Applying Game Design Theory to Virtual Heritage Environments

Erik Champion
Architecture and Geomatics, University of Melbourne
e.champion@pgrad.unimelb.edu.au

Abstract
Much literature has argued that interactive engagement in a computer medium is best demonstrated by games. With this in mind, this paper suggests certain techniques that virtual environments (especially cultural heritage ones) can learn from game design.

Keywords: Usability, archaeology, narratives in multimedia, cultural immersion, game design, virtual environments, heritage, tourism, engagement, interactivity.

1 Introduction: Advantages of Games
The computer game’s massive influence on culture, its pivotal role in the development of computer graphics, avatar technology, and internet networking, as well as innate suitability for evaluation; suggest promoting the game medium as suitable for academic evaluations of virtual environments, especially those with a cultural focus.

2 Learning In Virtual Heritage Environments
In games we learn and follow social rules, or learn about physical rules of the world, without risking personal injury. We socially learn (by stories, and commands). We learn by play (puzzles toys and games). And we learn by observation (observing cause and effect, emulation and by imitation).

We could reorder the above, by suggesting learning is from place, objects, and people. Such learning requires a cultural setting (a place that indicates certain types of social behavior), artifacts (and how they are used), and people. For people teach a social background and how to behave (through dialogue devices such as stories and commands) along with or counter to the participant’s own personal motives.

According to research by Mosaker and others, tourists want to share cultural perceptions and learn through doing, being told, observing, and asking. In the role of virtual heritage and virtual tourism, people want to feel engaged in the activity, enjoy the spectacle, feel the pressure of time, (the relative cultural idea of time-place), and understand the ‘embedded’ meaning of local cultural activity based on artifact.

In a virtual environment then, the setting should also be an interactive artifact, you should be able to interact with the environment as much as a local. In games, settings are backdrops. For example, actors could exchange maps with each other of the best places to visit and with audiovisual descriptions and instructions of how to use artifacts etc. Real-time events could trigger historical events (historical events could depend on real-place change, like freak floods or extreme temperature, etc).

2.1 Issues-Stop the Shooting, Smell The Trees
In computer shooter games artifacts are limited to weapons, medicine, opening and closing things. You do not communicate apart from typing, and you do not grow or cultivate things. Games are predominantly artifactual settings of instant use and destruction. The restricted range of artifacts almost certainly limits the emotional states possible.

In games the only dramatic way to have others involved is to shoot them or team up to shoot others. Do hovering vultures create drama by forcing you to act quickly? Rushed time heightens engagement but does not necessarily make for compelling drama.

Artifacts are normally used for personal display (social identity), communication (of ideas, rules, commands), attack and defense, cultivation, transport, building, medicine, food, toys games and education, clothes (shelter), open and close things. Artifacts are not just for war. To produce a typical game goal for virtual environments is to reduce the likelihood of cultural immersion.

Users of a virtual heritage ‘game’ might also ignore the environment in order to win the game (to finish tasks etc). Observation of the setting must be an essential part of the game.

A time-based task (a typical component of games) means that people would be punished for contemplating their surrounds, (Waterworth, paper on undated website). So we need to reduce or replace the time constraint, by making time based goals only part of the experience, or the timing could be triggered by significant events.

2.2 Suggestions to Increase Engagement

- Solve tasks in order to travel back in time (reverse time travel). As mastery grows, and less is known (as we travel backwards into the dim past), more interactivity is possible.
- Create a world where individual autonomy and remembrance of users is integrated with actual historical events and figures (augmentable history).
- Use scripted agents as dialogue aids - agent-actor dialogue - to help guide users who ask appropriately worded questions.
- Allow people to update personal memento maps with their own positioned and scaled icons.
- Changing factors in dynamic environments have an effect on how people move through virtual environments through the metaphorical notion of ‘health points’ as borrowed from game design.
- Enable users to view the effects of how they choose to complete tasks via the artifacts at their disposal.
2.3 Evaluation

To check engagement we need evaluation devices but we cannot stop people who are in a virtual environment to evaluate their feelings of engagement as that will affect their sense of engagement. Further, on evaluating people after their experience of the virtual environment may be prone to error, as it relies on memory recall and on their noticing and communicating exactly what made their sense of engagement seem powerful or weak or non-existent (Slater, 1999).

In games, data is gathered by innate interactive mechanisms (chat logs, health points, completion of the memento map, and the final state of the inventory of artifacts). Such data could be compared against results from a pre and post-experience user evaluation questionnaire to determine if we can gain user feedback on cultural immersion in virtual heritage environments without their enjoyment being curtailed, and without them being forced to participate in laboratory interviews or complete survey forms.

2.4 Testbed

The author of this paper is currently conducting a research project and virtual environment case study in order to evaluate the relative success or failure of the above features. The site chosen is a Mayan temple-city that can appropriately use the above features in order to test user engagement.

The testing will have 4 stages, first is a cognitive walk through by domain experts who offer advice on the questionnaire, content and interface. Second will be user testing.

In the second stage, users will enter three different virtual reconstructions of Palenque, a Classical Mayan site in Mexico.

The first site allows them to explore in time and space, through clicking on objects. The goal will be to reach all parts of the site (which will automatically ‘fill in’ the related memento map).

The second conversational environment will have the same objects along with hyperlinked interactive panoramas and avatars that can ask and remember simple dialogue. The task will be to gain knowledge through questioning the avatars.

The third mercantile environment will have the same modeled buildings as well as artifacts that users have to collect in order to navigate through the site, (in time and space-Mayan artifacts were considered portals to spiritual sites) by solving culturally specific problems. The task will be to collect and trade with other users in order to change the user’s social role. Certain artifacts will act as constraints that impede progress etc.

Engagement will be assessed by physiological measuring of users, questionnaires, and indirect monitoring, such as mapping of user paths, points scored in solving tasks, social roles obtained, and the inventories of artifacts collected. Users will be able to check navigation via maps in fly over mode, scaled down walk through mode, or axonometric mode. They can also choose to monitor their progress via point scores, maps of their path, or by inventories.

The aggregate levels of engagement of the explorative, conversational and mercantile environments will be assessed against demographic features of the audience. These may include age, gender, knowledge of 3d mediums, archaeological knowledge, PC game knowledge, and travel.

Then, the domain experts (archaeologists and usability specialists) will suggest further refinements to the questionnaires, content, and interface, based on the user testing results. The second user testing will be the final stage of the evaluation, and where possible, users from the first user testing will act as a control group, against a larger group of new users.

3 Conclusions and Future Work

The data gathered from user evaluations will hopefully suggest answers to the following questions. Which varying modes of interactivity (constraints and affordances) add most to engagement in a virtual tourism environment and to a ‘sense of place’? Which tasks are most popular? Is this indicated by the data collected by the indirect monitoring elements themselves or by the questionnaire? What level of social presence (personalization, voices, agents or avatars of other users) is needed?

Is it possible for wide segments of an audience to be engaged and educated at the same time by interactions in a virtual archaeology project? Or must we leave genuine engagement to the realm of games-does engagement conflict with edification?

Finally, did travelers most enjoy collecting artifacts, questioning avatars or trading with their fellow avatars, and did this allow them to gain a culturally embedded new world-view?

References


