

The Use of Digital Technologies to Enhance User Experience at Gansu Provincial Museum

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Abstract. This paper discusses the critical issues faced by Gansu Provincial Museum in attracting and maintaining its audiences, and how it engages digital technology to create new compelling exhibits via the use of both digital and multimedia tools. Real life examples using virtual reality, augmented reality and interactive games will be briefly discussed.

Keywords: Smart Museum, CAVE, Sand Model, Digitization

1 Introduction

As digital technology evolves, more and more conventional museums are exploring new and innovative methods to go beyond the mere display of physical artefacts. Gansu provincial museum is no otherwise. The urge to engage technologies becomes stronger as visitors become more affluent and are seeking more enriching experiences that digital technologies can provide.

Technologies that can share deeper contextual information about the museum's cultural artefacts include touch screens, projectors, multi-medias, virtual reality and interactive games. However, all these are made possible and be exploited to the very best only if the cultural exhibits are digitally available.

Digital exhibits provide opportunities for the production of new information by recreating interactive models and incorporating visual and sound effects. Such end products form better and efficient tools for disseminating valuable information about the artefacts than if they were merely displayed physically.

1.1 Objectives of the paper

This paper discusses how Gansu Provincial Museum engages digital technology to resolve its main issue of creating new compelling exhibits via the use of both digital and multimedia tools.

2 Problems faced by the museum

The Gansu Provincial Museum faces a few issues with its original display of exhibits.

First, is the lack of digital exhibits data. Gansu Provincial Museum realizes the need to digitize its collection of exhibits in order to provide enough contents to create compelling themes for exhibition purposes. As a result, the museum is incapable of deriving new exhibition themes within a short time frame. Digital contents will be able to do so.

Second, is the lack of effective presentation tools. Currently, visual sign boards are used to narrate the history behind the exhibit. However, there is a limit to the amount of content that can be displayed on a sign board. Furthermore, it is impossible to cater a signboard to each exhibit. As a result of the failure to provide enough information, many patrons may leave the museum with questions unanswered. Multi-media exhibits can effectively combine 3d models, oral recording, videos and still images to produce more captivating creations to enhance learning

Third, is the lack of new display equipment. Most, if not all of its equipment are either outdated or have deteriorated to an unusable extent. Even if high resolution digital models of the exhibits are available, it is impossible to vividly display them on outdated screens.

3 How does the museum enhance user experience

To prepare itself for the digital era, it is essential for digital exhibits to be available via 3D digitization. The museum reconstructed 300 of its most valuable exhibits and a mural tomb. Images, sound recording, narratives were also tirelessly consolidated. 3D digitization comprises 3D scanning via laser scanners such as Konica Minolta Range 7 and high resolution photography using high end digital cameras were carried out. 3D data are very versatile. They can be used in many downstream applications.

The museum also invested in setting up a 3D data management system. This system provides a platform for curators to search titles, review materials and create compelling exhibition themes conveniently. Information is at your fingertips.



Fig. 1. Screenshot of a 3D collection management system

4 How to enhance user experience

4.1 Interactive digital exhibits

Although the museum have engaged the use of verbal and visual aids such as brochures and audio guides, their effects are very limited and fail to allow visitors the means to explore artifacts more thoroughly as they tour an exhibition. Visitors often leave with queries unanswered or pass through an exhibition without being engaged. Due to the fact that every visitor is peculiar in interest and preferences, it is difficult to develop an all rounded platform that provides all relevant information, histories and stories or other content that each visitor would like. Some examples are shown below.



Fig. 2. Traditional sign boards were used to convey information to visitors



Fig. 3. Signboards being replaced by interactive touchscreens

Gansu Provincial Museum carefully design and install interactive systems of its exhibits to help connect visitors to the exhibits. In our case, users can manipulate the digital exhibits in 360 degrees, zoom-in on a particular area, detach and attach an exhibit, and even read articles or view videos to learn more about the historical back-

ground of the exhibits. All these functions are controlled by the users themselves at their own comfortable pace.

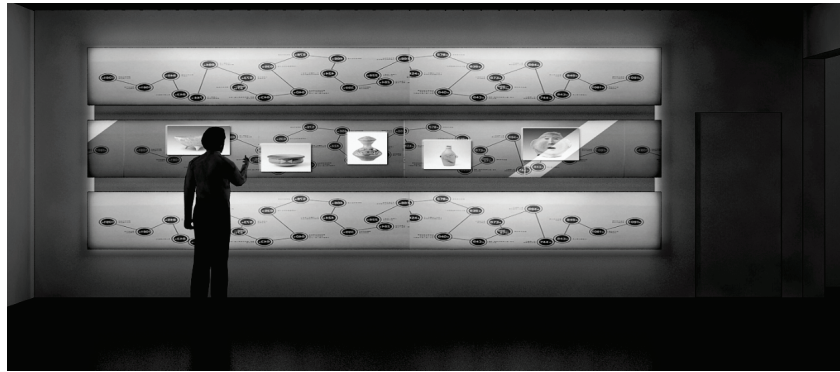


Fig. 4. Interactive timeline

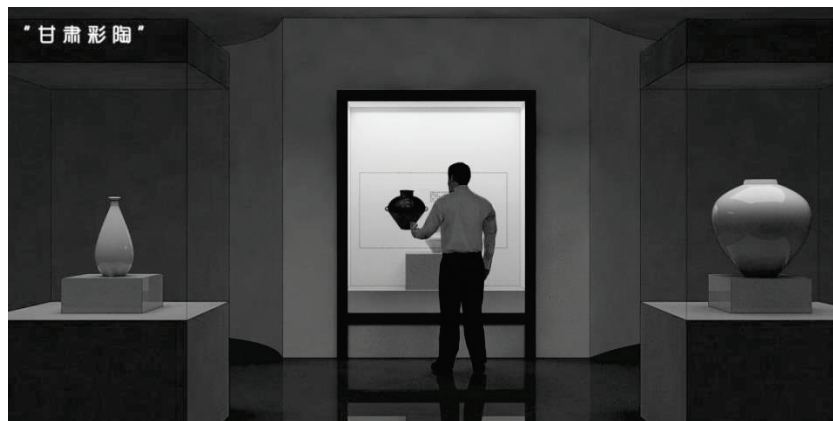


Fig. 5. Information of the relics are directly posted on the glass panel via the use of transparent film

4.2 Sand Model with Augmented Reality

Within the Silk Road Hall and on one of its wall, hangs a 2D map of the Silk Road. Important locations are marked with a red dot and that's all. No information about these locations was provided in any form. The museum feels that more can be done to this important historical trade route history. A 3D sand model is proposed as tool to provide as much relevant information as possible, and to empower visitors to engage with augmented reality.

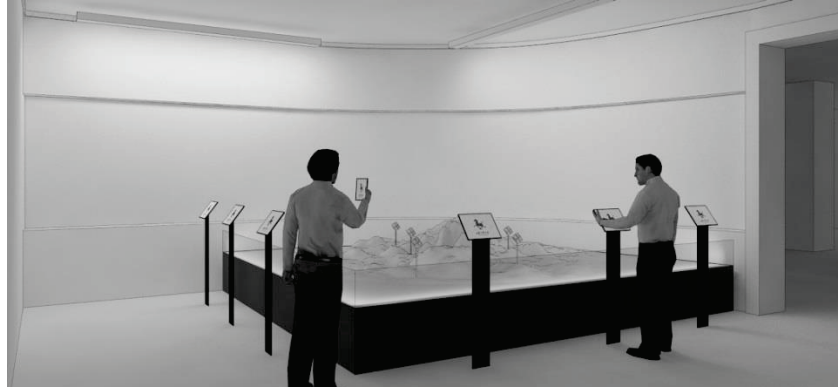


Fig. 6. Sand model of the Silk Road with Augmented Reality

To engage visitors, ipads are provided to users which at a touch of the screen can direct them to locations of interest. Once the camera detects the hotspots, narratives, videos, images of the location will start popping out to educate the users. The menus are simple and users can study the map with minimal searching and clicking.

4.3 Interactive Games

To instill interest among young visitors, interactive games form part of the museum's strategy. One of the most popular traditional games among the youths is perhaps the jig saw puzzle. Using its 3D resources, Gansu Provincial Museum easily recreate digital jig saw puzzles of its digital exhibits and install them on touch screens. Users can change the contents of the jig saw puzzle to a different exhibit to up the difficulty level. Being digital, the exhibits can be changed regularly and effortlessly.

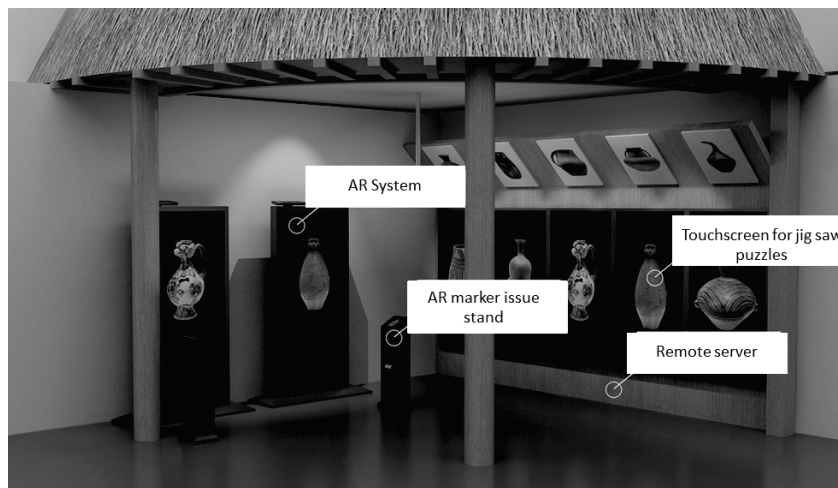


Fig. 7. Interactive games area – AR and Jig Saw

4.4 Virtual Reality of the Mural Tomb

Studies reveal that by immersing people in an intended virtual environment, they learn and assimilate faster than if they were merely exposed to 2D graphics. Therefore, using immersion in a museum can enhance the learning process. Perhaps the most common system is the CAVE system. A CAVE (automatic virtual environment) is an immersive virtual reality environment. Depending on the requirements, it is essentially an enclosed portable room made up of high resolution rear projection screens. Depending on the requirements and budget, the number of projector screens can range from 3 to 6.

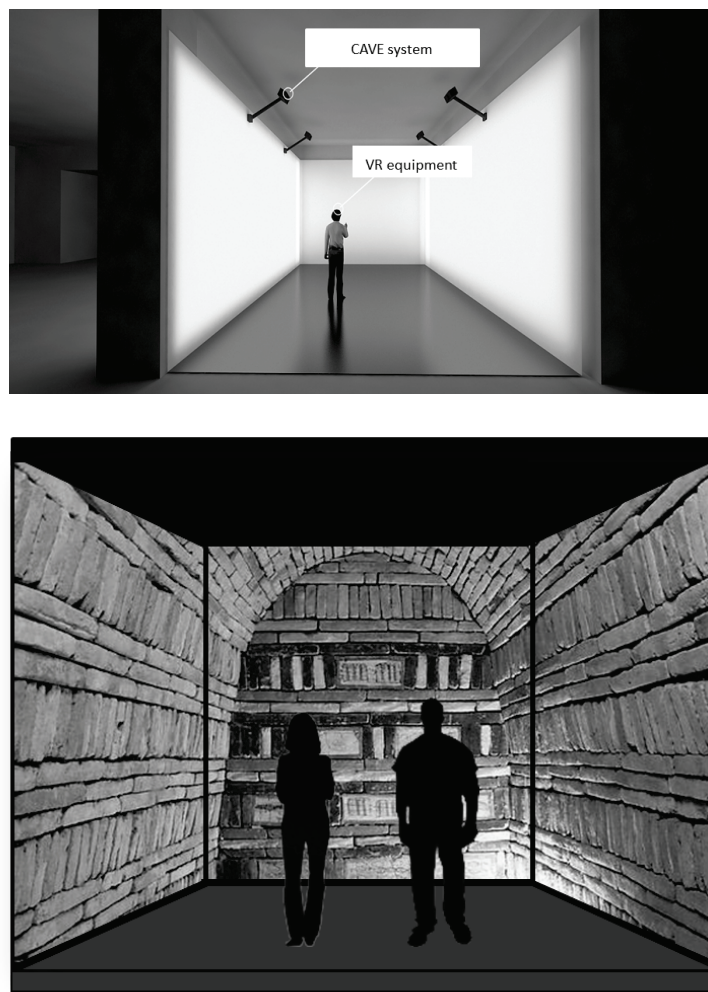


Fig. 8. CAVE system for the mural tomb

Users wear 3D glasses and once inside the CAVE, they are able to view the tomb as if they were physically inside the mural tomb. This was made possible by the high resolution 3D model of the tomb generated by 3D scanning prior to the set-up. Sensors installed on the 3D glasses continuously track the users' movements and feed back real time information to the computer system which in turn input 3D scenes back to the glasses.

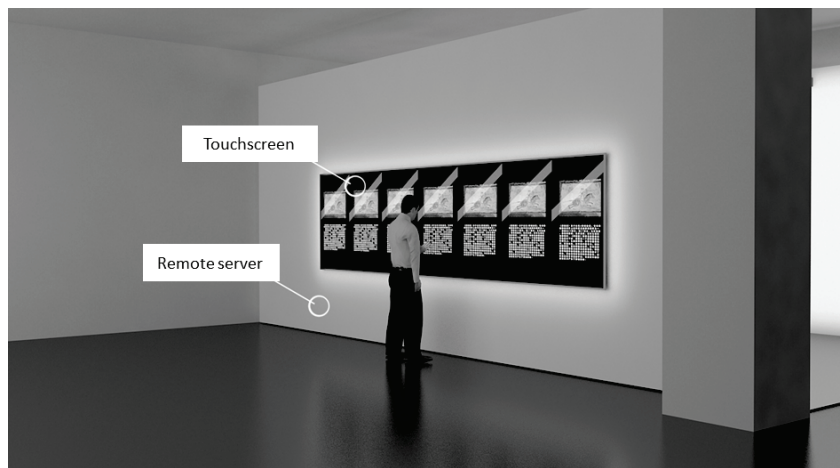


Fig. 9. Touchscreens installed outside the CAVE system to provide close up view of the murals

5 Conclusion

Gansu Provincial Museum takes advantage of 3D multimedia digital technologies and uses them effectively to generate impressive and educational presentations. Simple and user friendly interfaces and menus help make museum artifacts more accessible, appealing and human like. However, it must be remembered that too much digital technologies may rob the exhibition of its real essence. Gansu Provincial Museum does not intend to utilize digital technologies to replace an actual tour of the museum. Hence, museums must strike a balance by retaining the original flavor of a traditional museum and complement its objectives with digital museum capabilities.

