

Extended summary

Emotional Mapping of Museum Augmented Places

Curriculum: E-Learning

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Abstract. Mobile and ubiquitous learning has been linked to new information and communication technologies embedded in everyday life objects. A variety of invisible embedded tools have been developed and are connected to the Internet. The boundaries between learning, gaming, simulating or role playing are not clearly defined. In this context a visit to a museum or to another place of interest (e.g. Archaeological parks, historical towns, urban trekking etc.) using a smartphone, or a tablet, may offer a unique educational experience as will be described in the trial of EMMAP (Emotional Mapping of Museum Augmented Learning) at the *Archaeological Museum* “Giuseppe Moretti” of San Severino Marche (Italy), at the *Macerata Carriage Museum* and in the Macerata Walls for “Street Poetry” exhibition. EMMAP is a format aimed to develop innovative pedagogies, using handheld technology combined with QR codes, broadcasting and augmented reality (AR). These tools are useful in creating a ubiquitous learning environment and involving participants emotionally in a real landscape.

Keywords. Mobile and Ubiquitous Learning, Authentic Learning, Situated Learning, Learning by Doing, Multiple Intelligences, Emotional Cartography.

1 Problem statement and objectives

Sophisticated technological tools are being distributed to more and more citizens and students. Mobile phones, tablets and other handheld devices offer the possibility of interacting and staying fluidly connected to the mobile Internet. The consequence is that the mobile Internet may facilitate the development and the popularity of informal learning environments. The boundaries between learning, gaming, simulating or role playing are not clearly defined. A visit to a museum or to another place of interest (e.g. Archaeological parks, historical towns, urban trekking etc.) using handheld computer may offer a unique educational experience as described in the trials of EMMAP (Emotional Mapping of Museum Augmented Learning).

Mobile and ubiquitous learning may be described as something that occurs when the student is not in a traditional learning place (e.g. School building), but he/she is outside the classroom, somewhere “in mobility”. Here he/she takes advantage of the specific setting where he/she is, augmenting his/her competences and knowledge in relation to the real environment. Learning can be activated in different places (e.g. Home, workplace, playground, library, museum, natural environment, street etc.) and it occurs through all the senses (Bruce, 2008).

The increasing number of smartphones gives people the opportunity to interact with real objects, and the possibility to activate learning processes from a real situation. Smartphones and tablets are important for learning, but mobile and ubiquitous learning is more than just using mobile facilities to learn. Mobile learning is rather referred to the mobility of the learner. As “mobile learning can be defined as the processes (both personal and public) of coming to know through exploration and conversation across multiple contexts amongst people and interactive technologies” (Sharples, Taylor and Vavoula, 2007).

In recent studies, the vision of mobile and ubiquitous learning has been linked to new information and communication technologies embedded in everyday life objects (e.g. Cameras, dishwashers, heating, natural environment etc.). A variety of invisible embedded tools have been developed and are connected to the Internet. Consequently, ubiquitous learning arrives without intention as the technologies have made it happen. In fact, “there is no doubt that new forms of learning are already happening through social networking, online videos sites and environmental sensors” (Bruce, 2008; Hwang, Tsai and Yang, 2008).

Museums and other places of interest allow visitors to engage with authentic artefacts and create their own responses to the exhibition. Museums are a resource for learners at all levels of formal education and for other users (e.g. Group of people, adult learners, communities etc.). Therefore, there are differences in the experiences and knowledge that

people bring to and take away from a museum (Naismith and Smith, 2009). A new interpretation of museum cultural languages and mediums emerges from the proliferation of entertainment facilities; they allow learning through game during cultural tours. Among the many applications available for smartphones and tablets, games are particularly appreciated because they foster the development of non-traditional attitudes in relation to artefacts and “involve visitors physically, intellectually and emotionally” (Astic and Aunis, 2011).

2 Research plan and activities

The format EMMAP (Emotional Mapping of Museum Augmented Places) is devoted to promote mobile and ubiquitous learning environments in places of historic-cultural interest. It was trialled in two different museums and in the urban streets. The participants to the trials were 115 teenagers attending secondary school, 10 students of the *Academy of Fine Arts* and a group of 20 adults. The teens visited the *Archeological Museum* “Giuseppe Moretti” of San Severino Marche, the *Academy of Fine Arts* learners visited the Macerata Carriage Museum and the 20 adults participated to a walk all around Macerata urban walls to visit “Street Poetry”, an exhibition in augmented reality. The trials that took place at the Macerata *Carriage Museum* and at the “Street Poetry” exhibit were propaedeutic to the Archaeological Museum. In fact, in this last trial the format was redesigned.

EMMAP may be defined as a technology enhanced project that makes the most of a cultural experience, creatively using both mobile Internet and handheld devices. The different itineraries are divided according to length, difficulty and target through an accurate tagging of real-world learning objects. EMMAP is aimed to provoke empathy with the region and to actively engage the participant in cultural artefacts. The geography of the location is redesigned each time a visitor passes through it, modifying bio-maps and geo-referred information. In fact, each EMMAP participant is a creator of new materials. During the learning experience, the student finds QR codes that may be read using their mobile phones. Based on Gardner's theory (2004), QR codes release different learning objects, in relation to the varying intelligences of the participants (Guazzaroni and Leo, 2011). Learners during the visit work divided into small groups with definite roles (e.g. Leader, reporter etc.) to activate collaborative strategies and improve positive interactions. Moreover, a tutor facilitates and provides scaffolding for individuals or groups. Game mechanics can be activated to involve students in challenging experiences and to achieve a more active and rewarding engagement (e.g. A mystery, a treasure hunt etc.). Every participant is involved in the co-construction of a bio-map where content, relating to the real environment, are created through a personal lens. An augmented reality browser and audio broadcast were used to leave traces and to create emotional maps. Learners moved into the museum according to the 7E learning cycle: Elicit – Engage – Explore – Explain – Elaborate – Extend - Evaluate. (Eisenkraft, 2003; Huang, Liu, Graf and Lin, 2008; Guazzaroni and Leo, 2011).

The development of EMMAP has been motivated by the need to shorten distances between students, families, young adults on the one side, and cultural heritage on the other side.

3 Analysis and discussion of main results

The mobile learning experience seems to reinforce the awareness that mobile devices are cultural resources that can be efficiently used with students. Generally teens consider their cellular phones as personal tools to remain in contact with their network of friends. The trials demonstrate to participants that other uses of cellular phones are possible. Culture is one of these possibilities; consequently heritage institutions may offer new experiences by integrating mobile and ubiquitous learning facilities for their visitors. Moreover, using mobile devices seem to attract teens and, thus, shorten the gap between younger generation and inheritance.

The possibility to use different multimedia materials, while interacting with peers in order to create new knowledge, is one of the most important positive outcomes of the whole experience.

Positive results prove that knowledge can be effectively constructed socially. Trial participants experienced active learning in an informal environment: the museum and its surroundings. They lived a learning-by-doing experience where they were called to complete different tasks.

Gardner (2006) wrote about the importance of developing a creative mind for future leaders. The more creative activities (e.g. Write a story, draw a warrior etc.) were conceived to promote creativity and unusual responses to stimuli. The outcomes demonstrate that participants improved this aspect. Gardner's theory of multiple intelligences (2004) was at the basis of different tasks in the trials. Most of the activities were based on the assumption that different learners could use their favourite smarts, or share with peers their attitudes towards a particular intelligence. The possibility to activate different smarts offers a sort of personalization of the experience and the possibility to involve dissimilar participants in the learning paths.

Another aspect to be considered as a positive result is encouraging the emerging of a "sentimental dimension" in young learners (Galimberti, 2009). For this reason, the experience was emotionally mapped using contents produced by trial participants. The fact that peers' traces were embedded in a map and exposed in augmented reality had unveiled vivid emotions in participants. Current learners could see what past visitors had produced. At the same time, they did their best to leave their traces for future guests and future interactions.

4 Conclusions

Evaluation has revealed positive outcomes relating to: a. the developing of an "emotional dimension" in young learners (Galimberti, 2009); b. the developing of different forms of intelligences, according to the theory of Multiple Intelligences (Gardner, 2004); c.

the possibility for the learner to use different multimedia materials, while interacting with peers in a social co-construction of meaning; d. the developing of “The Creating Mind”, a key attitude for the future (Gardner, 2006).; e. the production of different stories that remained available for future interactions. EMMAP major results are relating to strengthen the awareness that handheld devices should be considered as new cultural resources that work within an individualized, mobile and convergent mass communication (Cook, Pachler and Bachmail, 2011).



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