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NARRATIVE AND MOBILE LEARNING IN PRACTICE AND THEORY

ABSTRACT

This paper reports preliminary results from a trial in which school children used mobile devices to create narrative trails, as part of ongoing research in personalised learning trails. In the context of the Kaleidoscope Network of Excellence, I also draw links to other relevant activities, and synthesize ongoing theoretical work in the area of mobile learning.

LEARNING TRAILS

My research explores the use of mobile technology to create narratives for learning, through the capture, editing and sharing of experience 'trails' from visits to museums, botanic gardens and cultural heritage sites. The basic process is that data, in the form of pictures, audio recordings and text, are captured during a visit with mobile digital technology. These data are then uploaded to a web site where the captured trail can be edited, added to, and re-ordered in a way meaningful to the learner. The trail can then be shared with others.

Within this there are many variations – for example trails can be explicitly created on particular topics, or created after the fact from data captured from random points of interest. Each point of interest in the real world is regarded as an 'analog learning object,' which, when captured, can be augmented with 'value added' information into a digital learning object. Learning objects are defined not according to a formal specification (such as IMS-LD) but very broadly to include almost anything. It is hypothesized that in connecting these individual learning objects into a narrative framework, meaning is made and knowledge is constructed.

An initial assumption was that automatic capture of location information would be important; in practice this appears to be irrelevant in many cases. Trails were originally viewed as a tool for individuals; but the social aspects of both constructing and sharing trails has become more important.

DATA COLLECTION

Thus far the focus has been on data capture. I have been collecting informal data from adult visits to museums since January. A more focused trial in June involved four classes of school children aged 9 to 10, on a visit to Kew Gardens – a large botanic garden in London. Each class visit occurred on a different day. Each class was split into groups of five students, and each group given a mobile phone containing software which enabled them to take photos, audio recordings, and text easily – all of which was automatically uploaded to a web site.

This service is called My Art Space (<http://myartspace.org.uk>). It was developed as part of a project involving The Sea – a small company which designed and developed the service; Culture Online, which is part of the UK's Department of Culture, Media and Sport; and the Centre for Educational Technology and Distance Learning at The University of Birmingham. The service has been used in other UK museums and schools, and is being evaluated by the University of Birmingham.

Using museum metaphors, learners' captured 'objects' are placed in an online 'store,' from which they can sequence them into linear 'galleries,' with minimal structure for linking them together thematically. New objects can also be created on the site, and photos and audio files can be uploaded. The gallery can be customised somewhat with regard to colours and fonts.

Learners can also 'collect' objects that the museum (or botanic garden in this case) has tagged with two-letter codes. When a learner selects 'Collect an object' on the phone and enters a two-letter code, the phone downloads information that the museum has created with regard to the object. This is meant to provide additional explanatory or contextual information about museum objects to the phone, while the learner is encountering the objects.

My Art Space was developed specifically for schools and linked to the history and art areas of the curriculum; for younger learners this is related to collecting and noticing, and for older ones it is about investigating and collecting evidence. It is assumed that teachers will structure visits and in so doing influence what students create. Teachers can create their own galleries, and each class has its own 'store' containing all the objects created and collected by students, which they can all access. Students can copy teachers' or other students' objects to use in their own galleries; in such case this is made explicit and the student is asked to justify/explain why they are copying it.

ABOUT THE TRIAL

At Kew Gardens the focus of the school visits was on food plants. Particular activities were devised before the technology was introduced – identifying the parts of a plant; sorting vegetables into plant parts; finding plants in the same family in the order beds of the garden; and making up a drama, poem or riddle about a particular plant (without mentioning its name) and other groups had to guess which plant they were describing. The first two activities were indoors, the others in different parts of the garden.

Initially I planned to give the groups a small voice recorder, which they would use to record the identification of plants they encountered in the garden and other information relevant to the task at hand and, at each plant, identifying where they were. Thus far I had been collecting trails using only audio in this fashion, on the assumption that the location information was important for creating a trail map; and that such a geographic representation would be useful for later use and sharing. But what was emerging from the informal museum trails I was collecting was that location did not matter in many cases; what was important was the learning objects and the thematic links between them, not the geographic links. Related research by Nova et al (2005, 2006) shows that location was not important in other mobile contexts.

Simultaneously I was contacted by The Sea, which had been developing a system that supports a similar form of trail capture, editing and sharing. This system's ability to add photos and text in addition to audio would be important at a botanic garden – where images could help with plant identification for example. In museums, the 'collecting' capability of My Art Space provides access to museum-provided photos of works, instead of allowing visitors to take photos (which is not possible in many museums).

RESULTS

The four school groups collectively uploaded more than 700 individual objects. No attempt was made to quantitatively measure learning outcomes; the main goal was to assess how data was captured and used. Generally students were able to easily use the technology in meaningful ways. There was concern by the Kew education staff that the technology might interfere with learning – a similar concern expressed in museums – but in fact, it was agreed afterward that this did not happen.

Overall the students loved using the phones as tools for scientific investigation. There were a few cases where boys tended to hog the devices, but tutors and helpers (myself included) tried to ensure that everyone had a chance to use them. Each group of four to five students had a phone, and generally shared them around; in some cases a group delegated one student to record everything. One surprising finding was that the seven phones provided was deemed a sufficient number of devices. If we had had enough phones we would have given one to every student, but the teachers felt that that would have discouraged group work. Individual use of phones may have its place and this different approach will be tested in the future.

The audio recording facility proved – surprisingly – to be the most popular, and the most useful. Teachers praised the function because children could easily input information and enabling those who had difficulty participating in writing. Both teachers and students also liked the fact this was a much quicker way of entering information than typing text – an important consideration in any mobile context. Each audio clip could only be up to 15 seconds long. Students used this in different ways – sometimes individually recording their observations, sometimes conducting interviews with each other. Some (especially girls) would carefully script and rehearse their recordings, while others (especially boys) would simply press record and if they didn't like the result, discard it and start again. Audio recordings had to be played back before uploading, and students were thankful for and amused by this function. (have you any figures for boy girl differences? Can this be found from the website sound recordings?)

Many pictures were taken - of other students, of vegetables, of other plants encountered and sometimes of information panels. The data are still being analysed, but photos appear to fall into four categories: those taken to record information for retrieval later; those taken merely to capture the experience of the day; those taken for use in constructing narratives; and miscellaneous – including tests of the camera and pure play. One teacher said she appreciated the ability to take photos because she would not have been able to provide enough digital cameras for the students.

The 'Collect an object' capability was used in the trial, with plants in each of the groups (carrots, tomatoes, mint, etc.) being tagged with information that could be

downloaded. Both students and teachers particularly liked this function. My focus had not previously been on this aspect, but I am now looking at ways that the system can support narrative creation, and this capability may be valuable in this regard.

Collecting is also a means of location tracking, since the location of tags is known they become particularly useful in the outdoor activities.; one activity had the students explicitly looking for individual plant traits among many unknown others, and the blue and white tags were much easier to look for than particular plants (most children are unused to identifying plants because plant science in schools can be very limited); additionally tags make it easier for children to share the location of plants.

Students learned very quickly how to use the mobile phones. There were some inevitable technical problems, with the software sometimes logging out unexpectedly for example (sometimes the children were impatient and clicked again while the phone was uploading information). Generally the software is simple to use and there is no easy way for students to access the phone's other capabilities (the phones were restricted from making calls and sending text messages). At the start of one day, a student asked me how to take pictures; before I could answer, one of his classmates grabbed the phone and showed him.

Each time an object is captured it is uploaded, which can take up to 30 seconds; the developers have already planned to make the uploading occur in the background. A related issue is that everything captured can only be accessed again on the web site. In the drama activity students captured data as part of research to be used again later at Kew but could not access it.

Both students and teachers wanted to record video. To my knowledge no one asked about the ability to communicate with other students over the phone or access others' data but it has been discussed by the developers. Adding these capabilities however would have profound effects and should be planned carefully with regard to inter- and intra-group exchanges – the technology may then disrupt the learning potential.

NEXT STEPS

The classes will now use the web site to make galleries from the objects they have captured and collected. This will be done in class as groups, and as a further step all students could be given a login, and can access the site from home.

Data can be captured in two ways. Firstly it can be simple 'experience capture' for sorting later – for example in noisy or otherwise 'disturbed' environments. This was identified by teachers as useful during the Kew trial since there were many schools visiting and members of the public in the garden on each day. Secondly, data can be captured with an explicit goal or task in mind. A separate school is using My Art Space more explicitly to make trails, with 9-year-olds who make tours of their garden to show 7-year-olds.

Another surprising finding was that on the first day, only half of the class had used the web before. Technological issues are not the main concern, and in fact. I am currently testing My Art Space informally with adults at the museum, botanic garden or historic site of their choice. The focus of this research will shift to the representation and use of trails that have already been captured, particularly

focusing on how best to support narrative creation. Social uses will be also explored.

THEORETICAL ISSUES

Since this work has been closely connected with Kaleidoscope, I will draw some links to other activities. The trails work was started by Mark Levene and Don Peterson (2003) just before the network started, but was carried forward in a first-year joint project led by Levene, which resulted in significant early work in this area (Schoonenboom et al 2004, Keenoy et al 2004). It was recognised as such by the network and is soon to be published as a book.

Peterson started the Kaleidoscope special interest group in the Philosophy of Technology Enhanced Learning (PTEL), and was also my PhD advisor. I am not a philosopher, and this PhD began from a more practical perspective as I had been designing interactive museum exhibits for several years. However that work had become increasingly influenced by Dewey and others, and new PhD coursework in philosophy complemented my earlier studies in anthropology and sociology.

Conversely, the Philosophy SIG is strongly committed to practical aspects of philosophy. It has been focused on mobile learning and is developing online and coursework resources in this area, which complements an explosion of technology trials around Europe.

A separate mobile learning initiative in Kaleidoscope (which includes several members of the Philosophy SIG) recently held a 'Big Issues in Mobile Learning' workshop to bring the theory and practice together in this area. One outcome was a clearer definition of what 'mobile learning' is. Driven by smaller and more powerful technology, mobile learning has fast become a buzzword and a fast-growing research area. But 'mobile learning' is not something that people consciously set out to do; people simply learn. 'Mobile learning' is merely a tool toward an end, not the end itself. Increasingly portable digital technology has simply made it easier for people to learn while moving around the world. Thus at the Big Issues workshop mobile learning was regarded not just as learning using mobile devices, but learning across contexts. The Philosophy SIG prefers the term 'learning in a mobile age' (Nyiri 2005, Sharples 2005).

Another issue discussed at the workshop was that new mobile technologies not only support existing ways of learning, but create new conditions for, and ways of, learning. By enabling anywhere, anytime access to resources and networks, they enable things not possible before. The Philosophy SIG has concentrated on mobile learning because the technology reifies or makes explicit theoretical issues such as cognitive amplification and ethical issues. One focus has been on computational or network models in which individual learning objects or activities can be formalised or codified (e.g. Nyiri 2002). The Trails project specifically used a formal computational definition of Learning Objects (Keenoy et al 2004, Schoonenboom et al 2004).

A narrative perspective contrasts with this – but in a complementary way I believe – since it is better suited to information that cannot be codified easily in a formal network structure. Or, in the context of my work, narrative can act as a framework to tie together individual learning objects. This is analogous to Wittgenstein's (1953) conception of knowledge acquisition as criss-crossing a

landscape in order to gain a deeper understanding of the ground beneath; in this case however the landscape is real, but the 'ground' is conceptual.

Interestingly, one of the formal Learning Object specifications (IMS-LD) uses a narrative metaphor, dividing a 'Unit of Learning' into plays, acts, and activities. In previous work on physical trails (Winters et al 2005), we broadened the definition to include learner interactions, as 'Learning Events,' similar to Conle's (1999) notion of moments of encounter or 'resonance'. Such events are more closely related to narrative, and can complement the notion of learning objects – where the objects are things to be encountered in the world, while events are the encounters with objects or other people.

When we introduce a social dimension into the formal world of networks and learning objects, language comes to the fore, and another main focus of the Philosophy SIG in formulating a philosophical theory of mobile learning has been centred around conversations (see Sharples 2005). Dewey, for example, placed shared experience at the center of education (Ansbacher 1998). Conversations, he said, have "a vital import lacking in the fixed and frozen words of written speech.... Vision is a spectator; hearing is a participator" (Nyiri 2002).

For Vygotsky (1978), conversations are a methodology for turning experience into knowledge, with language as a medium for negotiation of teaching and learning. Meaning is made after, not before, words are uttered, and in this way discourse is a semantic tool, linking people with the objects being used and studied – it is a 'tool of tools' (Halliday 1993). In mobile learning specifically, learning is perceived as being as much about conversations as content (Taylor 2003). This could be seen directly in the Kew Gardens trial in the students' recorded conversations.

Gibbons (2006) says that the problem of learning objects is not a matter of finding and sequencing them, "but it is really a problem of *the instantaneous computational design of a conversation* intended to support learning through different types of events that accomplish story-telling in which the learner participates" (his emphasis). "Every bit of information in an instructional communication," says Gibbons, "is really just a new brush stroke on a larger painting of a system that is in progress." (ibid.) Just as a painting tells story, he says, so does a 'system', and the goal of instruction is to bring learner into the process of storytelling; learners' stories tell how much they know about the 'system' under study. By 'systems' Gibbons refers mainly to cause-effect systems – of which botany is a good example.

In his notion of 'instantaneous computational design' of learning conversations, he says there has been too much emphasis on the design of systems, not experiences. Various projects in our lab (including my own) are giving learners tools of the right granularity to support them to create things – including narratives – as part of knowledge construction. The next phase of my research will be to find ways to support narrative creation from captured objects and conversations. The research reported here indicates that it is the teachers who need to have the physical capacity in schools (access to computers) and pedagogical capability themselves to be able to make full use of the learning students have achieved alone and to extend their cognition and conceptualisation of the issues raised.

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