

# Play to Learn II: Developing Educational Games for Museums

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## 1. Introduction

This is a sequel paper from the 2006 SIGGRAPH presentation on *Play to Learn: Exploring Educational Games in Museums*. It will further discuss how to develop educational games in the museum context from the perspective of a museum educator. This paper hopes to achieve a better understanding especially for commercial gaming developers to extend their skills and expertise in order to produce educational learning games for museums.

## 2. Digital Games and Museum Authentic Learning

As the next generation of museumgoers is growing up in the digital age, Mark Presky calls them the “digital native.” It is clear that the choice of developing educational learning games is becoming popular in museum media production. In fact, educators in most museum organizations already use traditional games and game-like activities as tools to teach visitors. However, taking this pedagogical tool into the digital learning environment presents challenges. The museum is a place for visitors to engage in authentic learning directly with museum objects. When developing a digital museum learning game, a serious assessment needs to be taken on how to balance such a learning experience within a virtual environment. By observing how learning games can contribute to learning, Malone and Lepper (1987) studied computer games for insights into intrinsic motivation for learning. They pointed out four key attributes of a learning game:

- a) **Challenge** - Players tackle a clear, fixed challenge of some relevance to them. Frequent feedback guides them towards success, clarifying both successes and failures, and promoting feelings of competence.
- b) **Curiosity** - Cognitive curiosity is triggered by discrepant events and other paradoxes arising from the game play. Sensory curiosity is triggered by multimedia elements.
- c) **Control** - Players have meaningful control over their actions in the game, causing clear and powerful effects in the game universe. Contingency, choice, and power are key elements of control.
- d) **Fantasy** - The context of the game includes some degree of fantasy, which engages the emotional needs of learners while providing relevant metaphors or analogies.

Fortunately, museums have a long record of accomplishment

with these attributes. Since the days of the cabinet of curiosity, fantasy and curiosity have loomed large in the museum visitor experience. In discovering how to provide an authentic learning experience in a digital gaming environment, the real focus must be on content. This is where museums do well. By focusing on content development, a good museum educational learning game not only requires good graphics and good character development, but also it needs to apply constructive learning theory in the creation of the game with focus on the interpretation of collection objects and integrate these key attributes into the design.

## 3. Considerations for Game Developer

Many museums are venturing into the world of digital games in an effort to reach young audiences as well as to serve the need of digital natives beyond a museum field trip. By examining the most recent MUSE Awards winners from the American Association of Museums (AAM)<sup>1</sup>, it is clear that many museums have hired media developers to develop games and multimedia productions tied to specific exhibitions or collections areas. Noteworthy examples are: *Be a Patron of the Art* from the Allentown Art Museum, *In Search of the Ways of Knowing Trail* from the Brookfield Zoo & Chicago Zoological Society, *Virtual Knee Surgery* from COSI, Columbus, *Design a Panda Habitat*, *A Walk in the Forest*, and *Habitat Adventure: Panda Challenge* from the Conservation Central at the Smithsonian’s National Zoo, *A Brush with Wildlife: Create a Composition with Carl Rungius* from the National Museum of Wildlife Art, *Amazing Reef* from the John G. Shedd Aquarium in Chicago, *Mystery of the Poison Dart Frog* from the North Carolina Museum of Art, *Theban Mapping Project* from the Rare Books and Special Collections Library at the American University in Cairo, *Cycles: African Life through Art* from the Indianapolis Museum of Art, and *LearnAlaska* produced by the University of Alaska Museum of the North, and *OLogy* from the American Museum of Natural History in New York. In addition, a few have collaborated with the for-profit game industry to put their content on gaming Web sites. For instance, the Smithsonian American Museum has created jigsaw puzzles on Shockwave.com<sup>2</sup> and a virtual Getty Museum on Whyville<sup>3</sup>. In the past few years, the investment by museums in these digital learning game projects has increased. Such trends in the museum field present a great opportunity for commercial gaming developers to find work in such cultural institutions. To bridge between these two fields, it is essential for game developers to have a keen understanding of the mission, operation, and audience of the museum.

### **Understanding the Museum Mission**

According to the definition from the International Council of Museums (ICOM), the “museum is a permanent institution in the service of society and of its development, open to the public, which acquires, conserves, researches, communicates and

exhibits, for purposes of study, education, enjoyment, the *tangible and intangible* evidence of people and their environment.”<sup>4</sup> For instance, the mission statement from the Metropolitan Museum of Art is “to collect, preserve, study, exhibit, and stimulate appreciation for and advance knowledge of works of art that collectively represent the broadest spectrum of human achievement at the highest level of quality, all in the service of the public and in accordance with the highest professional standards.”<sup>5</sup> Another mission statement from the Exploratorium, a museum of science, art, and human perception founded in 1969 in San Francisco, is “to create a culture of learning through innovative environments, programs, and tools that help people nurture their curiosity about the world around them.”<sup>6</sup> With a better understanding the mission of each institution ranging from children’s museums, science centers, zoos, aquariums, history museums and art museums, game developers can bring their skills learned from the commercial world into such cultural and learning organizations that primary focus on teaching, learning, exhibition, and conservation.

### **Understanding Museum Audiences**

When developing a museum educational game, the developer should also consider users’ age, gender, racial diversity, special needs, and previous gaming experience as well as the need for curriculum standards at national and state levels in museum context. Each game should clarify its targeted age level, number of players, and especially the role of the teacher if applicable. A good game helps students to enhance their learning techniques, such as learning by doing, learning from mistakes, goal-oriented learning, discovery learning, task-based learning, question-led learning, and multi-sensory learning. Benefits of creating such games are to provide digital engagement, expand vocabulary, customize learning experiences, extend thinking processes, develop strategic planning and problem solving skills, and promote generalization to broader ideas and applications. The ultimate goal of developing museum educational learning games is to expand users’ common knowledge, and opportunities to learn the skills used by art historians, biologists, geologists, historians, museum professionals, and then hope to increase the authentic learning experience and possibly transfer to their own real-world futures.

### **Understanding Museum Collections**

A museum is a unique institution that offers an authentic learning environment through exhibits, collection objects and educational programming. One question that often occurs in the museum field is how extensive a role technology should play when visitors cannot see or experience the “real” paintings or collection objects. Should museums continue encouraging visitors to visit the museum physically, or should they consider adopting technology to provide supplemental learning experiences? The answer is both. As technology has widely influenced today’s younger generation, museum online gaming provides an alternative learning tool for an individualized learning experience. Creating authentic learning activities by using technology, the rich content of a museum can be more fully explored. In addition to increasing awareness about the institution, targeted games can also achieve specific pedagogical goals related to its collection. An art game that requires users to compare differences between paintings reinforces visual analysis skills. A natural history game that simulates a simple ecosystem teaches about biological competition and symbiosis in a demonstrative way. Museum online gaming is based upon the richness of content from collection objects that few other

educational institutions can offer. This especially applies to curatorial research and educational interpretation. Through online gaming development, a great opportunity can be provided for a deeper level of intellectual stimulation and learning with the hope that the more you play, the more you will learn.

### **Understanding the Practicality of Museum Digital Applications**

There are many museum online games available today as mentioned above. A major challenge is they are usually isolated within the Web site of each individual organization. Most museums develop one or two games at a time that mostly are related to an online exhibit and sometimes not coherent. To better facilitate a comprehensive learning experience by using museum collections, objects, and exhibits, a game developer needs to understand the portability of the game and how to easily integrate or repurpose such an application into the broader context of museum learning. For instance, can a Flash game be exported to a cell phone application? Can an online game be used on a hand-held device? Can an audio tour be repurposed for a Podcast application? Can all types of users and learners including hearing and visual impaired access these educational learning games?

## **4. Conclusions**

Why are museums creating games? In a world where video games appear to preoccupy most young people, venturing into this arena may seem almost necessary for such institutions, which must build young audiences who become their future constituencies. The Pew Internet & American Life Project by Lee Rainie (2006) reports 75% of teens play digital games but teens are not the only people playing games. A 2006 study by the Entertainment Software Association reports that the average gamer is 33 years old, and that 25% of all gamers are over 50. Clearly, games are a way of life for many people today and are quickly becoming mainstream avenues for reaching many new audiences.

However, technology is not a means for learning but a tool. The advance of technology can offer broader experiences than a traditional visitor tour. These can include interactive online tours using high-resolution images for the clarity of each brush stroke or revealing drawing underneath layers of painting. Detailed conservation documentation, audio recordings for oral histories and historical events, and other materials can be made accessible. These types of deeper learning experiences most likely are not included in a physical exhibit display. Online environments or educational learning games can provide additional information for further exploration and understanding. In order to serve the need of digital natives beyond a museum field trip, educational learning games have become a popular choice to enhance learning and teaching in the museum context.

By understanding the context of museums, this paper hopes to give commercial game developers insights on how they can bring their knowledge and skills to such learning and cultural institutions. Remember the key is to tie the goals of the game to the goals of museums and their audiences.

## References

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## Web Sites

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<http://www.renaissanceconnection.org/>

*In Search of the Ways of Knowing Trail*, Brookfield Zoo & Chicago Zoological Society  
<http://www.brookfieldzoo.org/pagegen/wok/index.html>

*Virtual Knee Surgery*, COSI  
<http://www.edheads.org/activities/knee/index.htm>

*A Brush with Wildlife: Create a Composition with Carl Rungius*, National Museum of Wildlife Art  
<http://www.wildlifeart.org/Rungius/index.html>

*Amazing Reef*, John G. Shedd Aquarium  
[http://www.sheddaquarium.org/sea/interactive\\_module.cfm?id=20](http://www.sheddaquarium.org/sea/interactive_module.cfm?id=20)

*Theban Mapping Project*, Rare Books and Special Collections Library & American University in Cairo  
<http://www.thebanmappingproject.com/>

*Cycles: African Life through Art*, Indianapolis Museum of Art  
<http://www.ima-art.org/cycles/index.html>

*LearnAlaska*, University of Alaska Museum of the North  
<http://www.learnalaska.org/>

*Ology*, American Museum of Natural History  
<http://ology.amnh.org/>

*MUSE Awards*, Media and Technology Standing Professional Committee, American Association of Museums,  
<http://www.mediaandtechnology.org/muse/index.html>

## Endnotes

- <sup>1</sup> <http://www.mediaandtechnology.org/muse/index.html>
- <sup>2</sup> <http://www.shockwave.com/gamelanding/americanartjigsaws.jsp>
- <sup>3</sup> <http://www.whyville.net>
- <sup>4</sup> <http://icom.museum/definition.html>
- <sup>5</sup> [http://www.metmuseum.org/visitor/faq\\_hist.htm](http://www.metmuseum.org/visitor/faq_hist.htm)
- <sup>6</sup> [http://www.exploratorium.edu/about/fact\\_sheet.html](http://www.exploratorium.edu/about/fact_sheet.html)