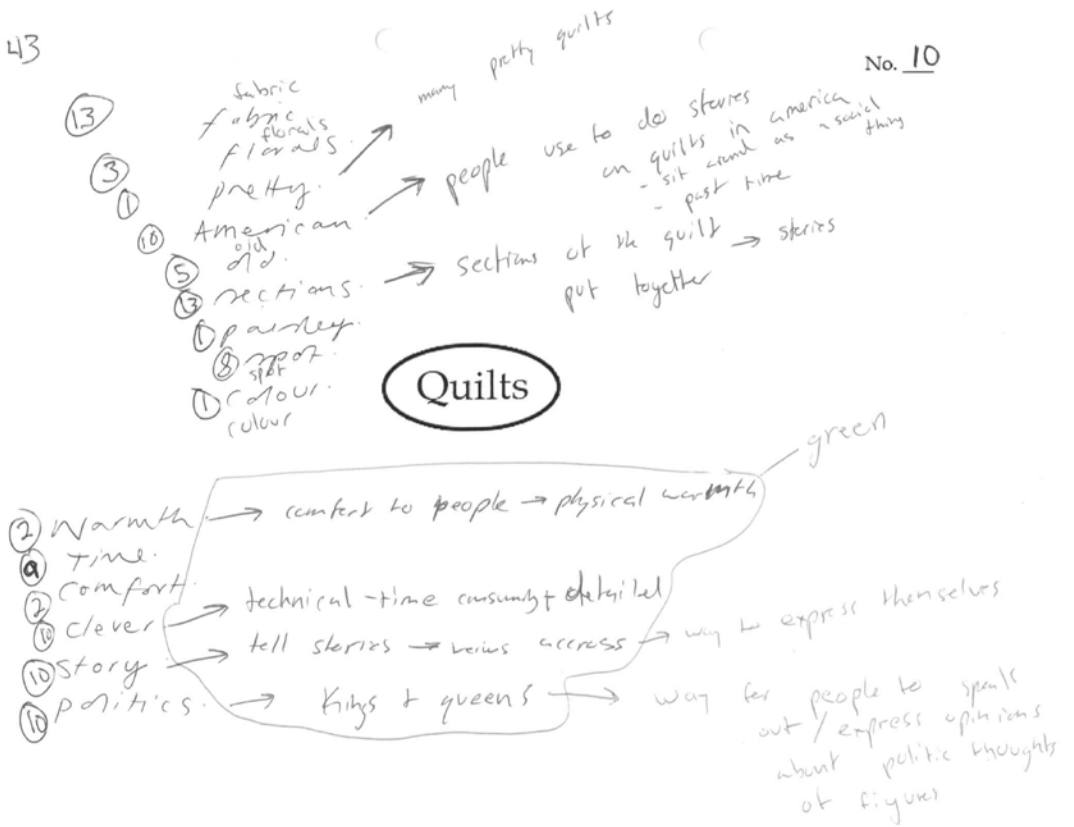
- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device

55 → 43

No. 10



Surveyor: Brent
Time: 1:10
1:34

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device

75 → 20

- ⑤ Women → demographics in exhibit made then
- ⑥ curves intricate → astounding, lightning, w/o electricity
- ⑨ geography → The one with the globe
- ⑩ politics → ~~The particular one~~ → caroline one

No. 11

Quilts

- ② patchwork → comprised of several patches
- ③ hexagon → preferred
- ④ padding → ~~padding~~ to be included
- ① colour → what i's inside then. blues reds greens

Surveyor: Nick
Time: 1:43
230

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

- ~~Have difficulties while using it?~~
- ~~Have no problems while using it?~~
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- ~~Hand Held Device~~

Textiles. (18)
 Blankets (2)
 Art - 'in place of photographs, way to express something' (1)
 embroidery (8)
 patterns (3)
 fabric (3)
 Geometric Shapes (3)
 Piping - fashion design - sometimes physical between squares (3)
 stitching (8)
 story books (2)
 Childhood - in books & story tells about patchwork Blanket (5)
 multi coloured. (1)
 surface embellishment - have textiles, sequins, dressed up (14)

No. 71 → 65

WTO

Quilts

Political References - message being sent through the quilt b/c she was not allowed into political Chambers w/ she was a woman (15)
 Feminism - actions, stitching more on hair (10)
 family history (15)
 Use of text, Memories - see you suddenly one day (10)
 characteristics - ~~history~~ reading of history, in spirit unique way (15)

Surveyor: CS
 Time: 11:27
 1:57

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

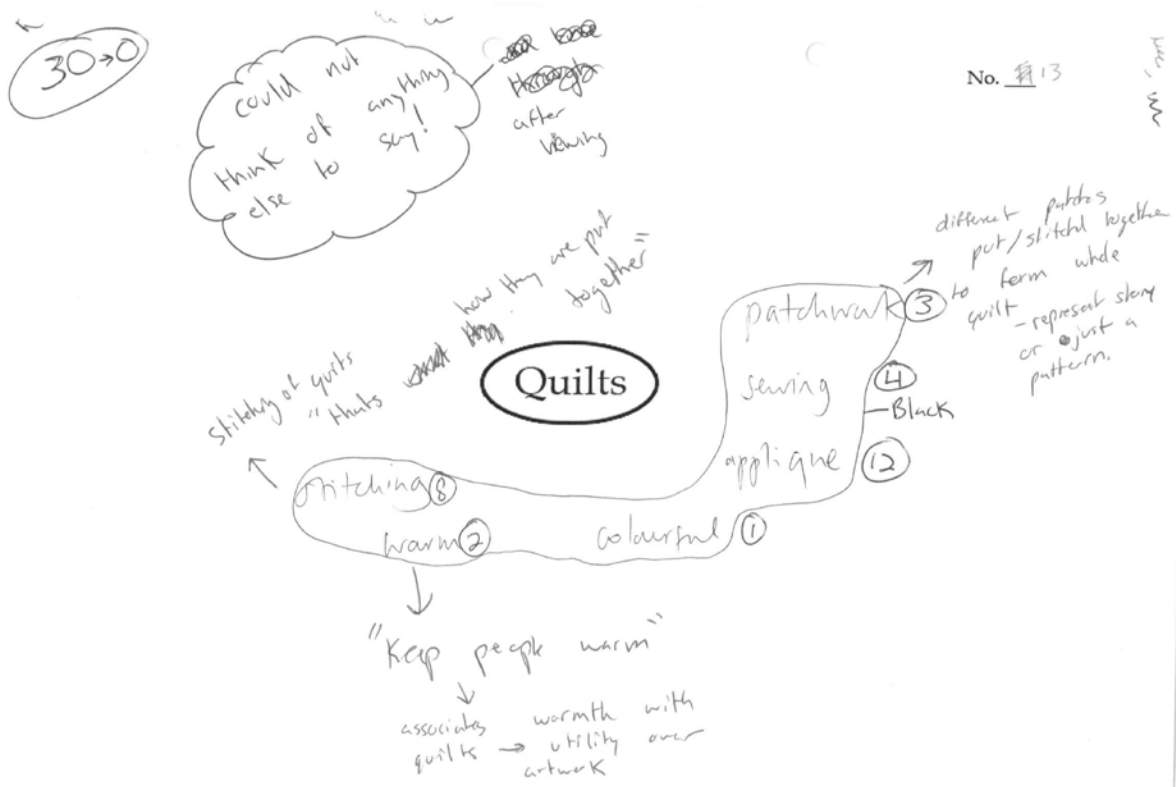
Gender
 Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device



No. 13

Surveyor: Brent

Time: ~~1:45~~
1:45
2:31

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device

- OLD ⑤
- FABRIC ③
- EARLY-early years ⑩
- PIECED ⑧
- DECORATIVE ①
- MODERN ⑩
- CONTEMPORARY ⑩
- ⑩ FAMILY - family quilts
- ⑩ HISTORY - really old, aspects of history made by a person in history
- ⑤ Artique

72 → 0

Quilts

could not think of anything else to say.

after viewing the exhibit.

commemorative

Surveyor: Jess
Time: 3:00
3:17

Deb Roberts

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

Did not use the handheld device

Where did you feel you learned the most information from?

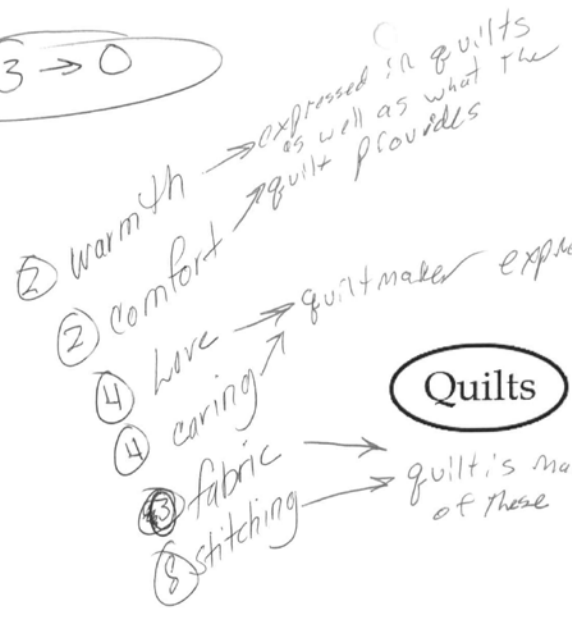
Viewing Quilts

Information Panels

~~Hand Held Device~~

23 → 0

No. 15



wish quilts were on angle

~~and on back~~
- and see back

- difficulty
- for every
- for ~~more~~ quilts

had app but is - learned nothing → expert

Surveyor: Nick
Time: 2:30
5:15

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

a little confusing
b/c never used one before
- still found it useful

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device able to see them on it

40 → 54

⑩ history - expressed

⑮ Family - Patriotism
↓
passed down through generations

⑨ preservation
↓
Throughout hundreds of years

⑮ Skill
↓
under developed with ~~zero~~ technology



Quilts

⑭ money - cost of materials
⑮ mum - makes the quilts
⑮ friendship - formed & expressed
⑮ is provided
⑮ displays - often on display

① patterns
① pretty fabric - made of these
⑤ home - lots around house

Surveyor: Ni'el
Time: 12:30
1:15

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

Did not use the handheld device

Where did you feel you learned the most information from?

Viewing Quilts

Information Panels

Hand Held Device

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

- Crazy ← Seen so many
- Patchwork (8)
- Leopards (12)
- Comfort (2)
- Warmth (2)
- Color (1)
- Pattern (3)
- Hand work (14)
- Machine work (7)
- Flowers (3)
- (10) Memories - when she made them & the fabrics involved
- (10) Ancestors - 5th generation quilting

74 → 0

No. 17

Could not think of anything else to add or elaborate on

Quilts

after viewing exhibit

Surveyor: Brent
 Time: 2:58
 3:26

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age
 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
 Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device

53 → 20

15) Mayflower
 travellers - pilgrims
 to America - made quilts on boats
 8) Skitling - stitching creating beauty
 10) English
 6) art

more domestic
 use across the
 classes of society
 than I appreciated

Quilts

9) ready
 resource
 1) beauty
 10) America - seen quilts in
 America - have info → back on quilts - 18th century

don't need - appreciate
 appreciate
 up the circle
 more
 words
 quilts
 design
 esp box
 quilt

history in fabric. 10)
 interesting to silk 8)
 know 16) etc in cotton 8)
 18) - 19) cotton
 became more
 using cotton
 USNY considers the
 style of modern quilts to be different
 than what a quilt really is
 utility - not just display

Surveyor: JS
 Time: 10:30
12:54
1:33

Age
 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
 Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

Did not use the handheld device

Where did you feel you learned the most information from?

Viewing Quilts

Information Panels

Hand Held Device

Black-Interviewee Before
 Blue-Interviewee After
 Red-Interviewer Before
 Green-Interviewer After

15 → 46

No. 19

④ Creative

① beautiful

"masterpieces" → flowers, morals, pretty patterns and designs

⑩ historical

old quilts, women used to meet w/in community to quilt → social event

Quilts

⑮

Family heirlooms → sometimes family crests are present

seamly → hand sewing and machine → ~~stitch~~

⑬ fabrics

different patches can use different fabrics or quilting materials

⑧ patchwork

preference of hand over machine
↓
more meaning to the maker
quilt

⑩

English/England — centuries of artwork/quilting in England

- o many groups/clubs of women still quilt
- o generations of families

★ - liked ^{the} tech. - ^{no} problems ~~that~~ supplied additional information about the quilts that was not on the info. Panels

Surveyor: Nick
Time: 12:31
1:14

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

Did not use the handheld device

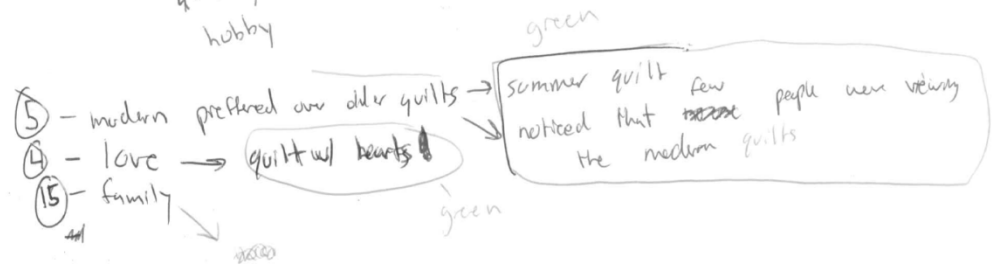
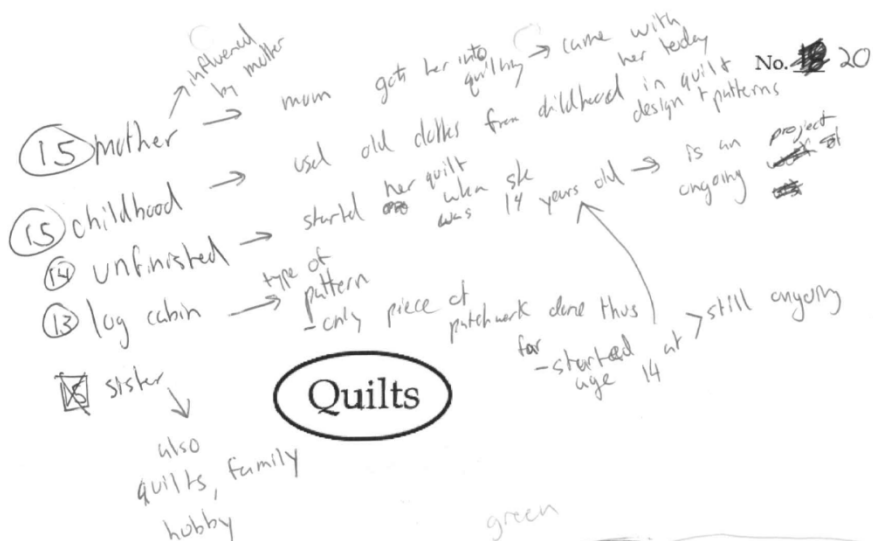
Where did you feel you learned the most information from?

Viewing Quilts

Information Panels

Hand Held Device

57 → 24



Surveyor: Brent
 Time: 1:25
 2:16

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age
 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

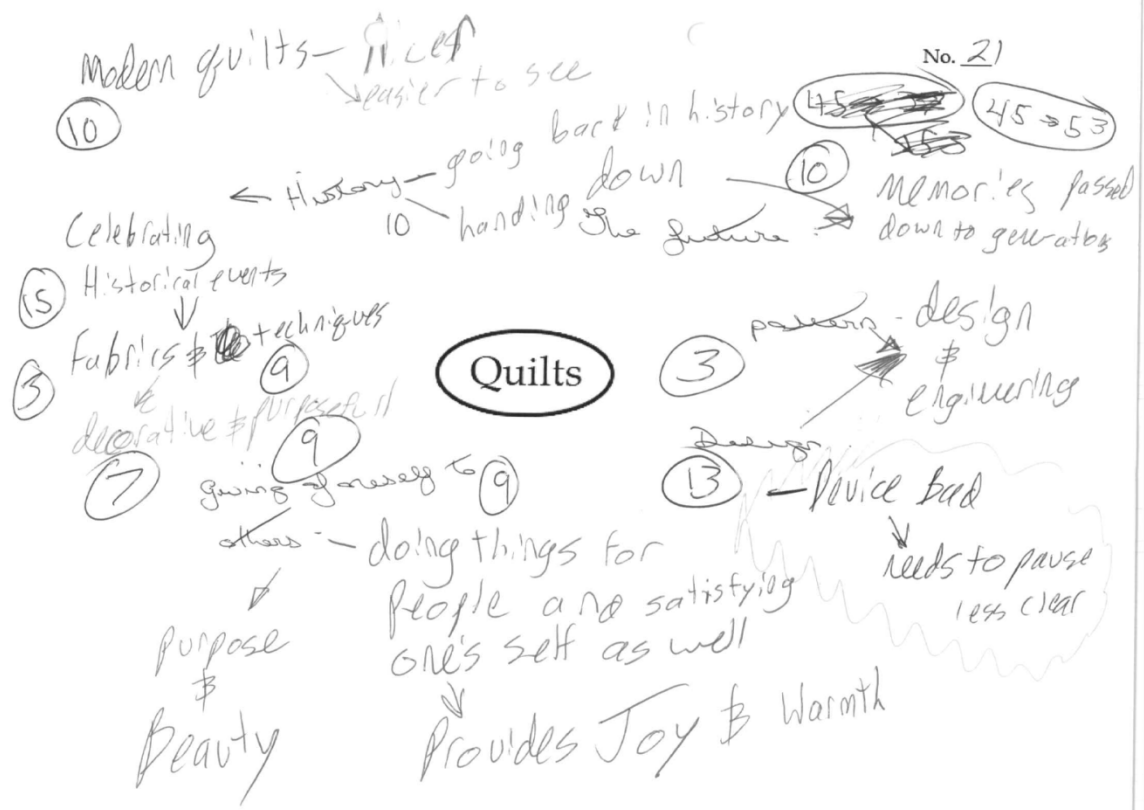
Gender
 Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device



Surveyor: Nick
 Time: 1:25
2:15

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age
 16-24 25-34 35-44 45-54 55-64 (65+) Prefer not to say

Gender
 Male Female

While using the hand held device did you:
 (Have difficulties while using it?) → D. I did not know how to pause it
 Have no problems while using it?
 Did not use the handheld device

Where did you feel you learned the most information from?
 Viewing Quilts
 Information Panels
 (Hand Held Device)

30 → 35

No. 72

① Colour - quilts are colorful

② Comfort

history ⑩

⑤ Women - women make them

⑨ long evenings sewing - they take long time

③ local patterns. - affluence!

Quilts

8 change in materials

14 change in social status.

13 papers used as backing.

tell where a quilt came from by its patches

30 42

Surveyor: 65

Time: 10:00

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

Did not use the handheld device

Where did you feel you learned the most information from?

Viewing Quilts

Information Panels

Hand Held Device

was refused ^{by her at first} - learned so much ^{insisted on input} No. 23

48

- enjoyed use

Brilliant

- w/ someone

being asked question

- details from ^{- life story # history of the time} quilt maker

Quilts

wish had all over

- Carolina Brunswick

15

↳ Betrayed by husband etc.

10 - modern quilts

talked about maker ¹⁴
9 described what maker does how & where
↳ how long it takes to make quilt
↳ inspiration

Surveyor: Nick
Time: 1:34 - only at end of front
↳/c was returned
Age 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Gender Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

Did not use the handheld device

Where did you feel you learned the most information from?

Viewing Quilts

Information Panels

Hand Held Device

44 → 0

- 14 - wants to be able to do/make quilts to ^{currently learning how} make quilts ^{No. 24} sees it as an art form and hobby
- 6 - really like it as an art form
- 9 - course → Cassia College → while ago → "how to quilt"
- 15 - mother was a needle woman
- wants to make a really expensive one/nice one

Quilts

- managing w/ device → struggling
- blame age/demographic for struggle
- impressed w/ exhibit

like all quilts, less so the modern ones
 - info presented by the app is very useful, but sometimes hard to read on device → larger



Surveyor: Brent
 Time: 2:25
3:08

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age
 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
 Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device

No. ~~25~~ 25

15 → 27 Sister → ~~talk quilting~~
 15 daughter → does quilting

⑨ Time - To make them

⑩ Historical Importance
 ↓
 Historical events expressed
 ↓
 Personal → Global
 15

③ Large quilts - ~~with~~ w/no electricity
 ↓
 Intricate designs & geometry
 Sewing machines/lights etc

Surveyor: ~~Nick~~ Nick
 Time: 2:21
 2:56

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age
 16-24 25-34 35-44 45-54 55-64 65+

Gender
 Male Female

While using the technology did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use Technology

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Pannels
- Hand Held Device

24 → 20

No. 26

Recycling textiles → Reuse to quilt - make new from old
 Historical archive → Preservation - extra knowledge & information
 Family heirlooms → passed down → family heritage history

Quilts

10 Politics → on quilts stories

2 decoration → Art etc.

4 hard work → to make them

4 Antiques

Surveyor: Nick
Time: 12:10
1:13

Black: Interviewee Before
Blue: Interviewee After
Red: Interviewer Before
Green: Interviewer After

Age
16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

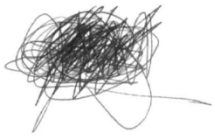
Did not use the handheld device

Where did you feel you learned the most information from?

Viewing Quilts

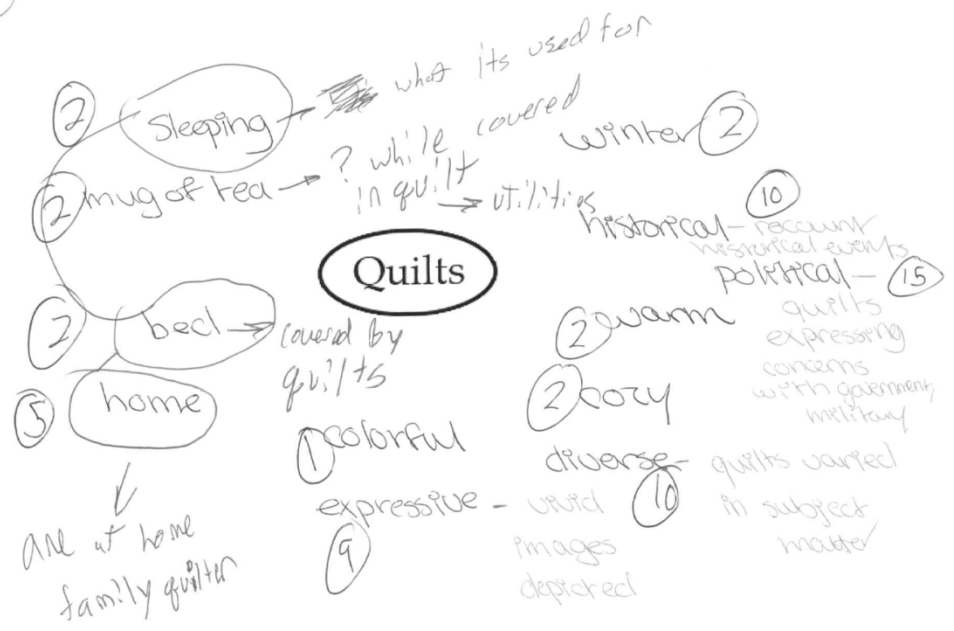
Information Panels

Hand Held Device



18 → 44

No. 27



Surveyor: EJ
 Time: 12:10
1:05

Age
 16-24 25-34 35-44 45-54 55-64 ~~65+~~ Prefer not to say

Gender
 Male Female

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device

colors → very pretty & plentiful
 sewing → to make them
 comfort → is provided
 warmth →
 gentle childhood → generations of quilters

Quilts

history - old
 politics - used to express political ideas
 family-passed down, made for family
 long hours working on the quilts
 types of fabric - different types of fabric
 art/decoration - hanging on walls as well as for beds
 recycling - exhibit goes up to 2010

Surveyor: Nick
 Time: 12:35
1:45

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age
 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

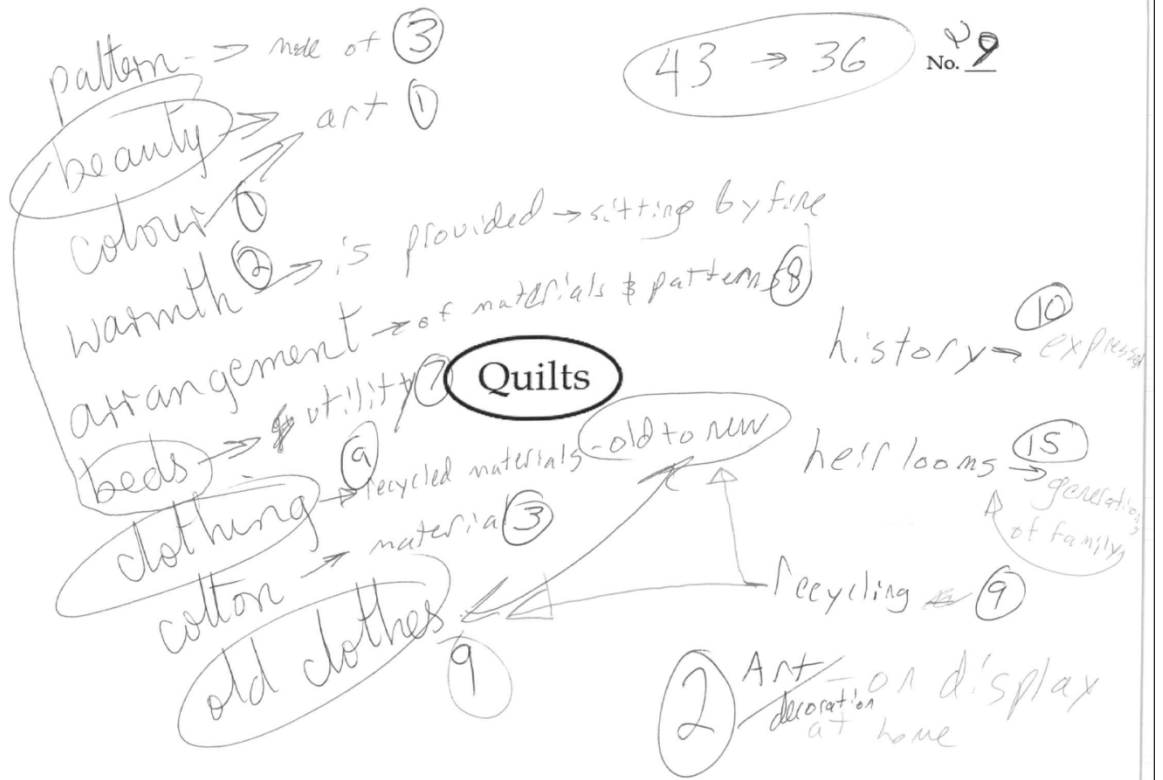
Gender
 Male Female

While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device



Surveyor: Nick
 Time: 12:15
1:07

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age
 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
 Male Female

While using the hand held device did you:

Have difficulties while using it?

Have no problems while using it?

Did not use the handheld device

Where did you feel you learned the most information from?

Viewing Quilts

Information Panels

Hand Held Device

patchwork → to recycle w/older materials
 embroidery → shapes, words
 closet → storage, preservation
 needles → needed to make quilts
 thread → used
 fabric → used
 beautiful

Quilts

fabric types - different materials
 designs
 shapes/pattern
 antique - age of quilts
 decoration - not just for beds
 hard work - long nights

Surveyor: FJ
 Time: 12:40
1:20

Black: Interviewee Before
 Blue: Interviewee After
 Red: Interviewer Before
 Green: Interviewer After

Age
 16-24 25-34 35-44 45-54 55-64 65+ Prefer not to say

Gender
 Male Female


While using the hand held device did you:

- Have difficulties while using it?
- Have no problems while using it?
- Did not use the handheld device

Where did you feel you learned the most information from?

- Viewing Quilts
- Information Panels
- Hand Held Device

APPENDIX C QUILTS EXHIBIT APPLICATION COMMENT BOOK

ANTENNAAUDIO  The world is listening

The exhibition is utterly & inspiringly illuminated by this audio tour. Delicious. Thank you - *Teena Cornick*

Not interested to have the stories of the quilts - *Melbott, a quilter from Canada.*


A wonderful exhibition!
A beautiful expo - Thank you
Wonderful Exhibition a feast for the senses
A very helpful guide - *thanksya.*

I really enjoyed the exhibition. *Ladyan*
Excellent. We really enjoyed it

A great exhibition but there was too large a gap between old and very modern quilts - not enough 19m-20m century quilts of which I'm sure there are plenty. Also not enough examples of good contemporary quilting of which I know there are many. *Marge Price, Quilting Tutor.*

Date: _____

www.antennaaudio.com

ANTENNAAUDIO  The world is listening

Good exhibition but not enough large books for those who find the notices difficult to read. Took the visual aid but there were so many quilts not on that it was very frustrating. It is ridiculous that your credit card is asked for as a security for return of the set - you are not supposed to let this out of your sight. You need to rethink the whole system. It spoiled the overall visit. Really superb exhibition I shall be waiting again.

Great exhibits - hopeless arrangements for getting a quilty bad Audio Guides!

Fabulous exhibition - wonderful collection in one place. But the audio guide left out some incredible quilts! (and the headphones were uncomfortable).


Fantastic. What a treat!
Audio guide super.

Amazing! beautifully presented & so interesting!

Wonderful. Most interesting were the personal stories behind the quilts. I especially liked the range of different styles in different times and approaches.

Date: _____

www.antennaaudio.com

ANTENNAAUDIO  The world is listening

Excellent exhibition with useful audio guide. Wonderful to see the Rajah Quilt which I have not been able to see in its home, Australia. Won't take by most of the modern quilts, have seen other more meaningful. *Ann Robinson, Australia*

Using the audioguide amplified my enjoyment & interest in the Quilt's Exhibit. Essential for a serious quilter who wants background information, disc-ups of quilts, "inside knowledge". *Ann Louise King, 2010 Handmade - Labrador*

Went over with THE TARD FROM Sunny *Wally*

Inspiring *Clareta's Beltut*

Wonderful exhibition. *Wendy*


Audio Guide thanks that the screen too that

Wicked cool
Amazing

22 March, 2010
A very impressive and wonderful exhibition. Very interesting information very good information
A great pleasure *Andi Schroder, Munich, Germany*

Date: 22/03/10

www.antennaaudio.com

ANTENNAAUDIO  The world is listening

Creditable exhibition, very respectful. Useful audio guide.

lovely and inspiring exhibition. Oh that I had time on my hands...
Amazing exhibition!

Love the commentary but ~~HATE~~ the iPod only useful device was ability to magnify. Please can there be an option for Press Button type device. Thanks!

Ditto ref iPod - I couldn't get beyond 7. BUT the quilts are superb, I shall come again with friends. What a coup to show the RAJAH quilt. Fascinating.

Fantastic, Wonderful. Would to go and see it all again *Angi Steg.*

Excellent audio guide *Caren Garfen*
Superb exhibition especially No. 10!

Yes especially No. 10 !!!

Date: 22/03/10

www.antennaaudio.com

ANTENNAAUDIO The world is listening

Very useful audio guide - will come!
 Wonderful exhibition - amazing exhibits but I found the audio difficult to use & the security kept going off!! member 24832
 thought I understood audio but got stuck on a screen & couldn't clear it. ☹️

I found the guide excellent. It really enhanced my understanding and appreciation of the exhibits. One point I might suggest is to have the oral histories on the guides rather than through the tour - or maybe as well as. I couldn't hear one of the voices of the weavers too well. Well worth the extra 23.50! Thanks!

An excellent supplement to the exhibition. I particularly liked the artists' statements - a real insight to their work.

Wonderful - especially the ability to see close-ups and hear the maker's story.

If you would like further information about Antenna Audio, future exhibitions or our download tours, please leave your e-mail address.

Date 24/03/10

ANTENNAAUDIO The world is listening

Labours Exhibition

Fascinating exhibit with very good explanations. I enjoyed the audio with the close-ups. Thank you!

Wonderful exhibition - EXCELLENT!!
 Fabulous exhibition. Perhaps overhead mirrors may have helped to look at stunning colours etc.

Imaginatively put together exhibition covering a very wide range of work. Particularly moved by the Harknsworth quilt - so relevant to today.

Excellent exhibition sensitively displayed
 Fabulous close-up feature!
 Very interesting

Had not good for a person who cannot use mobile phone. Guy found with this person drove me mad.

If you would like further information about Antenna Audio, future exhibitions or our download tours, please leave your e-mail address.

Date 24/03/10

ANTENNAAUDIO The world is listening

The exhibition was excellent and the audio guide really added to the enjoyment.
 Jimie Taylor & Sue O'Neill - Buckinghamshire

I really valued the interactive audio guide & think so much can be done, looking out to exist websites etc. But I did observe people having difficulty with i-Phone technology. Perhaps offer traditional guides for those who prefer it?

A very good guide; easy to use equipment; clear commentary & choices to hear in depth information.

A useful guide & really appreciated the comments from the curators.

Just enough very useful, illuminating information. Thanks!

The exhibition has been so much richer for having the audio guide - The audio guide gave very interesting information which added to the experience of viewing the quilts. But for a lady in her 90s, not very familiar with technological devices, would have preferred a simpler guide with press buttons

If you would like further information about Antenna Audio, future exhibitions or our download tours, please leave your e-mail address.

Date 26/03/10

ANTENNAAUDIO The world is listening

Best audio equipment used in exhibition.
 Clear commentary - informative & very far sighted exhibition.
 Thank you & well done V&A, Home Maid, London.

Loved the audio - good to be able to see as well as hear, & look at close-ups. But equip's a bit temperamental - especially for the (slightly) older user! Thanks.

Take the audio guide!
 Solo


Would love to purchase the app for my i-touch as ~~it~~ gives so much better close ups. Also would like all the quilts including the Sunday Quilt.
 Steve Gray.

Excellent guide!

Many thanks a beautiful collection which was not patronous, informative and really well laid out.
 The guide was excellent
 Semy Hall
 Moelwyn Words.

If you would like further information about Antenna Audio, future exhibitions or our download tours, please leave your e-mail address.

Date

ANTENNA AUDIO  THE WORLD IS LISTENING

The exhibition gives a very history and has people loved. It was well worth going to see & worth a return around museum. *Alphab*

I object to having to give up my group licence - certainly not mentioned on purchase

Excellent - when it works! It does have a mind of its own when trying to return to the museum but will reach it.

Found the guide really difficult to use - it kept getting stuck and impossible to move on - can't see the zoom facility. The exhibition is splendid. *Lucy*

Came twice!
Excellent!


Audio Guide good idea, very "layered" but frustrating to use - kept "sticking". No mention of "Linus" Quilts?

Thank you so much to the organisers of this exhibition - as an old patchwork quilter (84 hrs) I will appreciate it. *Therese* 8/13.

If you would like further information about Antenna Audio, future exhibitions or our download tours, please leave your e-mail address.

Date: 30/09/2010

www.antenna-audio.com

ANTENNA AUDIO  THE WORLD IS LISTENING

"Wonderful exhibition! Inspiring me to 'Hand Piece' — *Sue Fairbairn*
www.textile2quilt.com

The audio-visual guide is far too difficult to use - very sensitive and frustrating. I returned 3 times to the desk, as did my companion, for help. And it has ruined the exhibition for me. *L. Young*

I'm sorry all of the quilts, M. Swamy
it was very good *S. Parnell*


Wonderful Exhibition! Enjoyed using as well to consult on the various quilt exhibits. *J. Klein*

Very helpful *Fann*
Awesome!!!

If you would like further information about Antenna Audio, future exhibitions or our download tours, please leave your e-mail address.

Date: 31/03/2010

www.antenna-audio.com

ANTENNA AUDIO  THE WORLD IS LISTENING

Very enjoyable audio!

Marilyn Hall

* The new audio guide is fantastic & its interface is easy to follow. The best part is the "zoom in" command allowing the viewer maximum visiout *Zals. Tribstad H. H. 10*

Interesting extra info - really got more out of it *M. Jeyasingham*.

wonderful - it would be interesting to connect English quilt making with Canadian & American, the latter both by white but also black women.

wonderful - very inspiring some of the earlier exhibits looked like modern ones! *Jenny Bedford*

wonderful exhibits - real to see again...
Very useful extra info.

* I can't read that well, so your Audio tape is a total god send. Thank you love *Shuler*

The tape was a great help in understanding the quiltmaker had in mind, helped in appreciation to detail. *Anne Love*

Very moving - just wonderful *Jenny Law*

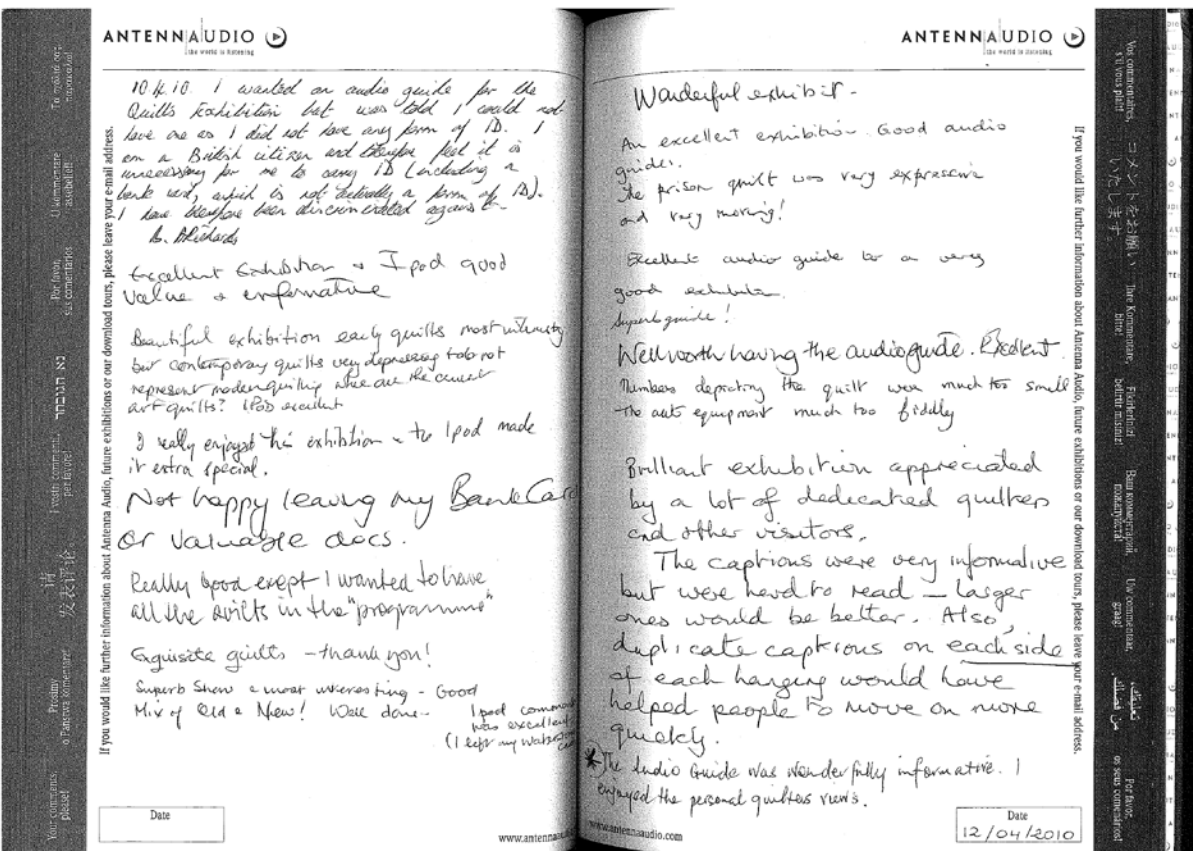
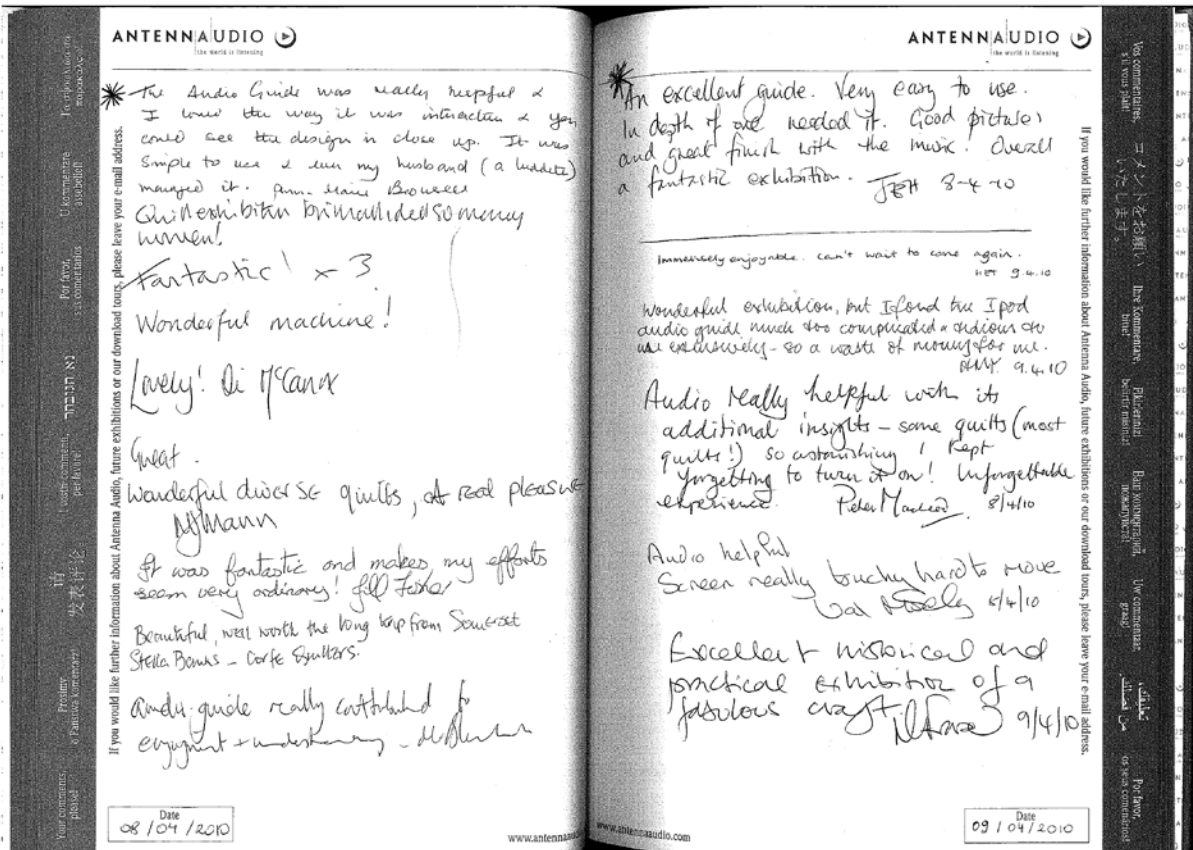
wonderful *f Reader*

Very helpful *Becky*

If you would like further information about Antenna Audio, future exhibitions or our download tours, please leave your e-mail address.

Date: 05/04/2010

www.antenna-audio.com



ANTENNA AUDIO The world is listening

13/04 Brilliant history lesson through seeing! If the flat displays were tilted or if there was a visitor of small person could see the intricate center design better. As a visitor from USA and a quarter it was a rare treat to stumble on this exhibition.

14/04 Fantastic exhibition!

14/4 Very enjoyable.

14/4 Having the ipod really helped my enjoyment at the exhibition. Although it was very busy it gave me time to stand + listen to the quilt's history. I will visit again. Thank you

*A very well thought out + executed audio commentary. Really added to the exhibition. Thank you. Please put together an audio documentary for BBC Radio 4 - it would be so interesting.

Very interesting & useful
PS

Very informative. See.

Very enjoyable - particularly liked the old ones

Date: 14/04/2010

www.antennaaudio.com

ANTENNA AUDIO The world is listening

15/04 Very impressive show. I am influenced to start a quilt of my own family life. 12th

15/04 Fantastic - how inviting! I shall certainly have a go now. Africa.

15/4 Brilliant - my daughter and I really enjoyed the tour guide especially!

15/4 Excellent guide, a must to make the most of the exhibition

15/4 Very good - enjoyed the history behind some of the quilts of Africa.

15/4 Wonderful - really enjoyed it.

15/4 Excellent had a great time

15/4 Excellent guide

15/4 Wonderful

5/4 Amazing + inspiring.

15/4 I found the lighting too low to really get the feel of the textiles.

16/4 Very interesting and informative

Date

www.antennaaudio.com

ANTENNA AUDIO The world is listening

*17-4-2010 What a wonderful guide... one of the most interesting exhibits I have seen and tremendously enhanced by the commentary, music and ability to look close at the textiles using the guide. I am only sorry the museum is closing. I would have stayed another 2 hours!!

The exhibition was interesting + comprehensive. An eye-opening.

The audio guide made all the difference - what a wonderful exhibition.

Excellent collection - wonderful stories, widely the unknown ones. Heart tenderly poignant in the story of woman's lives - (and the male partners).

BUT - lighting is very difficult to know - but so many shadows over the patterns of the quilts laid on the bench. Also with the shadows over the displays making it difficult to read until a lamp was on. The audio guides in Tampa value a recommendation.

Audio guide was enthralling -

18-4-10 Wonderful, moving exhibition. Amazing quilts & stories to be seen here after. BUT as above the Audio Guide was so frustrating to use!!

Collingwood Cameracenter

Date

www.antennaaudio.com

ANTENNA AUDIO The world is listening

More detail needed on some of the quilts - lighting very bad occasionally. Hard to see detail. Zena + Angela

lovely exhibition. Agree about lighting! Sorry not to see a bit about technique + traditional designs. Artist designed quilts seem sterile compared with old ones made of scraps that have a history

18/4 We absolutely enjoyed this. The audio does add. Thanks for the experience. Helen.

Fantastic! Susan + Diana

7/10 - VERY GLAD REPIET WAS CLOSED ALLOWED ME TO SEE THIS AMAZING EXHIBIT FOR A PASSION OF MINE QUILTING. RONA LA YOUNG AGOITE, ONTARIO (CANADA)

Inspiring display - would so have loved a booklet/photos of the quilts. Thank you

iPod very easy to use even on first go! Excellent movie and interesting. Thanks. Susan Daisy (France)

Date

www.antennaaudio.com

2 of previous people I saw looking at a virtual tour. That was

20.4.10. Unable to hear an audio guide as did not have the necessary card / amn licence or passport id deposited with the - extremely disappointed as this lessened my enjoyment of the exhibition
R. M. L.

21.4.10 Fantastic - audio guide a must. Loved the Prison Quilt particularly. L. Reed

20.4.10 Beautifully put together - a fascinating journey. Very good well worth the visit
V. Wolfson

20.4.10. Couldn't see some of quilts due to being too flat and poorly lit. Overall a fair exhibition. The audio equipment was too complicated - the program easy to lose and difficult to again. A simpler system would be better so as not to detract from an otherwise excellent commentary.
Beautiful guide - Ellen

Fantastic - highly enjoyed K Wood + S. Howells.

Date
20-04-2010

Most enjoyable highlight of the exhibition
Excellent and easy to navigate.

V. helpful - once I got used to the 'easy' technology (Granny C!)

That was a stunning exhibition & the Audio guide really helped.

Fantastic Audio guide & superb exhibition - many thanks.

Wonderful exhibition, beautifully displayed - could not work the audio (too high tech). USE THE 'MISS' SYSTEM KEEP IT SIMPLE STUPID

A truly inspiring and teaching exhibition
Thank you!

I really enjoyed everything. wonderful exhibition.

Fascinating!

*The iPods were great + very easy to use - eventually!!

Date

Enjoyable, want to quilt now! I kept - Montreal CANADA

Really good exhibition. Enjoyable and fantastic show - shame about the final exhibit!

Hello! Great exhibit but the fiddly iPod guide was horrible. Please bring back regular audio guides.

I disagree with the comment above. I thought the iPod was great especially the zoom in option for this particular exhibition.

Great addition to a fantastic exhibition. Many people commented it would have been easier to see the quilts if they had been hung not draped, but the iPod showed no that detail

Loved the iPod/touch. Many of the quilts lying horizontally reflected the light so were difficult to see. If the "bed" had been raised slightly it would have improved the experience.

Date
22-04-2010

Terrific. Most enjoyable NORFOLK

Wonderful for a beginner JEFFSON WARRAN. H.K.uld

Excellent. Enjoyed the exhibition immensely - staff very helpful when I struggled with audio guide. Worth giving up our U.S.A. holiday for a London visit from Scotland. Muriel Markland Perth

Great exhibition, enhanced by the iPod guide

Excellent. Amazing work. Well displayed

Wonderful! - Some of the info was too far back to see with or without glasses didn't particularly care for some of the modern exhibits. Audio guide for all quilts would have been appreciated.

Very interesting, might have been good to have some modern quilts produced by 'ordinary' quilters. But a great & inspiring exhibition nevertheless

* Very good - audio added well - new technology helps.

Date
23-04-2010

ANTENNA AUDIO
The world is listening

Enjoyable but would have been better if the quilts as the beds had been slightly angled (raised at the head) to make viewing easier.
Molokent ab/410

(Would have liked directional arrows so as not to back track to see the quilts in the audio guide but consistent exhibition - some mean 'non-visual' quilt pieces - Boston like 2010/10)

Pictures were quite good. To non-technical people it was confusing, displaying on the ear-phones were not v. comfortable.

In this day and age you would not ask people to leave ID as a deposit - a card deposit for the audio guide would be better.

Interference from noise, the overlay of the 'public' descriptions made it very difficult to concentrate on individual pieces. Labeling quite small for aging eyes!! Otherwise - a wonderful exhibition - Dec 27/10

*Excellent audio guide. Would have been good to have image of all quilts with the ability to zoom in on each thing.

Tough screen very hard to maneuver - wanted back fire. Connecting good -
Amoran

Date
26-04-2010

www.antennaaudio.com

ANTENNA AUDIO
The world is listening

27/04 Excellent. I agree it would have been good to have something a soul quilt!!
Johanne - audio guide, great
Lillian Keyes Canada

Return process not well thought-out

28/4/2010 Excellent exhibition but would have liked the labels placed higher so that everyone could see them.

28/4/2010 We found the guides very difficult to use. The screen "froze" or just would not allow access to the information.

28/4/2010 Faulty exhibition but do get the audio to hear it in 2010.

28.4.2010 Fantastic help to volunteers

29/4/2010 Wonderful! Would also love to see Kaffe Fassett quilts displayed! Perhaps another exhibition? It was great to see the quilt + video from Warsaw Prison - I would have liked to have seen more of their work. It is great that the UK has projects like this reaching into the wider community.

29.4.2010
30/4/2010 Fantastic.
30/4/10 Wonderful!
30/4 Wonderful

Date

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ANTENNA AUDIO
The world is listening

Very enjoyable exhibition. Especially for a beginner quilter.

So sorry! Go back to the "Bottoms"!
Yes - good - just tell people to touch the arrow at the side not the actual picture of the number.

I think the audio price could be included in the admission! - An excellent resource and one that will keep youngsters well entertained as well as allowing them to run the technology for grandparents & parents alike.
It could be useful to advise where to return your audio guide.
Well worth the visit to hear about the patchwork.
Miles Dinn
Australia

*As a former Antenna poster, I have to say hats off to Miranda & Amy - you guys produced an absolutely incredible guide. One of the best I have ever seen - one thing to the creator - Joyce Wieland, the amazing Canadian artist shall have been included! Thanks, Karen Rens

I enjoyed the guide very much,
Thanks
I found the guide hard - I need reading glasses - I saw most of the quilts but I was worried about the technology at the quilts.
E. Norris

Date
06-05-2010

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ANTENNA AUDIO
The world is listening

Very enjoyable and inspiring exhibition.
Excellent audio guides!
Fabulous guide - very informative. as above - fab + understandable.
Very enjoyable!
Excellent!
Fantastic! A must for all quilters!

Audioguide was good, but required some knowledge of how to use these things which some of us older folks find hard!

Excelsior! Love in London

Really inspiring - a wonderful collection.
Wonderful exhibition audio guide so far!!

*Superb! loved it - could go back again & again. The audio guide was excellent.

Date
06-05-2010

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The word is listening

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The word is listening

IPOD

Didn't find it easy to use.
Would return to acknowledge
for no obvious reason.
Exhibition v. good

*Great idea - first time I've
ever used an ipod!!
Not easy to use but excellent
commentary.

Great exhibition & the audio guide was
very clear and explanatory. Thank you

Excellent exhibition, not keen on
touch screen guides.

V. enjoyable except for the iPhone technology!
This was difficult to use and irritating.

Wait for audio was a bit long
Very good - easy to use technology
- great.

Excellent commentary which greatly enriched
my viewing. The attendants were very helpful when
I had difficulty, being rather ancient and not
used to present day technology. Thank you
to Cathy who wrote it.

Date

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ANTENNAAUDIO
The word is listening

Had the exhibition even better especially
as I was here by myself.
A wonderful experience.
well worth the journey from
Durham.
Fantastic! So glad I came. D. Jones, Devon

Audio very well produced and easy to use
can be an 'audio' like me!!
Wonderful help. JF

Did add to my interest.
me too!
Really enjoyable lovely guide

Like a terrific and moving exhibition. See recordings of
past lives was fantastic here. I loved Tracy Ellis
I had at the close of the exhibition! with thanks.

I feel each quilt should have
been shown in the audio guide.
I found it confusing and not
easy to follow - images not easy
to match to quilts.

Best way to see an exhibition.
First time I've used an ipod.
Totally hot with ipod.

Date

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The word is listening

Well worth a visit! **MANDY**

More variety + some plain quilts with
history etc would have been better.

Excellent quality of information
- thank you.

Absolutely Amazing
fabulous exhibition and so well
laid out. **Paula**

So glad we came - an exhibition
not to be missed, quilts or not. Kathryn
Michelle

Great criticism of having to have to for
an ipod - coming by train from
Devon by train, on travels as
light as possible - it would have
been helpful to have been told when
tickets were sent. **Blaise**

Excellent thank you **Blaise**

Fantastic exhibition but audio guide on i-pod was
distracting. Much prefer audio only!
Fantastic exhibition well made the trip!
Wonderful exhibition iPhone makes all
the difference. Easy to use.

Date

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The word is listening

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Date

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The world is listening

fantastic - made it even more enjoyable! M. Ellis

Wonderful tool - Cool Ebor Dublin

The numbers on the exhibits are too small to read. The I Pods are useless for partially-sighted people and especially for a population who are not used to hi-tech instruments.

What a wonderful event to experience! Beautiful work - brilliantly presented. The i-pod was a joy.

Sat - 8/15/10
Thank you - I have come from Richmond, VA (USA) to see this show.

Have enjoyed the audio/vids very much, especially with the last song. 12-sept for Quilts I am a quilter, have one my grandmother made many years ago - Double Wedding Ring Pattern

Travis Mary Swanson

Date

www.antennaaudio.com

ANTENNAAUDIO
The world is listening

Saturday 15/05/2010: This is a wonderful exhibition of aesthetic cultural and social history. Thank you V&A Margaret Marsh Sydney Australia.

Fantastische tentoonstelling
voor
Jans Leenders-Jones
Amsterdam
15.5.2010

Very good Kyoga.

A most interesting experience I will try to reflect it in my article. It shows the ~~value~~ values of quilts signifying in social life.

Beautiful! L. Gray, 2010 -
Intentic - thank you!!
Sue Barnett, Pennsylvania USA

Thank you for an inspiring exhibition and very informative audio
Gina Haggart, York

Date

www.antennaaudio.com

ANTENNAAUDIO
The world is listening

Great exhibition. The i-pod was very good.

Leslie Bellin
Finland

What a shame not to see any of the backing fabrics.

Beautiful to see all the old quilts
Wonderful exhibition!

C Donofus
Tain - Duffland
Francie de Dobbelaere
Dunsany Co Meath EI

Generally good - what a pity the beds were not on checks so we could have a better view of the quilts displayed -
Also why advertise India's needle trade or not Reddick?
Mary Johnson
Weybridge

Date

www.antennaaudio.com

ANTENNAAUDIO
The world is listening

I am annoyed that I was not aware that I would have to provide proof of ID to collect an audio guide.

Paulie Walters
Wantage
Essex

SH. Kello -
13 Windmill Rd
WANTAGE

An extremely good guide to the exhibition but it would be better if the number relating to the audio was large & sitting next to the quilt as it is difficult to see if there are 1st of people standing in front of the written explanation.

A great exhibition
Tha Edwards.

Date

www.antennaaudio.com

ANTENNAAUDIO The world is listening

WHY IS THE AUDIO GUIDE NOT ON THE LOOP SYSTEM? SURELY THESE DAYS YOU ARE SUPPOSED TO REQUIRE TO LOOK AFTER DISABLED PEOPLE. I WAS SENT A TRANSCRIPT BUT THE NUMBERS QUOTED WERE NOT THE SAME AS NUMBER ON AUDIO GUIDE SYMBOL SHOW BY QUILT, SO VERY DIFFICULT TO FIND RIGHT TRANSCRIPT.

More information about the direction to follow to now all the quilts. I missed some in first room. A wonderful exhibition, the very historical side was great. The problem details of quilts not easy to read too small - Anna O'Brien Schlager Kowitz

A delightful & very informative visit. Audio guide was excellent. J. Watkinson W. Killip.

I enjoyed each & every quilt and hearing about the quilters. I'm happy to help & also am a quilter. S. Goldberg Illinois USA

Loved it! But it would have been good if the bed style displays had been tilted a little to make them easier to see. Judith K. Moore.

Loved it; agree with above comment re beds to be tilted - higher a bit low! Otherwise great. Jenny Baker, UK

Date: _____

www.antennaaudio.com

ANTENNAAUDIO The world is listening

Excellent exhibition - amazing how the quilt can make a connection to a 'Soul'. G's Mums UK.

Wonderful. Could have gone round several times. C.A.

Very good addition to Exhibit. Machine works very well - & very easy to use. P.C.

Beautiful. BUT I WANT MORE! MORE DETAIL ON CONSTRUCTION, TECHNIQUES ETC - LOVED IT. Kief, NZ

Brilliant! Very good exhibition and the audio helped enormously. J. Moore.

Amazing! Got the audio now & then download it! Quilts are spectacularly designed - esp. Reginald Quilt & had I have seen it home. Enjoyed participation of a lot more. Libby Williams, Canberra Australia.

The idea of the Pod was great, not only did you get the background but you also got to see the quilts in more detail. Fantastic visit. Dawn & Andy Chimes, Oxfordshire UK.

Lovely inspiring & powerful exhibition. It would have been helpful to have many of the 'beds' tilted to show the details. Love the piece from Mrs. P. Henderson. P. Johnson, USA.

Date: _____

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ANTENNAAUDIO The world is listening

Very good exhibition, audio with excellent great Exhibition. M. Long, UK.

Inspiring! Excellent! S. Riley, S. Borneo

Excellent addition to a fantastic day. Elizabeth Johnson

That's your effort people. Fantastic - will write the trip! J. Cr.

Inspiring, informative and thoroughly enjoyable exhibition - enhanced by the iPod. However, could be improved by having bed exhibits tilted to aid viewing. And no mention of QGBI? - quilters guild of the British Isles?? J. Vitalobos + S. Borneo 27-05-10

Excellent exhibition having the iPod was a great help, but I would have liked to have the beds tilted up a little so as to see more of the quilts. Where is the location of Quilts Guild of the U.S. Maybe they would have offered these quilts also. But the iPod was great. P. Johnson, UK.

Absolutely fantastic! M. 21/5/10

Date: _____

www.antennaaudio.com

ANTENNAAUDIO The world is listening

Beautiful & interesting quilts, but not sure that the audio commentary added v. much to what was already available on the cards. Nigel L.

Great use of iPod allowing close ups of the quilts was excellent!

Very interesting & heightened the exhibition. Thank You

The audio guide was so worth the money! So informative and really added to what was already a stunning exhibition. The intelligent and developed commentary provided a real insight into the topics and background of the pieces. Fab!!!

Fantastic - iPod a great addition.

Date: _____

www.antennaaudio.com

Your comments, please.
 您的评论，请发表。
 For feedback comments, please.
 反馈评论，请发表。
 For further information on products, please.
 关于产品的进一步信息，请发表。
 If you would like further information about Antenna Audio, future exhibitions or our download tours, please leave your e-mail address.

The guide was one of the best we have ever used. Wonderful guitar exhibit
Donna & Blumir

Great exhibition and I got helped to understand many of the displays. Pam Ward, Shropshire

Excellent

Great! Enjoyed.

lovely art to see! gmed Cork Ireland

Excellent guide - imaginative, well-chosen guitars. Margaret, Pennell - (Kansas) USA

Fascinating history of guitars. The variety of style was most interesting. The numbers could have been more clearly shown for the audio program. Andrea Conner, Toronto, Canada.

Date
01/06/2010

A fabulous exhibition!! Thank you so much for putting it on. Would have missed it if Grace Kelly was not full today
Verna Plummer, Barchemley, Cheshire

I gave 5.00 with thanks to my husband. With reverence & gratitude for experience seeing what so many of you together for this exhibit. The heart-things of here have seen into cloth!
Kathie P. Sanford, ME, USA.

Enjoyed so much. Marg Brown, Bright Vic, Australia

I did not find the iPad easy to use - push button audio would have been easier for me! Julie.

Really Excellent. Cathie Foster, Spain

Good - but volume control should have been further away from remind/ffwd controls as it was too easy to fast forward when you actually wanted to reduce the volume.
Date

Your comments, please.
 您的评论，请发表。
 For feedback comments, please.
 反馈评论，请发表。
 For further information on products, please.
 关于产品的进一步信息，请发表。
 If you would like further information about Antenna Audio, future exhibitions or our download tours, please leave your e-mail address.

APPENDIX D GENERAL VISITOR SURVEY

Survey # _____

Data Collector _____

Date Collected _____

Time Collected _____

Victoria and Albert Museum Mobile Technology Survey

Good Morning/ Afternoon/ Evening. On behalf of the V&A, we are trying to find out a bit more about our visitors. This survey is completely anonymous and will only take a few minutes of your time. The information taken from this survey will help us provide a better experience for all future visitors to the Victoria and Albert Museum.

1. Gender (Silent)

Male Female

2. Have you visited the V&A before?

Yes No

3. If Yes, When did you last visit the V&A?

In the last 3 months 6 months 1 year 3 years +3 years

4. How long have you been in the museum today?

Less than 1 1hr 2hr 3hr 4hr 5hr +6hr

5. Have you used or seen a copy of the complementary paper map?

Used Seen No

If not provide them one,

If used:

6. Do you find the paper copy to be useful in your navigating through the museum?

Yes No

7. How did you find navigating through the museum?

8. How comfortable are you using touch screen devices (iPod, iPhone, other touch screen mobiles or displays)?

Never used one 1 2 3 4 5 6 7 8 9 10 Very

Survey # _____

Data Collector _____
Date Collected _____
Time Collected _____

9. How often do you use mobile touch screen devices?

Once a week A few times a week Constantly I don't have one

10. Would you find a digital interactive map easier to use in navigating through the museum? (provide an example)

Yes No

11. Would an interactive tour on a mobile device be of interest to you?

Yes No

12. If a mobile device application (or iPhone app) was developed for you to use at the V&A would you find this useful?

Yes No

13. Would you like to see this technology available for visitors?

Yes No Not sure

14. Would you be comfortable using a mobile device application during your visit to the V&A?

Yes No

15. If there was an option to download a digital application onto your mobile device would you prefer to

1. Download it into your own device for free
2. Rent a device from the V&A
3. I would not use a digital application

16. Age

16-24 25-34 35-44 45-54 55-59 60-64 65+ Prefer not to say

17. Do you have any thoughts or ideas about integrating technology into the museum?

Thank you for your time, enjoy the rest of your visit

APPENDIX E GENERAL VISITOR SURVEY ANALYSIS

Survey Questions

1	Gender	Male	Female					
		39	41					
2	Have you visited the V&A before?	Yes	No					
		47	33					
3	When did you last visit the V&A	In the last 3 months	6 months	1 year	3 years	3+		
		13	5	8	5	16		
4	How long have you been here today?	Less than 1 hour	1hr	2hr	3hr	4hr	5hr	6hr
		20	18	25	10	2	4	1
5	How did you find navigating through the museum?	Easy	Difficult	Undecided				
		38	32	10				
6	Have you seen the map?	Used	Seen	Not seen it				
		45	20	15				
7	Do you find the map useful	Yes	No					
		33	34					
8	How comfortable are you with touch screen devices?	1 to 3	4 to 6	7 to 9				
		6	8	66				
9	How often do you use touch screen devices?	Once a week	A few times a week	Constantly	Don't have one			
		15	12	35	18			
10	would you find a digital map useful?	Yes	No					
		46	34					
11	would an interactive tour interest you?	Yes	No					
		57	23					
12	Would you find a mobile device applicational useful?	Yes	No					
		62	18					
13	Would you like to see this mobile technology available for visitors?	Yes	No	Not sure				
		60	9	11				
14	Would you be comfortable using this technology during your visit?	Yes	No					
		65	15					
15	how would you like to use this mobile device application	Own device	Rent device	Would not use				
		41	21	18				
16	Age	16-24	25-34	35-44	45-54	55-59	60-64	65+
		14	14	14	15	10	5	8

Age Table

	16-24	25-34	35-44	45-54	55-59	60-64	65+	Total
Would you Find a digital interactive map easier to navigate through the museum?								
Yes	7	10	10	9	6	2	2	46
No	7	4	4	6	4	3	6	34
Would an interactive tour be of interest to you?								
Yes	10	11	11	14	5	2	4	57
No	4	3	3	1	5	3	4	23
If a mobile device application was developed for you to use at the V&A would you find it useful?								
Yes	10	12	12	13	8	3	4	62
No	4	2	2	2	2	2	4	18
Would you be comfortable using a mobile device application during your visit to the V&A								
Yes	10	12	12	13	8	4	6	65
No	4	2	2	2	2	1	2	15
How comfortable are you using touch screen devices?								
1 to 3	0	0	1	2	0	2	1	6
4 to 6	0	3	3	1	1	0	0	8
7 to 9	14	11	10	12	9	3	7	66
If there was an option to download a digital application onto a mobile device would you prefer to								
Download	10	10	7	6	5	0	3	41
Rent	0	2	5	5	3	4	2	21
Would not use	4	2	2	4	2	1	3	18
How did you find navigating through the museum?								
Easy	10	5	7	7	4	4	1	38
Difficult	4	9	4	5	3	1	3	29
Unsure	0	0	3	3	3	0	4	13
Do you find the paper copy to be useful in your navigation through the museum?								
Yes	7	3	6	8	6	4	4	38
No	6	10	6	5	1	1	3	32
How often do you use mobile touch screen devices?								
once a week	2	1	1	3	3	1	4	15
Few times a week	3	3	2	1	1	1	1	12
Constantly	8	8	8	5	4	1	1	35
Don't have one	1	2	3	6	2	2	2	18
Would you like to see this technology available for visitors?								
Yes	9	12	8	14	8	3	6	60
No	3	2	1	1	0	1	1	9
Unsure	2	0	5	0	2	1	1	11
Gender								
Male	5	7	6	11	5	1	4	39
Female	9	7	8	4	5	4	4	41
Total	14	14	14	15	10	5	8	80

Gender Table

Male	Female	Total
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Would you Find a digital interactive map easier to navigate through the museum?			
Yes	25	21	46
No	14	20	34
Would an interactive tour be of interest to you?			
Yes	30	27	57
No	9	14	23
If a mobile device application was developed for you to use at the V&A would you find it useful?			
Yes	31	31	62
No	8	10	18
Would you be comfortable using a mobile device application during your visit to the V&A			
Yes	30	35	65
No	8	7	15
How comfortable are you using touch screen devices?			
1 to 3	3	3	6
4 to 6	2	6	8
7 to 9	34	32	66
If there was an option to download a digital application onto a mobile device would you prefer to			
Download	18	23	41
Rent	9	12	21
Would not use	11	7	18
How did you find navigating through the museum?			
Easy	13	26	39
Difficult	18	10	28
Unsure	8	5	13
Do you find the paper copy to be useful in your navigation through the museum?			
Yes	15	21	36
No	19	12	31
How often do you use mobile touch screen devices?			
once a week	7	8	15
Few times a week	9	4	13
Constantly	17	18	35
Don't have one	6	11	17
Would you like to see this technology available for visitors?			
Yes	27	35	62
No	7	4	11
Unsure	5	2	7
Age			
16-24	5	9	14
25-34	7	7	14
35-44	6	8	14
45-54	11	4	15
55-59	5	5	10
60-64	1	4	5
65+	4	4	8
Total	39	41	

APPENDIX F BRITISH MUSEUM SURVEY REPORT

RESEARCH METHODOLOGY

A total of three studies were undertaken during January and February 2010 using two different research approaches.

A quantitative study was conducted in which data was collected through a self-administered questionnaire. In total 425 adults filled in the questionnaire which they were asked to complete when they returned a rented the Multimedia Guide. The questionnaire was intended to capture user demographics and information about their visit to the museum and use of the guide.

A series of qualitative studies in the form of user tests and semi-structured interviews were conducted using both the adult and children's versions of the guide. The aim of these observations was to better understand the how the guide was used and identify any specific usability issues that may have been encountered.

The questionnaire was made up of 23 questions. It was intended to build up a more detailed picture of the user and their experience of using the guide on a number of levels including:

- who rented the guide (age, gender, origin, group size, etc.);
- how they found out about the guide;
- why they rented the guide,
- their levels of satisfaction with the guide in terms of ergonomics and content;
- any difficulties they encountered while using the guide;
- and their interest in future developments of the guide (content).

One member from each group that rented the multimedia guide was asked to fill in the questionnaire in the language in which they had rented the guide. This approach was therefore not intended to capture information about all members of the group.

RESULTS OF THE SELF-ADMINISTERED QUESTIONNAIRE

Who hires the guide?

Gender

As can be seen in Table 2, slightly more women (51.7%) rented the multimedia guide than men (48.3%). When compared with the visitor profile data collected by the British Museum (October – December 2009) it can be seen that these percentages almost exactly reflect the gender mix of the general museum visitors. It should be noted that the gender recorded was that of the person completing the questionnaire and since only one member of the group was asked to fill in the questionnaire it does not provide information about the gender of other people in the group which they visited with. However, in terms of sampling the approach would seem to provide representative results.

	<i>MMG users</i>	<i>% MMG users</i>	<i>% Museum visitors ¹</i>
Female	209	51.7	52
Male	195	48.3	48

Table 2 What is your gender? (n=404)

Age

Figure 9 shows that 87.8 % of the people renting the multimedia guide were aged between 19 and 54 years old. With over three quarters (77.5%) of the multimedia guide rental being accounted for by people aged between 19 and 44 years old. Outside of this range usage drops off quite quickly. This may be due to in part, amongst the youngest visitors (and the adults accompanying them), to the fact that there is a children's version of the multimedia guide aimed at those aged less than 12 years old.

In terms of the age of people renting the multimedia guide there was a bias towards a slightly younger age group compared to the general museum visitor (see Table 3). Note that because the age ranges are structured in a slightly different way on the British Museum rolling visitor

¹ The general British Museum visitor statistics are based on 633 exit interviews collected by the museum between October and December 2009

profile questionnaire a broader age range of 17 to 24 is compared to the multimedia user age range 19-24. However, it still shows that generally a higher percentage of people in the younger age ranges (19 to 24 and 25 to 34) rent the multimedia guide than occurs in the general visitor population – approximately 5% in both age ranges.

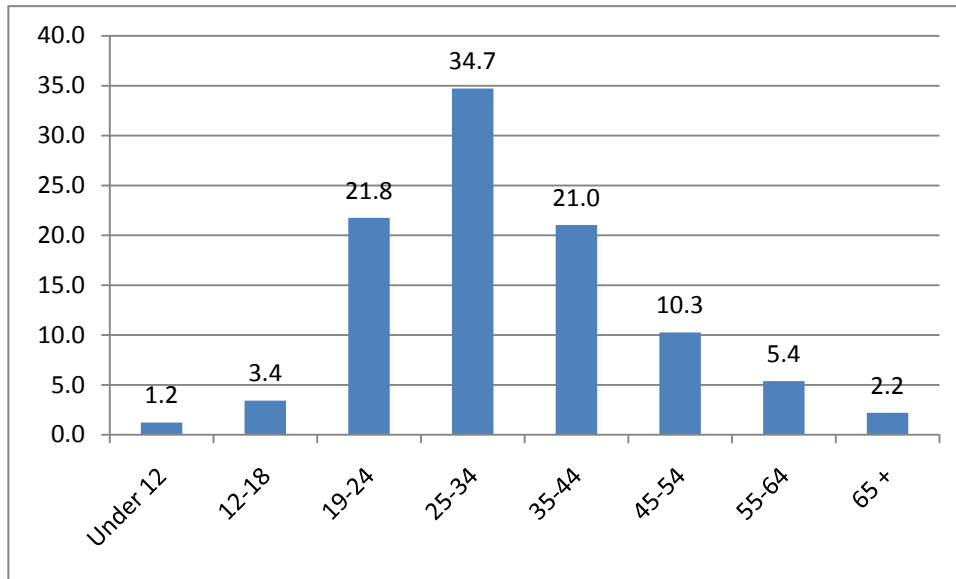


Figure 9 Percentage of Multimedia Guide users by age

	<i>MMG users</i>	<i>% MMG users</i>	<i>% Museum visitors</i>
Under 12	5	1.2	-
12-18	14	3.4	-
19-24	89	21.8	172
25-34	142	34.7	28
35-44	86	21.0	17
45-54	42	10.3	17
55-64	22	5.4	14
65 +	9	2.2	6

2 aged 17-24

Table 3 Which of these age bands are you in? (n=409)

Residency

A total of 29 countries (including the United Kingdom) were represented in the sample. Table 4 shows how the origin of those using the multimedia guide compares with that of the general museum visitors. It can be seen that the guide users are divided relatively equally between those from the UK (34.8%), those from the rest of Europe (31.3%) and those from the rest of the world (34.0%). When compared to the museum visitor statistics available, the data shows that slightly more non-UK resident visitors were renting the guide than would have been expected based on the general museum population and slightly less UK visitors than would be expected.

	<i>MMG users</i>	<i>% MMG users</i>	<i>% Museum visitors</i>
Greater London	74	18.4	21
Rest of UK	66	16.4	19
Rest of Europe	126	31.3	28
Rest of world	137	34.0	32

Table 4 Where do you live? (n=403)

The origin of the multimedia guide users from countries which represented more than 1% of cases is shown in Figure 11. The number of Korean multimedia guide users could be attributed to some extent to the large publicity campaign regarding their sponsorship of the guide that Korean Air undertook. There was anecdotal evidence also that Korean visitors were happier to fill in the questionnaire than visitors from some other countries.

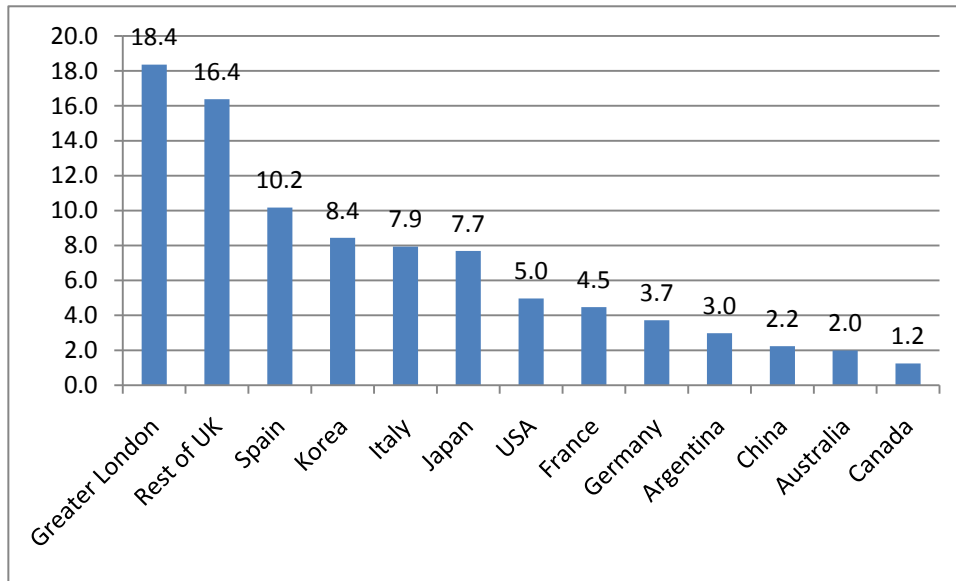


Figure 10 Residency of multimedia guide users (where greater than 1% of respondents)

Language

Both the multimedia guide and the questionnaire were available in 10 languages. The respondents were asked to complete the questionnaire in the language in which they rented the multimedia guide. Table 5 shows the number of questionnaires filled in by multimedia guide users by each language.

	<i>MMG users</i>	<i>% MMG users</i>
English	148	35.2
Spanish	64	15.2
Korean	51	12.1
Mandarin	42	10.0
Japanese	35	8.3
Italian	33	7.9
German	20	4.8
French	18	4.3

Arabic	6	1.4
Russian	3	0.7

Table 5 Questionnaire language selected by respondent (n=420)

As can be seen English was over twice as popular a language with 35.2% people choosing to use it as its nearest rival Spanish, 15.2%. Korean was the third most popular language at 12.1% and this could be attributed to the availability of a Korean gallery tour in Korean and sponsorship of the multimedia guide by Korean Airways. 13.8% of respondents who declared their residency to be the UK filled in the questionnaire in a language other than English.

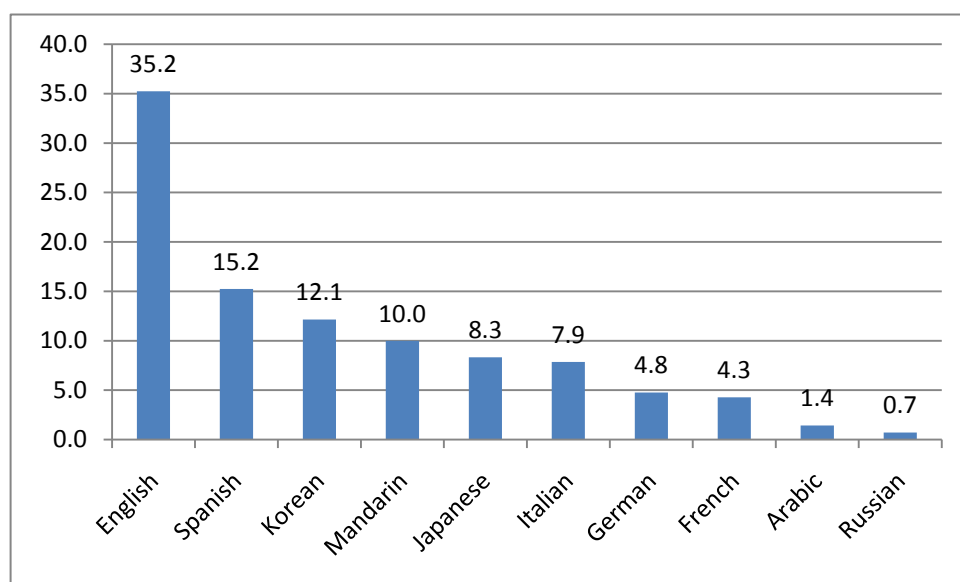


Figure 11 Percentage of questionnaires completed by language selected

Frequency of visit

The majority of multimedia guide users had not been to the museum before (68.7%) or had visited more than five years ago (11.4%). This is a higher percentage of first time visitors than is found in the general museum visitor numbers and suggests that people see the guide as a useful way to find out about the museum (see Table 6).

<i>Greater London</i>	<i>Rest of UK</i>	<i>Rest of Europe</i>	<i>Rest of world</i>	<i>All MMG</i>	<i>% of museum</i>
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					<i>users</i>	<i>visitors</i>
Yes, I have never been to the British Museum before	<i>51.4</i>	<i>59.1</i>	<i>77.6</i>	<i>74.5</i>	<i>68.7</i>	<i>51</i>
No, I have visited before but more than 5 years ago	<i>12.2</i>	<i>16.7</i>	<i>4.8</i>	<i>14.6</i>	<i>11.4</i>	<i>10</i>
No, I have visited between 2 and 5 years ago	<i>4.1</i>	<i>10.6</i>	<i>11.2</i>	<i>2.9</i>	<i>7.0</i>	<i>6</i>
No, I have visited between 1 and 2 years ago	<i>14.9</i>	<i>3.0</i>	<i>4.8</i>	<i>2.9</i>	<i>5.7</i>	<i>8</i>
No, I have visited in the past 12 months	<i>17.6</i>	<i>10.6</i>	<i>1.6</i>	<i>5.1</i>	<i>7.2</i>	<i>24</i>

Table 6 Is this your first ever visit to the British Museum by origin (n=402)

As would be expected the highest first time visitors were from Europe and the rest of the world (77.6% and 74.5% respectively). A relatively high percentage of users from outside London and Europe were also visiting again after 2 to 5 years and renting the guide. The multimedia guide would not have been available during their previous visit.

Social context of the visit

Table 7 shows the percentage of people visiting in the most common group sizes by the region in which they reside.

	<i>Greater London</i>	<i>Rest of UK</i>	<i>Rest of Europe</i>	<i>Rest of world</i>	<i>% of Total</i>
1 person	<i>27.8</i>	<i>15.4</i>	<i>16.3</i>	<i>37.0</i>	<i>25.3</i>

2 people	40.3	58.5	48.0	39.3	45.3
3 people	16.7	12.3	9.8	9.6	11.4
4 people	8.3	6.2	14.6	10.4	10.6
N	72	65	123	135	395

Table 7 With how many people, including yourself, did you visit the museum today? (By residency)

The majority of people using the multimedia guide visited on their own or with one other person (70.4%). The numbers of people in larger groups using the multimedia guide quickly drops off and if groups of up to and including four people are considered 92.8% of multimedia guide users are accounted for.

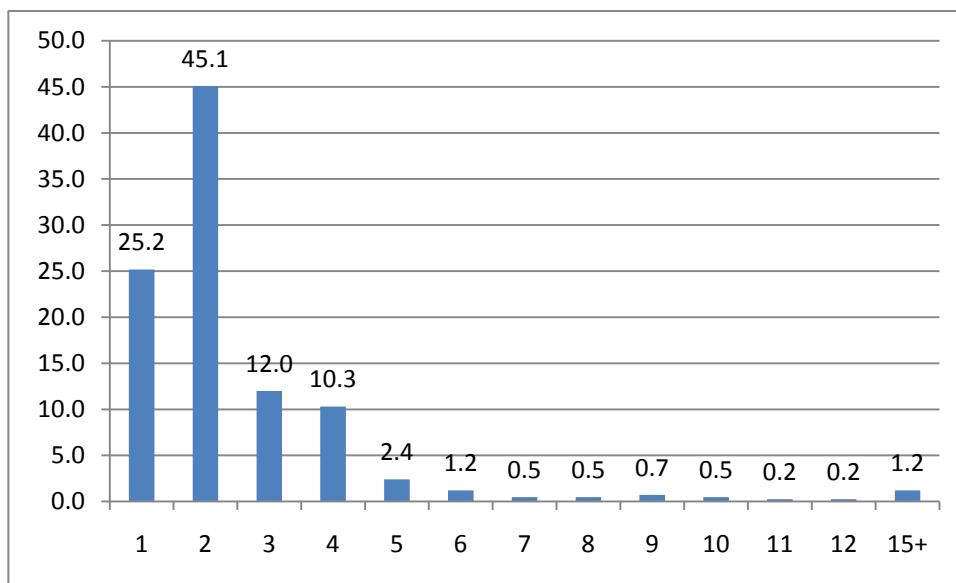


Figure 12 Percentage of people visiting by group size (n=417)

Use of the guide

Number of guides rented

Table 8 shows the percentages of people renting between one and four guides across their place of residency.

	<i>Greater London</i>	<i>Rest of UK</i>	<i>Rest of Europe</i>	<i>Rest of world</i>	<i>% of Total</i>
1 guide	47.9	23.4	30.6	45.9	37.8
2 guides	33.8	59.4	40.3	37.6	41.3
3 guides	9.9	10.9	13.7	9.0	11.0
4 guides	4.2	0.0	11.3	6.0	6.4
N	71	64	124	133	392

Table 8 How many Multimedia Guides in total did you group rent today? (By residency)

Even though 25.2% of visitors were visiting the museum on their own 37.9 % of groups hired only one guide. Very few people (14 out of the 414 respondents that is, 3.4%) said that they rented more than four guides. However, at the time that the study was conducted larger groups of eight or more were not able to pre-book guides for all people in the guide and therefore this information may have been superseded.

A comparison of the number of people in a group and the number of multimedia guides rented shows that, across all respondents, 72.8% of groups rented the same number of guides as there were people in their group. Table 9 however, shows that as the size of the group increases the likelihood of this being the case decreases.

	<i>1 person</i>	<i>2 people</i>	<i>3 people</i>	<i>4 people</i>	<i>All groups</i>
Same	90.3	76.5	63.3	53.5	72.8
Less	-	21.4	36.7	46.5	23.8
More	9.7	2.1	-	-	3.4
N	103	187	49	43	412

Table 9 Percentage of groups renting same, more or less guides than people in the group

Time spent using the Multimedia Guides

As can be seen from Table 10, on average people spent just over three hours in the museum and spent approximately 82% of this time, just over two and a half hours, using the multimedia guide. The amount of time spent in the museum was fairly constant across the middle age ranges with the Under 12s spending very slightly less than three hours in the museum and the 65 and over group spending four hours in the museum on average.

	<i>Mean minutes</i>	<i>No. of respondents</i>
How long did you spend in the museum?	<i>186.52</i>	<i>418</i>
How long did you spend using the guide?	<i>152.74</i>	<i>392</i>

Table 10 Approximately, how long did you spend in the museum and using the multimedia guide?

Looking at Figure 13 it can be seen that there is a general trend for the amount of time spent using the guide as a proportion of the time spent in the museum to also remain fairly constant.

The slightly lower proportion for the under 12s age group may be due to the fact that the guide which was being tested is aimed at adults and did not manage to keep their attention. A children's guide is available for this age group.

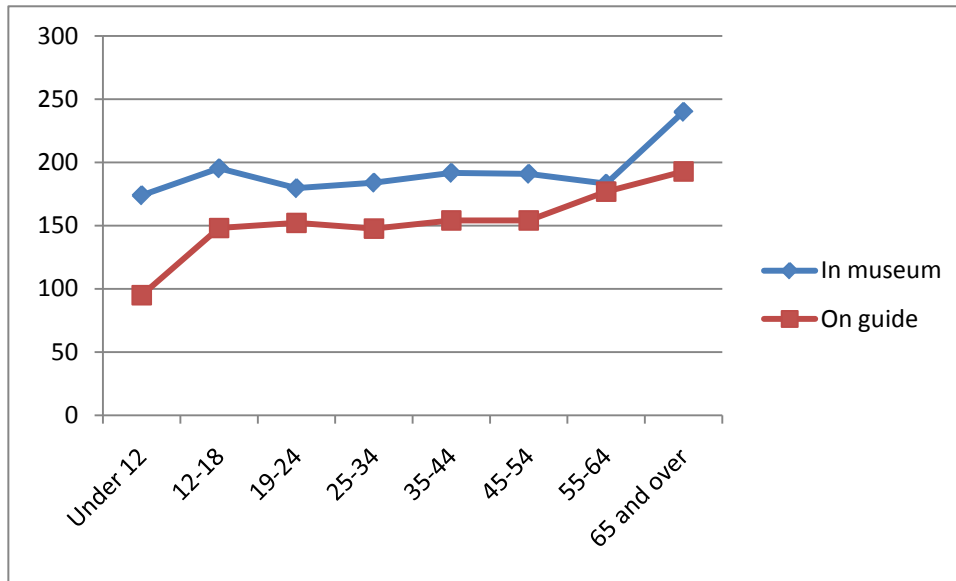


Figure 13 Minutes spent in the museum and using the multimedia guide by age

Motivation for hiring the guide

Table 11 shows the main motivation given for renting the multimedia guide. In general the users saw the multimedia guide as a means of increasing their understanding of the objects in the museum with over half of respondents (58.6%) stating that this was their main motivation for rental. The second motivation chosen shows that there is a general level of expectation that there will be a guide available as 45.6% of users stated that they often or always take a guide when in a museum.

	<i>Number expressing motivation</i>	<i>% MMG users</i>
I wanted to better understand the objects exhibited in the museum.	249	58.6
I often/always take audio/multimedia guides when I visit museums.	194	45.6
I wanted a quick guide to the museum.	121	28.5
I have never taken a guide before and I was	52	12.2

curious to try it out.

My visiting companion/child wanted to take the guide.	47	11.1
Someone recommended it to me.	44	10.4
I did not want/do not like to read brochures and wall text.	30	7.1

Table 11 Why did you rent the Multimedia Guide today? (Mark all that apply) (n=425)

As can be seen in Figure 14 and Figure 15 these are the two main reasons for renting the guide across all respondents whether considered by place of residency or age group. The trend appears to be for people to take a guide more regularly as they get older and also when they are visiting from the UK (outside of London) and Europe. In terms, of wanting a better understanding of the objects a higher percentage of those who have travelled further and those who are younger give this as motivation for hiring the guide suggesting that the local and older visitors have already some knowledge of the objects in the museum.

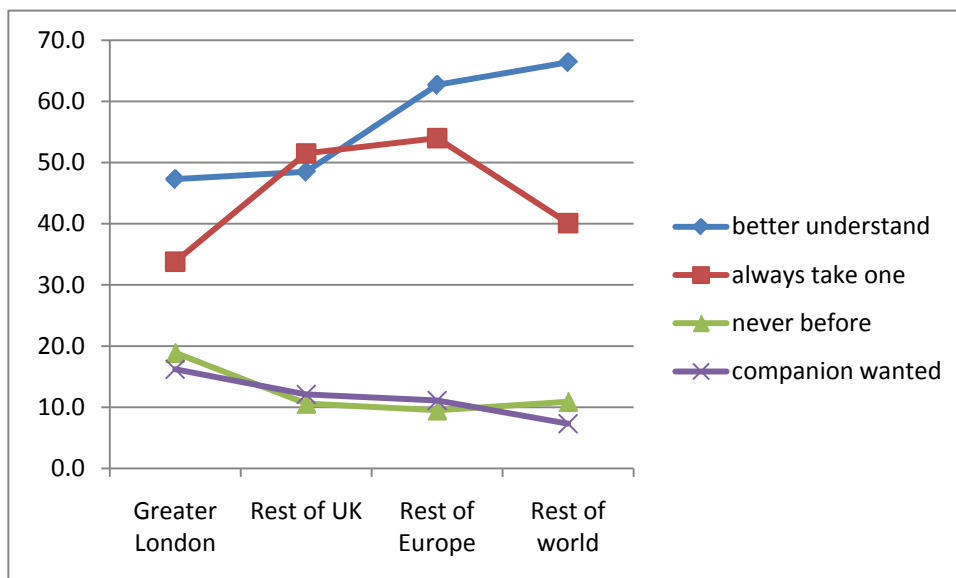


Figure 14 Percentage for top motivational reasons in each area of origin (n=403)

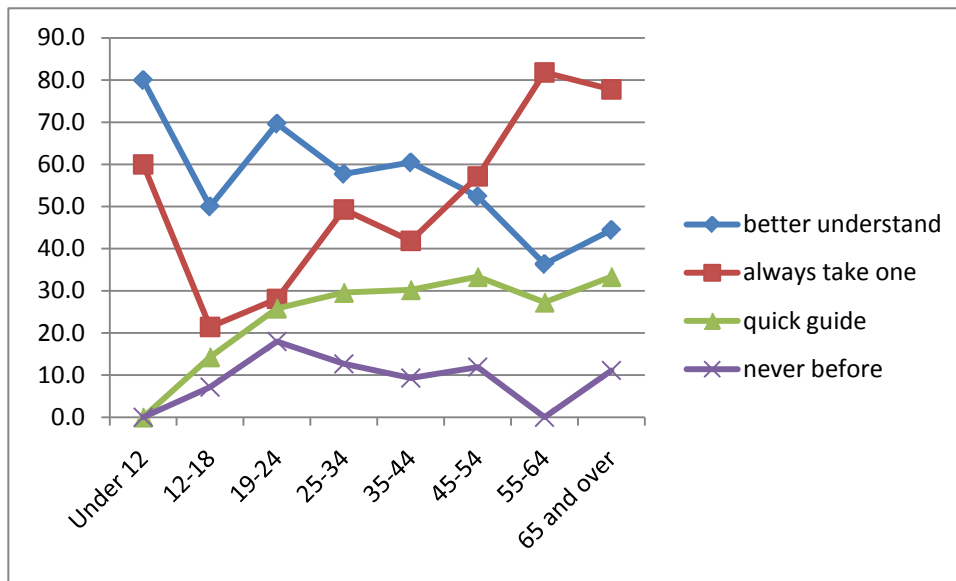


Figure 15 Percentage for top motivational reasons in each age group (n=409)

Beyond the two top motivations for taking the guide the picture is not so clear cut. The motivation of those wanting a quick guide to the museum is not as high a reason across origin as it is when looking at reason by age.

Awareness of the guide

Across the entire cohort of multimedia guide users the two most common answers to the questions aimed at discovering how they found out about the guide were that they saw the multimedia guide distribution desk in the Great Court (43.8%) and that they expected there to be one so looked for it (31.3%) (See Table 12).

	<i>Number choosing reason</i>	<i>% MMG users</i>
I noticed the multimedia guide distribution desk in the Great Court.	186	43.8
I expected there would be one and looked for it.	133	31.3
I saw other visitors using the multimedia guide.	45	10.6

A museum employee at the information desk told me about it.	39	9.2
I found out about it on the British Museum website.	36	8.5
I saw it advertised in the press.	21	4.9
I noticed the multimedia guide distribution desk near the Parthenon Gallery.	14	3.3

Table 12 How did you find out about the Multimedia Guide? (Mark all that apply) (n=425)

These were the top two answers from all of the respondents where ever they lived and apart from those 65 and over what ever their age. However, while the third most popular answer overall was that they saw other visitors using the guide; this is in fact true only for those living outside of Greater London. For those living in London the British Museum website was the third most popular way in which to find out about the guide at 13.5%. Figure 16 and Figure 17 show how the percentages for the top reasons given vary across place of residency and age group.

The fact that the British Museum advertises in *Time Out London* would account for the awareness of the guide from the press in Greater London. In addition, Korean Air has been publicising the guide and this no doubt accounts for awareness in the rest of the world where only people originating from Korea, China and Japan chose this option.

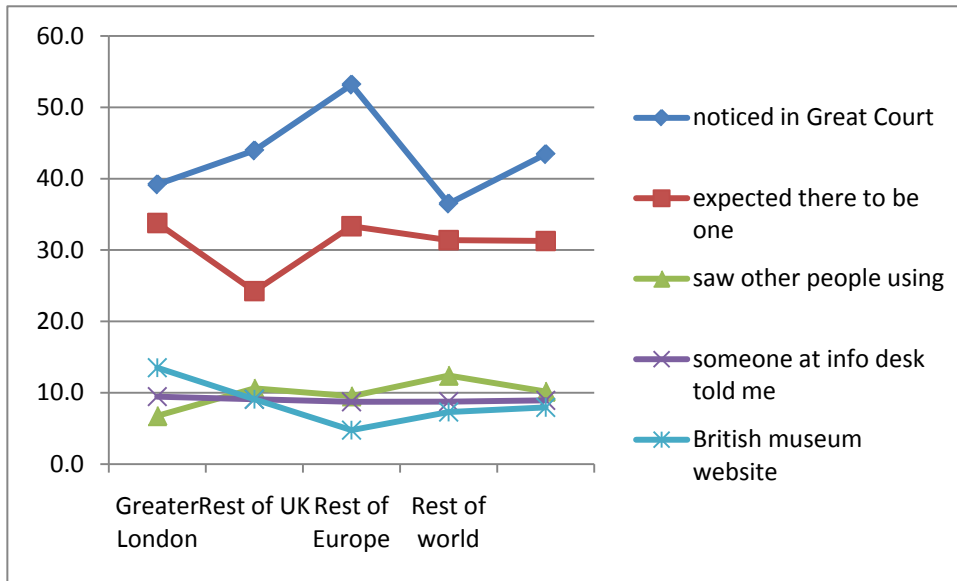


Figure 16 Percentage for top awareness reasons in each area of origin (n=403)

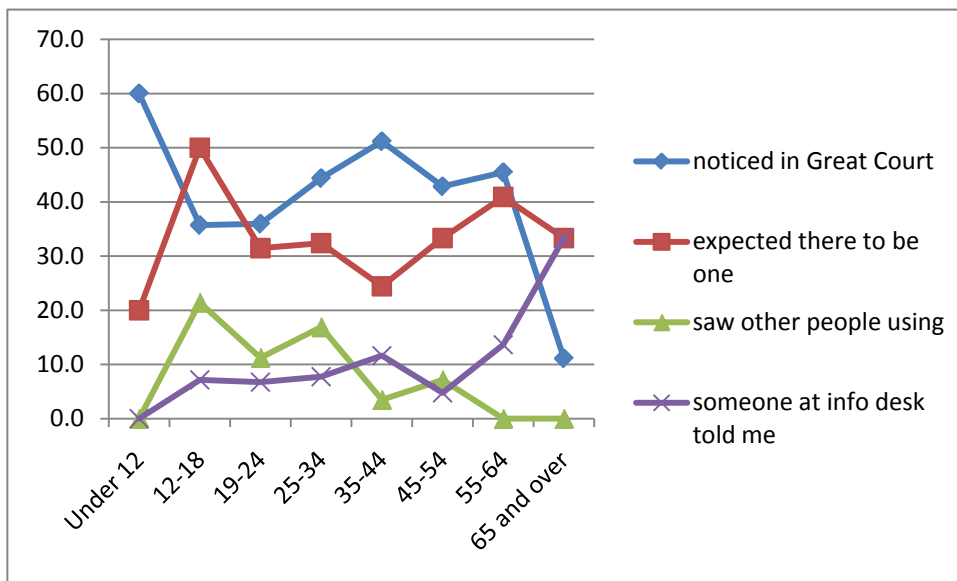


Figure 17 Percentage for top awareness reasons in each age group (n=409)

Amongst older visitors, 65 and over, 33.3% of them were more likely to have been told about the guide by the museum information desk employees and in addition gave ‘expecting there to be one’ (33.3%) and ‘noticed the distribution desk in the Great Court’ (11.1%) as other reasons for renting the guide. Only those in age ranges 12-44 saw the guide advertised in the press and then only those who live in Greater London and outside Europe again most

probably due to the Museum’s advertising campaign in *Time Out London* and by Korean Air (as mentioned earlier).

Awareness of the multimedia guide sponsor

Across the 398 respondents who answered this question the percentage of multimedia guide users who were aware that Korean Air is the sponsor of the multimedia guide was 53.3%.

Table 13 shows how this awareness changes depending on where the visitor lives. Not surprisingly 70.6% of those living in Korea were aware that the sponsor was Korean Air.

There was no significant trend found in awareness across age.

	<i>% Yes</i>	<i>% No</i>	<i>N</i>
Greater London	61.6	38.4	73
Rest of UK	63.5	36.5	63
Rest of Europe	38.1	61.9	126
Rest of world	58.1	41.9	136

Table 13 Korean Air is the sponsor of the Multimedia Guide. Were you aware of this? (n=398)

Object commentaries

Number of commentaries listened to

All the respondents listened to some of the commentaries. Table 14 shows that over half of the multimedia guide users (52.0%) listened to between 21 and 50 object commentaries with nearly a quarter of them (24.5%) reviewing between 51 and 100. This pattern was fairly constant across the four geographical regions under consideration with the exception that nobody from Greater London reviewed over 101 objects. (Removing Greater London from the analysis gives an average of 6.1% of people from the other regions reviewing this many objects.)

	<i>%</i>	<i>Number choosing option</i>
--	----------	-------------------------------

1-20	18.5	78
21-50	52.0	219
51-100	24.5	103
Over 101	5.0	21

Table 14 Approximately, how many objects did you review using the guide during your visit today? (n=421)

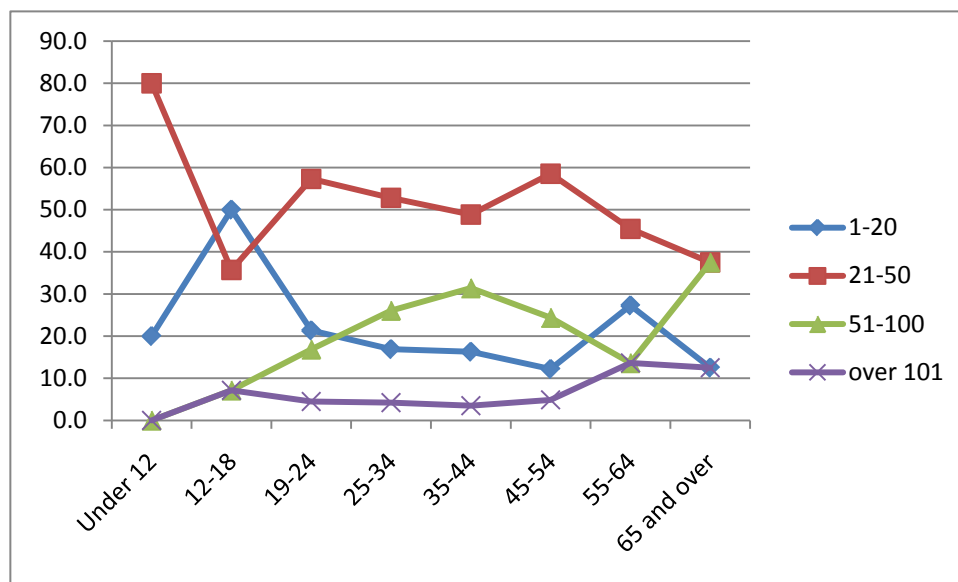


Table 15 Percentage of people reviewing numbers of objects by age (n=407)

Amount of commentary listened to

Table 15 illustrates that when looked at by age only in the age group 12-18 did more people review 1 to 20 objects (50.0%) than 21 to 50 objects (35.7%). Higher percentages of people in the 55-64 (13.6%) and 65 and over (12.5%) age groups reviewed over 101 objects than in the younger age groups.

Overall amongst those who responded, most people listened to either all (43.0%) or most (40.0%) of the commentaries (see Table 16). Across age ranges there was a slight trend for a

greater percentage of people to listen to all or most of the commentaries with age. However, Figure 18 shows how the listening pattern varied more across language.

	%	<i>Number choosing option</i>
Listened to all of them right through to the end	43.0	180
Listened to most of them right through to the end	40.6	170
Listened to some of them right through to the end	16.5	69

Table 16 Thinking about the commentaries that were available for each object, did you mostly..... (n=419)

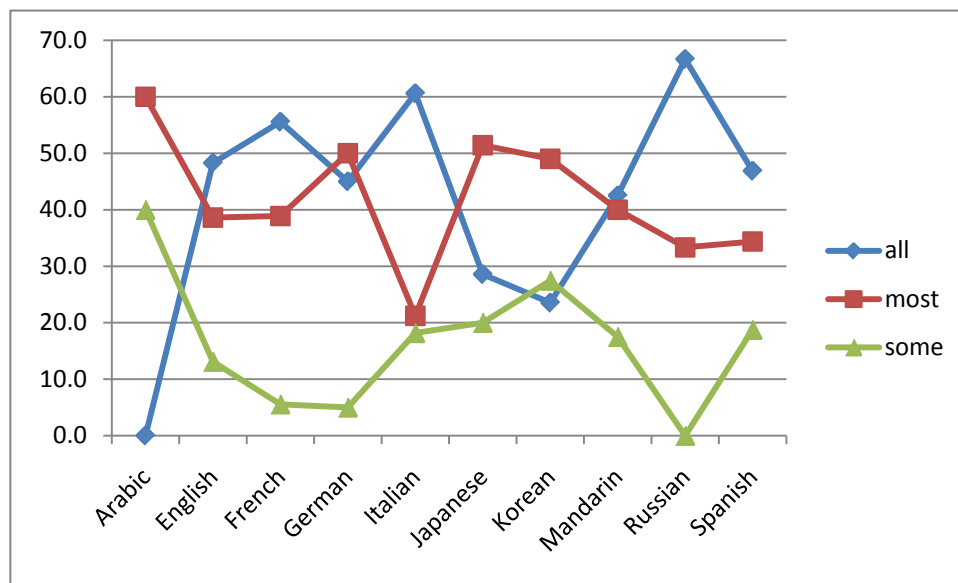


Figure 18 Commentary listening pattern across guide language (n=414)

Level of the commentaries

Looking at Table 17 it can be seen that 59.4% of guide users thought that the commentaries that they listened to were aimed at them. However, more than a quarter (26.6%) thought that the commentaries were enjoyable but a bit basic.

	<i>%</i>	<i>Number choosing option</i>
It was too complicated for me	2.9	12
It was a bit confusing, but I understood most	7.7	32
It was aimed at me	59.4	246
It was a bit basic, but I enjoyed it	26.6	110
It was too simplistic	3.4	14

Table 17 What did you think of the level of the commentaries? (n=414)

When looked at by the users' place of residency (Table 18) it can be seen that in fact more people in the non-UK categories (rest of Europe- 64.2% and rest of the world – 69.4%) thought that the commentaries were aimed at them. While less than half of respondents from Greater London and the rest of the UK agreed with the statement (47.9% and 47.0% respectively).

	<i>Greater London</i>	<i>Rest of UK</i>	<i>Rest of Europe</i>	<i>Rest of world</i>	<i>All</i>
It was too complicated for me	4.1	4.5	1.6	2.2	2.8
It was a bit confusing, but I understood most	8.2	4.5	4.9	9.7	7.1
It was aimed at me	47.9	47.0	64.2	69.4	60.1
It was a bit basic, but I enjoyed it	35.6	40.9	25.2	17.2	27.0
It was too simplistic	4.1	3.0	4.1	1.5	3.0
N	73	66	123	134	396

Table 18 Level of commentary difficulty by place of residency (n=396)

Again while overall 26.6% of users thought that the commentaries were a bit basic when considered by origin it can be seen that those users living in the UK rated the commentaries at this level more frequently with 35.6% of people from Greater London and 40.9% from the rest of the UK rating the commentaries at this level.

There could be a number of possible explanations for this such as the UK residents being more familiar with objects already and wanting a different type of information to those who were less familiar or they may have different expectations regarding the purpose of a museum etc. A follow-up study would be required to determine the cause of this difference.

Museum guide distribution experience

Table 19 and Table 20 show the mean satisfaction rating with the amount of time it took to collect a multimedia guide from the distribution desks and the usefulness of the instructions given by the distribution desk staff.

	<i>Greater London</i>	<i>Rest of UK</i>	<i>Rest of Europe</i>	<i>Rest of world</i>	<i>All MMG users</i>
Mean	6.21	6.43	6.34	6.37	6.35
N	72	63	125	135	405

Table 19 On a scale of 1 (too long) to 7 (just right), how would you rate the amount of time you had to wait to collect a Multimedia Guide? (n=405)

	<i>Greater London</i>	<i>Rest of UK</i>	<i>Rest of Europe</i>	<i>Rest of world</i>	<i>All MMG users</i>
Mean	6.15	6.07	6.31	6.14	6.18
N	71	60	118	130	389

Table 20 On a scale of 1 (not at all useful) to 7 (very useful), how would you the instructions provided by the Museum staff at the distribution desk? (n=389)

The rating across all respondents was 6.35 and 6.18 respectively. No distinction was made between the experience of those who collected their guide from the distribution desks in the Great Court and those who collected one from the Parthenon Sculptures gallery. The distribution desk in the Parthenon Sculptures gallery was closed for a period of time during the study and therefore the result refers predominately to the distribution desk in the Great Court. No obvious pattern of difference was found when considered across age groups or place of residency.

Features used

Of the features available on the multimedia guide the most popular were the guided tours with a total of 293 respondents out of 425 (68.9%) taking one or more of the guided tours.

Figure 19 shows the relative popularity of the different features as the percentage of multimedia guide users who used each features.

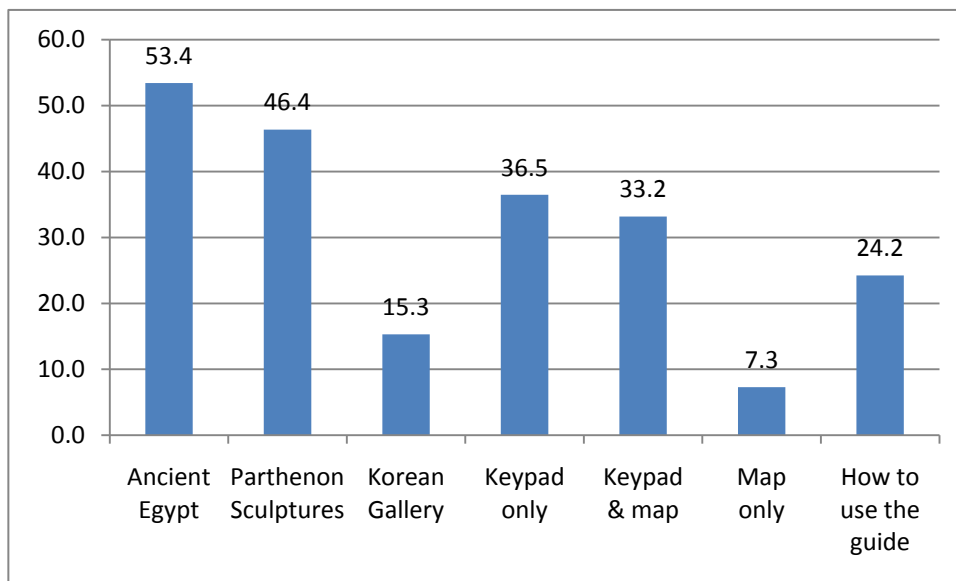


Figure 19 Percentage of multimedia guide user using each feature

Guided tours

At the time of the study, the multimedia guide contains three guided tours: the Parthenon sculptures tour; the Korean Gallery tour and the Ancient Egypt tour. Of these tours the most popular was the Ancient Egypt tour with over half of all respondents (53.4%) taking this tour. This tour was very popular with younger visitors with 78.6% of 12 to 18 year olds taking the

tour. The Parthenon Sculptures tour was also popular with 46.4% of the guide users taking this tour. The Korean Gallery tour was the least popular with only 15.3% of guide users choosing this option.

Table 21 shows that where respondents specified their place of residency the breakdown of those taking the Ancient Egypt and Parthenon Sculptures tours was fairly consistent with a slightly higher percentage of people visiting from the rest of the world being more interested in the Parthenon Sculptures than Ancient Egypt and vice versa for visitors from the UK (in total).

	<i>Ancient Egypt</i>	<i>Parthenon Sculptures</i>	<i>Korean Gallery</i>
Greater London	<i>18.1</i>	<i>16.9</i>	<i>18.0</i>
Rest of UK	<i>17.1</i>	<i>12.0</i>	<i>11.5</i>
Rest of Europe	<i>33.3</i>	<i>33.3</i>	<i>16.4</i>
Rest of world	<i>31.4</i>	<i>37.7</i>	<i>54.1</i>
N	<i>210</i>	<i>183</i>	<i>61</i>

Table 21 Percentage of tour takers by origin

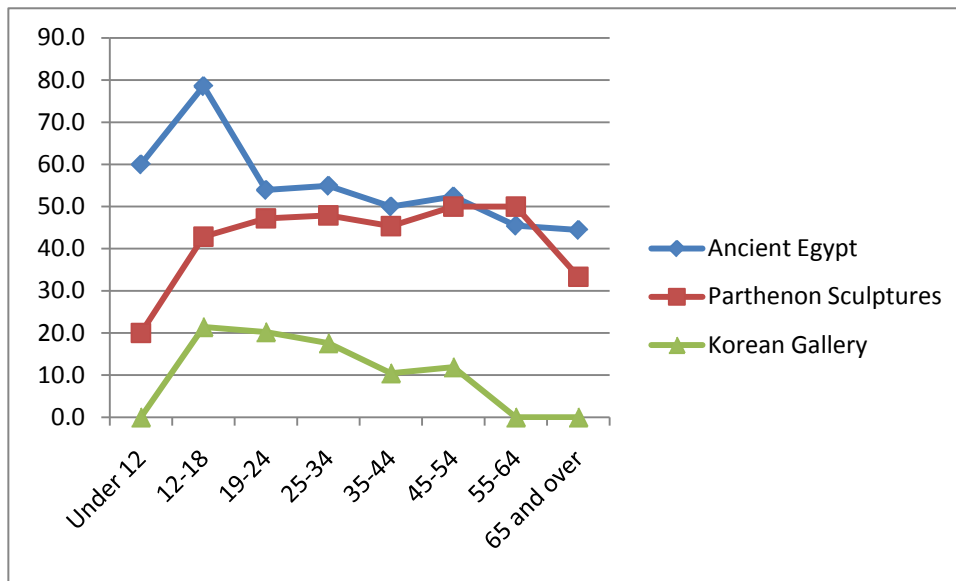


Figure 20 Percentage of visitors in each age group taking the tours

However, with the Korean Gallery tour there was a definite decrease in interest from European visitors. The increased interest from visitors from the rest of the world is most likely accounted for by the popularity of the tour with Korean language respondents, 64.7% of whom took the tour. Figure 20 shows that between the ages of 19 and 64 the Ancient Egypt and Parthenon Sculptures were very nearly as popular as each other although interest in the guided tours tends to decrease with age.

Table 22 show the mean number of tours taken in each language and the number and percentage of people using that language who took a guided tour. From this table it can be seen that people using the Korean, Russian and Mandarin languages took more than the average 1.7 tours. The number of people using the Russian language guide was very small (3 in total) and therefore this result may not be reliable. Although people using the Japanese language version took 1.7 tours as a percentage of the people using this version of the guide (37.1%) theirs is the lowest take up of guided tours.

	<i>Mean</i>	<i>Number taking a guided tour/s</i>	<i>% of total language</i>
Korean	2.0	45	88.2
Russian	2.0	3	100.0

Mandarin	1.8	29	69.0
Japanese	1.7	13	37.1
Spanish	1.7	43	67.2
French	1.6	17	94.4
Italian	1.6	25	75.8
German	1.5	14	70.0
English	1.5	99	66.9
Arabic	1.4	5	83.3
All languages	1.7	293	69.8

Table 22 Mean number of guided tours taken in each language (n=420)

How to use the guide

A total of 103 (24.2%) people chose the ‘How to use the guide’ facility from the homepage of the multimedia guide. Table 23 show the percentage of guide users choosing this option by age. It suggests that while on average just under a quarter of all respondents used the ‘How to use the guide’ facility 40.9% of those in the 55-64 age bracket and 29.6% of those aged 25-34 chose it. Co-incidentally the percentage of people 65 and over who chose this feature is also the percentage of that age group that chose to use just the map. However, without further research it cannot be assumed that there is a correlation between these two percentages.

	<i>Under 12</i>	<i>12-18</i>	<i>19-24</i>	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>	<i>65 and over</i>	<i>All</i>
‘How to use the guide’	20.0	21.4	19.1	29.6	20.9	21.4	40.9	11.1	24.4
N	5	14	89	142	86	42	22	9	409

Table 23 Percentage of guide users choosing the 'How to use the guide' facility by age (n=409)

Using the keypad and interactive map to find objects in the museum

A total of 296 of the 425 respondents (69.7%) chose to find information about objects in the museum using the keypad and 172 (40.5%) used the interactive map to find objects. Table 24 and Table 25 show the breakdown of these numbers in terms of those who used both the keypad and the interactive map and those that used just either the keypad or the interactive map. From this it can be seen that using the map on its own to find objects was only chosen by a small number of people (7.3%) compared to those who used only the keypad (36.5%) which was the most popular of these three options. It should be noted that these people may also have taken a guided tour.

	<i>Number choosing feature</i>	<i>% MMG users</i>
Keypad <u>only</u>	155	36.5
<u>Both</u> keypad and interactive map	141	33.2
Interactive map <u>only</u>	31	7.3

Table 24 Percentage of guide users choose to use the keypad and/or map to find objects

	<i>Under 12</i>	<i>12-18</i>	<i>19-24</i>	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>	<i>65 and over</i>	<i>All over</i>
Keypad only	0.0	35.7	34.8	40.8	41.9	28.6	36.4	33.3	37.4
Keypad and map	60.0	42.9	37.1	30.3	27.9	45.2	27.3	0.0	32.8
Map only	0.0	14.3	5.6	7.0	9.3	7.1	0.0	11.1	7.1
N	5	14	89	142	86	42	22	9	409

Table 25 Percentage of guide users choosing to use the keypad and/or map by age (n=409)

Looking at the percentages in terms of age shows that using the keypad only was most popular amongst those aged under 12 (60.0%), 25 –34 (40.8%) and 35 – 44 (41.9%), using both the keypad and the map was most popular with those aged 12-18 (42.9%) and 45-54 (45.2%). The largest percentages of people using the map only were found in the 12-18 (14.3%) and the 65 and over (11.1%) ranges. These last two figures and those for the under 12 age range may not be so reliable due to the small number of users falling into these groups. If instead the age range 19-54 is considered, which makes up 87.8% of the guide users, then the highest percentage of people in a particular age range that used the map were aged 35-44 (9.3%).

	<i>Keypad only</i>	<i>Keypad and map</i>	<i>Map only</i>	<i>N</i>
Arabic	16.7	50.0	0.0	6
English	34.5	37.8	5.4	148
French	38.9	38.9	5.6	18
German	25.0	50.0	15.0	20
Italian	36.4	30.3	9.1	33
Japanese	57.1	22.9	8.6	35
Korean	25.5	21.6	5.9	51
Mandarin	42.9	28.6	7.1	42
Russian	33.3	33.3	33.3	3
Spanish	40.6	31.3	7.8	64
<i>All languages</i>	36.7	32.9	7.1	420

Table 26 Percentage of guide users choosing to use the keypad and/or map by guide language (n=420)

Table 26 shows the percentage of guide users choosing the keypad and/or map features by the language of the guide they were using. The largest use of the keypad and map together was found amongst those using the German and Arabic languages (50.0% each). Using the keypad only was most popular with the Japanese language guide where 57.1% of users used this feature. Using the map on its own to find commentaries were most popular amongst Russian language users (33.3%) and German language guide users (15.0%). Note however, the small number of Russian and Arabic language guides that these percentages are based on.

Difficulties experienced

Of the 425 people completing the questionnaire 246 (57.9%) reported that they had encountered no difficulties at all while using the guide. 100% of respondents under the age of 12 reported no difficulties but all those people using the Russian language guide reported some difficulties (see Table 27). It can be seen also from this table that around 50% of people using the Korean, Mandarin, English and Japanese language version of the guide experienced difficulties with it.

	<i>% reporting no difficulties</i>	<i>Number using language</i>
Russian	0.0	3
Korean	47.1	51
Mandarin	50.0	42
English	50.7	148
Japanese	54.3	35
Italian	72.7	33
Spanish	73.4	64
German	75.0	20
French	77.8	18
Arabic	83.3	6

All languages	58.1	420
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Table 27 Percentage of users reporting no difficulties with the guide by language (n=420)

Table 28 and Table 29 show the difficulties reported divided into those that might have been experienced by all users and those that apply to the subset of people who used the interactive map or guided tours.

	<i>Number reporting difficulty</i>	<i>% MMG users</i>
I could not easily find the objects in the galleries that had a commentary available on the guide	45	10.6
The guide stopped working	16	3.8
I could not see the images or read the text on the screen easily	10	2.4
I had difficulty interpreting the icons	9	2.1
The instructions were not clear	8	1.9

Table 28 Percentage of guide users reporting a difficulty when using the guide (n=425)

	<i>Number using the feature</i>	<i>Number reporting difficulty</i>	<i>% MMG users using the feature</i>
I found it difficult to use the	172	44	25.6

interactive map			
I found it difficult to orientate myself using the interactive map	<i>172</i>	<i>37</i>	<i>21.5</i>
I had difficulty following the spoken directions in the guided tours	<i>293</i>	<i>12</i>	<i>4.1</i>

Table 29 Percentage of guide users reporting difficulties when using the interactive map or guided tours

Across all respondents the main difficulty reported related to finding the objects with commentaries available on the guide (10.6%). Since this option might relate to problems occurring while looking for objects using the keypad and/or map or while following a guided tour the percentage has been calculate using the total number of respondents. If this number is used for all the difficulties then the next two problems relate to using the interactive map (10.4%) and orientating oneself using the map (8.7%). (Difficulty following directions in the guided tour ranks fifth with 3.8%)

However, if the percentage is calculated using only those who said they used the feature then the highest percentage of those reporting difficulties was found amongst those who had used the map. Here over a quarter of users (25.6%) had difficulty using the interface and over a fifth (21.6%) had difficulty orientating themselves. There is a discrepancy however, between the number of people who reported using the interactive map only (31) and those reporting a difficulty with using the map or orientating with the map (44 and 37 respectively). This may suggest that some people tried to use the map but found they could not. However, this information cannot be ascertained from the data.

Ergonomics and navigation

Satisfaction with the guide

The guide users were asked to rate their general level of satisfaction, with their experience using the guide, on a scale from 1 (not satisfied) to 7 (very satisfied). The average reported

overall satisfaction rating for the multimedia guide was 5.92 (Table 30). The lowest average score was given by the 65 and over age range at 5.63 with the under 12's scoring the guide 7.00. However, these groups were the smallest in the sample with 8 and 5 cases respectively and across the majority of age ranges the rating appeared fairly consistent.

	<i>Mean</i>	<i>N</i>
What is your overall satisfaction with the multimedia guide?	5.92	415

Table 30 On a scale of 1 (not satisfied) to 7 (very satisfied), based on your experience today, how would rate your overall satisfaction with the Multimedia Guide?

A number of aspects relating to the general ergonomics of the device were rated by respondents on a scale from 1 (very poor) to 7 (excellent). The mean ratings for these characteristics are given in Table 31.

	<i>Under 12</i>	<i>12-18</i>	<i>19-24</i>	<i>25-34</i>	<i>35-44</i>	<i>45-54</i>	<i>55-64</i>	<i>65 and over</i>	<i>All ages</i>
<i>Screen size</i>	7.00	6.50	6.15	5.89	6.01	6.02	6.38	6.38	6.06
<i>Ease of use</i>	6.80	6.14	5.82	6.03	6.09	5.88	5.95	5.75	5.99
<i>Display quality</i>	6.60	6.43	5.83	5.87	5.81	6.00	6.35	6.38	5.92
<i>Size and weight</i>	4.80	5.29	5.02	5.40	5.61	5.74	5.90	6.00	5.42
<i>Headphone comfort</i>	5.40	5.21	5.19	5.12	5.45	5.68	5.85	5.25	5.31

Table 31 On a scale of 1 (very poor) to 7 (excellent), how would you rate?

Overall, the device scored best for its screen size and its ease of use and poorest for the size and weight of the device and the headphone comfort. However, when looking at the rating for ergonomics of the device by age then there is some evidence of a pattern in the ratings given. In particular, there is a slight overall downward trend in the rating given for ease of use and a

slight overall upward trend for size and weight and headphone comfort. The ratings given for screen size and display quality are slightly higher from younger and older guide users with the ratings dipping around the 25-34 and 35-44 age groups (respectively). One explanation for this may be the type of technologies that different age groups use outside of their museum experience which could colour their expectation of the device.

Future content

The questionnaire asked respondents how interested they would be in new content, for example, more or contextual information about objects (see Table 32) and new guided tours (see Table 33). No strong correlation was found between the users' age and interest in additional information though interest in games generally decreased by age. A number of respondents wrote comments on the questionnaire suggesting that games should be added for children. However, this guide is aimed at adults and a different version of the Multimedia Guide which has been specifically designed for use by children exists and contains some simple games.

	<i>Mean</i>	<i>N</i>
Add factual information	5.39	378
Add slideshows of related images	5.07	386
Add information about conservation	4.65	374
Add music	4.17	368
Add interviews with curators	3.96	367
Add interactive games	2.88	365

Table 32 On a scale of 1 (not interested) to 7 (very interested) how interested would you be in the following additional content?

	<i>Mean</i>	<i>N</i>
Highlights tour	6.08	383
Classical World tour	5.92	386
Early and Ancient Britain tour	5.67	378
Asia tour	5.31	367
Enlightenment tour	5.22	359
Middle East tour	5.18	363

Table 33 On a scale of 1 (not interested) to 7 (very interested) how interested would you be in the following guided tours?

Table 34 to Table 39 shows the relative popularity for the suggested new guided tours by language. Looking at the results tours in general seem to be least popular amongst the Japanese language user and most popular with Mandarin language guide users. The Highlights tour is most popular with those using the German language guide rating it the highest. This is interesting as the German language users took least number of guide tours out of the current selection. Apart from the Highlights tour, English language guide users which make up the largest percentage language (35.2%), rated the Classical World tour and the Early and Ancient Britain tour highest.

	<i>German</i>	<i>Arabic</i>	<i>Mandarin</i>	<i>Korean</i>	<i>Spanish</i>	<i>French</i>	<i>Italian</i>	<i>English</i>	<i>Russian</i>	<i>Japanese</i>	<i>All</i>
Highlights tour	6.50	6.33	6.33	6.27	6.25	6.11	6.08	6.05	6.00	5.03	6.08
N	20	6	39	49	57	18	25	131	3	33	381

Table 34 Rating for the Highlights tour by language (n=381)

	<i>Mandarin</i>	<i>Spanish</i>	<i>French</i>	<i>Italian</i>	<i>Russian</i>	<i>English</i>	<i>Korean</i>	<i>German</i>	<i>Japanese</i>	<i>Arabic</i>	<i>All</i>
Classical World tour	6.28	6.22	6.22	6.19	6.00	5.91	5.89	5.45	5.18	5.17	5.93
N	39	58	18	26	3	133	47	20	33	6	383

Table 35 Rating for the Classical World tour by language (n=383)

	<i>Mandarin</i>	<i>English</i>	<i>Korean</i>	<i>Russian</i>	<i>French</i>	<i>Spanish</i>	<i>German</i>	<i>Italian</i>	<i>Arabic</i>	<i>Japanese</i>	<i>All</i>
Early and Ancient Britain tour	6.39	5.92	5.67	5.67	5.61	5.38	5.21	5.17	5.17	5.06	5.67
N	38	131	46	3	18	58	19	24	6	32	375

Table 36 Rating for the Early and Ancient Britain tour by language (n=375)

	<i>Mandarin</i>	<i>Russian</i>	<i>Spanish</i>	<i>Korean</i>	<i>English</i>	<i>German</i>	<i>French</i>	<i>Japanese</i>	<i>Arabic</i>	<i>Italian</i>	<i>All</i>
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Asia tour	6.38	6.33	5.65	5.44	5.38	4.68	4.65	4.48	4.40	4.24	5.31
<i>N</i>	37	3	55	48	128	19	17	31	5	21	364

Table 37 Rating for the Asia tour by language (n=364)

	<i>Russian</i>	<i>French</i>	<i>Mandarin</i>	<i>Spanish</i>	<i>Italian</i>	<i>English</i>	<i>Arabic</i>	<i>German</i>	<i>Korean</i>	<i>Japanese</i>	<i>All</i>
Enlightenment tour	6.00	5.78	5.75	5.61	5.41	5.37	5.00	4.74	4.55	4.19	5.23
<i>N</i>	3	18	36	54	22	125	5	19	44	31	357

Table 38 Rating for the Enlightenment tour by language (n=357)

	<i>Russian</i>	<i>Spanish</i>	<i>Arabic</i>	<i>English</i>	<i>Mandarin</i>	<i>German</i>	<i>French</i>	<i>Korean</i>	<i>Italian</i>	<i>Japanese</i>	<i>All</i>
Middle East tour	6.33	5.67	5.50	5.49	5.22	5.20	4.65	4.64	4.50	4.48	5.19
<i>N</i>	3	54	6	126	36	20	17	47	20	31	360

Table 39 Rating for the Middle East tour by language (n=360)

Adult guide

Test dates:	2 nd , 7 th , 8 th , 9 th February 2010
Location:	The British Museum, Great Russell Street, London WC1B
Purpose of test:	Identify usable designs and usability issues with Multimedia Guide.
Version tested:	Version in general use on day of study.
Areas tested:	Welcome message, Ancient Egypt guided tour, keypad and interactive map.
Test facilitator:	Sarah McDaid

Methodology

A total of 9 adults participated in the study. The group was made up of five females and four males with ages ranging from 19 to 57. None of the participants had used the multimedia guide before and one had never used the internet.

Participants were observed using the Ancient Egypt guided tour and asked to perform a number of tasks using the map and keypad. Participants were encouraged to use the guide as they would if visiting the museum on their own. At relevant points throughout the study, participants were probed in order to clarify unexpected actions and/or problems that they were observed having with the tasks and which they seemed unable to solve themselves. Test sessions lasted between 60 and 90 minutes.

Tasks

Participants were asked to complete the following tasks at the start of the study:

- listen to the welcome message;
- identify the purpose of the icons at the top and bottom of the screen;
- identify the different ways in which to use the guide;
- select the option they would like to do first.

They were then asked to complete the following tasks one at a time but in an order that was determined by their first choice option:

- take the Ancient Egypt guided tour;
- find an object with a stop icon and listen to the commentary using the keypad;
- enter an incorrect stop number into the keypad and correct it;
- find the current room on the interactive map, then also using this map find an object in an adjacent room and listen to the commentary;
- using the guide, first, find room 95, where there is a collection of Chinese pottery and then find room 65, where there is a collection of Egyptian mummies;

‘Find room 95’ was selected as a task as the floor layout and the sequence of room numbering in the museum can make it difficult to find, particularly for those unfamiliar with the museum such as first time visitors who make up the highest proportion of both museum visitors and multimedia guide users. Therefore, if it became obvious that the participant was struggling to complete this task using only the interactive map on the guide they were prompted to use whatever means they would normally use when in the museum to get to the room. Some participant did this without being prompted and it included following the general museum signage, consulting other maps situated around the museum and asking the museum staff.

There was not always sufficient time to complete the task of going to room 65 to view the Egyptian mummies. In these cases the session was terminated so that the study did not run over 90 minutes.

General comments

Although a number of usability issues are identified in this report it should be noted that they are of a relatively low risk level as they did not stop the participants completing their tasks or cause them not to enjoy the experience of using the guide. A list of specific issues regarding the Ancient Egypt guided tour (hard to find objects etc) is included in the appendix.

Generally, the participants could be divided into those that liked to be guided around the museum and chose the tour, and those that preferred to wander around in a less structured manner. The guided tour was the most popular choice for the first thing to do with 6 participants choosing it and three participants choosing to use the interactive map.

General satisfaction with the multimedia guide

The participants enjoyed using the guide generally and the majority described it as fun to use. However, the younger participants (under 21) described it slightly differently with one saying that he saw the multimedia guide as more of a necessary tool for visiting the museum rather than calling it an item that was fun. When asked if they would recommend the guide to a friend again most participants said they would but a different younger user said that they would recommend it to a parent rather than their peers. ('My mother lives for this sort of thing.')

Ergonomics and quality of interaction

The overall experience that users had of the multimedia guide was determined to some extent by the initial settings for volume and brightness, the comfort of the headphones and the response of the touch screen.

Volume and brightness

The handsets were not all set to the same default maximum volume and brightness when they started up. Due to this they were sometimes too quiet for users to hear directions etc clearly or they were not bright enough for the user to see the screen properly. It should be possible to have the devices set to default levels for the volume and brightness so that it is not necessary to rely on a member of staff checking before they hand out the device what the levels are. It may be worth investigating whether these settings can be defaulted to particular levels (for example, through the multimedia guide software, operating system or through firmware). The user cannot adjust the volume above the maximum setting.

Headphone comfort

The headphones were too big for some users and fell off at least two of the adults. A number of adults commented on this and there were comments also about how the headphone lead kept getting tangled up with all the other 'dangling wires' and a suggestion that the headphones should be wireless. One adult also suggested that they would rather be able to use their own headphones.

Size and weight

Again the younger participants thought that the guide was a bit thick and that it 'should be more like my iPod Touch'.

Responses and touch screen

The majority of the time the participants found it easy to use the touch screen and had no problem with response times or the accuracy of the stylus as a pointing device. However, occasionally there were some issues regarding the response of the system to user input.

Firstly, the touch screen itself did not always seem very sensitive. This was sometimes only apparent in particular areas of a screen. Secondly, it was observed that sometimes when the system suggested that the user 'touch the screen to continue' there was a delay between the user clicking the screen and the presentation continuing. The effect of this 'slow' response was that the user clicked on the image repeatedly in quick succession. Because of this, when the system responded and displayed for example, a menu which included 'About this object' and 'Continue' the user was still clicking in the middle of the screen and therefore selected 'Continue' without seeing the screen or even noticing that they had selected continue. To recover from this error it was necessary for the user to understand that they had gone ahead in the tour, why they have gone ahead and how to get back to the previous page.

This could have been caused by an insensitive touch screen but another possible reason is that although an audio/visual file appears to have finished (that is, it is silent) the file itself has not ended and the system does not accept input until the end of the file (or a particular point in the file). The user clicks on the screen as soon as the audio ends, but nothing happens so it seems like the response is slow. If this is the case then this issue could be resolved by ensuring that audiovisual files are cropped correctly.

Another user commented that the number of clicks needed to get information about an object was inconsistent (and annoying). They did not give a specific example and therefore it is not clear if this is a similar issue to the one above or is to do with the design of the interface.

The welcome message

After listening to the welcome message most of the participants were fairly or very confident that they would be able to use the guide successfully. Three people chose the 'How to use the guide' facility before continuing.

It was apparent however, from some of the comments made that participants did not necessarily concentrate intently on the message. In particular, one participant stated that they didn't listen to the welcome message and assumed that they would be able to learn how to use it as they went along. Another admitted that they just listened out for the things they were interested in rather than concentrating on the whole message.

There was a general feeling that the welcome message was a 'bit too long' with one participant saying that the instructions in the message were not clear. Even if they were happy with the message in general a number of participants thought some of the images flashed on the screen too quickly to register what they were. (These were mostly regarding the layout of the museum and the zooming in and out of the map.)

When asked if an audio visual introduction using different colours to show how the museum was laid out would be useful, five out of nine people thought it would be useful. However, others said it wouldn't be or that it would make the introduction much too long and one other thought that it would only be useful if the same colour coding was also used throughout the museum 'otherwise it would be confusing'.

Based on these comments usability may be improved if the welcome message gave the absolute minimum amount of information necessary to get started with the guide, less images were used and they remained on the screen for a longer period of time. One way to do this might be to simply show the main interaction icons and then direct the user straight to the 'How to use guide' facility where they can find out how to use those aspects of the guide that they are interested in.

In that way the information will be presented to the user in smaller chunks making it easier for them to absorb the information. At the same time those who wish to start using the guide straight away can do so and not have to listen to the introduction.

Interface and interaction icons

The interface was intuitive and required minimal training for people to use. It was generally described as useful, fun and enjoyable to use.

Interaction icons at the top and bottom of the screen

Immediately, after listening to the welcome message the participants were shown an image of the multimedia guide interface and asked to identify the icons at the top and bottom of the screen (see Figure 21). At the top of the screen these were: the back button which took the user back to the previous screen; the link to the homepage; the link to the keypad; and the link to the interactive map. At the bottom of the screen they were expected to identify: the pause button, the rewind and fast forward buttons and volume control button.



Figure 21 Image used to check participant understanding of interaction icons

With the exception of the rewind and fast forward buttons the icons were generally understood. Even an older participant who had not used the internet and interpreted the 'Homepage' icon as a picture of the Museum and the 'Keypad' icon as a 'Calculator' was able to use the keypad and complete a tour without the true meaning of the icons being explained to them.

Rewind and fast forward buttons

The exception to this was the understanding of the icons for rewinding and fast forwarding the directions etc. which were only described correctly by 3 out of the 9 adults. One thought they would take you straight to the next object or previous object in the guided tours, another thought they would take you up and down a level in the map. This suggests that they assumed that these

buttons would be used for those parts of the guide that had either caught their attention during the welcome message or they intended to use.

During the guide tour, a number of participants got too far ahead, tried to go back but clicked the back button too often and ended up at the start of the tour again. However, it was apparent that they did not understand the meaning of the fast forward button as they thought that they had to listen to the whole tour again up. A number of people commented that they did not know what these particular icons meant as they had not been explained in the welcome message.

Back button

An issue was discovered with the back button during both the adult and the children's guide test. The back button only allows the user to go back 8 times/screens. This was quite often not enough as repeated clicking could take someone for example, to the end of the guided tour either by accident or out of curiosity. This would happen especially when they had just started using the guide and were trying to find out how it worked by experimenting with the icons.

They would then try to use the back button to return to their starting point only to find that it would not take them all the way back. This meant that in order to get to the correct place they had to understand that they had to go to the homepage and reselect the guide and then fast forward all the way to the place they wanted to be. This was an issue for a number of people and the facilitator in the end had to help them.

While this may have a memory overhead, if at all possible the number of times that the back button can be used should be increased. Ideally, there should be no restriction on the number of times it will work as the participants were not able to understand why it stopped working and did not build up a sufficient model of the system to work around the limitation in the short amount of time that they were using the system.

Following a guided tour

The guided tours were the most popular aspect of the multimedia guide. Six out of the nine participants chose to take a guided tour first and eight out of the nine participants named it as the feature of the multimedia guide that they preferred. (The ninth participant thought that using the keypad was the best option.)

The guide tour was the first choice with participants for a variety of reasons including that it would:

- be the easiest option;
- take you around the museum without getting lost;
- be the most instructional option.

It was observed also that it gave less assured participants more confidence in using the multimedia guide and it was an easy way for them to learn how to use the interface. Participants thought that there should be more tours, more objects on the tours and some thought there should be more supplementary, commentaries on the objects (but not longer ones). Some of the reasons why people thought that the guided tour was the best aspect of the guide included:

- the images, landmarks and directions which were generally described as very useful;
- the animated room maps which helped the participants orientate themselves;
- the interesting selection of objects which the participants wouldn't normally look at and meant they learnt new things;
- the animated maps in the tour which were sometimes easier than directions for orientating themselves and finding an object in the rooms;
- how easy it was to use (once you got passed the initial long commentary at the beginning of the tour.)

However, there were also some problems with the guided tour. The following aspects did cause some confusion and a list of specific problems with directions etc. is included in the appendix.

A number of participants tried to start the tour using the 'Tour introduction' menu item rather than the 'Begin tour' menu item. The confusion occurred because the introduction states which room the tour starts in.

The other main concern related to images which did not give an indication of the size of the objects. In some cases the participants were expecting an object to be bigger than it actually was which hindered their ability to find the object.

Another issue with the images, and similar to that mentioned in the welcome message, was that some of them would disappear from the screen too quickly. This seemed to be a problem more

often when the participants were listening to directions and walking with the guide hanging around their necks. If they heard an instruction telling them to look at the screen, by the time they had picked the device up the image would be disappearing from the screen.

One participant was concerned that by following the guided tour she was missing out on other information that was contained in the commentary accessible through the keypad. She also suggested that the tour should direct you to the wall text if the information was not in the commentary.

There were also a number of issues with the general museum signage and system of room numbering causing confusion to the participants when they were following the guided tour directions but these are covered in a later section.

Using the interactive map

The idea of an interactive map appealed very much to some of the participants and one third of adults chose to use the map first either to find their way around the museum or to go to a particular room. Overall the maps were considered very useful for orientating oneself in a room, for example while following a tour or when asked to find an object with a commentary in a room. In fact, participants preferred using the map to find these objects and even when specifically asked to identify an object from the stop icon label they would consult the map instead. One user commented that it was easier to use the map than to try to find the icons in the room. Some participants also used the position of objects in a room to orientate themselves on the map.

However, the interactive map was not thought so useful a tool for orientating oneself in the museum as a whole. Ultimately, using the map was most problematic aspect of the guide for most users. When asked what was the worst part of the guide 80% of the participants' answers featured some aspect of using the map.

Whilst three people had chosen the interactive map feature as their preferred first option only one managed to complete the map tasks at their first attempt. After around 15 minutes, when the other two participants had failed to orientate themselves in the museum and it was obvious that they were struggling to use the map, it was suggested that they take the Ancient Egypt tour. Doing the tour instantly boosted their confidence in using the guide and they tried the map tasks again later in the study.

The group as a whole managed to successfully identify which room they were in on the map and find objects with commentaries on the map. However, when asked to find room 95, only two found the room on their own, four found it with help from a member of museum staff (or the facilitator) and the remaining three gave up (and were taken there by the facilitator). The following areas are highlighted as some aspects of the interactive map caused difficulties for the participants.

Expectations of the technology

One issue, that caused misunderstandings regarding the use and functionality of the device, were the expectations that people brought with them about how the interactive map would work and the location based features that the guide would provide. These expectations were expressed in the form of assumptions including that:

- the guide would always show the users current location on the map;
- that they would be able to say/point at where they wanted to go on the map and the guide would direct them there from their current location;
- that movement around the map would be accomplished by pointing with the stylus and dragging the map around;
- that rotating the device from 'portrait' to 'landscape' would rotate the map.

These, in this case unrealistic, expectations of what features a museum guide would include were most likely based on to the specification of handheld devices and location technologies that they were familiar with outside of the museum environment, examples of devices mentioned were the Apple iPod Touch/iPhone and car navigation systems using GPS.

Representation of the museum layout

The museum building has been extended a number of times and the resultant layout is quite complicated for a first time visitor to comprehend even when looking at a large printed map. The museum is made up of three floors (lower, ground and upper) each of which has a number of levels (two, four and three respectively).

This would always be a difficult arrangement to display on a small screen and as expected most people found it hard to build up a mental model of the layout of the museum. Furthermore the multi-level representation of the floors and levels was difficult for them both to understand and use. In particular, many participants had difficulty recognising which floor of the map they were

on and working out how to changing floors. This was no doubt one of the reasons why they found it difficult to orientate themselves within the museum using the map.

Zooming in and out of the map

The younger participants and those more familiar with the use of a magnifying glass as a standard icon for zooming in and out did not have any problems understanding how to use these icons. However, not all participants recognised the icons and it became apparent when observing the majority of people, as they tried to move between the different floors of the museum on the map, that the zoom in and zoom out icons were not very well understood. These icons were not shown on the screen during the welcome message even while the audiovisual explanation of the map talked about zooming in and out.

There are two ways to zoom the interactive map to its highest magnification. One is to click on the general map area repeatedly and the other is to use the zoom in icon at the bottom of the map. Many participants only used the former to zoom in and consequently didn't know how to zoom back out. Often zooming into the map was a side effect of touching the screen rather than an active desire to zoom the map. Many participants assumed that touching the map icon at the top of the screen would take them back to the highest level of the map.

Even when they did know how to use the zoom icons, a number of participants stated that they felt that the map was either zoomed in to too high a magnification, making it difficult to work out where you were in relation to the adjacent rooms, or it was zoomed out too far (to the three floor map) making the representation of the floors too small to be of any use. Most of the participants, who commented on it, thought the zoom in and out facility was too fast and jumped from too small a representation to one that was too big in so few stages that it was confusing.

Scrolling around the map

Scrolling around a floor of the museum on the interactive map was achieved using small arrows at the sides and corners of the map. A number of people said that they initially thought that dragging the map across the screen would move it around rather than clicking on the arrows at the side of the screen.

Apart from an expectation that the device would behave like an iPod Touch as mentioned earlier, another reason why people may have thought that the maps were draggable could be the fact that some participants said they did not notice the scrolling arrows on the map at all due to their very

small size and lack of differentiation from the background. When these arrows were pointed out to them, a number of users said that it would be easier to see these arrows if more colour was used to highlight or distinguish them from the general background of the maps.

Stop number text

As with the arrow icons, used to scrolling around the interactive map, some people commented that they couldn't see the object numbers easily on the map and others didn't notice any of the numbers at all.

Using the keypad

The keypad was easy for all the participants to understand and use. One participant named the keypad as their favourite way of using the guide. In terms of entering stop numbers and amending incorrectly entered numbers study participants had any problems. Participants were asked to find an object with a commentary and listen to it using the keypad. After completing the tasks they were asked if the stop icons were visible.

Expectations

One expectation of the keypad that was not met was that most participants thought that they would be able to enter a room number and receive instructions on how to get to that room (from their current location). This became apparent when they were asked to go to room 95 or wanted to go to a specific room themselves.

Finding the stop icons

The main problem that occurred was therefore not with the keypad itself but with the visibility and location of the stop icons. Quite often participants tried to use the map to find objects with commentaries rather than look for them in the rooms, even requested to do so. There were a number of reasons users gave for why they found the stop icons difficult to find and the map more useful for this task. These included:

- there were so few objects with a stop icon that you spent more time looking for them where they weren't rather than where they were;
- they had forgotten what the stop icon looked like so they weren't sure which objects had commentaries and tried to type in any number they saw;

- they assumed the commentary would be on the most prominent objects in the room but they weren't;
- in room 95 they found the grey stop icons harder to find than the black and white stop icons and thought the 'PDF' numbers by objects were also stop numbers;
- they didn't notice the stop icons on the outside of the cabinet because they thought the icon would be by the objects;
- had to look very closely to find stop icons
- the small stop icons in the cases were hard to see because there were so many other little things in the cases as well.

Museum signage

Participants often commented that they found the museum signage confusing both generally and when objects were named different on the multimedia guide. Specific issues with the guided tour are listed in the appendix. Some other issues which were raised by the participants or observed by the facilitator included:

- often the museum signs and room labels were cluttered and needed more differentiation;
- signs showing the way to rooms were inconsistent, for example, signs pointing the way to rooms 61-63 suddenly changed to 62-63 even though it was still the way to room 61.
- the counter intuitive way that room numbers are placed inside a room but next to the exit such that participants thought that the number referred to the next room;
- the use of directional arrows next to room numbers which reinforces the idea that the number refers to the next room;
- the general lack of visibility of room numbers from the Great Court;
- the order in which rooms are numbered. One of the main problems with finding room 95 was that participants expected it to be next to room 94.

Ideally, the multimedia guide and the museum signage should be fully integrated. Since some of these issues would be hard to resolve it is important to be aware that they can cause confusion in the mind of the multimedia guide users when designing the instructions and directions.

CHILDREN'S GUIDE

Test dates:	15 th , 16 th , 18 th , 21 st February 2010 (School half-term holiday)
Location:	The British Museum, Great Russell Street, London WC1B
Purpose of test:	Identify usable designs and usability issues with Multimedia Guide
Version tested:	Version in general use on day of study
Areas tested:	Welcome message and guided tours
Test facilitator:	Sarah McDaid

Methodology

The test subjects comprised a total of 15 children aged from 4 to 11 years of age. They took the guide in groups made up of between 1 and 4 children with 1 or 2 adults (8 groups). In this study the adults were all parents of one or more of the children in the group. The study was conducted during the schools' half term holiday and the museum was particularly busy during this time. Most of the children had used a touch screen before either on a handheld computer game such as a Nintendo DS or their parent's mobile phone. Only two of the boys (aged 8 and 7) had used an audio or multimedia museum guide before.

Participants were observed using one or more of the guided tours. They were asked to choose from a variable selection of tours in order to ensure that most of the available tours could be observed. The Middle East tour was not included as it was about to be reorganised. Sessions lasted between 45 to 90 minutes. The duration was mostly determined by whether the children (or adults) wanted to do more than one guided tour. As a thank you for taking part the children received a small goodie bag of British Museum children's gift items (value c.£10).

Tasks

Participants were asked to complete the following tasks during the study:

- listen to the welcome message;
- identify the purpose of icons at the top and bottom of the screen;
- select and follow a guided tour.

At the end of the tour a semi-structured interview was undertaken with both the children and adults. The list of questions that were covered is included in the appendix along with a sample of the observation guide used during the study..

General comments

Overall the guide and guided tours were very popular with both the children and the adults. In the end five of the groups took two guided tours and three of the groups took one. Some of the younger children (girl 5, boy5) became tired towards the end of the first tour (by seventh item) and only wanted to do one tour. A number of times the parents did not really want to take a second tour but the children were insistent.

Out of the thirteen tours that were completed, ten were chosen by the children and two were chosen by the parents. The thirteenth tour was the 'Asia' tour which had not been freely selected by the previous groups and so the final group was asked to take this tour.

Quite often even when the parents made a suggestion the children had a strong idea of which tour they wanted to do and generally it was an area that they had an interest in before coming to the museum. The children never wanted to listen to the 'tour information' even if the parents did. Often the older children would set off to start the tour before the parents were ready and had to be called back. This happened throughout the tours as well.

When groups were given a completely free choice the most popular tours were the Early Britain, Americas and Ancient Egypt tours. (The final three groups were asked to choose their first tour from a smaller list to ensure that the Africa, Ancient Greece and Asia tours were taken. As mentioned previously, the Asia tour was not chosen by any of the groups and the last group was asked to take it. If they wished to do a second tour they were given a free choice and both the groups that chose to take a second tour selected the Early Britain tour.)

Overall the parents thought that the guide was appropriate for children in the age range 5-11. In the interview, where the children were in groups the older children tended to answer most of the questions.

General satisfaction with using the multimedia guide

Children

Virtually all the children loved using the multimedia guide and preferred visiting the museum with the guide rather than just walking around looking at objects. They all said that would like to use the multimedia guide next time they came to the museum. The children gave various reasons for liking the guide including because it was fun, it told you what the objects were, it was interesting and it was more interactive. Some of the children also mentioned the puzzles as being what made using the guide preferable.

One of the older children (boy, 11) said he liked visiting both with and without a guide. A younger boy (7) proclaimed that 'audio guides were rubbish' and that he much preferred the multimedia guide. One boy (6), totally unprompted, said that he thought that all school trips should be given the multimedia guides to use when they came because it was better.

Parents

Most of the parents thought that the guide was useful for entertaining the children, in particular the treasure hunt aspect of the tour. One parent thought it successfully slowed down the child (boy, 8) and made him look at the objects and in that way the parents could enjoy looking at the objects on the tour as well. In general they preferred listening to information about an object to reading the wall text. However at the same time, parents in five of the eight groups had mixed feelings about using the guide. Basically, they felt that they were missing out on other objects because the definite route of a guided tour caused the child to become too focused on the treasure hunt aspect of the tour, looking just for those objects on the tour and then moving directly to the next object.

In terms of whether they would hire the guide again some parents said that the price could be an issue if they were hiring the guide for more than one child. Although this ranged from one parent (with one child) saying they would happily pay for the guide (and pay to get into the museum as well) to a group of two parents and four children who said that they would only pay between £1 and £1.50 each. A number of the parents said that they saw the museum as a cheap day out and if you added the cost of a multimedia guide to the cost of travel then it was not longer cheap ('I'd rather spend the money on a cake.'). Some thought that they might be more inclined to hire the

guide, when visiting with more than one child, if there was a family package for hiring more than one guide.

There were a number of suggestions made by the parents which they thought would make their multimedia guide experience more satisfactory. In particular, some of the parents would have preferred not to go back to the multimedia distribution desk in order to start a new tour and one of the parents said that it would be useful to have an option on the guide which allowed them to get information about adjacent objects as well. In effect they were requesting that the keypad feature should be available.

General use of the guide

Even one four year old girl skipped happily around the museum with the guide around her neck, although she was too young to fully use/understand the guide. However, while at the start of the tour she was asking her mother what to do next ('Click on continue. The curly c') by three quarters of the way through the tour she was telling her mother that she knew what to do and didn't want help.

Only one seven year old girl didn't really seem to be able to understand how the guide worked. She tapped on the guide repeatedly and so that she kept getting to the end of the tour and not knowing how to get back. This wasn't helped by the fact (as detailed in the adult study) that the back button will only take the guide back eight screens. (In this group of three children and two parents, the parents were absorbed in the adult commentary and keeping up with the other two children.)

Welcome message and 'How to use the guide'

After the welcome message a number of groups chose to listen to how to use the guide again before continuing. In the eight groups who did the study the parents tended to listen to the 'How to use the guide' feature more than the children. In total the parents in five groups and children in three of these groups listened to the instructions again.

Generally, the younger children required more help from their parents unless the older child got too far ahead in the tour in which case they asked for help also. However, there were a number of occasions when the children/parents needed help from the facilitator. One child managed to get into the adult guide (using the back button?) and if they had got more than eight screens ahead

the facilitator had to help children and parents to get back to the correct place (because of the eight screen back button limit).

Ergonomics and interaction

The main issue for the children (as with some of the adults) was the fit and comfort of the headphones. In particular, the headphones were too big for quiet a few of the children (aged 4 – 11 years old) and they constantly fiddled with them to keep them from slipping off their heads. Sometimes the headphones slipped off and the children left them around their necks rather than put them back on which meant of course that they couldn't necessarily hear the guide.

Touch screen and stylus

None of the children had any problems using the stylus. (The younger children poked the stylus into every crevice and hole that they found.) Children used their fingers to point at the screen occasionally, mostly when they were doing the puzzles. However, when asked if they used their fingers they all said 'no' and one father was told by his daughter (5) that he should not be using his finger.

However, the touch screen was not always as responsive as would have been liked. One or two of the children commented that sometimes they had to push the touch screen quite hard for it to work. Once or twice children were observed having difficulty doing one of the games when the option chosen was not highlighted or the device registered a different, incorrect option had been selected. This caused a little confusion at the time but did not stop the children enjoying the experience.

It was observed that there seemed to be variable sensitivity on some areas of the screen. This meant that the guide would work better for the menu items in the centre of the screen but be less sensitive towards the edges. This manifested itself mainly when a child was trying to play one of the games.

Size, weight and display

There did not seem to be an issue with the actual weight of the device. However, sometimes the lanyard could not be shortened enough to suit the smaller children.

The children all said that they had no problems seeing what was on the screen.

Volume and brightness

The issue concerning the default setting for the volume and brightness that exists for the adult guide is also relevant for the children's guide. However, based on the previous study experience the children were all asked to check that the volume of the guide was not too loud or too quiet before starting the tour. There were a number of instances when the audio on the guide stuttered.

Interface and interaction icons

The children liked the colour of the interface. They also loved the 'funny' alien character in the guided tours apart from one boy (7) who spent the most of the time lying on the floor playing the games when asked if he liked the alien said 'what alien?'. The children also mentioned that they liked the stories that the objects told about themselves (especially the chess men) and the music. After listening to the welcome message, and optionally the 'How to use the guide' feature, most of the children aged seven and over understood most of the navigation icons and the volume control. Even younger children who had help from their parents in the early stages of the study quickly learnt the meaning of the buttons. Most children were shown how to get information about the object the first time.

The exception, as with the adult guide, were the rewind and fast forward buttons which some children thought, when asked, would take them back to the previous or on to the next object on the tour. This was not completely correct but those who did use the buttons appeared to use them correctly once they were doing the tour. Most people use the back button to go back not the rewind button.

The reason that the children needed to use the back button was that they tended to touch the screen quite often, maybe absent mindedly, and so they were often slightly ahead in the tour.

Taking the guided tour

The general consensus was that the tour was easy to follow and that the directions, landmarks and images of objects were equally useful. The exception to this was where the object that was being looked for did not look like the image or the object had been removed from the case for another exhibition. This is covered in detail in a later section and a full list of problems that occurred during the guided tours is included in the appendix.

As has been mentioned earlier, the choice of tour was done in the majority of cases by the children who made the decision ten out of twelve times. In all the groups the children lead the way and enjoyed the treasure hunt aspect of the guided tour. In only one group of a girl (7) and her mother did the mother lead the way more than the child. However, towards the end of the tour the girl took the lead.

Out of the 120 objects that the groups looked at 106 were objects on the tour. Most objects, not on the tour, were only glanced at as they party moved on to the next option. Often the parents called the child back to look at something. The only exception to this was the mother and daughter (7) group where the mother was leading the tour. In terms of engagement with the object, while they listened to most of the commentaries on the tour, in terms of for example, walking around the object, looking intently at it or reading the wall text this occurred in about at about a quarter of the objects.

Identifying objects on the tour

The only real difficulty with the guided tours came when an object was missing or the image on the guide did not look much like the object in the case. A complete list of these issues and some recommendations regarding these issues is included in the appendix.

When objects were missing it became particularly problematic to find the next object on the tour as most directions start at the previous object. This caused confusion for the groups taking both the Americas and the Africa tour.

The Hoxne Hoard image also caused difficulty as the display did not look like the image. A number of families overshot the case. In addition, the name of the object was not displayed on the handset while they were looking so they could not refer to the labelling in the cabinets as they could not remember what the object was called.

Interaction within the group

The interaction between parents and children depended to some extent on whether the adult was listening to the adult commentary or the children's commentary. As mentioned earlier, some adults wanted to listen to the adult commentary but found that the children were quickly moving on to the next object as the children's commentary was shorter. Therefore, in order to keep track up with the children they had to listen to the children's one. Those adults who continued to listen

to the adult commentary interacted much less with the children, unless the children required help with the guide.

Where a parent or parents were visiting with one or two children they were more likely to try and engage the children in discussion about the objects on the tour or more generally in the museum. Generally the interaction which took place between the parents and children was initiated by the parent. These interactions can be categorised as follows:

- giving directions on which route to take on the tour;
- helping a child to use the guide;
- identifying objects on the tour;
- drawing the child's attention to an object e.g. 'Look, can you see?';
- asking the child about the game e.g. 'What do you have to do?';
- laughing and joking about something that the alien character said.

Where the children were in groups of two or more they tended to behave in two ways. Either they all worked together or they worked in isolation of each other.

An example of the former was a group of four girls (aged four, six, seven and eight). The three older girls were working in unison and hunting for objects together, discussing the objects and the games, and helping each other (and the four year old) to use the guide. This was the group that didn't notice the games until the end of the tour and then went back to do all the games at the end. The mothers in this case were listening to the children's commentary and contributed to the children's discussion (and also helping the four year old to use the guide).

An example of the latter style of working was in a group made up of an eight year old girl, a seven old girl and a seven year old boy. They were hardly interacted with each other at all. The adults were listening to the adult commentary and were not drawing the group together. The eight year old girl was following the tour, the seven year old boy was playing the games and the seven year old girl was very quiet and kept tapping the guide but did not really understand how to use it. (The facilitator had to keep putting it back to the beginning of the tour for her.)

Content of the guide

In six groups one or more parents listened to the children's commentaries (although as mentioned before some listened to the adult commentary at the beginning and later switched). In the other two groups the adults either listened to a mixture or started with the children's and changed to the adults.

Generally, if the mother and father were both in the group the mother listened to the children's commentary and interacted with the child and the father didn't. Most parents who listened to the children's commentary said that wanted to listen to the adult commentary but almost immediately realised that the adult commentary was longer and the children had moved on to find the next object before their commentary had ended. Therefore, in order to remain synchronised with the children they had to listen to the children's commentary.

Level of commentaries

Those parent who listened to any of the adult commentaries thought that they were okay but one parent thought they were 'a bit simplistic'. They thought the children's commentaries were also fine and suitable for the children. Some parents were observed laughing with their children over the content.

Those children, who were engaged with the actual tour (that is, not just playing the games) listened either to all or most of the commentaries. The general opinion was that the children listened to less of the commentary as they got tired towards the end of the tours. Other parents said that the children sometimes accidentally clicked the touch screen before they had finished listening and so continued to the next object without hearing all the commentary.

Most children and parents said that there were no words that they didn't understand. The children especially seemed unwilling to admit that they had not understood content. However, parents were observed explaining certain words to their children including 'bog' and 'flagon' (both in the Early Britain tour).

On one other occasion a parent had to explain to the children what the 'multimedia icon' (stop icon) mentioned in the directions was (Africa tour). Also on the Asia tour, a reference to the 'multimedia icon' was used to identify an object. In both case the confusion was caused because this icon is not introduced in the welcome message or the 'how to use the guide' sections of the

guide. Another parent was also heard to explain the word 'partition' that occurred in the directions for the Early Britain tour.

Length of commentaries

Most parents thought that the children's commentaries were about the right length and one parent thought they could be a bit quicker. However, one boy (10) thought that they were a bit long. One parent would have preferred if there was a short introduction and then longer supplementary information on an object that they could choose if they wanted to listen to it.

Games

Once they found them most children played all the games and wanted more games to be included. One boy (7) didn't listen to any of the object commentaries and spent the whole tour playing games while the girl (8) followed the tour intently.

However, some of the children (and adults) did not find the games until the very end of the tour.

Sometimes this seemed to be because the children were very keen to find the next object above anything else and other times it was because the naming of the game did not imply that it was anything other than more information about the object. The game named 'What is it?' was mentioned as being confusing.

One group of children who found the games at the end of the tour then went through the tour on the guide and played all the games on their own, that is, without their parents needing to help them navigate around the guide.

Some of the children suggested that there should be new games such as 'walking the alien around the exhibition with the pen' (boy, 8). Games mentioned as being their favourite ones were 'odd one out', 'what am I?' and the chess game.

APPENDIX G BRITISH MUSEUM SURVEY

Multimedia Guide survey

English

Q1 Is this your first ever visit to the British Museum? (Mark one response)

- Yes, I have never been to the British Museum before
- No, I have visited in the past 12 months
- No, I have visited between 1 and 2 years ago
- No, I have visited between 2 and 5 years ago
- No, I have visited before but more than 5 years ago

Q2 With how many people, including yourself, did you visit the Museum today? (Write in number)

Q3 How many of these were children under the age of 10? (write in number)

Q4 How many Multimedia Guides in total did you and your group rent today? (Write in number)

Q5 Why did you rent the Multimedia Guide today? (Mark all that apply)

- I often/always take audio/multimedia guides when I visit museums
- My visiting companion/child wanted to take the guide
- Someone recommended it to me
- I have never taken a guide before and I was curious to try it out
- I wanted a quick guide to the Museum
- I wanted to better understand the objects exhibited in the Museum
- I did not want/do not like to read brochures and wall text
- Other, please specify _____

Q6 How did you find out about the Multimedia Guide? (Mark all that apply)

- A Museum employee at the Information desk told me about it
- I noticed the Multimedia Guide distribution desk in the Great Court
- I noticed the Multimedia Guide distribution desk near the Parthenon Gallery
- I saw other visitors using the Multimedia Guide
- I expected there would be one and looked for it
- I found out about it on the British Museum website
- I saw it advertised in the press
- Other, please specify _____

Q7 Korean Air is the sponsor of the Multimedia Guide. Were you aware of this? (Mark one response)

- Yes No

Q8 On a scale of 1 to 7, how would you rate:

a. The amount of time you had to wait to collect a Multimedia Guide?

Too long 1 2 3 4 5 6 7 Just right

b. The instructions provided by the Museum staff at the distribution desk?

Not at all useful 1 2 3 4 5 6 7 Very useful Not applicable

Q9 Which of the following features of the guide did you use? (Mark all that apply)

- I took the Parthenon guided tour
- I took the Korea guided tour
- I took the Ancient Egypt guided tour
- I used the interactive map accessible at the top of the screen to find objects in the Museum
- I used the keypad to find information about objects in the Museum
- I used the "How to use the guide" facility

Q10 The Multimedia Guide covers over 200 objects. Approximately, how many objects did you review using the guide during your visit today? (Mark one response)

- None 1 - 20 21-50 51-100 More than 101

Q11 Thinking about the commentaries that were available for each object, did you mostly ... (Mark one response)

- Listen to all of them right through to the end
- Listen to most of them right through to the end
- Listen to some of them right through to the end
- Didn't listen to any commentaries

Q12 If you did not listen to all of the commentaries right through to the end, please tell us why not.

Q13 What did you think of the level of the commentaries? (Mark one response)

- It was too complicated for me
- It was a bit confusing, but I understood most
- It was aimed at me
- It was a bit basic, but I enjoyed it
- It was too simplistic

Q14 On a scale of 1 to 7, where 1 is 'very poor' and 7 is 'excellent', how would you rate:

	Very poor							Excellent
	1	2	3	4	5	6	7	
a. Ease of use	1	2	3	4	5	6	7	
b. Size and weight of handset	1	2	3	4	5	6	7	
c. Screen size	1	2	3	4	5	6	7	
d. Quality of screen display	1	2	3	4	5	6	7	
e. Headphone comfort	1	2	3	4	5	6	7	

Q15 Which of the following difficulties, if any, did you encounter while using the Multimedia Guide today? (Mark all that apply)

- I did not encounter any difficulties
- I could not easily find the objects in the galleries that had a commentary available on the guide
- The instructions were not clear and I did not know how to use it
- I had difficulty interpreting and/or using the icons
- I could not see the images or read the text on the screen easily
- I found it difficult to use the interactive map (e.g. scrolling, zooming in and out, selecting objects)
- I found it difficult to orientate myself using the interactive map
- I had difficulty following the spoken directions in the guided tours
- The guide stopped working
- Other, please specify _____

Q16 Approximately, how long did you spend ... (Write in numbers)

- a. In the Museum? _____ hours _____ minutes
- b. Using the Multimedia Guide? _____ hours _____ minutes

Q17 Based on your experience today, what is your overall satisfaction with the Multimedia Guide? (Mark one response)

Not satisfied 1 2 3 4 5 6 7 Very satisfied

Q18 We are considering adding more content to the Multimedia Guide.

On a scale of 1 to 7, please rate how interested you would be in the following content:

	Not Interested							Very Interested
	1	2	3	4	5	6	7	
a. Interviews with curators	1	2	3	4	5	6	7	
b. Information about object conservation	1	2	3	4	5	6	7	
c. More factual information (dates, context, etc.)	1	2	3	4	5	6	7	
d. Music extracts related to the objects	1	2	3	4	5	6	7	
e. Interactive games	1	2	3	4	5	6	7	
f. Slideshows of related images	1	2	3	4	5	6	7	

Adult guide evaluation: observed problems on Ancient Egypt tour

Object/ area around which the problem occurred (9 tours taken)	Times problem occurred	Difficulty	Observations	Recommendation
Starting the tour	1	Misread map of Great Court	A participant missed room 4 completely because they thought the side galleries were also part of the Great Court.	Distinguish different areas of the map more clearly.
	3	After reading Tour Information people tried to do the tour without selecting 'Begin tour'.	Tour Information says that the tour starts in room 4. After reading this some people thought that they had to find room 4 on their own without selecting 'Begin tour'. Either by just walking around and looking for a room labelled '4' (from the Great Court) or by looking for the word 'Egypt' on the interactive map.	Ensure it is clear that option 'Begin tour' is the tour.
List of kings	7	Route to the first object	The majority of the participants experience some difficulty finding the first object.	Review the directions to see why people are looking for the object so early (timings?). The word 'towards' isn't conveying the fact that the object is almost at the end of the gallery.
			Firstly, some people did not realise how far it was to the first object and started looking for the item on the wall to the left immediately after passing the Rosetta Stone.	
False door	1	Identifying the object	Secondly, when they realised that it was further down the gallery they overshot the object and had to turn back. Most commented that they thought the two columns referred to were the ones at the very end of the gallery.	Review directions / image to clarify which set of columns the object is displayed by.
			Had difficulty distinguishing False door from other similar objects which occur (obstruct the view?) of intended object	Review directions / image or highlight some distinguishing feature of the intended object.
Barque of Mutemwia	2	The image disappeared from the screen before it can be properly seen.	Many of the people taking the tour walked between objects with the guide hanging around their necks, just listening to the directory and only looking at images if they needed to or were prompted to by the guide. In this instance when people picked up the guide to look at the image they just saw it before it disappeared.	Check the length of time that the image is displayed and consider adding a 'click to continue' event.
	1	Identifying the object	The object was expected to be bigger.	Indicate the size of the object in directions or image.
Bronze figure of seated cat	3	Route to the object.	Some confusion arose as to whether 'behind' in the directions meant behind the person or behind the statue.	Review directions. Is there a pause after the word 'behind'?
	1	Identifying the object	Expected the object to be bigger.	Indicate the size of the object in directions or image.

Adult guide evaluation: observed problems on Ancient Egypt tour

Object/ area around which the problem occurred (9 tours taken)	Times problem occurred	Difficulty	Observations	Recommendation
Hunting in the marshes	3	Route to the object.	Some confusion over the route to this object and the room numbers. (One person thought room 59 was room 61, one overshot the object and another got to the end of room 4 very quickly and turned into room 9 because they hadn't heard they had to go up the stairs.)	Review the directions / landmark image and direction timings. Consider stating that the route goes up the stairs nearer the beginning of directions to take account of faster walkers.
Mummy mask of Satdjehuty	1	Exit option not working on commentary.	Didn't want to listen to all the supplementary commentaries but could not exit.	Check the supplementary information navigation and exit icon (X).
	5	Difficulty finding the object (3) or didn't find the object at all (2).	Based on the build up to the object in the directions people thought the mask would be bigger and in a more prominent location. The image didn't give a proper indication of the size of the object. Some people spent some time looking at the larger, painted coffin to the right of the mask (in the same case) before realising it was the wrong object.	Review directions and give an indication of the size of the object either in the directions or in the image. Note: this room seems to be a bottleneck and was often very crowded which meant it was difficult to walk up the centre of the room or see the mask from any distance.
Blue faience shabti group	2	Difficulty finding the object (1) or didn't find the object (1).	There is another group of similar figures in an adjacent cabinet which is passed first. One person listened to commentary while looking at the wrong object and another person spent quite a long time comparing this group to the image before deciding it was the wrong group and moving on.	Review directions / image
Predynastic Egyptian burial	1	Difficulty finding the object.	spent sometime trying to decide between this and adjacent object (other side of isle)	Review directions
Kushite sphinx	2	Difficulty finding the object.	The image on the guide has not been given the same name as the object in the museum that is, it is called the 'Sphinx of Tahargo' in museum and the 'Kushite sphinx' on guide.	Use the same label for an object on the guide as is used in the museum.
			In addition people thought from the image that the object would be bigger and one person was looking for a sign for 'Sudan' but seeing that the room was still about Egyptian artefacts thought they were in the wrong room.	Review directions / image so it is clear that the object is in the same room and to indicate its size.

Semi-structured interview questions for use during the children's multimedia guide study

Below is a range of questions that were to be answered by the study. Some were asked directly after the study, were answered by comments made during the study and some were answered by observation.

Questions directed to the children

General questions

Have you been to the museum before? How many times?
Have you used another audio guide before? Do you remember where? Did it have a screen like this one or was it just an audio guide? Which one did you prefer?
Have you used this guide before? How many times?
Have you used something with a touch screen before? When?
Have you used...
a mobile phone, a digital camera, a computer, a games console?
What type of games console? How frequently?
How old are you? Where do you live?

Multimedia guide content

Did you enjoy using the guide? Was it fun?
Did you like/prefer visiting the museum with the multimedia guide? Why?
Was the information on the guide interesting?
Is there anything on the guide that you remember liking in particular? What?
Did you use any of the games on the guide? Which ones? Did you enjoy them?
Would you have liked there to be more or less games? Why?
Could you easily understand what people said on the guide? Was it too fast?
Were there any words you could not understand? What were they?
Was there anything your parents had to explain to you?

Using the multimedia guide

Why did you choose the tour/s you did? Did you or your parent choose the tours?
Did you ask your parent how to use the guide?
Did you find objects on the tour easily? Why?
How useful were the directions? the landmarks? pictures of the objects?
Which did you prefer? Why?
Did you listen to the audio for all the objects or just some? Was the audio too long?
Was the multimedia guide too big or too heavy?
Could you see what was on the screen easily? Was it too small? Not bright enough?
Did you use the stylus or your finger to point at the screen?
Did you understand the icons? Did you use the icons?
Would you like to use this guide next time you come to the museum?

Questions directed to the parents

Did you find the guide useful for entertaining the child/ren?

Did you have to explain how to use the guide to the children? What did you have to explain?

Did the child ask any questions about using the guide? What questions?

Did you prefer using the multimedia guide to just walking around and reading the wall text?

Did you listen to the children's content?

Do you think it is at an appropriate level for the age of your child?

Why not? Was it too simple, too difficult? What age do you think it is aimed at?

Did you listen to the children's content, the adult content or both?

Did you enjoy the adult content?

Why not? Too simple, too difficult, too long, interfered with looking after children

How did you interact with the children during the visit?

Who decided which tour to take you or the child/ren?

Did the children ask questions about any of the objects? Which ones?

Do you normally hire audio or multimedia guides when you come to a museum? Why not?

Would you normally hire a guide for the children or just for yourself?

Would you use this guide again if you had to pay for it?

How much would you be happy to pay? If no, why not?

Next time would you hire a guide for yourself or just for the children?

Which guide would you hire for yourself?

Children's guide evaluation observation grid

Date:		Start:		Finish:	
Group	No. Adults	No. Children	Ages	Gender	
Did the children listen to the instructions?					
Did the parent/s listen to the instructions?					
Did the children need any help from the parent/s to use the guide?					
Which tour did they choose?					
Who chose this tour?					
Tour:					
Transect	Which object looking at?	Children interact with parent/s or other children?	Interaction with the guide. Do they play the game?	Interaction with object?	
Start:	Start:		Parents: Y N		
End:	End: On guide: Y N		Children: Y N		

Children's guide evaluation: observed problems

Tour name	Times tour taken	Object around which problem occurred	Times problem occurred	Problem	Recommendation
Africa	1	Ceramic alter	1	Reference in directions to multimedia icon not understood.	Describe or show an image of the m shown in the children's guide introdu
		Head of King Ife	1	Incorrect route taken to the object and object location not found (object missing).	Review directions and in the cabinet object has been removed (at a child'
Americas	3	Crystal Skull	2	Problem finding object. Looked in cabinet to right (which contains other glassy objects) not the corner of the room.	Review directions.
		Beaver tail knives	2	Overshot turning and had to backtrack. Problem finding object.	Review directions and image.
		Feather Bonnet of Yellow Calf	3	Difficulty finding the location of object (missing).	Review labelling in cabinets for miss obvious where the object was and th
		Zoomorphic pipes	1	Difficulty finding the location of object.	Review directions so they don't rely previous object since this causes a l object has been removed.
Ancient Egypt	2	Ship model	1	Incorrect route taken to object.	Review directions.
		Mummy of Katebet	1	Incorrect route taken to object and wrong (adjacent) cabinet identified from directions.	Review directions.
		Sphinx of Tahargo	1	Overshot object and difficulty recognising object.	Review directions and image.
Ancient Greece	1	Marble figure	1	Unsure of route to first object.	Review directions to first object.
			1	Wrong statue identified from directions/image.	Review image. Many similar figures
		Odysseus Vase	1	Overshot object and difficulty recognising object.	Review directions and image. Not re small size of vase after looking at re Expected it to be bigger.
		Horse of Selene		Incorrect route taken to object.	Review directions on entering room left rather than right.
Tour name	Times tour	Object around which problem occurred	Times problem	Problem	Recommendation

Children's guide evaluation: observed problems

	taken		occurred		
Asia	1	Cong and Bi	1	Difficulty finding object and reference to multimedia icon not understood.	Describe or show an image of the multimedia icon.
		Moon Jar	1	Difficulty finding object.	Review directions.
Early Britain	5	The Lewis Chessmen	1	Unsure of route to first object.	Review directions.
		Hoxne Hoard	4	Incorrect route taken to object	Review directions.
			3	Couldn't find object and couldn't remember what it was called while looking.	Review image or make it clear that the objects displayed as shown in the image. Also display the object that is being searched for at the bottom screen instead of the word directions.
		Lindow Man	2	Difficulty finding object.	Review directions. The object is hidden by another object and cannot be seen from the central aisle.
			1	Child banged head on protruding label.	Review choice of object? It is difficult for small children to see the object.
		Basse Yutz Flagons	1	Incorrect route taken to object	Review directions.

APPENDIX H INTERVIEW QUESTIONS

Interview: Juliette Fritsch

Greeting

Introduce Ourselves

Why are we at the V&A?

Interview Questions:

If you don't mind, I'd like to start off by asking you a few questions about yourself.

- What is your position at the V&A?
- What does your job entitle? What are your specific responsibilities?
- Why do you think the V&A is interested in the integration of a tour-based mobile device application?

How do you think a visitor's learning experience will benefit from the implementation of a tour-based application?

- Do you think it will aid to the experience? Or will it deter the visitor from the museum's exhibits and artwork?
- Do you think visitors will use the application if provided by the museum?
- Should a device with the application be provided by the museum OR should the application be downloadable via a data network (meaning, iPhone and other data capable devices provided by users?)

Let's talk a little bit about the Quilt Exhibit application.

- Why do you think the V&A decided to invest in an application for the Quilts Exhibit?
- Do you see this application aiding the visitor or inhibiting their experience?

Interview: Mark Hook (IT team)

Greeting

Introduce Ourselves

Why are we at the V&A?

Interview Questions:

If you don't mind, I'd like to start off by asking you a few questions about yourself

- What is your position at the V&A?
- What does your job entitle? What are your specific responsibilities?
- Why do you think the V&A is interested in the integration of a tour-based mobile device application?

Does the V&A currently offer any mobile device applications to the visitors of the museum? What are they? (Remind him of Quilt Exhibit app and Tipu's Tiger app)

- IF OTHERS: Could we possibly get our a hold of the other applications?

Were there ever any applications in development that did not get completed?

- Did you have a hand in the development of such applications?
 - IF SO: What did you do?

Let's talk a little bit about the Quilt Exhibit application.

- Why do you think the V&A decided to invest in an application for the Quilts Exhibit?
- Do you see this application aiding the visitor or inhibiting their experience?

Do you have any documentation or research pertaining to mobile device applications in museums or the current applications the V&A offers that you would be willing to share with us?

How do you think a visitor's learning experience will benefit from the implementation of a tour-based application?

Do you think it will aid to the experience? Or will it deter the visitor from the museum's exhibits and artwork?

Do you think visitors will use the application if provided by the museum?

Should a device with the application be provided by the museum OR should the application be downloadable via a data network (meaning, iPhone and other data capable devices provided by users)?

If the museum is interested in developing a new mobile device application, would it consider upgrading its wireless network to make the device data based as opposed to memory based?

Would the museum prefer to make the mobile device application data or memory based?

Would the application be developed in house or outsourced to another company?

Is the Museum interested in creating apps across the four major platforms (Apple, Google, Palm and RIM) or would it prefer to make one for the highest market share (Apple)?

What would the development time be for an application like this?

Approximately how much would an application like this cost to develop?

Is the V&A creating a mobile version of its new website that all mobile devices can access?

Do you think this could serve as a replacement for a mobile application?

Do you think this would be more cost effective?

Considering the fact that the quilts application is 180MB do you think it would be impractical to develop a memory based application for the entire museum?