

# Content creation by end users for location-sensitive mobile educational games

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**Abstract.** In this paper we discuss the use of social media as tools for collaboratively creating content for location-sensitive mobile educational games. One of the main challenges for the broader adoption of location-based mobile games for learning is the process of creating useful content. End-users, e.g. teachers and facilitators who use such games may be actively involved in this process. We discuss experience of using tools for end-user content creation for two location-sensitive mobile games. The game design process is presented as the interplay between technology, learning and content with the content generation as a distinct phase of the process. Finally we discuss the opportunities and limitations of using social media for content-creation.

**Keywords:** Location-sensitive mobile games, pervasive games, social media, end-user content creation.

## 1 Introduction

In recent years, location-sensitive mobile educational games have gained in popularity. These games are multiuser activities where collaboration or competition between the players is an important trait. They are played in specific locations using wirelessly networked mobile devices that link the physical space with digital information. The main features that support learning are mobility, location awareness of the players, interaction between the players and various ways in which the games can migrate between different places [7]. These characteristics make them useful for situating playful learning activities in real contexts. While some interesting research prototypes have been developed, such as in museums or archaeological sites that offer to groups of visitors learning activities that involve mobile devices and gaming, this model of on-site playful learning has not gained a wider acceptance yet. This is in part due to the location-specific characteristics of these examples. They are designed and developed for a set location using certain content. The scope of these games remains strongly site-specific and it is not easy to transfer an existing activity to a new location or a different knowledge domain.

The combination of two more recent technologies can offer a remedy for this situation and lead to a new generation of mobile educational games. On one hand, the recent proliferation and maturity of mobile technologies such as iPhone or Android-based devices, constitutes a qualitative jump in terms of availability of these devices. The uniformity of platform and capabilities allow the deployment of mobile applications in large numbers of devices easily. On the other hand, the availability and wide adoption of social media, like social networking platforms that can function as quasi operating systems that run applications in their context gives to the users tools that can be used collaboratively in order to generate content.

This article discusses a way of involving end-users by employing the potential of social media as tools for content creation for such games. The aim is to actively involve end users, like teachers, as content creators by providing a model for active collaborative involvement in the content design process. Next, we examine the case of two location-sensitive mobile games where content related to domain knowledge is separated from the game mechanics and discuss the implications of placing the process of content creation with the end-users. We argue that using platforms of social networks or other social networking media is a viable strategy for achieving this target.

## **2 Background**

Collaborative mobile games have been used in recent years as tools for informal learning in the relevant physical environment. The underlying idea is that with these games the players associate information with physical activities in the real world. In other words, the unification of physical and social space with the digital dimension through games is what makes these games attractive as tools for learning. Especially for museums, there is a clear tendency for using the game as a means for involving the visitors and allowing interaction with the space and exhibits.

In order to successfully employ games for learning one needs to consider ways for incorporating disciplinary knowledge into game-play [1]. Regardless of the underlying learning theory on which a learning game may be based, the inclusion of this knowledge for a given area is important for the actual application of games in learning. Content-neutral or exogenous games [4] separate game mechanics and structure from content and can incorporate different contents that reflect knowledge for specific areas. Thus, one can give the opportunity to domain experts or teachers to develop, update and adapt content for games according to their own criteria. Despite many attempts at designing location-sensitive mobile games as such or at devising methodologies or frameworks that can inform the process of designing these games, they remain constrained to specific instances or locations. In fact, this is mostly not by design but rather a side-effect of the rigid process that is followed for introducing and updating content.

The design of educational mobile games requires a process where multidisciplinary teams work to pursue three diverging goals that stem from the different values,

culture and practice of (a) game designers, (b) learning experts and (c) domain experts. This distinction follows the technological pedagogical content knowledge (TPACK) framework [3], where knowledge is viewed as emerging from the combination of technology, pedagogy and content. This framework is useful in understanding that the resulting design is the product of the tension between the three parties. Game designers typically focus on a gaming experience that is enjoyable and fun. Learning experts aim at producing an outcome that can aid learning and domain experts aim at including rich, accurate and detailed content about their respective field. The resulting design is used by two groups of end-users. The players themselves, for which the games are designed and the facilitators, who aim at using the games as tools for enhancing learning. Thus, by specifically creating tools for end-user generated content, facilitators, e.g. instructors and teachers can be actively involved in the design of these games through a collaborative content design process.

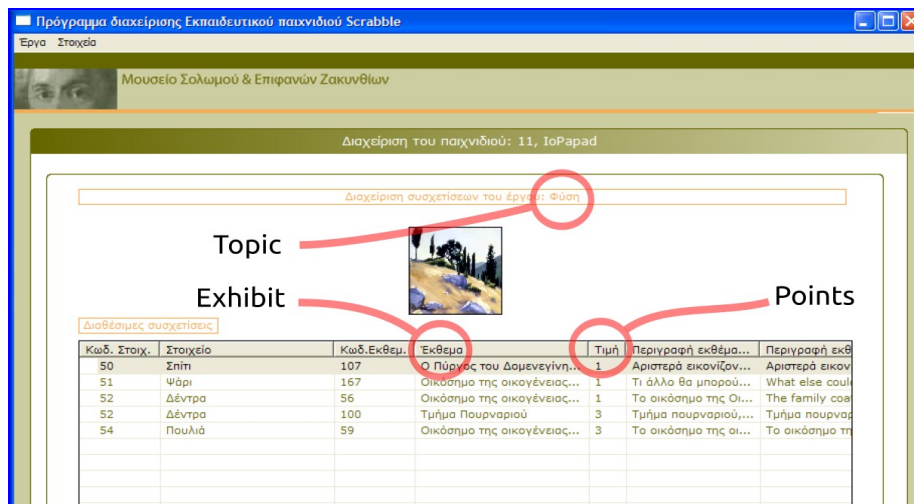


Fig. 1. An instance of the MuseumScrabble content creation tool.

### 3 End-user generated content

Next we discuss two cases of location-sensitive games for learning. The first game, *MuseumScrabble*, has been supplemented with a traditional desktop application with the aim of allowing teachers to prepare content for game sessions. For the second example, *Invisible City: Rebels Vs Spies*, the process of content update is web-based but requires manual steps through which content creators can define location-specific quizzes and game-missions. In both cases the content is conceptually separated from the game mechanics.

### 3.1 MuseumScrabble management tool

MuseumScrabble [6] is a game that has been designed for pupils who visit a museum. The game is a race for points between competing teams. Each team of 2-3 pupils is equipped with one PDA, through which they can scan RFID tags attached to the exhibits. A scanned exhibit can be associated with a thematic topic (such as religion, feminism, nature, history etc). The more relevant the exhibit is to a topic, the more points are awarded to the player. The game lasts roughly 30 minutes and ends when all topics have been associated. The educational aim is to help game players focus on specific information about a set of exhibits, reflect about the relation of the exhibits to specific topics and use their imagination and their observation skills as tools for searching and finding relevant exhibits in the museum. This game has been explicitly designed following a constructionist learning approach. Each game instance is played with nine topics that can be related to 36 exhibits.

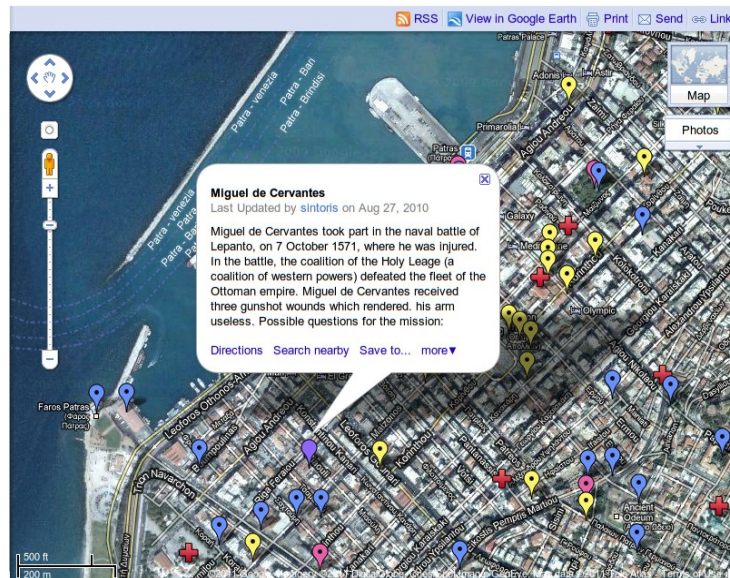


Fig. 2. Placing location related content for Invisible City

A game facilitator, such as a teacher, can choose in advance from a list of more topics or create her own and choose to which exhibits these topics are relevant. For this reason, a tool was developed that can be used by teachers who intent to visit the specific museum in order to create topics and possible associations with the museum exhibits (see Fig. 1). The tool is a windows-based application that connects to a database allowing the user to insert custom game content.

### 3.2 Content update process for Invisible City

*Invisible City* [5], is a framework for games designed to be played outdoors, by a group of players in a city centre. The games are based on the popular party game Night in Palermo (also known as Mafia party game, assassins or werewolves) where the players are divided between two opposing groups [8]. In the current implementation, *Invisible City: Rebels Vs Spies*, the original game mechanics have been modified and include individual missions that are to be carried out by the players in specific locations in the city. These missions relate real-world artefacts such as buildings, paintings, murals, sculptures or areas to content that can be descriptions, story fragments, historical events, folklore etc. The creation of this content is facilitated through Google Maps (see Fig. 2). The content authors can collaboratively place marks on the map of the city, attach content and pictures. The content and geolocation data is pulled using RSS and incorporated into the game. The incorporation process is currently done manually. The geolocation data is pulled as such directly into the game but the content that the end users upload has to be edited and take the form of questions, thus a manual step is introduced at this phase of the process.

## 4 Discussion

Both presented examples have inherent limitations. In the case of MuseumScrabble, tool usage is subject to many constraints. The tool needs to be downloaded, installed, configured and maintained by individual users. The second example illustrates how the above constraints have been overcome by using a web-based collaborative application. The incorporation of new content in this case is however manual, making it difficult to manage and scale the process. In both cases the use of social network applications for content creation opens new opportunities, as follows:

- *Domain knowledge.* In social networks a large number of experts on different knowledge domains can be found that can produce contents related to a wide range of disciplines. Thus, over the same physical location and using the same game mechanics, different versions of games can be created and played. For instance, in the case of *Invisible City*, some experts may focus on the recent history of the city, while others may highlight cultural contexts or examine specific events in detail.
- *Scale.* People with disciplinary knowledge may get involved in the content-creation process in larger numbers. The quality of the result is not always desirable, however if a large enough number of people is involved, this, as the example of Wikipedia has demonstrated, can result in increase of the quality of the produced content.
- *Proliferation.* Besides creating their own content, facilitators can have access to a pool of already created material. So the opportunities for facilitators to employ

location-sensitive mobile games for learning are increased, as they can cover more domain knowledge areas.

## 5 Future work

Building of social applications is actively facilitated by all major social media platforms, like the *Facebook API*. Using such an approach for location-specific content creation process bears many advantages, given the large user base of this platform. Another approach is related with use of *Google Shared Spaces [2]* for creating tools where domain experts can collaborate in order to compose content. The two games discussed, *Invisible City: Rebels Vs Spies* and an open space version of *MuseumScrabble* are currently in the process to be supported by such tools. The following issues need to be further investigated in this context:

- Incentives and obstacles: The advantages of online social user content creation as discussed above are counterbalanced by concerns on privacy, content ownership and quality.
- Platform suitability and limitations: Online social platforms and tools pose limitations that are not easily balanced. For instance, visibility and access to a large user base is characteristic for Facebook applications while the interaction design of Google Gadgets for Shared Spaces are greater.

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