

Context Sensitive Mobile Learning: Designing a 'Technoscape' for Urban Planners

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ABSTRACT

Context sensitive learning is a fascinating area that holds great potential for enabling learners to engage in meaning making through interactive practice (Dourish, 2004). There are a number of unique educational affordances of mobile devices, such as increased portability, functional convergence of technologies, social interactivity, context sensitivity, connectivity and individuality. In terms of context sensitivity, an important affordance is that of digital augmentation, whereby contextual data is added to objects and activities to enable deeper understanding. In this paper we review several projects that have investigated context sensitive and location aware learning. We then provide a report of the implementation and evaluation of a recent context sensitive system for urban planners, which is part of the CONTSSENS project.

KEYWORDS

User Generated Learning, Mobile Content Mapping, Learning Design.

INTRODUCTION

We can distinguish context aware from location aware services, already used by emergency services, which use systems that are able to detect the exact physical location of mobile device. An example use is if a learner is stood in front of a painting by Picasso in an art gallery, the location aware system can offer to transfer background information on the painting and the artist. Context sensitive systems on the other hand are aware of the activities of learners and can thus offer to give assistance. For example, if a student's course work is due in soon, the context sensitive system can send a tip giving the location of resources that may help with an assignment. Thus, interaction based approach to context should, ideally, continually derive what intervention is appropriate and provides relevant services to aid learning. In summary, context sensitive systems enable the delivery of appropriate learning content.

Sharples (2006) has pointed out that examples of context aware learning could include: location based guides and customised help systems; systems that enable activities in context, e.g. data logging; game learning offering services and options such as communication and awareness of other game players; customise content; adaptive interface and interaction, where the level of detail and order of presentation can vary and be made appropriate for context and for display on different devices.

RELATED WORK

CAGE is a system with an interaction model of context (Lonsdale et al, 2004), whereby context was seen as a dynamic and historical process that enabled appropriate action (learning). CAGE, which stands for Context Aware Gallery Explorer, was developed as part of the MOBILElearn project (see below). This model of context is constructed through interaction between people, technology, objects and activities in the Dourish (2004) sense.

MOBILElearn provides an example of another significant context sensitive learning project. This research and development project ran for 33 months from January 2002 to March 2005 and involved 24 partners from academia and industry in ten countries (www.mobilelearn.org). This project provided access to knowledge through appropriate learning objects, mobile services and interfaces. One aspect of the non-formal learning that the project tested extensively was with users at the Uffizi Gallery in Florence (<http://www.mobilelearn.org/results/trial.htm>; Lonsdale et al, 2004). Thus, the MOBILElearn project realised the shift in focus from learning with handheld devices, towards support for the mobility of learning as it started to make use of location aware systems, i.e. the system deployed was able to provide information and guidance depending on the users' location. Furthermore, the lead partner, Giunti Labs has subsequently developed a mobile extension to its Learn eXact system based on results from MOBILElearn that enables context aware learning; this approach is being utilised in the CONTSSENS project (see discussion below in phase three).

Other examples of context sensitive learning include Greenfield (2008) who describes in a wide ranging discussion JAPELAS, a prototype context-aware ubiquitous Japanese language instruction system developed at Tokushima University: “One of the complications of learning to speak Japanese involves knowing which of the many levels of politeness is appropriate in a given context, and this is just what JAPELAS sets out to teach. JAPELAS determines the apposite expression for a given situation by trying to assess the social distance between interlocutors, their respective status, and the overall context in which they are embedded. In this model of the world, context is handled straightforwardly as being a matter of where you are physically: is the setting a bar after class, a job interview, or a graduation ceremony?” (Greenfield, 2008, p. 7).

CASE STUDY

The CONTSSENS project is one of several follow ups to MOBIlearn. Specially, the CONTSSENS project investigates the use of wireless technologies for context sensitive education and training in museums and galleries, for language learning and for the workplace learning. The 2 year project involves a European-wide consortium headed by Ericsson Education Ireland, with Giunti Labs, ECLO, Plovdiv University, London Metropolitan University and Corvinno, and is funded by the EU Leonardo Life Long Learning Program.

London Metropolitan University have developed a series of mobile learning applications that are being used to educate trainee teachers by exploring their knowledge and understanding of urban education in a meaningful context (Smith, Cook and Bradley, 2008). An urban area close to London Metropolitan University, from 1850 to the present day, is being used to explore how schools are signifiers of both urban change and continuity of educational policy and practice. The learning content developed for the mobile devices is directly relevant to the context of the learning need and the location of the learner. It relates to the university’s continuing mission of connecting with the local community and bridging the gap between formal and informal learning as a continuum of activities (Cook et al 2008). This is the area from which many of the students are drawn. It is an area steeped in social and cultural heritage, as “Cities are very much the crucibles of cultural juxtaposition, fusion, hybridization and syncretism” (Sheller and Urry 2006: 14).

It provides evidence of how the organisation and re/structuring of urban space worked alongside educational discourses and policies to support participation in civic urban life and educate generations of working class children. The intention is to examine the community from the past, in order to engage, understand and inform the present, as urban space and society becomes made and remade. The project uses a complex interplay between mobile learning technologies, iconic physical infrastructures and educational discourses to visualise urban education through various collective images and representations. Many of the historical media is sourced through the British Film Institute, thus avoiding copyright issues. The project has created a digital ‘technoscape’ (Appadurai, 1996; Sheller and Urry, 2006; Urry, 2006), essentially a visualisation that represents urban land, archaeological space, and subjects using a combination of social and cultural scripts. The idea in this project is to scaffold the teachers’ understanding of what is possible with mobile learning.

THE APPLICATION

The project used a combination of smart phones: HTC Advantage and HTC Diamond (running the Mediascape authoring environment <http://www.mscape.com/> on the Windows Mobile operating system). Mediascapes or Mscares are a new form of media which overlay digital sight, sounds and interactions onto the physical world to create immersive and interactive experiences. The cameras on the smart phones were used to allow students to produce video podcasts of themselves and take photos. This instant capture of report writing and note making in situ was designed to promote real time reflection. Users running the Mscape player on a mobile device can move through the physical world and trigger digital media with GPS via an invisible interactive map. (Figure 1) shows the authoring environment where the zones are initially set up on a map which has been geo-referenced to the physical site. Content (Figure 2) is triggered using scripted behaviours (predefined logic applied to the media delivery).

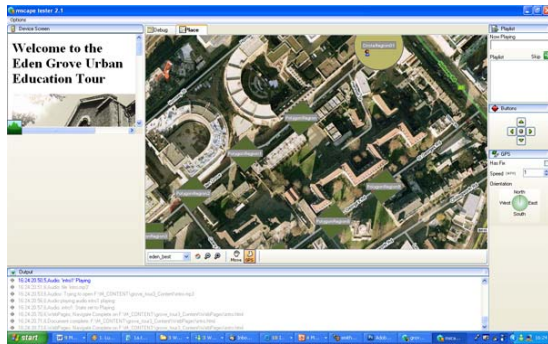


Figure 1

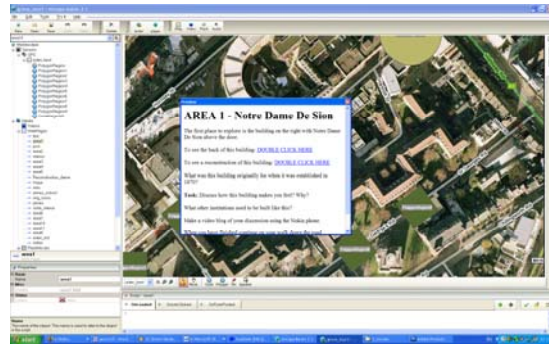


Figure 2

The training starts with minimal instruction for the user. The intention is that whilst the technology (GPS) is working behind the scenes the content is very much at the forefront in order to minimise any technical concerns. The users can see themselves positioned on the map (Figure 3) and as they walk along the tour their position is updated until they enter into a training zone. Once they enter a zone audio and textual instructions are automatically triggered to the mobile device (Figure 4).

Some examples of the varied learning activities involved in the application include a section where the user is asked to examine both the physical architecture and the virtual architecture in the same physical location. The virtual architecture in this instance includes areas which are not available to view on the day of the tour and visualizations of the building as it was in the late 19th century. The user is then asked to examine what the building was originally used for when it was established in 1870. The user also has the opportunity to listen to the oral history of a former pupil at the school and adopt their point of view whilst in the same physical space where the events took place. The user can reinvest the insight gained back into the context and augment the space.

In another section the user is asked to look at a newsreel of a religious procession from the 1930s that was filmed in Eden Grove (Figures 5 and 6) whilst they are standing in the same location where the film was shot.

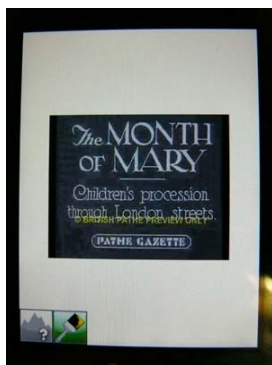


Figure 3



Figure 4

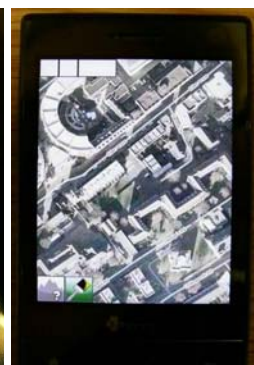


Figure 5

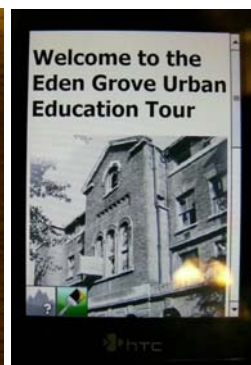


Figure 6

In the 1920's this area was known as the Ring Cross Estate (Figure 7) and was in the second highest criterion for overcrowding and squalor, with people living in some of the worst slums. Conditions improved throughout the 1970's (Figure 8) and education standards improved. The user is shown these street scenes and asked to approximate by physically sketching out how much of the area in the archive footage still remains and how much of it has been redesigned.



“Figure 7 – Ring Cross Estate (1920’s)”



“Figure 8 – Ring Cross Estate (1970’s)”

The final section exposes the user to the differing architectural styles of the buildings. The user is introduced to a traditional Victorian 3-decker (Figure 7) style school design (where the hall is located at the centre with classrooms coming off a central point) and asked to compare it to the more recent open style designs (Figure 8) where each classroom is given some access to the playground. The central activity is to examine what the architecture suggests about the educational approaches of the time.



“Figure 9 – The Three Decker”



“Figure 10 – The Open Plan”

EVALUATION

Key outcomes for the students were that the context-sensitive and location-aware GPS system made the tour easier because the information was sent to them on their devices. As two students said, “a lot of past events/information was brought to my knowledge without much struggle to access them through other means”; “it made it easier than trying to find the information every time you got somewhere”. Contextual information was provided in the form of audio commentaries that guided the tour and outlined the tasks, along with supplementary multimedia resources, such as photographs, maps, videos and QuickTime VR reconstructions of the inside of buildings. One student said, “it gave a wider perspective for learning, it wasn't just standing looking at buildings, it gave you more information from the past with narration and images”, and another when asked about the mix of media used said, “it contextualised the area very well”.

Several students commented that they were less passive than they would be on a tutor-led tour, and that the mobile tour encouraged active learning. This was largely because as the information arrived on their device it helped them to re-focus on the tour and the tasks. Indeed, each of the groups mentioned positively the fact that on entering a new zone their attention was re-focused, and this helped to increase their levels of concentration (on a tutor-led tour participants are more passive and can tend to drift in and out of concentration).

Students made many references to the fact that they liked learning in context and in situ (see Table 1). It provided a richer learning ‘experience’, it helped to bring the area alive and was fun. One student said it was “very useful in terms of contextualising the information.”, whilst another said “the

information given was underlined by the 'experience' of the area and therefore given context in both past and present”.

Some of the transferable skills and outcomes of the project:

1. Critical understanding of a range of cultures and social situations and be able to apply these to real world issues. These real world issues could include - inner city, urban, community; schooling of working class children, past/present lived urban experiences, movement of peoples in/out of locales.
2. Awareness of a wide range of issues that have implications for a range of professional contexts including teacher education, teacher workforce and other work in/with schools, educational research, urban design professionals, planning and regeneration, community development.
3. Use of audio-visual and technical materials to support team/collaborative learning, academic dialogue as well as learner autonomy in the communication of complex ideas and completion of tasks.
4. Make the links between theoretical analysis and practical contexts - can relate this to understanding and use of praxis. Praxis in this context means firstly 'shared practice' - when communities of practice bring together learners and practitioners to develop and share useful learning insights. Secondly it is also the process of putting theoretical knowledge into practice - so in this case this would include applying theories of urban education/urban studies with the real, lived context of the Eden Grove working class community.
5. Application of higher order cognitive and intellectual skills – exploring issues in depth and over time.
6. Carry out research and investigate the subject within a conceptual framework, pose and answer questions and construct arguments. In essence this combines the use of historical descriptions, visual/digital materials and MLO technologies and student-led research activities to explore, examine and explain the community from the past in order to understand and engage with the present, as urban space and society becomes made and remade.
7. Develop general study skills, problem solving skills and communication skills.

CONCLUSIONS

The mobile tour has been very well received by both the students and the tutor, and both are able to see the benefits that the mobile technologies have brought to the tour. The benefits included that:

- the learning experienced has been enhanced
- the student's attention becomes more focused and they concentrate on the tour more, because they are looking at what is coming up on the device, and working on the tasks given
- students become active learners and are not merely taking in information passively

We propose that there is much to commend context sensitivity as a catalyst for learning. An emerging trend is to support learner mobility with location and context sensitive systems that enable life-long learning transitions across multiple contexts.

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