# Mobile games in Museums : from learning through game play to learning through game design·

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## Abstract

*This paper investigates aspects of learning in museums through mobile games, i.e games that are played usually by groups of players, using mobile devices that allow interaction with the space and the exhibits and physical mobility of the players. It is argued that playing these games (which usually follow the pattern or scavenger hunt or role playing narratives), results in visitor engagement, motivation and knowledge about museum exhibits. Despite of these positive aspects, it has been observed that learning remains at the level of transfer of factual information about the exhibits. It is argued that in order to enrich the learning experience of game play we need to involve the visitors also in the process of designing mobile games for the museum.*

## From observation to interaction: learning with mobile games

The introduction of the constructivist perspective (Hein, 1998) in the museum learning experience stressed the active role of the visitor, who constructs meaning through the interaction with the exhibits as opposed to the passive consumption of information. Games have been used by museum educators to support constructivist learning through interaction with the exhibits. The proliferation of digital technologies and especially of mobile technologies resulted in revisiting the idea of game play in museums for many different purposes (for a detailed analysis and overview see (Beale, 2011)). One type of mobile games designed for museums follow the *scavenger hunt* motif where players look for exhibits following clues (for a presentation of representative examples see Avouris & Yiannoutsou in press) or try to answer correctly questions or quizzes in order for the game to continue[1]. Although studies on these games report player engagement, motivation and knowledge about the exhibits integrated in the game, there is also criticism pointing out that in the context of this type of games museum artefacts are treated as a bunch of disconnected and de-contextualized objects and as such they are discouraged by museums (Klopfer *et al.*, 2005)

The other type of mobile games contextualizes the scavenger hunt idea in *role-play mobile games and/or in playful narratives* (i.e. stories to be enacted in a specific site

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[1] Based on the specific characteristics of these types of games different categorizations have emerged. So, for example a categorization focusing on the different links between the findings describes five types of metaphors: a) treasure hunts, b) jig-saw puzzles, c) Dominos, d) Scrabble, and e) collecting butterflies (Kjeldskov & Paay, 2007). This categorization describes the emergent players' move in space and interaction with content in order to collect information or clues.

according to the scavenger hunt concept. For an analysis of the term and presentation of typical examples see (Yiannoutsou & Avouris, 2010)). Mystery stories are favored for this type of games (see for example Klopfer*et al.*, 2005; Paay *et al.*, 2008)) and offer a new context in which museum exhibits are integrated. A study about the game *Mystery at the Museum* (Klopfer et al 2005), which is a role play game combined with a mystery story, showed that in contextualized scavenger hunts players can connect the exhibits with broad scientific fields (such as mathematics, models, communication) and they have the chance to engage with the details of some exhibits and to think more broadly about multiple exhibits (combining depth and breadth).

Whereas contextualized scavenger hunts integrate museum exhibits in a meaningful context for players and they can be engaging and pleasant, a closer look at the focus of player activity indicates that often it is the *plot of the story* that is at the foreground of player activity and not the actual exhibits. This seems to be the case when exhibits are not connected to form a story in the context of which they obtain their meaning. Rather, they are manipulated to feed the meaning of a story which in turn does not necessarily give meaning to the exhibit. To further illustrate this we use an example presented by Klopfer et al (2005) where "*the water and the dice*" was selected from description of an exhibit to be transformed into the following message "*meet me by the water an hour after the close*". It becomes then apparent that "*the water and the dice*" are transformed to give meaning to the mystery story but their integration in this story does not in turn offer any information to further elaborate on the specific exhibit. Similarly in Yiannoutsou *et al.*, (2009) it was observed that in the context of the *Donation* activity, players were actually scanning instead of carefully reading exhibit descriptions in order to pick up from the descriptions the clues that would be combined to identify the exhibit –goal of the game. These observations seem to justify the criticism arguing that this type of games do not encourage students to think deeply about what they are reading, or looking at and thus promote thoughtful inquiry (Klopfer et al 2005)

To sum up, research on both types of mobile games for museums (scavenger hunts and role play narratives) reports visitor engagement, motivation and knowledge about museum exhibits. On the other hand there is criticism questioning the way visitors are engaged with museum exhibits in the context of these games. For the analysis we attempt here we need to take this criticism one step further and ask: what the visitors seem to learn in the context of these games? In order to examine possible answers to this question we present four representative extracts from four different studies. These extracts attempt to cast light on the learning focus either presenting the tasks assigned to the players or the comments of the players after game play.

> "*...We did see parts of the museum we weren't aware of,*"... "*hadn't ever seen the monkeys,*" ..."*We come a lot, and I still saw stuff in exhibits that I had never seen before.*" ..."*I learned things that I had never seen before, like*

*reading about the mummy or the banana tree. It made me read things that I wouldn't have otherwise.*" (Klopfer et al 2005, p. 319)

(Extract 1: Player comments from the mobile game: *Mystery at the Museum*)

*"Participants all enjoyed walking through the city of Aalborg; in fact current residents of Aalborg claimed that they had learned new things about their city. For example, the existence of the Aalborg Convent, hidden near the central city shopping precinct, and its historical associations with the Danish resistance during World War II had not previously been known to any of the participants "* (Paay *et al.*, 2008, p. 128)

(Extract 2: Player comments from the playful narrative "Who killed Hannae")

*"You have to find a job for your sons. Look for the Trajan Way where many coaches travel. Someone could need your son's help to fix a coach wheel" ... "When the group believes they have identified the target place, they mark that place on the map".* (Costabile *et al.*, 2008, p. 147)

(Extract 3: Tasks from the Explore! mobile game)

*In the comprehensive assignment, the City Teams (CTs) are asked to search for several details – such as a plaque with the medieval name of the area – and take pictures of the details while the Head Quarters (HQTs) are asked to select the correct picture from various pictures on the Internet or somewhere else... Imagination assignment: For this assignment, the CTs are asked to act out particular idioms/sayings such as 'this is monks' work', which is the equivalent of 'this is sheer drudgery' in English and refers to the days when monks meticulously copied books by hand. The acting out of the sayings is videotaped, while the HQTs are asked to find out what these sayings mean... The orientation assignment includes texts and tasks which are intended to trigger environmental awareness. This may be done via the creation or selection of photos, the answering of questions about the site.* (Huizenga *et al.*, 2009, p. 335,336)

(Extract 4: Tasks from the Frequency 1550 mobile game)

Before we go on commenting on the learning focus of the above games it is useful to provide some background information for each of them because it will help us explain the learning focus. Mystery at the museum is a game designed to be played in the Boston Museum of Science and in the study were involved children with their families. Explore! was designed for the archaeological park of Egnazia and in the study participated 12 year old students. The evaluation study for the playful narrative "Who killed Hannae" involved participants who's age ranged from 17-42 and it was designed to take place in the city of Aalborg. Similarly, Frequency 1550 was designed to take place in a city and specifically the medieval Amsterdam. The study of Frequency 1550 was oriented towards history learning and involved students whose age ranged between 14 and 16 years.

Our main observation that runs through all above studies is that they focus on enriching visitors' factual information: "*we did see parts of the museum we weren't aware of*" or "*current residents learned new things about their city... such as the Convent*" or "*look for the Trajan way... were many coaches travel*" or "*search for a plaque with the mediaeval name of the area*". Even the imagination assignment (Extract 4) ends up aiming at factual information where players are asked to find the meaning of the enacted saying. In several cases we can see that the game has become a vehicle for transferring new, more or "hidden" information to be stored by the visitor. On the other hand in the context of games the search of this factual information might take place in an intriguing and pleasant way for the visitors and might involve interesting processes such as hypothesis testing, reflection on actions etc (Costabile *et al.*, 2008). There is no doubt that factual information is an important part of cultural experience. But when it comes to learning in museums we need to ask: Is this all what we can get from a technology mediated playful interaction with cultural content?

## *From interaction to participation: engaging visitors in game design*

In order to respond to the above questions we will first try to identify what are the elements of cultural experience we want to pursue with respect to learning. In other words if learning in museums is more than accumulating factual knowledge (learning information about exhibits and cultural heritage sites) then what does this learning involve? Our attempt to respond acknowledges in museum learning the following dimensions: a) the role of the learner b) the objectives of the learning process c) the status of the knowledge produced and d) the relationship between the learner and the museum. These dimensions are grounded on the following theoretical perspectives:

> a) the process of *active meaning making* as it is introduced by the constructivist perspective (Hein, 1998) and enhanced by the idea developing a sense of ownership (Gee, 2008) over the cultural content;
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> b) the idea of *visitor participation* in the process of creating culture (H. Hein, 2006; Simon, 2010) interweaved with the concept of "objectified cultural capital" (Bourdieu, 1986) which acknowledges that the role of the museum is not just to provide access to cultural content but also to offer background knowledge that supports the person to appreciate and understand the value of a piece of art;
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> c) the idea of situating museum learning in an *enduring relationship* between the visitor and the cultural institution (Black, 2005);

The above theoretical perspectives can be concretized in a learning activity which: a) triggers creativity, imagination, and builds upon the subjective personal experience of the visitor; b) grounds this on the background knowledge produced by the museum; c) involves the learner in the process of participating in culture creation by providing the tools, the structure and the chance to produce and not just to consume; d) can have an output with the status of public meta-artefact over which

the learner can develop a sense of ownership and which not only meets the quality standards of its creators but also can become part of the museum assets and e) is structured in a way that can be in a constant dialogue with the cultural institution and can empower the communities of visitors which are developed around the museums.

We consider that a good example of a learning activity that can combine all the above characteristics is to involve the visitors themselves in the process of designing mobile games to be played in cultural institutions.

The idea of involving visitors in creating computer based public artefacts based on cultural content is new. Three examples are known and presented here: One comes from the British museum, which is currently organizing a 2 hour family workshop on game design: Participants are invited to build their own games inspired by the collections and stories of British museum (after visit experience). The new games can be uploaded on the web to be played at home or shared with friends. The other example comes from Tate Gallery, where young visitors (6-12years) create games for Galleries (Jackson 2011) and films from pieces of art. The third example is the idea of remixing museum content for the creation of a visitor generated narrative (Fisher & Twiss-Garrity, 2007).

So far, there is no research analyzing the learning potential of game design in the context of cultural institutions, while in the field of technology enhanced learning, its potential of helping learners to build a new relationship with knowledge has already been identified (Kafai *et al.*, 1998). Critical in this new relationship is the *ownership* learners obtain over their knowledge and on the deep interaction with the learning concepts in order to be integrated in the game due to their functional role (the learning concepts are by design crucial for the "playability" of the game). Apart from the learning of specific concepts, research has acknowledged that the process of game design also involves creativity, imagination, social, artistic and linguistic skills (Robertson & Howells, 2008; Salen, 2007). In the context of cultural institutions we assert that game design should focus on mobile games that can be played during museum visit (as opposed to the three examples presented above), because mobile games enrich the physical experience in the museum and takes into account context and space which are crucial elements of the cultural experience.

We argue that in order for games to have the status of public meta-artefacts need to be integrated in cultural activities that will structure and support game construction. Technology here can mediate these activities by a) providing access to content which will allow visitor free creation with museum view b) allowing manipulation of game elements so that visitors can create different instances of mobile games c) generating mobile games based upon visitor manipulation of game elements and content d) supporting sharing, evaluating, ranking, reconstruction, enrichment and exchange of games among communities of visitors.

## Concluding remarks

In our analysis we showed that the learning experience of playing mobile games involves visitor motivation, engagement and interest but on the other hand it seems to have a focus on factual information. Of course learning during playing mobile games has more dimensions which are not analyzed here (such as learning in context, spatial awareness, collaboration etc.). These along with the pleasant ways of approaching cultural content make them a valuable practice for learning in museums. We showed however that involving visitors in the process of designing mobile games can enrich the learning experience of game play with the active role of learners who participate in the process of culture creation, the development of a sense of ownership over the cultural content, the creation of public meta-artefacts that can be integrated in the museum assets and as a result, the creation of an enduring relationship between the learner and the cultural institution.

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