

CULTIVERSE: A tabletop application for inducing discussion by creative expression in a museum

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ABSTRACT

This paper presents a tabletop computer application to be placed in the "Museum of World Culture". *Cultiverse* is an application that welcomes people to create worlds by drawing items that they believe should be in a "perfect world" allowing any person to join in at any time and collaborate in the creation. Qualitative methods for user testing was held in a laboratory setup, and from these studies it was concluded that improvements related with the usability of the application were needed.

ACM Classification Keywords

H.5.2. Information Interfaces and Presentation: User Interfaces. - Graphical user interfaces.

Author Keywords

Tabletop computers; museum; creativity; discussion.

INTRODUCTION

This paper describes the design process held, from ethnographic studies to the implementation of a tabletop computer application, including refinements after evaluating a high fidelity prototype. The project was initiated with finding a fun, novel and doable application for a tabletop computer to be placed in the Museum of World Culture.

Part of the project goal was to answer a number of questions. How can a tabletop application enhance the experience of exploring museum visitors? How can the visitors be encouraged to move from the museum cafeteria to the tabletop? And how can the application be amusing, purposeful and connected with the vision of the museum, all at the same time?

BACKGROUND

This section presents a selection of previous studies related to tabletop applications placed in museum environments and research in Human Computer Interaction (HCI), to inspire creativity with technology and motivate users to engage in discussion.

Tabletop in Museums

Most of current tabletop applications have been placed in museums or near exhibitions, with the aim of enhancing the experience of visitors and make them feel more connected with

what is being displayed [1]. Museums are considered interesting environments for tabletop application design and development. It has been shown that museum visitors are both willing to, as well as curious about, exploring the possibilities of a tabletop interface, resulting in an increased interest of certain items in particular, as well as exhibitions in general [6]. Tom Geller further encourages the use of such technology compared to traditional keyboard and mouse setups, claiming that visitors *"wants a museum visit to remain sensual, visceral, and direct"* [9].

Motivating creativity

As Shneiderman said *"Creative people often benefit from advanced technology to raise their potential and explore new domains"* [16]. Several software tools already enhance creativity but can limit or suppress ideas depending on how they are implemented. There is a thin line between enhancing creativity through technology and excluding people from accessing it.

Creativity has been studied in the field of HCI either with the direct use of technology to enhance people to be even more creative [4] or by having applications with tools that already augment the creative process [7], such as for brainstorming sessions [5] and mind mapping ([2], [3]). From these studies, it can be concluded that, if implemented properly, a tabletop application can motivate creative expression.

Engaging into discussion

One research that looked into the possibility of encouraging discussion amongst the visitors after they have attended the exhibitions is a tabletop application used in a museum café [15]. Visitors were successfully inspired to discuss different topics related to the museum installations. The application displayed cues to influence the conversation topics, and it was concluded that the conversation somehow can be moderately influenced with hints [14]. Models like "engage, empower and encourage" [8] have also been applied to study social interaction of a tabletop application to support making decisions in groups and engaging people in more focused discussion.

Therefore, it is possible to influence people's behaviour with the content of tabletop applications, either encourage them into engaging in friendly discussions, or to have a not so nice social interaction experience.

DESIGN PROCESS

In this section the design methodology is presented.

Inspiration

Ethnographic studies were held to identify the regular users or visitors of the museum, and also, who the museum exhibitions are intended to attract. The designer team carried out "a day in the life" design method [11], where they went to the museum as visitors and explored it as they would in an ordinary manner. The idea was to get insights and understand the themes of the exhibitions.

Observation and semi-structured interviews to visitors and staff were also held. Finding that the vision of the museum is to bring people together to:

"Meet the world in all its historical and geographical breath with as many senses as possible, and thus get engaged, empowered, inclusive, curious and feel that they, as well as all others, are important" (words of Klas Grinell, museum keeper).

The museum tries to invite the community to express themselves and share opinions about controversial and contentious topics. However, it was noticed that most of the visitors stayed at the restaurant either for lunch or to have coffee with friends and very few of them had intentions on attending the exhibitions.

From these studies, it was decided that the target users will be the same group of users that the museum aims to attract: young people from the community. Furthermore, the tabletop application should be aligned with the vision of the museum.

Concept Development

A relationship matrix was created with the information gathered from the ethnographic research. Relevant words (nouns and actions) that were repeated the most during interviews were written in a 12x12 matrix. The words were matched together by rows and columns, depending on the concepts that had a direct relation.

A concept map was created following Jon Kolko's guidelines [13], using the words that had the most relations from the matrix followed by writing linking words and phrases that define how those words were connected within each others. The word that was found as the most interesting to address and key for the project was "discussion".

After analyzing the concept map, some facts and conclusions about the relationships among words were found. These facts joined with other relevant ideas and descriptions from the ethnographic studies were used to generate 25 crazy ideas using the insight combination method [10].

The ideas were then placed in a reference system, considering feasibility to implement in the available time versus the most entertaining solutions for the target users. Most of the ideas were quite related with the museum exhibitions, resulting in either games for kids or applications with educational purpose.

One idea out of the 25 ones, "sharing your culture with others", was chosen to be analyzed with the re-framing method [10]. Solving the issue of people staying in the cafeteria and not visiting the exhibition was used as inspiration to make pa-

per prototypes, considering also that the main goal of the museum is to bring people together to express themselves and engage in discussion. The final idea chosen was a drawing application where the coffee cups from the cafeteria work as a key to activate it. The cups have a message displayed that says: "Go and create the perfect world in the exhibition", with the intention of intriguing people to find out what it is about.

The idea of having a drawing application was to encourage creative expression inspired by a chalk board filled with drawings from the museum visitors. In addition, the reason of creating the "perfect world" was inspired with one exhibition of the museum about space view; and also it was decided among the design team that it could trigger discussion on controversial topics, as every individual has a different definition of a perfect world and what it should have.

Two focus group, with four participants each, were held to evaluate early stages of the low fidelity prototype and to know if people would enjoy doing free drawing with others and what they would draw. A questionnaire followed to look into how participants interact with the design and what they thought of it. The findings from this evaluation were: the application should attract regular visitors rather than only people who is in the cafeteria; it should be respectful and inclusive, meaning that everyone should agree when they are ready to create a world and not let one person interrupt other people's drawing.

Result

Cultiverse, the tool that brings people together from the coffee place to the exhibitions, to start creating a perfect world with others by drawing items and placing them in a common area, which represent the world that they are creating.

At first, the application displays a view of a galaxy, where the worlds created by previous visitors can be explored. This view allows users to explore other visitors' drawing work. In this galaxy view, there are also a number of fixed spots where any user may place a coffee mug (or a token). When the coffee mug (token) is placed in such a spot, a message appears saying "create a perfect world", and a new view appears.

Instead of a galaxy, a planet is now displayed, along with a personal drawing area. The user can use the drawing area to draw artifacts that, according to him or her, belongs in a perfect world. The remaining coffee mug (token) spots remain in place, so that other museum visitors can join in. If so, the users then collaboratively fill the planet with drawings until they agree that the world is complete. During this process, the users might discuss certain ideas that their collaborators put in. Hopefully, this leads to an interesting learning experience for all users. When all visitors are done, they press an "agree" button which saves their work.

EVALUATION

After implementing the idea in a tabletop computer, *Cultiverse* was evaluated. In this section, the user tests held are described.



Figure 1. User testing - cooperative evaluation method.

Methods

Evaluation was held in a laboratory environment (controlled setup) due to limitations (logistics and permissions) to place a tabletop computer in a museum setting. Every method was applied to groups of three to four interaction design students, having a total of eleven participants.

The first method applied was a cooperative evaluation [12], in order to get feedback related with: the look and feel of the application, if further explanation (text or images) were needed and how intuitive the application is. This method required participants to think out loud when interacting with the application, followed by answering prepared questions related with the experience.

Moreover, other participants were asked to interact with the application as they would if they were in the museum, like role play of being in a different environment. The design team observed their actions, took notes and after, unstructured interviews were held. The main goal of this method was to know if the application encouraged people to discuss, what they discussed about, if they connect the application with the museum and what else they might interact within the application. See Fig. 1.

An introduction of the museum vision was explained beforehand, and the participants were then free to explore the application without help or interference from the design team. In the end there was a discussion about their overview of the application, how well it would suit the museum and if they had any suggestions of their own.

Data

The acquired footage from the evaluation session was analysed and scanned for specific events that occurred. Events that were noticed included: laughs, failed interactions, questions asked by participants, signs of frustration, discussion, collaborative comments and time spent drawing or exploring.

Apart from video recordings, notes were also taken throughout the testing. These notes mainly contained important issues with the overall application. Such as unclear interface

problems, glitches and other parts of the software that required some kind of improvement. Interesting quotes were also noted, some of them were: *"I don't know what that door opens"*, (misunderstanding of the eraser icon); *"People is too shy when they do this"*, (reason why they might not discuss with others).

The duration of the interaction was measured in order to estimate how entertaining or engaging *Cultiverse* is. On average, each group spent about five minutes exploring the features of the application. The time spent drawing and the time spent on exploring the galaxy were about even.

Some technical issues appeared during testing, for instance: the time for the drawing area to appear took about five seconds. The users often placed the token, then waited for about two or three seconds, and then thought something was wrong and tried to fix it.

Insights

After analyzing the data gathered during the evaluation phase, it was noticed that people enjoyed interacting with *Cultiverse*. Most participants were laughing, and it often occurred during some form of collaboration, for example while seeing a drawing of another person, or while chatting about the application itself.

The most apparent issues that the study elicited was about the usability of the design. Icons, explanatory texts and its features in general (e.g. editing or deleting drawings) were needed. Apart from a number of bugs and glitches which resulted in unintended behaviour, there were also a number of flaws which made users try to interact with elements that lacked any functionality, or misunderstand existing functionalities. Some of these issues might appear due to flawed design, or just a high willingness amongst the users to explore the application, and it is not always clear which is the case.

Some of these misunderstandings arose from the user's intuition. One example is the galaxy view, where at least one participant thought he could add drawings to an already existing planet, by first zooming in on it and then activating his drawing area. This could indeed be an interesting possible feature to implement in the future.

Evaluating *Cultiverse* as a tool for motivating discussion appeared to be difficult in this setting. Most of the participants were very engaged interacting with the tabletop, and in exploring the different features of the application, but they did not address any topic with the other participants different from the application itself as the main topic. Furthermore, most of the drawings were doodles and it can be said that not much attention was put into drawing something meaningful for a perfect world.

Improvements

The tabletop application was improved according to the findings of the evaluation. Primarily improvements were made to address intuitiveness and interaction issues, including the: addition of a separate button for drawing and erasing, having a color cue to hint which color is selected and a feature which enabled the users to edit someone else's drawings.

To address the issue that participants did not engage into relevant discussion or talk about topics related with creating a perfect world, a suggestion on what they should draw was added in the drawing area. It was noted during evaluation that in average, most of the users made up to five drawings, so it was decided to suggest the first four and after that, enable free drawing. It is thought that since all users get the same suggestions, perhaps their different drawings could encourage further discussion.

As it was intended to motivate a discussion or at least, influence them to draw something meaningful, the suggestions added have a broad and subjective interpretation, such as: Draw: "your favorite animal", "a vital item", "the best quality", "life", "neat things". This last one is meant to let users draw freely.

It is thought that since all users get the same suggestions, perhaps their different drawings could encourage further discussion. Nevertheless, more user testing has to be done in order to conclude whether the discussion goal has been reached or not.

DISCUSSION

A tabletop interface for creative expression like *Cultiverse* seems to have potential to be an enjoyable addition to a museum experience. Participants in the final evaluation enjoyed drawing as a form of creative expression, and they indicated that they had fun. However, the evaluation was held in a laboratory setup. It could be argued that due to this environment the participants were not very engaged on discussing broader topics. It is thought that if *Cultiverse* would have been evaluated in the museum, close to the exhibitions, the chances of having a different outcome could be high, as participants would have been inspired by the real context of use.

The goal of encouraging discussion about controversial topics was to be aligned with the museum's vision. However, if *Cultiverse* fulfills this purpose, it could be beneficial as: a social interaction ice-breaker tool, helping people to meet and talk with strangers; as an educational tool, interchanging cultural knowledge; and as an design tool, providing a space for creative expression. Therefore, *Cultiverse* could be used as a reference for other contexts of use, where any of these values are needed. However, there is a thin line on having a pleasant and friendly discussion with having a verbal disagreement that leads to a bad experience. This is something that *Cultiverse* should consider if further developed.

Tabletop computers are currently expensive and a delicate technology that require technical maintenance and setup expertise. Therefore, if the museum would be interested in such an investment, the idea of placing a cup of coffee to activate the *Cultiverse* application should be further thought through, as this could lead to unwanted accidents that could harm the computer. On the other hand, a potential benefit on having this technology available in a museum is that it is versatile to have other applications displayed according to the theme of exhibitions.

Further evaluation should follow to know if the primary target users (youth), would interact with *Cultiverse* and if they

find it entertaining or engaging to interact with. A field test (placing the tabletop at the Museum of World Culture) should be held to know if *Cultiverse* would be able to spontaneously bring people together (museum visitors), how they would interact with each other and if they would enjoy sharing their cultural opinions through drawings.

CONCLUSION

A functional tabletop application was created to be placed in a museum environment. Evaluation of the prototype showed that participants who tested the application enjoyed interacting with it and it elicited engagement and creative expression among them.

Ethnographic studies, a structured methodology and early evaluation during the implementation of the prototype, influenced the final outcome of the design project.

The knowledge of how to utilize the tabletop as an interactive technology can be the difference between a good concept and a great application. Tabletop computers are a novel technology, which might be the reason why it attracts people. This should be explored further in order to know how to take advantage of this technology, and in what other environments they might be useful.

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