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Personalized Game-based learning and Mobile learning: The app game "The Adventure of The Ch'ing Dynastry Treasures"

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Abstract: In this paper, we use images of cultural artifacts on digital content interactive media design and production with research methods as design analysis, user behavior analysis, observation and qualitative research. The process is as follows. The process is as follows. 1. Selecting three to five cultural artifacts for visual element analysis. 2. Transforming and operating images through design thinking. 3. Combining with new communication technologies (mobile device, sensor) to make prototypes.

Keywords: National palace museum, personalized game-based learning, mobile learning, digital game, digital storytelling

1. Introduction

Not only on the level of backend infrastructure, but also technological and new business , plus the government's promotion, the development of digital content in Taiwan is quite mature and flourishing. Judging from the ways of communication in modern society, design in its many forms has appeared in every part of our lives and is still rapidly changing. Every piece of design has to have interactions with the observer ultimately. Hence the designer has to satisfy his or her own esthetic demand and anticipate observers' possible reactions at the same time. As a message sent out by the designer, a piece of design also has to show its social value and responsibility. The aim of this study is to use images of some cultural artifacts in National Palace Museum on digital content interactive media design & production, new communication technology and learning effect evaluation. The main purposes are as follows: Using images of cultural artifacts on digital content interactive media design: digitalization, operationalization, applicability.

Due to the rapidly changing of complex situations in the external environment, Mansilla and Gardner (2008) called for today's educators to reconsider the current teaching methods. In addition to imparting knowledge, the educators should also focus on how to cultivate talented persons to face the future challenges and involve in more research and action. Mansilla and Gardner emphasized that students need to master the method of thinking, so as the ability to imagine and deal with the unknown. With these capabilities, when an individual faces the continuous emerging of complex situations and problems, he/she may not examine the problems with much of linear thinking. In addition to broaden the basis of thinking, a holistic and comprehensive ability is also developed to understand the changing world (Dorsch, 2012; Fettes, 2010).

However, despite the existed achievements in creativity, I deeply know that there are often many uncertainties and unpredictable trials. In the scientific field, people often concern about

"scientific inquiry". In the art field, people emphasis on "incubation". Both of them tries to clarify what happens during the "warm up" phase before creating. They also care about the quality of the experience during the warm up phase, in order to response to the needs of learners more appropriately. In the current learning context, learners often cannot digest and organize the knowledge they receive due to too much of fragmented knowledge. As a result, it might be difficult for the learners to produce creative products. On the other hand, individuals are required to involve in meaningful exploration activities and analyze the relevant affairs before creating. Moreover, they should express the implicit knowledge smoothly by continued practicing, as to boost the renewal and innovation of the original knowledge.

Mobile applications in ubiquitous computing have become diverse and well developed as network environments have improved. The historical and cultural aspects of attraction can typically be best understood when users experience them directly. For mobile users with a limited time to visit, developing a deep connection to a tourist attraction can be difficult. The development of an interactive application for mobile users for this purpose has become a challenge. Currently, many mobile travel services provide mobile users a large amount of information over the Internet, but not many developers consider history and culture in the early stage of development of such services, so as to help tourists experience the features of tourist attractions, or associating the style of the interface with the features of the attraction, for example. With reference to the above goal, this paper introduces “digital humanities” as an area of research that combines the fields of digital technology, history and the humanities (Borgman, 2009).

According to the comprehensive analysis of domestic and international literature in this study, although national programs in many regions have noticed the research value of imagination (Fraser, 2011; Gunnell & Bright 2011; MIT opencourseware, 2007), the relevant research in personnel training mostly focused on "creativity". The empirical research on the impact of imagination towards creation or learning is still insufficient (Leahy & Sweller, 2008, 2011). Therefore, the present study focuses on the learning process of college students. Based on different characteristics, experience, knowledge and background abilities, we should construct a learning model that may effectively guide the persons with different personality traits to stimulate their imagination and bring about their creation. By doing this, more effective teaching model may further be developed and be combined with knowledge of different fields to improve the effectiveness of teaching. Moreover, to assist the learners to develop their own self-guided model that benefit themselves.

The main purpose of this paper is to develop applications of digital humanities for National palace museum, in company with graduate interactive course to teach the students to develop their mobile GAMEs. To explore National palace museum, we took the students there to see artifacts, to experience and learn about the culture and history. Next, the students developed research architectures to design and develop their own mobile services. In this research, students without any prior mobile development experience were allowed to participate in the whole development process, including product planning, field test, and design and implementation of their services.

2. Design Imagination and Curriculum Planning

2.1 Design imagination

International studies of imagination continued to accumulate, which included several trends: (1) to emphasize that imagination is an innate ability of individual mental development. Thus, we should activate this innate ability to assist the individual to respond to the future challenges of complex environment more effectively (Gardner, 2007); (2) Imagination is usually largely associate with non-verbal and imagery thinking. Therefore the individual may link the implicit knowledge with the explicit knowledge, integrate abstract and concrete, and go from the known to the unknown. Imagination plays a whole and synthesis role of thinking (Egan, 2005, 2007; Eisner 2002); (3) Activation of individuals' imagination may bring mental activities such as curiosity, exploration, feelings and intuition. This may lead the individual to start a positive cycle of independent learning (Carrie, 2002); (4) High quality of imagination is the source of creativity. It not only activates the knowledge of the individuals, but also enables them to utilize and innovate the knowledge. However, in order to avoid the stagnation or excessive divergence of individuals' imagination, we should provide

them with appropriate guidance to promote positive development (Chen, Huang, & Liang, 2012 ; Lindqvist, 2003; Leahy & Sweller, 2008, 2010; Vygotsky, 2004).

The features of initialing imagination include inquisitive, innovative, productive, etc (Eckhoff & Urbach, 2008; Folkmann, 2011; O'Connor & Aardema, 2005; Thomas, 1999; Vygotsky, 2004). This means that when individual faces problem situations, if he/she may conduct various imaginary exploration and produce diverse and innovative imagination content, he/she is driven to perform the initialing imagination. Specifically, when individual engages in exploration, he/she uses a variety of senses or thoughts to process free association and combination. By doing this, he/she may bring out a variety of "possibilities". The imagination is considered "novel" when individual captures or generates unprecedented, new and unique ideas. When breakthrough is made to the aforementioned thinking, the imagination with "productive" feature will be created. Thus, the learners' imagination becomes rich and emerges continually. The assembly of the three features─exploration, production and novelty made the concept of imagination more concrete. It also corresponded to the connotation of "creative imagination" which has been discussed internationally.

2.2 Curriculum Planning

This research involved a graduate course called, “Interactive Technology: Media, Perception, & Design”. During the eighteen classes, the development of innovative and fancy techniques was not the main concern. Rather, much attention was paid to teaching graduate students with no mobile development experience to implement their own mobile applications. The goal was that the training would enable students to consider the culture, history humanities, and to engage successfully in team works and budget planning. More effort was made herein than in other works to enable students to participate in a complete development process, starting from product planning, field test, design and implementation.

During the course, students were separated by groups to choose a topic and develop a commercial application for mobile devices. The most important part of the design process was the documentation of the process. Every group was required to document their process for subsequent review and examination of their design. Experience of the local culture and interaction with the environment gave the designers the elements required for storytelling.

2.3 Interactive Course and Methodology

The smartphone which is a mobile device rises due two years. User can easy download games quickly by wireless from application market like Android market or app store. It is important for game developers to know which game user chooses and downloads in large games. This research involved a graduate Interactive Technology course. Most students who take this course have no prior mobile development experience. They develop their own mobile application, performing product planning, field test, and the design and implementation of their service. This research is also concerned with the integration of the actual target area with the implementation that is learned in the course. Rather than simply focusing on academic theories and case surveys, this research is highly practical. Students not only need a basic understanding of mobile development, but also consider actual target area engage in teamwork and plan a budget.

Sweeney and Soutar(2001)proposed the following four dimensions of customers' perceived value. 1. Emotional Value: Products that can induce feelings or emotional states. 2. Social Value (enhancement of social self-concept): products that can enhance or reinforce social identity. 3 Perceived Sacrifice: Long-term increase or decrease of the costs in cost owing to use of the products. 4. Functional Value (performance / quality): Desired effect that can be achieved by using of the products. This research considers the relationships among social cognition, social value, and service experience. In experiential learning, the teacher is transformed into an “instructor”. Students and instructor learn together during the design process(Chen, Huang, & Liang, 2012).

From theory through implementation to a cultural field to discover experience-oriented problems, the relationship among information technology, digital content and intelligent living is discussed. The main purpose of the course is to integrate interface design and technology with culture to provide solve problems and perform strategic simulations. Through the development of mobile

applications and theoretical analysis as a mediator, interaction between their cognition from real space to virtual space, students may learn and apply the techniques to a domain.

3. Illustrations “The Adventure of The Ch’ing Dynastry Treasures”

The invaluable artistic treasures held inside the National Palace Museum in the Taipei City consists the world’s largest collection of treasure troves from the Sung, Yuan, Ming, and Ch’ing Dynasties, which almost covers the entire 5,000 years of the Chinese civilization. Boasting a collection of over 655,000 pieces of artifacts, the treasures in the National Palace Museum can be generally classified into the categories of bronzes、calligraphy and painting, ceramics, documents and rare books, art crafts, and palatial treasures. Preservation and collection of the essence of cultural artifacts and arts from the various Chinese dynasties has also gained the National Palace Museum the good name “The Treasure Box of the Chinese Culture”. However, how many pieces of cultural artifacts do you know about among the world’s largest collection of invaluable Chinese artistic treasures in the National Palace Museum?

In view of the latest tread of economic development propelled by the launch of smartphones and phone applications, a game-based application “Mysterious Treasures from the Ch’ing Dynasty- an Adventurous Journey in Search of National Treasures” with profound significance of history education and fun features was designed by our team to re-interpret the historical meaning of cultural artifacts from the Qing Dynasty in the National Palace Museum with a fun concept, in the hope to allow more people to appreciate the history and aesthetics of the Chinese culture in the fun of playing games.

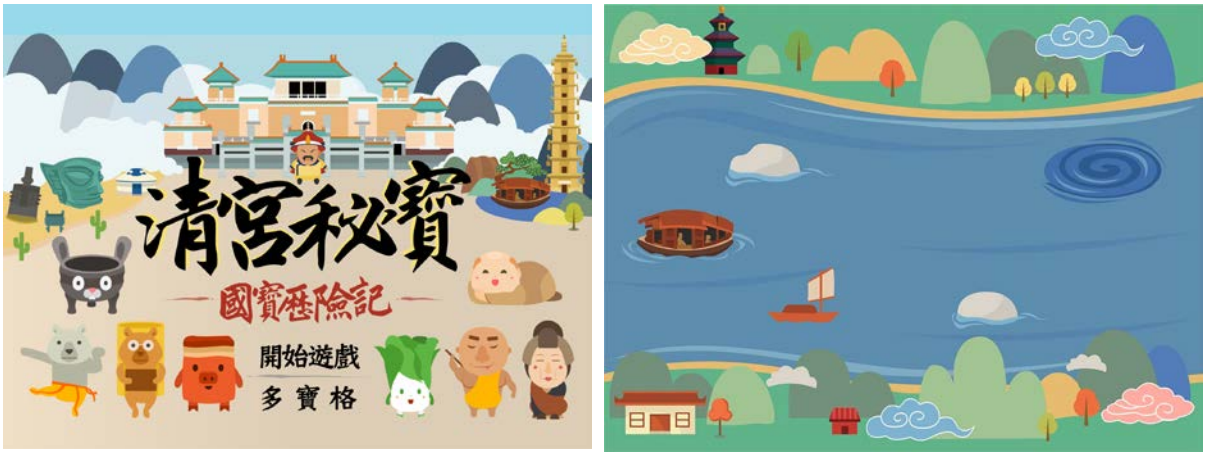

Figure 1. The main screen of the game「Mysterious Treasures from the Ch’ing Dynasty- an Adventurous Journey in Search of National Treasures」& The prototype and design of the game “the Ch’ien-lung Emperor travels to Jiang-nan”.

3.1 Concept of Creation

During a period of 33 years, the Ch’ien-lung Emperor in the Ch’ing Dynasty took six surveillance journeys to the Jiang-nan area (the southern area of the Yangtze River, often referring to south Jiangsu, south Anhui and north Zhejiang provinces) to lift taxes and corvée as rewards, oversee river works, observe local officials and civilians、patronize local gentries, cultivate official families, review troops, and express reverence for the dead at their tombs. The “Routing Atlases of the Ch’ien-lung’ Emperor’s Surveillance Journeys to the South” is the earliest atlases that document the Ch’ien-lung’ Emperor’s surveillance journeys to the south among the collection in the National Palace Museum. The main content of the atlases comprises of the preliminary surveillance routed planned by relevant imperial officials in order to arrange the Majesty to travel southward to the Jiangsu province. In the collection of atlases, each atlas is intertwined with pictures and words, graceful and light shades of colours, as well as simple and elegant composition. Giving a comprehensive and true account of scenes during the surveillance journeys of the Ch’ien-lung Emperor, and reflecting the landscapes and outlooks in that particular historical time, this atlas is popular from the ancient time to the present days. In light of this,

with the inspiration of the “Routing Atlases of the Ch’ien-lung Emperor’s Surveillance Journeys to the South”, design of the secrecy in the game resembles the natural scenery and cultural facets of the Jiangsu province in the “Routing Atlas of the Ch’ien-lung’ Emperor’s Surveillance Journeys to the South”. In addition, to add more fun elements to the game and to promote the historical and cultural artifacts from the Ch’ing Dynasty and the Chinese culture, characters designed based on various cultural artifacts are also placed along the journey in the application, which allows the application users to understand the Chinese culture and experience the virtual scenes of the Ch’ien-lung Emperor’s journey to the Jiang-nan area when playing the game.

To present the Chinese culture in an enjoyable manner, characters in the various barricades of the game are designed based on renowned antiques and cultural artifacts from the Ch’ing Dynasty. For example, the “Jade Bear Figurate from the reign of the Ch’ien-lung Emperor in the Ch’ing Dynasty” was used to brainstorm the characters in the game, and a story concept involving Jadeite Cabbage, a classic National Palace Museum collection, is incorporated into the application to enable application users (game players) to have better comprehension of cultural artifacts through playing around with the shapes of the cultural artifacts in the various selection of the little games. In addition, the concept of “multiple slots for treasures” from the masterpiece “Engraved Sandalwood Multiple Slots Square Treasure Box” is used to design the activity of collecting cultural artifacts in the game. Inside the “multiple slots for treasures”, there are national treasure dolls of the National Palace Museum which are rewarded to game players as they breakthrough each barricade of the game. Further, a description of the history and culture of these national treasure cultural artifacts is given to gradually guide game players to know each cultural artifact in the National Palace Museum.

In this game, players can collect multifarious cultural artifacts and understand the historical significance of these artifacts during the course of breaking through each barricade of the game. With adorable design of each character, user-friendly touchscreen, and interesting activities, the application allows users at different ages to happily enjoy the game. In addition, the most important feature of the application is that cultural background is incorporated into the game, which allows players to boost their knowledge at play, and makes the game a helpful assistance in providing education through fun activities, instead of being an ordinary game.

3.2 Design of Icon

The “Meat-shaped Stone”, which is a palatial curio in the Ch’ing Dynasty, was originally a naturally-formed agate, which during the process of formation was infused with impure elements from the exterior world that resulted in its strata of different colors resembling a piece of incredibly lifelike pork cooked in soy sauce and it name “Meat-shaped Stone”. Currently, the Meat-shaped Stone and the Jadeite Cabbage are listed together as important artifacts among the collection of the National Palace Museum.

Figure 2. Icon design—“tiny stone”.

As the Meat-shaped Stone has become an important artifact in the National Palace Museum collection and bas been well-known by the public, it is chosen as the prototype for designing the icon of the

application for the purpose of accurately linking the cognition of the public, promoting the National Palace Museum collection pertaining to the Ch'ien-lung Emperor in, and further exhibiting a fresh outlook of incorporating the classic cultural artifacts in the National Palace Museum with new technology. Besides, a "tiny stone" piggy character is designed based on the form and features of the Meat-shaped Stone to symbolize a fusion of the profound historical meaning of the National Palace Museum and the entertaining feature of the application(Figure 2).

4. Character Introduction and Inspirations

4.1 Character Introductions

Wen-Xiong: Inspired by the Bear-Shaped Jade Zun, this character is smart and erudite. He likes picking herbs in the mountains and writing poems and wants be doctor. A very good friend of Emperor Ch'ien-lung. Princess Cui-Cui: Inspired by the famous Jade Cabbage, this character is the princess of the Cabbage Kingdom. A shy and timid girl, she has two pets, a locust and a grasshopper. She enjoys hot baths to refresh herself(Figure 3).

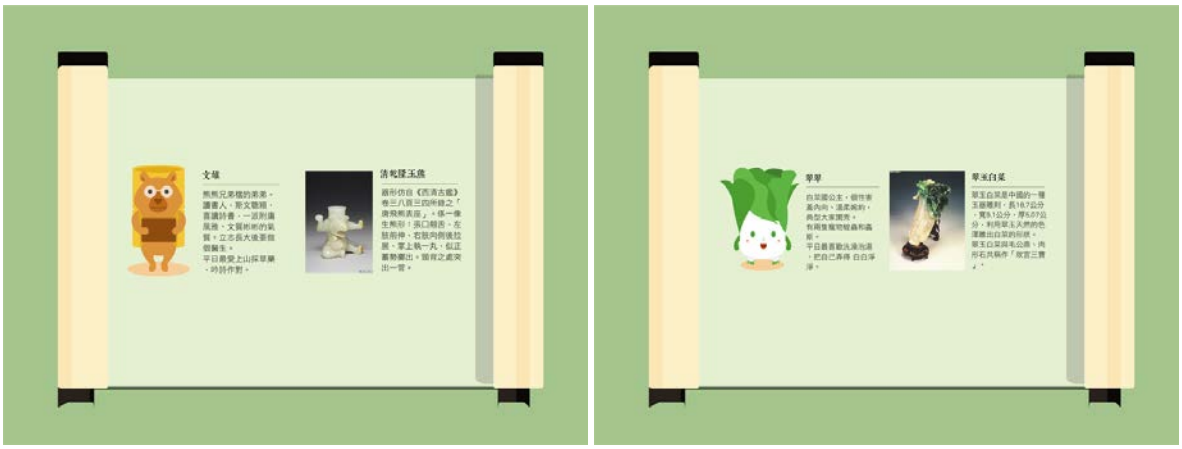

Figure 3. Wen-Xiong & Princess Cui-Cui.

4.2 Game Inspirations

4.2.1 Emperor Ch'ien-lung's Travel

The ideas for this game came form "The map of Emperor Ch'ien-lung's trip to the south" and the "Bear-Shaped Jade Zun". The story goes like this: The emperor invited the knowledgeable bear "Wen-Xiong" to go on a trip along the river with him. The bear is not only erudite for he's the one who introduced the scenic spots along the river to the emperor, but had keen eyesight to steer the ship away from the dangers in the water. With this simple ship-steering game, we hope to sharpen toddlers' visual skills and sense of direction.

4.2.2 Exterminate the Pests!

Cabbage Princess Cui-cui wanted to do something for her own country and so she decided to kill the pests in the garden. Similar to the traditional whac-a-mole, this simple and fun game was added a twist, there are bugs not to be killed. This is hoped to reinforce toddlers' color and shape learning and eye-hand coordination.

5. How to operate the app?

“The adventure of the The Ch’ing Dynasty Treasures” is an educative and interactive mobile game, which not only provides fun but also helps improve toddlers’ eye-hand coordination. Children can learn about ancient Chinese artifacts and their history in the process as well. The Curio Box system used in the app allows the user to tap and learn.

5.1 Basic Operations

For convenience and simplicity, users can either use their finger or a stylus pen. By opening the app, one is in the main menu. There are two options, “start game” or “the curio box” (Figure 4). From the main menu, select “The Curio Box”. Then select any icons to learn more details about the particular artifact. By selecting “start game” in the main menu, the map appears. If tapping on “Wen-Xiong”, one will be taken to the game of “Emperor Ch'ien-lung’s travel”. If choosing “Princess Cui-Cui”, one will be taken to the game of “Exterminate the pests!” The rules of “Emperor Ch'ien-lung’s Travel”: The point of this game is to steer the boat without hitting the obstacles like rocks or rapids in the river. Players are allowed three chances. The Rules of “Exterminate the pests!”: The point of this game is to exterminate as many pests as possible appearing in the cabbages within one minute. But the grasshopper and the locust have to be avoided because they are the princess’s babies. Users can use either their finger or a stylus pen. The bar at the top shows how many points you’re winning so far(Figure 5).

Figure 4. The Map & A Screenshot of “Emperor Ch'ien-lung’s Travel”.

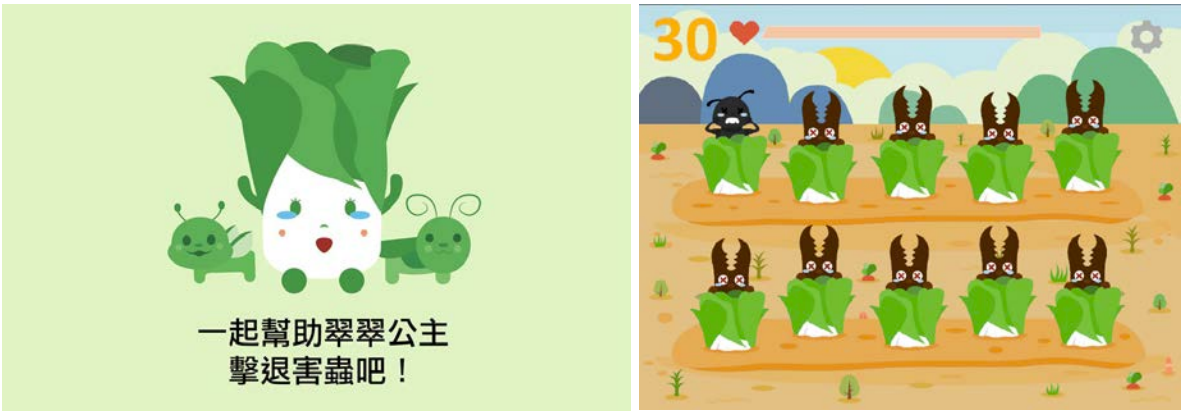

Figure 5. A Screenshot of “Princess Cui-Cui”.

6. Conclusion

This study aimed at firstly developing an app game with the inspiration of Chinese artifacts, and secondly, developing a curriculum that can improve design imagination and enhance design ability. Students taking this course will be able to cultivate digital skills for interdisciplinary applications. As we can be sure that the personalized game-based learning and mobile learning aren’t something to fade

fast, we hope our curriculum can inspire a new generation of app designers. With the rapid development of information communication technology, the capacity of mobile computing and the quality of network connection have been improved. The abundance of mobile applications can help people to complete more tasks than ever before. This research considers mobile devices as interfaces for presenting content. The computing resources of mobile devices have not yet been used not system evaluation or modification performed. A standalone mobile travel application is useful when the quality of the network connection is poor, but the amount of information delivered must be drastically reduced.

We hope to develop more diverse functions in the future, and provide more customized services for mobile visitors. Finally, the students who participated in this research were deeply involved in the whole development process. We hope that the products developed herein will be commercialized in the near future.

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