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## SUPPORTING EXPERIENTIAL FIELD-BASED LEARNING: INTERFACES AND ARCHIVES

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This proposal sought to develop experiential field-based learning in two ways, both involving mobile digital learning equipment and resources. Firstly the work acknowledges that there may be times when less closely supervised enquiry based learning can on occasion leave students exposed and frustrated and perhaps less competent than when they began. Identifying one such situation, the use of relatively unfamiliar field equipment while away from standard forms of support, we researched the development and structuring of a library of supportive podcasts to fill this gap that could be used across a range of field-oriented disciplines. Evaluation, conducted through the use of reflective diaries and focus groups, identified that all students thought the podcast reference library was a worthwhile exercise, of particular appeal to students with a more visual approach to learning. Notably, the podcasts appear to foster a confident and independent attitude to learning. Secondly, we sought to develop strategies to bridge learning from University to field by developing a geo-tagging system that enables students to refer to digital journal resources by locational context, via a mapping interface in the field. The latest version of this tool, which makes use of the more recently available Google Earth customizable api, appears to have been more successful than an initial version of the tool prototyped within a GIS system although further evaluation is ongoing. The students' strong preference for researching readings from home rather than University was an important reason behind the relative interest associated with the later Google-based tool.

### 1. BACKGROUND

In a context where the cost of field courses are a further and politically unwelcome burden on student budgets, there has been considerable reflection on the role of fieldwork on the geosciences curriculum. The useful role that the modern day field course can afford by involving students actively in research processes, has been highlighted (Healey 2005); Panelli & Welch (2005) also argue that field studies should follow the teaching of research methodology. This approach, through various forms of inquiry-based learning, has long been embedded at Leicester, where students frame

research questions, design and then implement methodologies to solve them at various points during their academic career. In the context of a field course, this process is guided by staff on a group-by-group basis but as both preparation time and on-site assistance from staff is shared across the cohort, group activity across a range of geographical locations is largely unsupervised. The dissertation student works independently in the field. While the place of fieldwork as a vital teaching and learning approach has been vigorously reaffirmed, two important caveats have emerged. Firstly, we need to know more about the effectiveness of fieldwork in improving learning (Fuller et al 2006); secondly, more needs to be done to integrate fieldwork into pedagogic strategies (Scott et al 2005). Following Kirschner et al (2006) we might therefore ask of our evidential inquiry based approach whether, in less guided situations, it can in fact leave learners less competent than when they began the activity. The openness of research topic during either a formal field course or the dissertation makes it inevitable that student groups spend some time doing the “unknown”, whether that is the use of a particular piece of equipment, a sampling method or an unfamiliar geographical process. We should also consider the “forgotten” in a field context; with no easy access to a text book or journals, techniques or concepts previously learned are similarly (if less) remote to students. This proposal sought to develop novel digital learning resources that better support students working remotely in the field, that are generic across a range of cognate disciplines such as geology and archaeology as well as geography, and that build pedagogic bridges from class to field. An important goal of the work has been to seek a reduction in what can be slow and frustrating progress in the learner, while releasing the teacher to spend more time with the students on the more intellectual challenges of the discipline.

## 2. PROJECT AIMS AND OBJECTIVES

AIM 1. Develop & evaluate podcasting as a means of supporting evidential inquiry based student research in the field

AIM 2. Develop, exemplify & evaluate the geo-tagging of research literature and subsequent access of papers via a mapping interface

AIM 3. Position particular podcasting and geotagging interfaces and tasks in relation to specific categories of mobile equipment.

## 3. PROJECT OUTCOMES AND ACHIEVEMENTS

- Workshop papers to the Impala 2 group and Learning Futures 2008 providing support and guidance for preparing audio-visual podcasts that demonstrate field equipment;
- A structured library of equipment podcasts as a Blackboard site, to which all staff and students in geography are registered (plus other internal staff/students on request);
- Podcast library field-operational on class sets of mobile teaching devices in Geography - iPods, rugged tablets and PDAs. Internal and external loan agreements for equipment to facilitate wider access to this equipment pool and hence podcasts in a field setting;

- A structured library of equipment podcasts on the SPLINT web server for use across range of disciplines (e.g. geography, ecology, geology and archaeology), in Leicester and beyond<sup>1</sup>.
- Interest & agreement from the JISC-Edina Go-Geo repository to archive and disseminate the library further;
- Seven papers/posters/workshop sessions in Leicester, UK and European contexts;
- Best poster award, Learning Futures 2008;
- Research paper submitted to Journal of Geography in Higher Education concerning the methods, models and effectiveness of podcasts as a means of supporting use of equipment;
- Methodology, guidance notes and software templates for geo-tagging research literature using ArcMap GIS;
- Prototype for a more flexible, updated version of geo-tagging approach using the Google earth api (which was available from late 2008 only)<sup>2</sup>
- Geo-tagged literature database relating to the Geography department's California Drylands field course area as exemplifier.

#### 4. EVALUATION

An ongoing programme of evaluation has been (and continues to be) carried out throughout the development of the approaches and strategies reported here in order to ensure that feedback can inform future direction. Focus groups together with tailored additional entries to student module feedback forms have both been utilized. However, the most meaningful feedback about student learning in relation to the approaches outlined in this document has been through commentary within reflective diaries incorporated as part of student assessment. For example, reflective diaries have been used, in the form of a post-hoc review, to gather evidence regarding students' engagement with mobile technologies. Efficient yet effective, this form of assessment and learning also suits the purpose of evaluation.

##### **Video podcast equipment library**

The podcasts were initially designed for use in the field using iPods to combat either the "forgotten" (in regard to core techniques) or "unknown" (in regard to unusual ones) in a context where textbooks were not available and staff not always immediately to hand in the case of student group projects. Their role in the curriculum has supported the embedded use of technology in a wider context, since staff can point students to first-base technical support without themselves feeling that they must have all answers in unfamiliar territory. Students have universally considered the podcast reference library to be worthwhile.

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<sup>1</sup> See <http://www.geog.le.ac.uk/splint/geopods/>;

<sup>2</sup> See [http://www.geog.le.ac.uk/staff/chj2/California\\_journals/CalifDrylands\\_JournalTag.html](http://www.geog.le.ac.uk/staff/chj2/California_journals/CalifDrylands_JournalTag.html);

Specific themes that have emerged from the qualitative analysis of student focus group and diary material include:

The role of the podcasts in fostering of independent and autonomous learning;

“It would be a good first base to rely on information before seeking further help, encouraging independence.”

“It’ll make you more independent as well with your learning instead of always having to go and ask someone what to do and ask for help”

The approach particularly appealed to students with a more visual approach to learning;

“I believe visual aids are much more effective means of understanding than a long list of instructions.”

“People learn differently, the visual aspect of the podcast is much better than having to sit and read pages of methodology”

“You can visually see how they are put to use by the person instead of reading it in a text book to see how it’s done”

The podcasts had a positive effect on student affect and confidence;

“I think it would give you a lot more confidence than just reading how to do the method by actually seeing and hearing someone say it as well”

“if you just read something you think you can interpret it in different ways but if someone is actually saying it to you... it gives you confidence”

“The podcast library was exceptional in familiarising me with techniques and building confidence before going into the field. I think that taking them into the field is a brilliant idea as they can be referred at any time and would prevent misuse of equipment and inaccurate data collection.”

“The technique podcasts have been a huge confidence builder and I definitely consider them a useful tool in making these mobile technologies more accessible to researchers”

The podcasts were used in a much wider range of contexts than initially envisaged (preparation, in field, revision, writing of methodologies).

The increased confidence expressed by students that appears to relate to the multi-modality of the materials is particularly noteworthy when weighing up the value of the podcasts as a means of improving the students’ learning experiences. The library is not designed to replace staff demonstrations of core geographical techniques, but the following quotes from members of teaching staff suggest that the library does indeed act as an agent of change that releases staff to spend more ‘quality’ time with students.

“Without needing to worry about the specific operation of a piece of equipment, far greater emphasis can be placed on observing and questioning phenomena in the landscape, which are clearly higher level cognitive processes.”

“It was also clear to me instructing students in basic levelling techniques that those who had not viewed the relevant podcasts were far more prone to making mistakes and carried out the activity slower than their peers.”

Further, it appears that the podcast library may facilitate change and updating of skills in staff as well as students. Significantly, the library has been of ongoing value to both academic and technical staff alike:

“Having started working in the department nearly a year and a half ago (and with no previous Geography background knowledge about equipment), I have found the Podcasts very informative and have "self-taught" myself how to use various pieces of equipment. The Podcasts are very easy to use and I find the demonstration pictures very helpful ... At times, especially in my earlier days the Podcasts have been like a lifeline and are very helpful when out on location doing field work.”

*Laboratory Technician, Geography.*

“We have found this resource extremely useful in physical geography teaching and are fully integrating it into our second year lab/field skills modules (e.g. “Techniques in Environmental Analysis”) and our residential fieldclasses (e.g. Year 2 Almeria field class).”

*Lecturer, Geography*

As a recent talk by Carolyn Roberts for GEES, entitled “Someone in the lab can help you!: student learning and the invisible army” highlighted, materials that are able to support the continued professional development of laboratory technicians who play a vital role in student learning are particularly scarce.

This body of qualitative evaluation materials suggests that the podcast equipment library has been well received and embedded within the geography curriculum and that it has been of value beyond geography into subjects such as ecology. More is known on the local impacts of the podcast than their usage beyond Leicester, but plans for the JISC-Edina Go-Geo version of the library (see below re continuation) will be designed to facilitate the collation of feedback towards a broader picture.

“I have looked at the Geopods web site - it's impressive. I am sure our Go-Geo! user base would be very interested in using this content”.

*JISC-Edina Go-Geo Geospatial Service Manager.*

However, reflecting on our experiences, the plans that a wider group of people would contribute to the library seem to have been misplaced, at least within the timescale foreseen. There is wider interest in extending the range of podcasts, but the video equipment podcast (as opposed to audio or spoken Powerpoint material) has taken a fairly consistent average of 3 days per unit to construct; too long for the majority of academic staff to consider or to undertake within workshops in which staff or PhD students design, construct and built podcasts as originally planned. Copyright issues have given rise to hesitation regarding a ‘load your own podcast’ facility to the University of Leicester GeoPods site, and indeed to the wider dissemination off-site of a small minority of our own podcasts concerning interfaces to proprietary software. However, negotiations with a major GIS

provider have been fruitful in this regard, and we soon expect to release further elements of the GeoPods library to the web.

### **Geo-tagged e-journals**

Success regarding the geo-tagging element of the TEF proposal has been slow in comparison to the achievements of the podcast library. It remains clear from staff discussions and external examiner reports that encouraging students to read is a priority action and that creativity is required to achieve our goal. In this case, a technically workable structure for the upload of geo-referenced library papers with clear supporting paperwork and a re—usable template was successfully implemented within ArcMap. However, a variety of practical issues arose with this prototype. Firstly, in regard to some modules which were potential targets for the tool, convening staff indicated that they wished students to gain experience using search engines as a learning outcome; providing accessible material (either directly to our students or implicitly via the web for other Universities) would have undermined colleagues. Other convening staff felt strongly that reading materials should not be available to students during fieldwork as this would adversely impact on important ‘doing’ time. In this regard however, and linking with more anecdotal commentary, one student explicitly suggested:

“May be good to integrate it more into fieldtrip modules instead of introducing it after the trip”.

Healey et al. (2005) suggest the “ ... need for staff to be aware of their teaching styles and be sensitive to the varying needs of students taking their courses”; the evidence here suggests that in fact not only is this easier said than practiced but also one’s own learning style and preference may be more implicit and embedded than one might give credit for. As an “assimilator”, I still see the opportunity to build bridges between field and lecture pedagogies although I do appreciate the counter point that too much time reading in the field would mean missed teaching and learning opportunities. My challenge coming from this scenario is to reflect on how many “accommodator” opportunities relating to active doing I might miss in my own practice, that could in fact benefit students. Additionally, experience as part of SPLINT has shown that embedding ideas across a variety of modules works to a different time span in comparison with implementing change within one module under one’s own convenorship. Patience, waiting for the “right moment” to go with a potentially right idea, and waiting for an up-swell of student (or external examiner) interest that might in turn trigger a change in staff perception all need to have a chance to come into play before I will write off a new concept entirely.

Further, and over-riding issues of individual teaching style in terms of apparent importance, student feedback suggested that the resource (accessible via any CFS machine) was in the main not used because it could not easily be accessed from home. Reading activity, for the relatively set of students submitting evaluation feedback on the module in which the geotagging tool was implemented, was clearly a “home” activity; not a departmental or (it would seem) library based preference. Given this disappointing initial outcome, a decision was taken not to disseminate the TEF-funded ArcMap based prototype more widely although the materials were handed to known academics in other environmental science departments with appropriate caveats. At this point, I had to consider whether the geo-tagged literature concept was simply something that needed to be put to rest. Reflecting on the evidence to hand, it appeared that it was not the concept itself that was

wrong, but rather the spatial context into which it was initially placed. The emergence of the Google Earth (GE) advanced programming interface (api) in late 2008, offering bespoke use of GE in one's own website, suggested an alternative technical strategy to overcome the issue of context and to streamline and simply the access interface as a side benefit. The result, programmed and implemented by myself in the post TEF period,<sup>3</sup> has met with considerable interest by staff. Given the small cohort taking the 2009 module, meaningful evidence from students has yet to accumulate although a focus group event is planned for March.

## 5. CONTINUATION OF THE PROJECT

### **Video podcast equipment library**

As the evaluation report above has shown, the podcast library is well regarded and embedded and regarded within Geography. Relevant podcasts are being embedded within virtual field course materials using social networking Web 2.0 technologies, and interest and use is growing internationally in an African context amongst ecologists via the British Council funded Field IT project. While the web site and workshops at local, national and European levels have disseminated the podcasts beyond Leicester, interest & agreement from the JISC-Edina Go-Geo repository to archive and host the library from 2009 will be critical in presenting the work more widely. Publication of the strong results via Planet and (we hope) Journal of Geography in Higher Education (paper submitted) is expected to further the credibility of the resource and encourage its uptake.

In regard to the future development (versus use) of the library, continuation is seen within two streams. Firstly, and in regard to locally developed and hosted materials, the strong evaluative feedback as to the value of the podcasts provides a better framework for encouraging the investment of further time on podcast development by staff. Further, we see potential for costing podcast development as a sub-activity of future teaching or indeed research proposals (e.g. new methods/equipment) as a small component of a wider dissemination strategy. There is considerable scope for the development of techniques/equipment podcasts of a similar style in ecology, geology and archaeology for example. I would encourage the University to consider playing a more top-down role in this regard by encouraging the production of one or two podcasts where relevant in future NTI bids where field disciplines are concerned in order to augment and update the existing library, given the evaluative feedback regarding student confidence and the fostering of independence reported here.

More ambitiously, discussions are underway with the JISC-Edina Go-Geo repository to consider an uploading and maintenance system to allow others to enhance the library post-project. Quality control and copyright issues inevitably make movement on a community library slower than that achievable in house, but the positive link with Go-Geo provides GeoPods with access to professionals with considerably more expertise on such matters. As such, the TEF-funded library is being well

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<sup>3</sup>Viewable at [http://www.geog.le.ac.uk/staff/chj2/California\\_journals/CalifDrylands\\_JournalTag.html](http://www.geog.le.ac.uk/staff/chj2/California_journals/CalifDrylands_JournalTag.html),

positioned to move into its next phase, although the final outcome and feasibility of the vision has yet to materialize in concrete terms.

### **Geo-tagged e-journals**

The Google version of the geo-tagging tool represents continued investment in the TEF ideas beyond the formal length of the project. The development of further Google accessed geo-tagged journal sites for well known field locations accessed by many students will be taken forward by me as development time allows, subject to the body of evaluative evidence to support this emerging in the next focus group. Once evaluation materials have been collated and the concept published, the Google tool and examples will be referenced from the SPLINT web site. Because the library references implemented for our students go via the Leicester library proxy for access, the disseminated tools will need to be altered to access papers only by DOI reference – in this sense, the outcome will not be as seamless for non-Leicester registered students. Interest and evaluation results will determine whether an additional interface to make it easy for other users to build these geo-tagged reference sites will be created.

Technical research relating to geo-tagged knowledge repositories is now emerging more generally, creating a climate where the geo-tagged literature approach is converging towards societal norm and hence may be more accommodated in a teaching context. Interest has also been shown in the further development and expansion of the Google tool for geo-contextualised local history (EMOHA) and as a means for profiling the Department's research interests worldwide on its website; in this sense, while the immediate outcome for TEF is not ideal, the time is now right for the geo-tagging tool and the longer term prognosis looks more hopeful.

## **DISSEMINATION**

The project has been disseminated to the wider community in a number of ways.

Firstly, the podcasting library has been mentioned explicitly to other spatially cognate disciplines here at Leicester (e.g. geology), although with little uptake to date, while the geo-tagged referencing system was been highlighted across the University via a poster to TEF Conference 2007.

Further afield, via SPLINT, the Universities of Nottingham and University College London have expressed interest in the podcasts and now have access to the materials via a dedicate internet site.

Within the East Midlands, as a component of SPLINT outreach, all PhD students taking Physical Geography were issued with the CD version of the podcast library and have been alerted to the web collection. This occurred within the context of participation in the East Midlands Training Consortium.

A special session on podcasting was convened by Dr Jarvis as part of the RGS-IBG Conference, London 2007.

The subject centre GEES (HEA) have offered to support further dissemination via their in-house magazine Planet (copy due 31 March 2009).



Within a European context, CDs & fliers were distributed at the Herodot Network Annual Conference (2008).

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