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# GeoHCI for learning in the wild

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## ABSTRACT

This position paper gives exemplars of location-based ‘in the wild’ learning and their relationship to GeoHCI, and also describes the challenges and research questions inherent in doing so. We present several projects that encompass both formal and informal learning experiences. We discuss the issues arising from the use of outdoor in the wild ‘blended spaces’ to change geoscience practices, together with a suggestion that we should also be considering a more responsible and scalable approach when designing these interventions.

## Author Keywords

Location-based learning; mobile media; mobile learning; GeoHCI; responsible design; research challenges.

## ACM Classification Keywords

H.5.1 Multimedia Information Systems (Artificial, augmented, and virtual realities; audio input/output); H.5.3 Group and Organization Interfaces (asynchronous interaction; asynchronous interaction; computer-supported cooperative work).

## INTRODUCTION

Formally-managed field trips ‘in the wild’ are a popular way of providing students and school opportunities to carry out environmental fieldwork or to visit sites of historical or cultural interest. Likewise, visiting ruined castles, nature reserves or just wandering around a new city are popular leisure activities that can provide opportunities for informal learning by members of the general public. However, designing effective educational experiences can be a challenge that technology can overcome. We need to know what resources are available and how they can be used appropriately to help learners achieve their tasks and goals in a timely manner. This paper gives examples of learning in outdoor settings and considers what the main research questions and issues are, in relation to educational GeoHCI.

## BACKGROUND

The authors of this paper have extensive involvement in designing both formal and informal learning experiences in outdoor settings. Some of these are documented here:

## Distributed Fieldwork

The Out There In Here (OTIH) project [1] looked at distributed technology support for collaborative geoscience fieldwork experiences. One group in a laboratory worked together with an outdoor field group, in real time. The project explored requirements of designing for distributed and co-located technologies (tabletops, large screen displays, tablets, mobile phones), issues of spatial coherence and deictic communication. The project also identified how technology enhanced distributed collaboration increased field-based reflections.

## Geolocated Media and Augmented Reality (AR)

Building on earlier work into placement and activation of geolocated media (e.g. mScape [9]), we developed further the overlaying of digital information on maps, often integrated with journeys through a physical environment.

## Augmenting the Visitor Experience (AVE)

The AVE project investigated different hardware and software for effective place-based information provided to tourists visiting a National Park, carried out as part of a university geography field trip [8]. The study used printed acetates, Personal Digital Assistants (PDAs), a head-mounted display (HMD) and laptop, tablet computers and mobile phones and a range of software (Google Earth, mScape, AR apps such as Layar, and customized mapping apps). Innovative ‘high-tech’ solutions, such as the HMD, were less suitable for tourists, due to the weight and low robustness of the kit, high purchase costs and technical overheads in setting it up and maintaining it. However, simpler solutions (e.g. printed acetates and mobile phone apps) ranked highly, due to usability and relatively low costs.

## Place-based Audio

The AVE project found that audio was often more compelling for learning in the outdoor environment than visual displays, due to issues such as screen glare and the difficulties for users in trying to shift cognitive focus between a large visually-stimulating landscape and the graphics seen on the small screens of handheld devices.

Further work therefore examined the design of effective audio guides [6] and also compared a ‘person-led’ historical walk with a ‘technology-led’ equivalent, where handheld devices provided the same audio at the same

locational points in both studies. Audio narratives, on the 1831 Reform Riot, were delivered by members of a local community history group [7]. Each walk offered different affordances but the use of authentic locations was a key feature for providing an immersive and engaging way of learning about local history. One important question arose from the work, questioning the issue of granularity in terms of what constitutes ‘local’ when considering historical data, events and sources and how this affects the learners’ experience.

### *Situ8*

Situ8 is work in progress that examines how we capture and deliver geolocated media on-the-fly, authored by the general public, to promote and enhance engagement with our outdoor surroundings. Such engagement could result in *ad hoc* learning [5], location-based games or simply a way of recording and reflecting on our experiences with our physical environments (a possible ‘next step’ from holiday photos – facilitating a rich multimedia scrapbook of memories). Initial development led to the creation of an Android app (see Figure 1); follow-on funding has enabled further development to create a related web portal. User trials planned for Summer 2013 will utilise citizen science and gathering field data as key scenarios for Situ8, and the results of this work will be published in due course.



Figure 1. The Situ8 Android app

### WIDER QUESTIONS AROUND EDUCATIONAL GEOHCI

Some intriguing questions have emerged from our work in location-based learning. These can be broadly considered under the following headings:

#### Technology Promoting Environmental Engagement

Situ8 is investigating how technology can facilitate use of the physical environment as a personally-meaningful resource so that we feel a deeper connection to our surroundings. But what are the benefits in doing so? Can it affect our health and well-being – or is it a way in which we can return to the pre-industrial days where we might have had a more symbiotic connection to our local environment?

### Relationship Between Place and Space

The OTIH project asked what kinds of interaction turn an in-the-wild physical ‘place’ into a culturally and socially constructed ‘space’ [4]? How do the affordances of these differ and how are these differences important when designing for technology-enhanced collaboration and learning experiences?

### Affordances of Blended Spaces

‘Blended spaces’, where physical and digital spaces come together [3], can provide rich environments for learning and were considered carefully into our work into place-based audio. How can we design these spaces effectively so that interactions successfully combine these two components – either seamlessly or seamlessly?

### Contextually-relevant Information

In attempting to bring together location and digital content for learning, there is a danger that the quantity of information or the mode of its presentation becomes overwhelming for the learner. These were issues in both the place-based audio and the AVE projects. How can we (or should we?) adapt – or personalize – this information so as to reduce cognitive load and potential cognitive dissonance for learners whilst also enabling a stimulating experience?

### DESIGNING RESPONSIBLY

Lastly, this research ties in with a recurring theme from our research: the notion of responsible scalable innovation. Much of our work has involved non-academic partners and one of the tensions we encounter is between technical innovation – what we have termed “catwalk technology” – and the way in which more “ready-to-wear” solutions can be used [2]. It could be argued that we have an ethical responsibility to consider impacts when a project finishes and the legacy we leave behind, or how the work might be sustained by partners.

### CONCLUSION

This paper has presented recent educational projects where an ‘in the wild’ physical location has been a central aspect of both the work itself and the way in which we design for collaboration. Whilst some important findings have emerged, it is clear that we still have many unanswered questions around providing effective and usable location-based technologies for learning. With the growth in ubiquitous computing, place and location are becoming more important than ever; what we now need is to understand how to utilize this for compelling technology enhanced learning experiences.

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