

Conference Proceeding: 2nd INTERNATIONAL CONFERENCE ON CREATIVE MEDIA, DESIGN & TECHNOLOGY (REKA2016)

INTERACTIVE MULTIMEDIA DESIGN IN MUSEUM GALLERY

Zhen Ling Katharine Ting¹

Multimedia University

¹ katmmu@gmail.com

Yan Peng Lim²

Multimedia University

² forest.lim@mmu.edu.my

Elyna Amir Sharji³

Multimedia University

³ elyna.amir@mmu.edu.my

ABSTRACT

The rapid development of digital technologies has made digital media widely available to everyone. Some museum galleries in Malaysia, such as the National Museum, have made use of interactive multimedia, which provides interaction between the users and the items being displayed. Regardless of the presence and accessibility of interactive multimedia, few studies have indicated that research on museum visitors in Malaysia, especially museums with interactive multimedia display, are still lacking. In this research, an interactive multimedia is proposed to enhance visitors' experience by using design elements and design principles. With the usage of the Norman's Emotional Design Model as the conceptual theory, the study was conducted to gain insights of interactive multimedia usage and visitors' perceptions and preferences. The outcome of this study will provide designers and developers the option of considering work closely in order to deliver the best interface design for interactive multimedia. This research will also benefit the museums in Malaysia as it is able to provide an insight into the awareness of interactive multimedia and touch screens usage for more engaging experience. It also encourages visitors to educate and entertain themselves with interactive and multi-sensory contents. Overall, the results provide directions for curatorial and design criteria issues for interactive multimedia in informal learning institution such as galleries in museums. The results of the research provided suggestion for the use of Norman's Emotional Design Model, design elements and design principles when developing interactive multimedia in order to enhance user experience in museum gallery.

INTRODUCTION

A museum is an institution which enables people to explore interesting and valuable collections for inspiration, learning and enjoyment (ICOM, 2010). Museums often offer a good opportunity for further study of informal learning experiences (De Backer et. al, 2014). Interactive exhibit allows visitors to be actively engaged rather than passively looking at the artefacts, which will increase their interest in learning and more (Elliston and FitzGerald, 2012). Aside of that, interactive multimedia promotes in shaping of knowledge to the museum visitors (Abbas, Taib and Masri, 2014). Some museums galleries have made efforts in incorporating interactive multimedia in their galleries, such as touch screens that also function as an interactive form of information provider. Nevertheless, not many studies have been conducted to look into the interactive multimedia usage among museumvisitors (Ng, Hoo and Jantan, 2013). As a result, it is essential to study the visitors' needs, how they perceive the current museum exhibits performance, and their expectation for further improvements.

Visual attractiveness was often mentioned as a reason to start using an application (Chang, Kaasinen and Kaipainen, 2012). From the preliminary study, it shows that the existing interactive multimedia needs to provide professional and finalized appearance in order to attract and engage visitors in informal learning experience.

MUSEUMS AND GALLERIES

In Malaysia, there are 185 museums and galleries on each state that uncovers and displays the local material, culture and heritage (Staff, 2012). According to Taha (2008), the main function for all museums in Malaysia is to defend the national uniqueness. In recent years, the Malaysian government has pumped in millions of dollars into the museums industry (Staff, 2012). However, the museums in Malaysia are still facing many problems. Other than being a non-profit body and a high maintenance institution, museums must also add value and contribute to the society in upholding their existence (Elottol and Bahauddin, 2011). All in all, the museums still depends greatly on its role in education progress (Taha, 2008). In particular, the researcher only studies the interactive multimedia in galleries of the National Museum Malaysia. The National Museum or MuziumNegara, is one of the top museums in Malaysia and provides a good overview of the nation's rich historical and cultural heritage (Elottol and Bahauddin, 2011).

NORMAN'S EMOTIONAL DESIGN MODEL IN INTERACTIVE MULTIMEDIA DESIGN

Norman (2004) stresses that attractive product or application triggers emotion and mental process and make users more tolerant of minor difficulties. Hence, the most direct way to influence a decision or perception is through the visual appearance. Based on the Norman's emotional design model (Partners, 2013), there are visceral, behavioural, reflective levels of design that are connected to the three different levels of psychological processing. It can be very difficult for the reflective level to overrule the visceral and behavioural level, which thereby gives rise to many human idiosyncrasies (Kahneman, 2011). Based on that, the researcher focused more on the fast thinking or subconscious levels, which are the visceral and behavioural levels in this study. From the Figure 1, the design elements include layout, typography, colour, imagery, and controls.

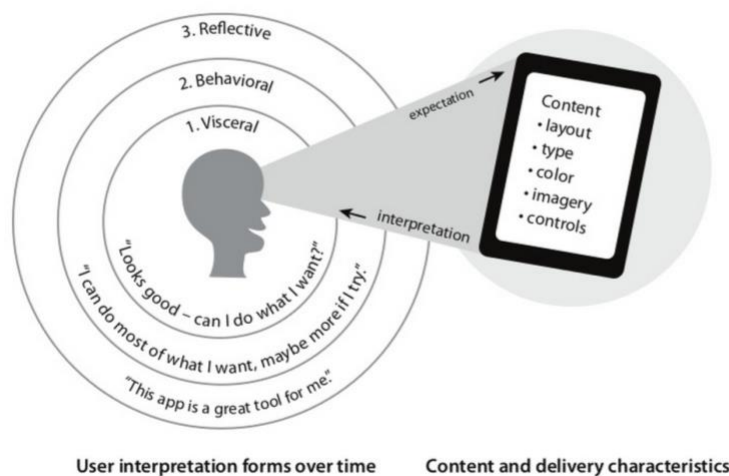


Figure 1. Norman's Emotional Design Model (Partners, 2013)

The first level is visceral level, which is the level of subconscious or fast system, where emotional signals from the environment are taken automatically. This level has to do with the initial impact of the appearance, touch and feel. It responds rapidly, makes judgements, and triggers the emotional responses to stimuli that are expressed through a combination of physiological and behavioural responses. A good visceral design is appealing and makes users feel happy, joyful and positive. The behavioural level is about how usable and effective the application is to interact with. This is the level where most human activities occur. Most usability issues are related to behavioural level. The behavioural design should include relevant functions that fulfil the users' needs. While interface distraction leads to negative emotion, ease of use and effectiveness trigger positive emotion (Idler,

2012). In a nutshell, user’s perceptions on visual design are important for interactive multimedia design. Norman (2004) suggests that designers focus on the context and the tasks of a product or application it is being used for. The application needs to help users to understand the purpose of it, show them how to use it and also create positive feeling. It is also important to differentiate from the mass and to provide professional and finalize appearance. In order to develop a good visual presentation, designers should adapt visual design criteria, which are the design elements and the design principles during design process (Yamin and Jaafar, 2013; Bakar and Long, 2013).

DESIGN AND DEVELOPMENT

The researcher decided to enhance one of the touch screens design, which is the “The Prime Minister of Malaysia” in National Museum. This application contains the biography and information about prime ministers of Malaysia. It was displayed in both English and Malay.



Figure 2. Interface of the current “The Prime Minister of Malaysia” application

Findings from preliminary studies show that multimedia elements which include layout, typography, colour, imagery and control, together with the ease of use are the most important design criteria that should be considered while producing interactive multimedia. Based on the main menu of the current interactive multimedia “The Prime Minister of Malaysia” application, the arrangements of the buttons are confusing, as the numbers are not in order. Apart from that, lack of images and design of the layout makes visitors lost interest. Besides that, there are too many words in one page as both Malay and English languages are used. There is no title or headlines to let visitors study to the point immediately. Other than that, every text is the same size, which is hard for users to read as well.



Figure 3. Modified main menu of “The Prime Minister of Malaysia”

The application was redesigned using Adobe Flash software. It was designed according to previous application layout, which is 1920 by 1080 pixel screen. Some requirements are set for the proposed design by combining design elements and design principles to create the prototype. Simplicity is one of the main design principles for this prototype as the interface must be comfortable to read and easy to use or navigate. Secondly, consistent interface helps users get comfortable with the application in a short time. The main menu is made clear for visitors to avoid clustered screens and allow them to navigate in better depth. Therefore, visitors can select and understand other prime minister's information in a very short period of time.



Figure 4. Modified pages of “The Prime Minister of Malaysia”

In order to not overload users with irrelevant information, different languages have been separated into two different pages but with the same design. Visitors can view the information in their preferred language by tapping on language options on every page. The size of text has been enlarged and additional information is offered in layers to keep the interface simple. Font sans-serif was used for its simplicity and ease of read (Ng, Hoo and Jantan, 2013). The icon or buttons for navigation have been redesigned for more intuitive and related to current designs. The icon designs for the ‘previous’ and ‘next’ icons are designed with chevron symbol (V-shaped pattern) and in black. They are simple shapes that viewers can easily identify as the symbol is widely used and are very legible, giving them the best appearance on screen (Lim and Woods, 2010). Comfortable colour scheme was used for redesigning the application. Colour block was used to separate the information with background design. Grey is the primary colour for this application which given it a minimalistic look with a touch of intelligence and seriousness. The greyish gradient background with the darker grey content background focuses the user's attention towards the centre of the application. The dark bar across the picture "frames" the user's view into the content. The use of orange in the application draws and leads the user to the aspects of the content. The neutral colour scheme provides enough visual stimulation to keep the audience interested, while allowing them to enjoy the site's content comfortably. To enhance users' experience, transition was applied on buttons. This creates feedback and visual appeal for users. The application is not designed with audio presentation to prevent distraction during the exhibition.

RESULT

After the design and development stage, the prototype was installed in the Gallery D of National Museum for a week (7 working days) to be evaluated. The user survey was carried out to measure visitors' overall experience and engagement with newly designed touch screen. A paper-based close ended questionnaire was used as the instrument for the data collection. It was created based on data from preliminary studies and Ng's paper (Ng, Hoo and Jantan, 2013), modified by the researcher afterwards by applying the Norman's Emotional Design Model. It consisted of three main sections, namely demographics section, user design preferences section and users' overall experience section. Visitors rated their experience on a five-point Likert Scale from “Strongly Disagree” to “Strongly Agree”. The data gathered was analyzed using Statistical Package of the Social Sciences (SPSS) software. Descriptive statistics were used to calculate the frequencies, mean and standard deviation

of the variables. In total, 104 visitors (N=104) interacted with “The Prime Minister of Malaysia” application and participated in the evaluation. The respondent of the study constituted of 55 males (52.9%) and 49 females (47.1%). By age-group, the highest number of the respondents fall within the age group of 18-24 years old which equals to 41.3%, followed by 34.6% between 25-34 years old, 14.1% between 35-44 years old, and 9.6% over 45 years old.



Figure 5. Visitor was evaluating the prototype

Based on the results, the modified application is more attractive (Mean=4.12), manages to hold their attention (Mean=3.97), easy to navigate (Mean=4.38). Besides that, respondents agree that the modified application presented clear and consistent information (Mean=4.36), well organised layout (Mean=4.34), and is comfortable to read (Mean=4.50). In addition, they agreed that the application was designed with well-balanced of colours usage (Mean=3.91) and also have suitable images or graphics (Mean=4.30). All of the design criteria have standard deviation below 1.0 which shows the values in the dataset are close to each other. In conclusion, the design of modified application is more towards the preferences for visitors. The respondents were also asked whether they think the modified application is easier to use, and the data shows significantly high mean value (Mean=4.42). This shows that aesthetically pleasing application does provide better ease of use due to the emotional connection with application (Norman, 2004). Moreover, visitors' learning experience is increased by means of visitors have agreed that they learned something new (Mean=4.00) and are curious to find out more information (Mean=3.70). As for user experience, it can be concluded that the mean values shows a slight increase throughout the relations (fun; entertained; emotionally engaged). However, with all the mean values around 3.39 to 3.76, this suggests that the modification does not significantly affect user experience. For instance, the researcher focused more on visceral and behavioural levels in this study, visual design on reflective level, which enabled them to design and builds long term relationship with users. On overall, 93.3% of respondents found that the modified touch screen application was enjoyable to interact with. This indicates that the modified application does enhance their positive experience. Few of them did not enjoy using the touch screen application. This is expected as to design an interactive multimedia that achieves users' expectation; it needs to go through few iteration cycles. Visitors are expecting more improvements for better experience. According to the feedbacks for further improvements, few of the respondents have suggested that buttons should be larger. Smaller touch target are hard for users to tap. Finger touch size should be considered to create more user friendly application. The colour contrast of the modified interactive multimedia can influence emotional impact. Brighter colours would be more attractive and good colour balance interface is able to make visitors feel fresh while reading. On the other hand, most advise to add more pictures, imagery, animation, sounds and videos for more

engaging and enjoyable experiences. Some visitors suggested that features like zooming into images or dragging for more information should be added in. The flexibility of interacting with digital contents afforded by finger gestures, such as swiping, flicking, pinching, pushing and tapping, has resulted into richer ways to engage users (Sharp, Rogers and Preece, 2011). Applying these interactive features to highlight certain content will improve the fun or playful feeling among users (Touw and Miller, 2012). Educational or learning based games can create fun experience. As some of the visitors are parents, they recommend having learning games in order to attract their children to have fun while learning. Meanwhile, adults will be more interested in what they can learn. Since the museums regularly receive international visitors, the option of adding different languages has been one of the recommendations for the interactive multimedia design. This helps more visitors to understand the museum context and information. The inclusion of both entertaining and educational features is significant for designing an interactive multimedia and balancing both can be a real problem. For instance, one of the respondents proposes using timeline for the main menu page according to the Prime Ministers of Malaysia servicing period, which would enable users to have easier and quicker reading. The content information should be simple and straightforward for users to retrieve in a short time. Furthermore, highlighting the headline or using leading words could bring better reading as well.

DISCUSSION

This study discovered that design elements which include layout, typography, colours, imagery and control, as well as design principles (simplicity, consistency) are the most important design criteria that should be considered by designers while producing interactive multimedia for informal learning place or museum. The visitors found that the modified application was much more attractive and manage to hold their attention. Besides that, respondents agree that the modified application was easier to navigate, and presented clear and consistent information. The visitors also perceived modified interactive multimedia had well organised layout and was comfortable to read. In addition, they agreed the application was designed with well-balanced colours usage and also has suitable images or graphics. The respondents were also asked whether they think the modified application is easier to use. All in all, there is significantly high mean value for the modified application. This shows that aesthetically pleasing application does provide better ease of use, due to the emotional connection with application (Norman, 2004). Some studies previously indicate that applying interactive multimedia in informal learning environment improve their learning experience (Ng, Hoo and Jantan, 2013). Since evaluate designs is to interact with the users, some requirements are set for the prototype to achieve the goal. Visitors' learning experience had slightly increased by means as visitors have agreed that they learned something new and they were curious to find out more information. Nevertheless, it was suggested by a few respondents that, learning experience actually relates to the content design. Some of them do not have interest on the content itself. For future development, the content should be considered as well in order to enhance the motivation to learn. For the overall entertaining experience which includes fun, entertaining and emotionally, the data suggests that the modification does not significantly affect their experience. In this case, as the researcher focused more on visceral and behavioural levels in this study, visual design on reflective level, which able to design and builds long term relationship with users does not able to function. All three levels of Norman's Emotional Design Model should be studied and applied in the application design in order to produce a good interactive multimedia which enhances user experience. In line with this study, it was found that, museum visitors generally have positive perceptions towards modified interactive multimedia application. These positive experience of the respondents indicated that the visitors are more willing to interact with interactive multimedia which adapt design elements as well as design principles into their informal learning process.

CONCLUSION

Based on the result, visitors do agree that interactive multimedia in the National Museum currently need more improvement on the design parts. Most of the visitors approach interactive multimedia with a purpose in mind, either for education or entertainment purpose. Several studies shows that interactive multimedia motivate visitors to learn in their own will whereby their own content, location, timing and learning style can be controlled (Ng, Hoo and Jantan, 2013). This type of informal learning is suitable for museum environment. The research data provided suggestion for designer and curators who are interested in creating interactive multimedia that is grounded in Norman's Emotional Design Model. In summary, it is confirmed that the interactive multimedia design which adapts content design elements in Norman's Emotional Design Model, and design principles such as simplicity and consistency have improved overall positive experience for visitors. As Chang et al. (2012) discover visually attractive designed touch screen application does improve visitors' experience. It is important for the curators to take actions to ensure the touch screens are functioning in the museum galleries and to keep updating the design of touch screens that meet visitors' expectation. Other than that, the curators should take an active role in encouraging the visitors to use touch screens while visiting. Also, the designers should adapt design elements and design principles in the touch screen design to ensure the design is usable and is able to meet the user's needs and expectation.

ACKNOWLEDGMENT

This project is funded by the Ministry of Higher Education under ERGS grant. The author and co-authors would like to show appreciation to the members and staffs from National Museum or Department of Museum Malaysia (JMM) for their willingness to cooperate and support with the study.

REFERENCES

- Abbas, M. Y., Taib, M. Z. M., and Masri, M. (2014), Museum Exhibition Design: Communication of Meaning and the Shaping of Knowledge. *Procedia - Social and Behavioral Sciences* 153, 254-265.
- Bakar, Z. A., and Long, P. A (2013). Study of visual appeal interfaces based on subjective preferences. *Proceeding of the International Conference on Artificial Intelligence in Computer Science and ICT (AICS 2013)*. Langkawi, Malaysia.
- Chang, T. R., Kaasinen, E., and Kaipainen, K. (2012). What influences users' decisions to take apps into use?: a framework for evaluating persuasive and engaging design in mobile Apps for well-being. *In Proceedings of the 11th International Conference on Mobile and Ubiquitous Multimedia*.
- De Backer, F., Peeters, J., Buffel, T., Kindekens, A., Reina, V. R., Elias, W. and Lombaerts, K. (2014). An Integrative Approach for Visual Arts Mediation in Museums. *Procedia-Social and Behavioral Sciences*, 143, 743-749.
- Elliston B. and FitzGerald, E. (2012). Encouraging museum visitor engagement using spontaneous talk-in-interaction audio guides. *Proceedings of the 4th International Conference on Computer Supported Education (CSEDU 2012)*. Porto, Portugal.
- Elottol, R. M. and Bahauddin, A. (2011), A Competitive Study on the Interior Environment and the Interior Circulation Design of Malaysia Museums and Elderly Satisfaction. *Journal of Sustainable Development*, 4(3), 223.

- Idler, Sabina (2012). *Not Just Pretty: Building Emotion Into Your Websites*[Online].Available: <http://www.smashingmagazine.com/2012/04/12/building-emotion-into-your-websites> [2014, May 27].
- International Council of Museums (2010). *ICOM Missions*[Online].Available: <http://icom.museum> [2013, January 15]
- Kahneman, D. (2011). *Thinking, fast and slow*. New York: Farrar, Straus and Giroux.
- Lim, Y. P. and Woods, P. C. (2010). Experimental Color in Computer Icons. In *Visual Information Communication*, pp. 149-158, Springer US.
- Ng, D. V., Hoo, G. W. L. and Jantan, W. S. A. M. (2013). Design of Interactive Multimedia Display Application for Sarawak Museum based on Visitors' Preferences. *Journal of Advanced Computer Science & Technology Research*,3(1), 39.
- Norman, D. A. (2004). *Emotional Design: Why We Love (or Hate) Everyday Things*.New York: Basic Books.
- Partners, N. (2013, July).Visual Usability: principles & practices for designing great web and mobile app UI [Online], Available: <http://www.slideshare.net/nimblepartners/visual-usability-principles-practices-for-designing-great-web-and-mobile-app-uis> [2014, January 5] Slide presented at the UXPA 2013 conference, The Washington Hilton, Washington, DC.
- Sharp, H., Rogers, Y. and Preece, J. (2011). *Interaction Design: Beyond Human-Computer Interaction* (3rd ed.). John Wiley & Sons.
- Staff, (2012, May 17). RM112 Million Allocated To Manage 185 Museums – Rais. *Bernama* [Online], Available: <http://bernama.com/bernama/v8/newsindex.php?id=666988> [2013, August 13].
- Taha, D. D. A. H. (2008). *Museums In Malaysia: Challenges And Development*. Kuala Lumpur, Department of Museums, Malaysia.
- Touw, M. and Miller, B., (2012). One Road: an engaging multi-touch interface within a museum context. *Proceedings of HCI 2012 The 26th BCS Conference on Human Computer Interaction*, University of Birmingham, United Kingdom.
- Yamin, M. S. A. and Jaafar, E. A. (2013). Web Design for Science Museum towards Engaging User Experience. In *Human-Computer Interaction-INTERACT 2013*, pp. 745-754. Springer Berlin Heidelberg.