Log-data, interviews, and observation: What can they tell us about learning in a museum-based mobile game

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Abstract: Museum exhibits are often considered passive experiences that have trouble engaging younger students. To increase their appeal, museums have begun re-inventing themselves by creating interactive multimedia exhibits that are supplemented with mobile technology. The Minnesota Historical Society (MNHS) has embraced this movement by developing a student-guided field trip experience called Play the Past (PtP), which was developed to enhance collaboration, critical thinking, and understanding of history. The current panel will discuss the development of PtP and evaluation of learning through several methods including, observations, interviews, and logged behavioral data. Lastly, the impact of the findings on the design of the exhibit will be discussed.

Panel Topic

This panel will look at three different approaches for measuring engagement, learning processes, and learning outcomes in an exhibit-based mobile game, *Play the Past*, for students in grades 4th - 6th at the Minnesota Historical Society (MNHS). The evaluation process involved staff and interns at the MNHS, experts from the University of Wisconsin, Madison, external evaluation from Audience Viewpoints (AVC), and a graduate student from the University of Minnesota to create this multi-faceted approach.

Why is it important?

This topic is important because it provides insight into how to evaluate a museum exhibit enhanced with mobile technology from several different perspectives. In addition, we are not aware of another study which has used logged behavioral data to analyze the learning behaviors of students who participated in a historical museum exhibit. This panel will also provide attendees with knowledge on how to implement this type of system within other informal learning environments by presenting information on the rapid prototyping and user testing methods used.

Panelists

Jennifer Sly is Museum Education and Technology Specialist at the MNHS. She leads the *Play the Past* and "Reinventing the Field Trip for the 21st Century" projects at the Minnesota Historical Society. For the past 15 years, Jennifer has worked at the intersection of technology and education in informal learning environments. Jennifer has a B.A. from St. Olaf College in Math and Music and an M.P.A. from the School of International Affairs at Columbia University.

David Gagnon is a Discovery Fellow and program director of the Mobile Learning Lab in the Wisconsin Institutes for Discovery at University of Wisconsin-Madison. He directs a team of educational researchers, software engineers, artists and storytellers that explore the intersections of learning science and media design, specializing in mobile media, video games and simulation. David is also the Director of the ARIS project, a free and open tool that allows anyone to produce mobile games, stories and tours. He is also active member of the Games+Learning+Society Research community.

Kate Haley-Goldman, is Principal at AVC. Kate's fascination with data dates to her teen years with data collection trips and subsequent analysis with her mother, a field biologist. Kate's academic background is in Anthropology, with her undergraduate years at Bryn Mawr College. In the 17 years she has been in the field, she has served as an Audience Researcher at the U.S. Holocaust Museum, spent over 10 years as Senior Researcher at the Institute for Learning Innovation, and most recently served as Director of Learning Research and Evaluation at the National Center for Interactive Learning. With experience in exhibition evaluation, citizen science, and amateur projects, and professional development programming, she has deep expertise in the field of informal learning. Kate is frequently called to advise on the use of technology in museums and other learning environments. She has directed projects both in the US and abroad, including mobile phones and smartphone apps, multimedia installations, websites, gaming, augmented and mixed reality, novel data visualization systems, and online learning. Currently, she

is Co-Principle Investgator of the National Science Foundation-funded open source project Open Exhibits.

Nicolaas VanMeerten is a Ph.D. student in the Educational Psychology program at the University of Minnesota. His research focuses on determining which behaviors are beneficial to learning in video game environments. In addition to this project with MNHS, he is currently developing a project to investigate how social play impacts learning in a multiplayer video game environment using logged behavioral data. He is also the co-founder of Glitch, a non-profit organization based at the University of Minnesota that provides extensive programming to promote gaming culture and game design as a creative practice.

Panel Structure

The session will be interactive, with the panel presenting evaluation results with attendees given time to reflect, critique, and interpret results.

I. Introduction by Jennifer Sly

II. Iterative Design and User Testing (David Gagnon)

   a. Attendee Interpretation

III. Observations, Interviews, Surveys (Kate Haley-Goldman)

   a. Attendee Interpretation

IV. Log Data (Nic VanMeerten)

   a. Attendee Interpretation

I. Introduction

Jennifer Sly will introduce the *Play the Past* project - a mobile game designed for students in grades 4th through 6th that visit the Minnesota History Center on field trips. The game uses the ARIS game platform and focuses on engaging students within an exhibit and encouraging their use of 21st Century skills. This section of the panel will describe the project, the process of development, and goals.

II. Iterative Design and User Testing

Play the Past used an iterative design method of development that used the ARIS game platform to rapidly prototype game designs and test with students visiting the museum. Over a two-year period, *Play the Past* tested with over 2,500 students and measured student engagement through observation, videotaped behavior, student interviews, and surveys of teachers and chaperones. This section of the panel will share findings from the iterative design period of the project and ask attendees to interpret these data points.

III. Observations, Interviews, and Surveys

AVC worked with interns and staff at the Minnesota History Center to conduct a series of exhibit observations, interviews, and surveys. AVC developed a protocol and trained staff to collect data for this evaluation. The observation and interview methods were paired in order to more purposefully focus on how *Play the Past* relates to student outcomes. A data collector followed individual students within a field trip group to first observe the student throughout their experience within the exhibition, particularly in the three exhibits connected to *Play the Past*, the Sod House, Iron Mine, and Fur Trade. MNHS data collectors noted such behaviors as *Play the Past* use, discussion and collaboration among students. Each student observed was then interviewed at the end of the field trip to more closely examine the connection between students' use of *Play the Past* and what students take away from their experience at the museum. Both students and teachers were surveyed back in the classroom post-visit.

The findings from the observations and interviews will cover the following topics:

1. Student Engagement

2. Collaboration

3. Critical Thinking and Problem Solving

IV. Analysis of logged behavioral data for evidence of learning

The current analysis utilized behavioral data logged from a mobile device from every student who participated in the *Play the Past* exhibit for one year from September 1, 2014 – June 3, 2015 (7,291 4th to 6th grade students). This data was used to study how students interacted with the exhibit. Specifically, we assessed student engagement and behaviors that reflected learning within the exhibit through completion rates, collaboration between students, and the manipulation of artifacts to complete activities. A discussion of these findings will follow the presentation to determine how they could be used to improve the student's experience with the exhibit and learning outcomes.