

DESIGN PRINCIPLES FOR MOBILE MUSEUM GUIDES USING VISITOR STUDIES AND MUSEUM LEARNING THEORIES

Areti Damala

*France Telecom Research and Development & Université de Rennes 1
4, rue du Clos Courtel, Cesson Sevigné, France*

ABSTRACT

In providing learning materials for the digital era, a thorough knowledge of the context and the conditions under which the learning process takes place is essential. This is especially true for museums, informal learning environments open to a public of all backgrounds and ages, where one of the latest trends observed is the use of mobile multimedia guides as communication and interpretation means. The body of literature is steadily growing; however, most studies focus either on purely technical or human computer interaction issues while there has been little concern on museum learning theories and visitor studies, as to which lessons could be learned in order to inform the design of a mobile museum guide. This reflection paper aims to provide a first approach on this topic and serve first as a stimulus and then as a discussion basis both for museum specialists as well as IT professionals implicated in the design of mobile museum guides.

KEYWORDS

Museum, mobile devices, learning, social context, collaborative environments.

1. INTRODUCTION

There exist different approaches to favor and facilitate learning in the museum but recent technological advances have made possible the creation of mobile, able to be personalized, multimedia guides for the museum setting (Brelot et al., 2005). The Exploratorium, a popular science museum in San Francisco, a pioneer in the domain, has published the results of two forums in 2002 and 2005 respectively (<http://www.exploratorium.edu/guidebook/>) while in Europe the first attempt to implement a mobile museum guide dates back to 1997, when several European Institutions joined the HIPS project (Broadbent & Marti, 1997). It is outside the scope of this paper to trace all the projects that have been launched ever since. Besides, a very useful listing is provided by Nancy Proctor (Proctor, 2005).

Mobile guides present certain advantages as a mean of interpretation in comparison to more "traditional" approaches. They can be context aware, facilitating the retrieval of the right information on the right spot; they can make use of wireless technologies, taming the greediness of rich multimedia content; they can provide museum professionals with valid visiting patterns revealing visitors' attitudes regarding exhibits; they are able to be personalized to tailor different needs and provide suitable learning material for casual or initiated visitors; they can combine almost all forms of "traditional" interpretation means (audio, video, text but also role playing activities etc). Finally, they can be tailored to accompany the visitor before, during and even after the visit by linking the activities proposed in the mobile guide with other kind of information and interpretation material (e.g. museum web sites, personalized printed material etc).

The bibliography in this domain is rich as more and more museums throughout the world adopt them, but so far learning theories and "traditional" visitor studies have rarely been evoked to inform the design of these mobile multimedia learning resources.

This study is a first step towards filling this gap and can be summarized in three main parts. The first examines what we know about museum visitors and how this could be related with designing mobile museum guides. The second is focused around objects as they lie in the heart both of museum exhibitions and

multimedia presentations. The third axis relates the first two, as it briefly discusses learning theories applicable in the museum setting and extremely useful in designing content for museum handheld devices.

2. DESIGNING GUIDES FOR THE MUSEUM VISITOR

A first insight about designing successful prototypes could be given by museum visitors' motivations before they even arrive to the museum¹. Though it is difficult to generalize, studies have shown that some of the main motivations are recreational, educational, social and reverential and that visitors believe that museums far from being only conservation and research institutions provide opportunities for knowledge, experience and entertainment (Falk and Dierking, 1992).

But different types of visitors manifest different types of behaviors while there is a variety of variables brought with them in the museum, different expectations and needs. Personalization is a much used term in the field of new technologies that has serious implications in the design and implementation of mobile museum guides as well. Though there are many possible ways of personalizing the content, ranging from language selection to thematic tours, and from age groups to adapting content to seniors or people with special abilities (Proctor, 2004), the focus here will be on simple facts known about museum visitors that could inform the design of a mobile museum guide and provide personalization ideas. The first criterion is related with the frequency of visits, where we distinguish three types of visitors: people rarely visiting or not visiting museums at all, occasional visitors (once or twice a year) and frequent museum goers (3-4 visits per year) (Falk and Dierking, 1992). These three groups differ not in the body of acquired knowledge but in the way they approach new information and make out meaning of it. Complicated chunks of information are better understood by experience visitors while for the novice it is the exhibits' attracting power that will make the difference. As a result, object focused interfaces might be more useful and understandable to people rarely visiting museums.

Another distinction can be based on the social context as visiting museums is also a social experience (Galani, 2005). Here we distinguish between school visits, family visits and other visitors. But even between categories it is sometimes possible to distinguish different visiting patterns. Family visits tours have already made their appearance (Tate Modern, London) as well as tours specifically designed for schools, and proved to be effective (Crane, 2006).

Finally it is important to notice that visitors, during their visit, will come along two types of educational activities: Interpersonal, direct, responsive or face to face communication (doing, handling, drawing, making, role play) and indirect, non responsive, one way communication (videos, text, audio guides, displays, exhibitions etc) (Hooper-Greenhill, 1994). Mobile museum guides stand in the cross section of these two approaches, being able to combine elements of both categories.

3. FOCUSING ON OBJECT ORIENTED LEARNING

Museum and visitor studies bibliography provides also schemes that reveal the way visitors approach and get related with museum objects. Objects lie in the heart of every exhibition and visitors are well aware of that. They respond actively, though many times randomly, to exhibits and objects and often try to relate what they see with their own experience. As exposed objects carry with them lots of meanings that go beyond just historical facts and dates, working with questions that are linked with a particular person, event, item or place, proves to be a good way of relating and actively involving visitors to what they see, stimulating affective reactions (Hennigar Shuh, 2004). Or, as Susan Pearce puts it, "it should be possible to ask the questions how, what, when, where, by whom and why about every artifact and get interesting answers" (Pearce, 1986). It could be interesting to examine whether this artifact oriented approach could be used for interweaving digital narratives when catering for the content and design of multimedia in the museum, being it mobile or not.

¹ The notion of museum here as well as in the full text is broad enough so as to include historic houses, archaeological parks, zoos and aquariums.

Additionally, when coming to the object level, it could be useful to take under consideration four different types of information an exposed object can reveal according to a study conducted among museum curators by Csikszentmihalyi and Robinson (Csikszentmihalyi and Robinson, 1991): the formal structure (meaning its components and a description), the intellectual references it carries (art-historical, cultural, historical and biographical), its emotional impact and the communicative/interactive possibilities it offers (dialogue with the artist, within the viewers, the curators). This structure could be possible to be reflected in the design of the interface and the structure of the interpretation material used in the mobile guide as well as in the navigation scheme. An additional reason for that is that we know from cognitive psychology that we are capable of learning not only factual information but also affective (concerning attitudes, feelings and beliefs) and psychomotor (doing things) though it seems that learning results as a combination of all three components (Lynn, 2005).

Finally it could be useful to have in mind that when it comes to 1st time and occasional visitors museum visits are usually comprised of an "orientation phase" (3 to 10 minutes), followed by an "intensive looking phase" (15 to 40 minutes), the phase of "exhibit cruising" (20 to 45 minutes) and then the "leave taking" phase (3 to 10 minutes) (Falk and Dierking, 1992). Therefore, it could be useful to take under consideration the fact that exhibits and objects at the beginning of the exhibition are susceptible of receiving more attention and should therefore be -if not privileged- at least not underrepresented in the mobile museum guide.

4. INSPIRING MUSEUM LEARNING THEORIES

4.1 The Museum Interactive Experience Model

Learning theories have neglected for a long time the important roles that personal, social and physical contexts play in learning and that is true not only in museums and schools but also in computer assisted learning.

Falk and Dierking (1992) developed the "interactive experience model" to approach more effectively the museum experience and this approach can also provide useful insights in the overall design process of multimedia activities offered by mobile guides. In both cases, the museum experience and the mobile museum guide experience, the personal context is whatever the visitors carries with him in terms of knowledge, expectations, motivations, special interests or needs. Experience from proprietary as well as other published projects has shown that no single application could cater for every visitor's needs. It is possible however to conduct exploratory research prior to the launch of the project in order to better define the target groups, and then tailor the content and presentation

The social context is related with the social character of the visit, and as we previously indicated, the social context can affect some of the design principles in terms of content, interfaces or complexity in structure and navigation.

Finally the physical context is closely related to the museum setting, the exhibition, the objects comprising it, though in a more abstract level the mobile guide itself becomes an important parameter or entity in the museum context.

In any case it is important to retain that the interactive experience model is situated in the intersection of the three contexts and that in any given moment any of these factors might prevail over the two others.

4.2 The Symbolic, Iconic And Enactive Model

According to the educational theory of Joseph Suina (Suina, 1990) we absorb new information using three different modes: The symbolic, the iconic and the enactive mode. This theory offers a framework for enriching educational program with different types of activities in order to engage in effective ways visitors with different skills. The symbolic mode is related with verbal forms, language constructions, reading words or sounds and is considered to be the more abstract of all. The iconic mode enables us to learn with images, two dimensional and three dimensional objects, films or demonstrations. The enactive implicates more the learner, and is about handling objects and participating in different activities. Mobile museum guides favor

not only the enactive mode but also the two others. Table 1 shows a mapping of possible mobile interactive activities that could be developed for a mobile multimedia guide.

Table 1. Mapping Suina's model to activities possible to be developed for mobile multimedia museum guides

SYMBOLIC	ICONIC	ENACTIVE
Speech	Images, pictures	Role playing
Textual information	Two dimensional and three dimensional objects	Puzzles
Audio comments and pod casts	Videos	Reconstructions, manipulating 3D objects
	Demonstrations	Texting, chatting, discussing about objects
Avatars, Story Telling		Collaborative Activities

4.3 The Theory of Multiple Intelligences

Another very influential model, both for the world of museums and schools, is that of H. Gardner. In developing his theory of multiple intelligences Gardner (Gardner, 1993, Gardner, 1995) described seven different abilities: Linguistic, logical-mathematical, spatial, musical, bodily-kinaesthetic, interpersonal, intrapersonal. The varying levels of aptitude in each one of these seven abilities constitutes our unique "cognitive profile".

While schools traditionally focused mainly on three of them (verbal, logical-mathematical and interpersonal, the ability to interact with people around us), museums propose nowadays activities that call on a broad spectrum of abilities. Could that principle be applied in mobile museum guides? Apparently not all kind of museum material could offer opportunities for the development of applications matching each one of the seven "intelligences". However, this hypothesis could be possible to be tested with a careful selection of the included in the multimedia guide objects.

4.4 Experiencing Aesthetic Encounters

Csikszentmihalyi and Robinson (Csikszentmihalyi and Robinson, 1991) have also identified three conditions that must be fulfilled when people are engaged with activities they find intrinsically self rewarding. Surprisingly they can be directly mapped to simple and well known principles of human computer interaction design (including mobile human computer interaction); the tasks must be equal to one's ability; there must be clear goals of what will be learned; there must be clear feedback. And they conclude "Every time a person gets involved in an activity for intrinsic reasons it is because these conditions are present. Otherwise it is very difficult to get people concentrate on something just because it is there." (idem: 22).

5. CONCLUSION

The museum environment constitutes an ideal environment for experimentations with mobile edutainment applications, as object interpretation and enjoyment resulting from a cultural visit are in the very core of the museum definition. Additionally and unlike other environments, museums are open to a wide public, issued from different ethnic, social and educational backgrounds and ages, thus favoring the opening up of pioneering mobile multimedia applications to a broad audience.

Though the use of museum handheld devices for delivering interpretation material can dramatically affect the way visitors conduct their dialogue with an exposed object there is still lot of skepticism regarding the effects the introduction of these new gadgets could have in the sensitive museum ecology (Bell, 2002).

Indeed, as practice has shown, in many cases the design of mobile museum learning resources is driven by a sometimes troubling coexistence of technological aspirations and constraints rather than carefully

targeted museum visitors' needs. Consequently, it comes as no surprise the fact that museum specialists but also parents and museum educators fear a "heads down" approach, tv-like multimedia content or visitors' isolation (von Lehn and Heath, 2003). The truth lies somewhere in between: Recent groundbreaking research in the San Francisco Museum of Modern Art, proved that all kind of interpretation means, from object labels to cell phones audio guides and mobile multimedia tours, act complementary for visitors. The author concludes that traditional interpretive media, like wall text and labels are the foundation on which visitor experience is built but affirms that "the most effective interpretation strategy is born from a mix of the analog and the digital" (Samis, 2007). The effectiveness of a successful museum interpretation policy lies not only in the content chosen, but also in its structure and the chosen display. What we wanted to demonstrate is that there are design implications resulting from well acquainted experience and knowledge in the museum education domain that could drive technological evolution providing new ideas to the already rich field of mobile learning environments (Naismith et al., 2006) and mobile human computer interaction (Love, 2005).

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