

Play to Learn: Exploring Online Educational Games in Museums

Herminia Wei-Hsin Din, Ph. D.
Assistant Professor of Art Education
University of Alaska Anchorage
hdin@uaa.alaska.edu

1. Introduction

How does one embed authentic learning outcomes in designing online educational games especially in a museum context? How does one design an online educational game so children can play to learn about museum objects and exhibits? These are challenging questions. In order to provide an authentic learning experience for today's learners, the choice of developing online educational games becomes a popular direction in current museum media. In order to enhance learning and teaching in the museum context, a good online educational game requires good graphics, good character development, good content, and applies constructive learning theory in the development of the game. Marvin Christensen (1995), writes that a constructivist teaching and learning model calls for learning as: hands-on, minds-on, and authentic learning. He states that,

This approach to teaching and learning enables students to participate fully in a learning community where the teacher is not the only source of knowledge and information. It encourages full involvement in a community of learners that includes other students, parents, teachers, and outside experts. Technology becomes a tool, supporting the learning process as students seek new knowledge and understanding. The challenge is to define the new approach to teaching and learning with sufficient clarity that it becomes a useful vision for educators as they make decisions about instructional materials, activities, and strategies for teaching.

By examining various types of museum online educational games, this paper hopes to provide an understanding of current museum gaming development.

2. Why Use Games in Museum Learning

Marc Prensky (2000), writing in *Digital Game-Based Learning* makes it clear that gaming is now a way of life: "Today's schoolchildren, elementary through college, travel with their own personal Game Boys, Handicams, cell phones, portable CD and MP3 players, pagers, laptops, and Internet connections." To reach out to such a technologically savvy group of learners to learn more about museum objects is not an easy task. Eric Klopfer and Susan Yoon (2005) also mentioned in order to "constructively promoting the educational development of today's young tech savvy students and fostering the productive technological facility of tomorrow's youth requires harnessing new technological tools creatively." They believed "these new technologies engage students at a deeply meaningful level, and provide them with the tools and techniques that scientists, engineers and technology

workers across a diversity of fields use every day." Patricia Deubel (2006) mentioned that Digital game-based learning (DGBL) unites educational content with computer or online games that offer a wealth of educational applications. Online games "motivates by virtue of being fun. It's versatile, can be used to teach almost any subject or skill, and, when used correctly, is extremely effective. What's more, its use is supported by constructivist theory, which calls for active engagement and experiential learning." In order to engage students in learning more about museum objects beyond a field trip, online educational games become a popular option to extend the learning experience. In fact, children learn best when they are actively involved in hands-on experiences.

3. Types of Museum Online Educational Games

Examining the most recent MUSE Awards winners from the American Association of Museums (AAM), there are six-types of museum online educational games. These are (1) role-play, (2) simulation, (3) creative play, (4) puzzle and mystery, (5) interactive reference, and (6) building personal online resources.

Role Play is a type of game that puts the player inside the story. As a player, you choose your own adventure such as picking a character, playing a role, and making decisions to see what happens. Players explore their path through the story and arrive at learning conclusions. For example, *Be a Patron of the Art* from the Allentown Art Museum offers an opportunity to travel 500 years into the past to discover many Renaissance innovations revealed through the Allentown Art Museum's collection of European art. This game asks players to design their own innovations, investigate Renaissance artworks in depth, discover how past innovations inform life today, and more. It is enhanced with quirky visuals, irreverent humor, and engaging interactivity that reveals the ways of Renaissance life and culture. This design clearly states that history is not boring. *In Search of the Ways of Knowing Trail* from the Brookfield Zoo & Chicago Zoological Society is another example that uses role play. By "choosing your own adventure" with a focus on science and geography skills, students take a trip to a rain forest in the village of Epulu in Central Africa. When their jeep breaks down, they must take a detour. Traveling through the forest with four native teenagers from different local cultures, the player needs to make choices for them. A fact book and an online-glossary tool is taken along to help them learn about people, animals, and survival tips of the rainforest.

Simulation is a game that gives users the power to manipulate reality. Users can "create" a model of the real world and see what

happens when things are changed. Most importantly, the choices made will determine the results. For instance, *Virtual Knee Surgery* from COSI, Columbus provides an overview of the procedures of knee replacement surgery. The process is explained by allowing visitors to manipulate tools such as scalpels and bone saws. The content can get quite graphic! However, it is presented in a way that makes it possible to enjoy the process and learn while going through the surgery. This web site is a highly effective tool for explaining a medical topic to a variety of audiences. Conservation Central at the Smithsonian's National Zoo presents a series of online simulation games that provide a great deal of information about conservation biology, and the complexities that underlay the science and practice of conservation. These games are *Design a Panda Habitat*, *A Walk in the Forest*, and *Habitat Adventure: Panda Challenge!* Players take conservation action steps in each module, and learn outcomes along the way. These programs integrate technology with both science and social studies concepts, and are aligned with national standards for Grades 5 to 8. By using "real" tools and scientific methods, these online simulated field studies provide practice for real world follow-up.

Creative Play gives players an opportunity to draw a picture, write a story, create a piece of music, direct a puppet show, or make a movie. It is a creative and original production that is based on things students have learned. This type of educational game provides an authentic learning experience by further investigating museum objects. One good example is *A Brush with Wildlife: Create a Composition with Carl Rungius* from the National Museum of Wildlife Art. This is a sequel production from the *Art Tales, Telling Stories with Wildlife Art* that allows visitors to create a story, to write a wildlife field guide, and to curate a museum exhibit by using museum artworks with added music and sound effects. This latter production, *A Brush with Wildlife* offers excellent activities for visitors to experience how Carl Rungius, one of America's finest wildlife artists, created a composition that made his wildlife painting so powerful. As an artist, composition is essential to a successful work of art and is also one of the hardest things to master. Using animation to introduce design principles, this game gives users a step-by-step process not only to get to know the content but also to create and arrange a piece of art by following the Rungius' footsteps. In addition, the technology behind the creation of this game is relatively simple compared to complicated Flash productions. Another good example is *Amazing Reef* from the John G. Shedd Aquarium in Chicago. In this movie-making interactive game, visitors can make an animated film about life on a coral reef. This game provides step-by-step instruction that begins with choosing or writing an exciting story, casting colorful characters, animating the movie, and adding music and titles to complete the movie. The best part of it is the visitor can download the movie to a personal computer. This site provides a totally authentic "movie production" learning experience of how reef animals have developed different adaptations for feeding, living, and surviving.

Puzzle and Mystery lets a player discover the solution by examining clues, field notes, or museum collection records, and put them together to determine the right answer or move on to the next stage of the game. As a player, you have to put on your "thinking cap" and solve a puzzle or mystery throughout the game. *The Lost Museum* from the American Social History Project and the New Media Lab (NML) at the Graduate Center of the City

University of New York is a great example. This site is a recreation of PT Barnum's 19th century American Museum, once found in Lower Manhattan, as a lens into mid-19th century New York City and antebellum American culture, society, and politics. *The Lost Museum* offers visitors a visualization and 3D interpretation of this extraordinary institution as well as an innovative way to learn and teach about the many issues and events of the period. With a rich archive of historical documents and present-day scholarship, excellent images, 3D graphics and animation delineate the marvels and scandals surrounding Barnum and his museum. A review in *Higher Learning: Technology Serving Education* stated that "Beware: if you visit *The Lost Museum*, you may never return. Just as one can spend an entire afternoon in a regular, brick- and- mortar museum, the NML's virtual take, might cause a visitor to lose track of time, online." Another good example is the *Mystery of the Poison Dart Frog* from the North Carolina Museum of Art. By using clues from ancient art made of jade and gold from the museum collection, players need to solve a mystery in the rainforest and treasure galleries of Central America. Working with twins Zeke and Zoey and traveling to Costa Rica, players solve a mystery of jaguars, crocodiles and the elusive poison dart frog by examining museum objects, interviewing museum experts, and analyzing museum records. This game leads to a richer understanding of pre-Columbia art in its cultural and historical context.

Interactive Reference is the most common online development in the museum field that opens the door to deeper knowledge, and gives users opportunity to explore a topic of their own choosing. By going through large amount of informative text, images, audio recordings, animations, and historical footage, learners can choose the information they need. *Theban Mapping Project* from the Rare Books and Special Collections Library at the American University in Cairo provides users an easier way to access large amounts of data in the Valley of the Kings. This interactive reference offers details at every corner while navigating in the valley. The content of this site is deep and is continually updated with new data. The site provides visitor opportunities to tour the tombs, zoom in on images, view video clips, and more. Another example of using interactive reference is from the Indianapolis Museum of Art on important themes in African art using a wide variety of media: works of art, curatorial commentary, historical and cultural context, photography and music. *Cycles: African Life through Art* is organized into four sections focusing on youth, adulthood, leadership and ancestors. Within each section, visitors explore features of African culture such as unity, diversity, and dynamism. Visitors can also learn about works of art featured on the site in a virtual interactive gallery.

Building Learning Resources allows students to collect learning objects, then create and develop their own projects by combining and reorganizing different online resources provided by a museum. This type of learning tool gives ownership back to the learner. *LearnAlaska* produced by the University of Alaska Museum of the North is a good example. *LearnAlaska* is an educator's tool for utilizing *Alaska Digital Archives* that integrates library digital resources and museum objects. The collection now includes over 15,000 items and partners with six Alaskan institutions. *LearnAlaska* enables teachers and students to build customized multimedia presentations by selecting historical documents, maps, oral histories, video clips, and three dimensional objects, and adding interpretations to illustrate a theme or concept about

Alaska. The design of *LearnAlaska* is rooted in an object-based learning framework that includes two major components, a *Discovery Tour Builder* and a *Discovery Tour Viewer*. The *Tour Builder* allows teachers and students to create online tours by using objects selected from the *Archives*. The *Tour Viewer* gives users an opportunity to view tours made by other visitors. This learning tool expands the use of the *Archives* beyond a searchable database. In addition, because *LearnAlaska* is linked directly to the *Archives*, it avoids copyright issues since none of the images, or audio and movie clips will be downloaded to a local computer. Another building learning resources examples is *OLOGY* created by American Museum of Natural History. The title refers to different “ologies” such as geology, biology, paleontology, genealogy, archeology, etc. This is a science-rich Web site for students from 7-11 year olds at home or school for whenever or wherever students are curious about objects in a museum collection. On this site, students can collect *OLOGY* cards, play games, meet museum scientists, ask questions, and read feature stories as they dig into different topics. Currently, there are 258 *OLOGY* cards available. Once students have collected a number of *OLOGY* cards, they can log on to their personal homepage to create projects by using the *OLOGY* cards. There are three types of projects students can create: (1) Stumpers – create a mini-quiz to test science knowledge, (2) Make a Group – create a theme by grouping some of the cards together, (3) Story Starters – gives students the beginning of the story, then task them to insert *OLOGY* cards into the story and write the rest. This personalized section provides a further learning opportunity for students to explore the knowledge they have gained. Learning outcomes are generated by creating one of the projects.

4. Core Components to Design a Successful Museum Game

By reviewing a variety of different types of museum online educational games, core components for designing a successful museum online game can be identified. First, the design of the game has to be immersive. The game has to provide an alternative environment so players can apply different knowledge for a deeper understanding. Second, the playability of the game has to be elevated. The game should allow a player to effectively control the flow of the game in order to navigate whatever task is presented. Third, the game has to be attractive, challenging and competitive. In particular, the game should offer a goal or several goals for players to achieve such as a higher score, or a completion of a project and/or a product. Fourth, the game should allow players to track and manage their progress. Lastly, the game should fulfill a personal need. Museum games should enhance the quality of a classroom presentation or a homework assignment, or can be used for pure fun and entertainment.

When designing a museum educational game, the developer should also consider students’ age, gender, racial diversity, special needs, and previous gaming experience. 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 multisensory 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 application. The ultimate goal of creating museum online games is to expand students’ common knowledge and provide real-life world authentic learning experiences.

5. Implications for Future Museum Online Game Development

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 much a role of 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 richness of content that a museum can offer can be more fully explored. Technology is not a means for learning but a tool. The advance of technology can offer a broader experience than a traditional visitor tour. This 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 many others can be made accessible. These types of deeper learning experiences most likely are not included in a physical exhibit display but online environment can provide additional information for further exploration and understanding.

There are many museum online games available today. A major challenge is they are 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 are not coherent. To better facilitate a comprehensive learning experience by using museum collections, objects, and exhibits, there is a need to provide a searchable capacity in a central location. Another observation is that the goals of each game may not be consistent with learning objectives and do not fit with standards-driven education.

6. Conclusions

Compared to other commercial online games such as *Second Life*, *World of Warcraft*, EVE online, the development of museum online gaming is in its formative stage. Although these multiplayer online games are created inside cyberspace, it requires players’ inputs to build a community. Museum online gaming is based upon the richness of content from collection objects that few educational institutions can offer. This especially applies to curatorial research and educational interpretation. Through online gaming development, a great opportunity is provided for a deeper level of intellectual stimulation and learning. The more you play, the more you learn.

References

Din, H. 2004, Object-Based Learning and Museum Online Resources – An Alaska Experience, *World Conference on E-*

Learning in Corp., Govt., Health & Higher Education, Vol. 2004, Issue 1, p. 41-44.

Higher Learning: Technology Serving Education, *Review*, September-October 2005.

Klopfer E. and Yoon, S. 2005, Developing Games and Simulations for Today and Tomorrow's Tech Savvy Youth, *TechTrends: Linking Research & Practice to Improve Learning*, May/Jun2005, Vol. 49 Issue 3, p33-41.

Marvin C. 1995, Providing Hands-On, Minds-On, and Authentic Learning Experiences in Science , *Critical Issue*, North Central Regional Educational Laboratory.

Patricia D. 2006, Game On! *The Journal*. Available: <http://thejournal.com/articles/17788>

Prensky, M. 2000, *Digital Game-Based Learning*, New York: McGraw-Hill.

OLogy

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

MUSE Awards

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

Second Life

<http://secondlife.com/>

World of Warcraft

<http://www.worldofwarcraft.com/>

EVE Online

<http://www.eve-online.com/>

Web Site Links

Be a Patron of the Arts

Allentown Art Museum

<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

The Lost Museum

American Social History Project & New Media Lab at the
Graduate Center of the City University of New York

<http://www.lostmuseum.cuny.edu/home.html>

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/>