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Design of Interactive Learning Materials with Concept of Sustainability Integrated into Macau Drunken Dragon Dance †

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Abstract: The Feast of Drunken Dragon is a special intangible cultural heritage of Macau, which is also known as the Drunken Dragon and Lion Dance Gala. Every year, on the eighth day of the fourth month of the lunar calendar, members of the Macau Fish Traders Association hold a drunken dragon and lion dance activity at the Macau Sanjie Guild Hall. Festivals play a part in cultural designing. They not only attract a large number of tourists but also promote local culture. The Drunken Dragon Dance is currently encountering many problems such as the inability to introduce new performance methods as technicians are getting older, and young people are unwilling to inherit it. This cultural heritage tends to gradually decline. The Cultural Affairs Bureau of the Macao Government has paid attention to the problem. However, the publicity methods are still mainly based on videos, simple online graphics, and cultural and creative products, and the impact of the COVID-19 epidemic harmed the promotion. With the rapid development of technology, mobile devices provide digital reading and augmented reality (AR) to assist learning. Thus, learning is not limited in space and time, and individuals continue to use it without hindrance. Using the concept of experiential learning, we design interactive teaching materials with dynamic images to advertise the historical stories of the Feast of Drunken Dragon in Macau, folk rituals, and traditional dragon performances through the AR interactive experience of the drunken dragon festival. The concept of learning by doing is an experiential way to understand relevant intangible cultural heritage knowledge. Using digital content, teaching material design is provided based on user experience to achieve sustainable education.

Keywords: Macau Drunken Dragon; experiential learning; sustainable education; augmented reality; electronic picture book

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1. Introduction

The Drunken Dragon Festival in Macau has a history of more than 400 years. This festival originated from the traditional folk sacrificial activities in the Xiangshan area of Guangdong. After the Cultural Revolution, the Drunken Dragon Dance on the Mainland was lost. As marine resources are being exhausted by overfishing and climate change, Macau's fishery industry is shrinking, and the number of fishers is decreasing significantly. The younger generation lacks a sense of commitment to traditional culture. To solve this problem, the Macau Fisherman's Association holds the Drunken Dragon Festival every year to create a unique festival brand, allowing visitors from Macau and other places to experience the traditional folk festival. Recently, the government has also begun to pay attention to the event and the lack of professionals for it. The promotion for the event can be launched in Macao's primary and secondary schools to encourage more Macao youth to learn about Macao's traditional culture and customs [1].

With the rapid development of information technology, many traditional cultures are preserved and disseminated in digital ways. In 1997, Thalmann and others transformed the terracotta warriors into 3D, including weapons, costumes, and scene environments, and integrated and produced a 90 min animation film for display and testing [2]. Korean scholars

also used the interactive operation of sound visualization and gesture recognition to invite visitors to experience Korean traditional royal court music and manuscript illustrations. This program enhanced the curiosity of the participants, as well as their understanding of traditional royal court music. Overall, this study is carried out to provide evidence that multisensory digital media facilitate learning and cultural appreciation of historical artifacts [3]. Based on the result, traditional culture can be combined with digital interaction and various educational puzzle-type APPs and virtual reality (VR) experiences.

2. Literature Review

2.1. Macau Drunken Dragon Dance

Every year on the eighth day of the fourth month of the lunar calendar, the "drunken dragon dance" team performs in groups of two with one holding the dragon's head and the other holding the dragon's tail. They tour seven major vegetable markets in Macau. The dancing posture of the dancers expresses drunkenness. During the dance, the dancers enter the side and spray wine into the air, implying that the dragon sprays water. In 2009, it was officially included in the Macao Intangible Cultural Heritage Preparatory List, and in 2011, it was officially included in the third batch of the national intangible cultural heritage list. The Drunken Dragon Festival, as a traditional cultural festival in Macao, contains rich cultural connotations and represents the intangible cultural heritage of humans. It is a characteristic traditional culture of Macao and is of great significance to the popularization and promotion of traditional culture [4]. Therefore, the Macau government has focused on promoting and organizing related groups and projects, making the Drunken Dragon Festival a precious traditional folk dance art event and providing participants with generous bonuses.

2.2. Experiential Learning with AR Interaction

Organizational psychologist Kolb put forward the experiential learning cycle model in 1983 by sorting out the experiential learning theories of Dewey, Levin, and Piaget. The model is composed of four stages: concrete experience, observation and reflection, conceptual abstraction, and active practice [5]. Related research used the experience mode and AR for design. Oleksy and Wnuk used augmented reality (AR) technology to allow users to view past historical photos in a real space. The results of the study found that AR enhanced the local significance of multiculturalism and reduced racial prejudice [6]. Unger and Kvetina used AR in Prague archeology and constructed a virtual museum for users to experience the archaeological site. From the research and application of the above literature, it was found that the technology of augmented reality combined with experiential visual interaction achieved better learning effects and a sense of experience for learners [7].

2.3. Digital Design of Intangible Cultural Heritage, Sustainable Education, and Management

With the continuous advancement of digital technology, 50% of young people around the world use 3C products on average every week, and the frequency of use is as high as 25% every day. Therefore, sustainable digitalization is important for investors to understand the company's current situation and grasp the latest data in real-time. Sustainable digitalization is more convenient for third-party verification units because it greatly improves efficiency while ensuring data quality [8]. The concept of digital sustainability is combined with cultural heritage, and related projects were launched recently such as the "Dong Wooden Architecture Construction Technique" and "Guangxi Cultural Field" in Guangxi in 2015. Due to the dwindling number of inheritors of traditional skills, lack of successors, fragmented graphic materials, and lack of systematic organization, there are worries of traditions being forgotten, destroyed, or even gradually disappearing. Therefore, the pilot project of the digital management system which is professionally organized to preserve traditions is required. In 2015, the United Nations Organization for the Promotion of World Cultural Heritage (CIPA) held a seminar at the University of Science and Technology

of China to discuss the application of technologies such as data acquisition and recording and technology digital processing and models to sustainable preservation of culture.

3. Research Methods

In addition to using digital technology for the Drunken Dragon Festival culture, we explored the mode of sustainable inheritance through digital art, experiential learning, and AR interaction. To overcome the constraints of time and space, a system was developed and ported on the mobile APP. For the development of the system, we carried out field surveys, literature reviews, and expert interviews. Based on this, the digital design of the historical background, shape, and color matching of the Drunken Dragon Festival was established. The overall process comprises three stages as follows.

3.1. First Stage: Data Collection, Collation, and Analysis

In 2022, Wei-Ming Guan, the vice president of the Macau Fresh Fish Traders Association was interviewed. He said that the Drunken Dagon Dance in Macau is different from the traditional dragon dance. There are only two parts, the dragon head and the dragon tail (Figure 1). The dragon head is generally 3 feet long, and the dragon tail is about 2 feet long. Both parts are made of teak and painted with gold or silver for color matching. Dragon horns are made of antlers from Taiwan or China. The overall shape of the drunken dragon is rounded and streamlined, and the scales are drawn on the surface.

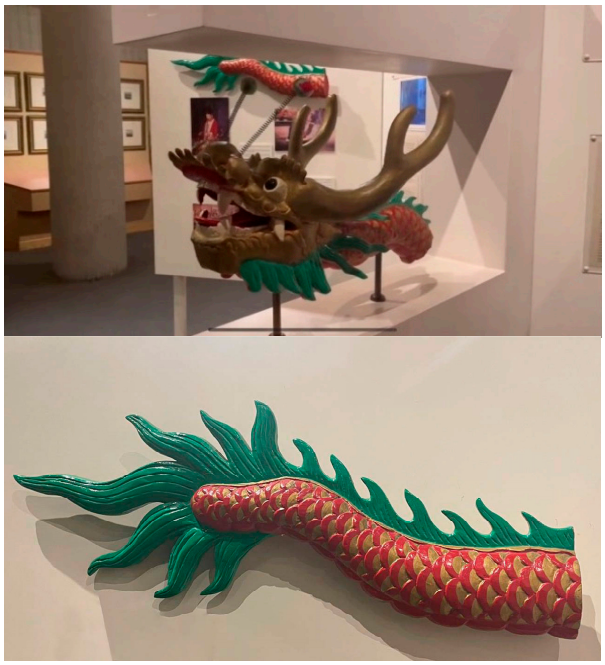

Figure 1. The shape of drunken dragon (photographed in this research).

3.2. Second Stage: KOLB Experiential Learning Framework for Digital Content Design

With the historical background data of the Drunken Dragon Festival organized, its stories are reinterpreted with illustration effects (Figures 2 and 3). Photoshop, Illustrator, and After Effect were used for digital content production, and Unity 3D, C Sharp, and Android platforms were adopted to develop the AR Drunken Dragon (Figures 4 and 5). The digital content was designed according to the KOLB experiential learning framework.

1. Animation display of the historical stories of the Drunken Dragon Festival (specific experience).
2. AR interactive experience, understanding, and observing the shape and color matching of Drunken Dragon (observation and reflection).

3. Concept formation of Drunken Dragon Festival culture, sacrificial activities, Drunken Dragon dance, and Drunken Dragon modeling (an abstract).
4. Practice and evaluate the final interactive experience (active practice).

Figure 2. Sacrificial activities in the Drunken Dragon Festival (drawn in this research).

Figure 3. Drunken Dragon Dance Troupe–The local cultural characteristics are highlighted in Chinese on costumes and musical instruments (drawn in this research).

Figure 4. 3D modeling design of drunken dragon (made in this research).

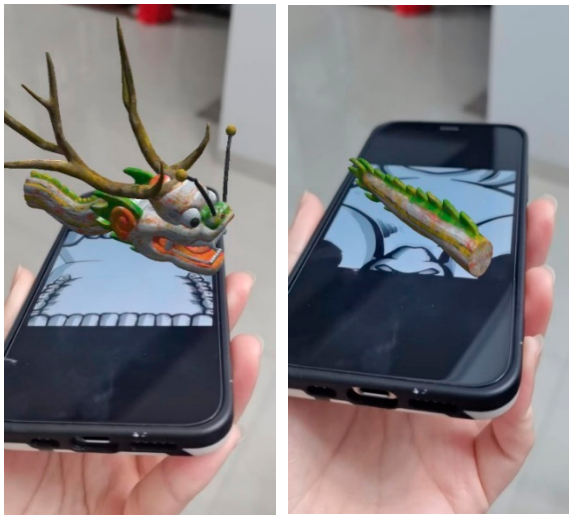

Figure 5. AR interactive experience and operation (made by researchers).

Based on the experience mentioned above, digital humanities were developed to help users have a better understanding of intangible cultural heritage on smartphones, computers, and other devices. Using this model, the preservation function of skills inheritance learning and activity materials was provided.

3.3. Third Stage: Feasibility Study of Sustainable Education

The "AR Drunken Dragon Interactive Experience Textbook" was provided to users for experiments, and a questionnaire survey was provided to explore their learning motivation, satisfaction, and effectiveness and observe whether users were interested in the interactive mode and had the desire to continue learning and exploring persistent behavior.

4. Conclusions

Dynamic images in the AR interactive design and experienced learning mode were created for intangible cultural heritages. Users observed and understood the traditional shapes, colors, and materials of the drunken dragon with 360 stereoscopic effects. Then, they understood the cultural value, development, and current situation of the Drunken Dragon Festival. The learning motivation of the users with the interactive materials was explored to understand the satisfaction, effectiveness, and sustainability of the design. The interaction was mainly for the single-user experience. In the future, extended production can be added for multi-person modes. Moving pictures may allow users to choose the level of experience interaction at different levels, which needs to be discussed and analyzed for the feasibility of teamwork learning.

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