

GeoJournal: Enhancing experiential field-based learning

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The **GeoJournal** tool forms part of the **"Supporting experiential field-based learning"** project that seeks 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. The aim of the GeoJournal tool in particular is to provide access to readings in a spatially referenced context, such that students are further encouraged to engage with journal literature and are better enabled to make connections both between different papers and also aspects of the underlying geographical landscape when they do so.

Drawing on increased interest in seeing photographs co-located in virtual geographical environments (e.g. Google Earth), an approach known generically as geotagging, GeoJournal is a novel new system that involves combining background data with up to date readings, images and animations taken directly from the field. This first prototype has been designed in ArcMap GIS.

Abstract



The implementation will allow a range of staff to embed links to abstracts, full text PDF files, images taken in the field and other multimedia including field sketches, audio clips and movies within a simple mapping interface. Changes and updates may be made incrementally to an existing GeoJournal base area without requiring in depth ArcMap GIS knowledge.

The poster illustrates the GeoJournal interface for an area of California visited as an in-field teaching module on a 3rd year drylands geomorphology module, GY3091. GeoJournal has been designed for use both in field (on tablet PCs) and laboratory; for the module GY3091 illustrated here, staff will use GeoJournal to support student reflections on themes, processes and places on their return from the field site. Student evaluations regarding the effectiveness of the tool for post-hoc reflection will be carried out in 2007/8.

Methods

While the place of fieldwork as a vital teaching and learning approach has been vigorously reaffirmed in the geographical literature (Healey 2005, Panelli & Welch 2005), more needs to be done to integrate fieldwork into pedagogic strategies (Scott *et al.* 2005). As a tool intended to support student reflections on themes, processes and places on their return from the field site and hence bring closer together the learning spaces of lab and field, GeoJournal particularly provides a strategy for targeting this issue.

Tool design

GeoJournal was implemented as a customised template in ESRI™ ArcMap 9.1. An additional toolbar was constructed using Visual Basic, allowing a user to select whether they wish to view an abstract (a), full paper (b), movie (c) or photograph (d) via a drop down menu. This toolbar draws on data uploaded into simple database from an Excel spreadsheet, that can easily be updated with new records by a staff user. Users simply click on a point symbol at a particular location on the map to view the media requested. ArcMap is available both via CFS across University machines and also on the SPLINT tablet PCs, allowing GeoJournal to be used in a variety of static and mobile contexts.

Application construction

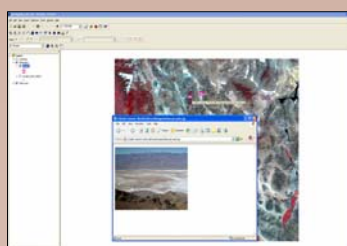
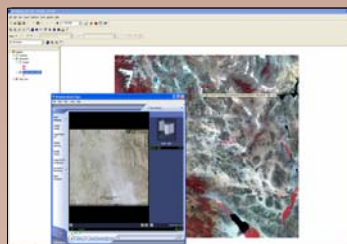
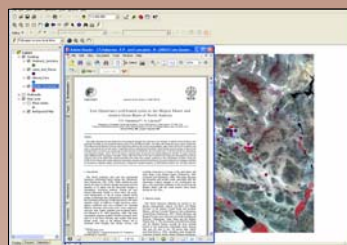
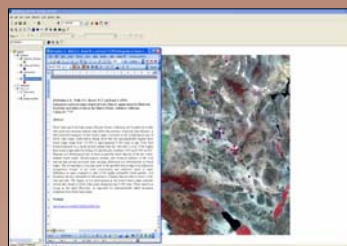
The GeoJournal example shown here is based on the Mojave Desert and Death Valley regions of California. In regard to the construction of this particular version of GeoJournal, satellite base data were downloaded from the USGS data browser while readings were based from a list that is used for a 3rd year Undergraduate field course and sourced from the internet. For each of these readings, abstracts were downloaded and weblinks to papers were found. These were then linked to reference points on the background map, and their co-ordinates uploaded into an Excel spreadsheet, making it possible to go straight from the map to the readings. To further enhance the project, photographic images from previous field trips were selected that best showed some of the prominent features and landforms in the area. These were then linked to the background map in a similar way. The last step in this process was to add movies to the map. For this initial version of GeoJournal, screen capture methods were used to capture fly-throughs of areas that are encountered on the field trip within Google Earth.

Application context

This region was chosen because it is the site of a 3rd year experiential learning field module "Drylands Geomorphology GY3091". GeoJournal has been designed for use both in field (on tablet PCs) and laboratory; for the module GY3091 illustrated here, staff will use GeoJournal to support student reflections on themes, processes and places on their return from the field site. Student evaluations regarding the effectiveness of the tool for post-hoc reflection will be carried out in 2007/8.

Using GeoJournal, our intention is that students will both be able to check references for locations visited on tour, and make connections between landforms and processes explored experientially with other examples of these landforms cited in the literature. The central figures show the various media views available. In (a) for example, a user views an abstract on soil development relating to lake sediment and could go on to view the full paper by clicking on the web link provided if the article looks to be of particular interest.

In this particular instantiation of GeoJournal, multiple databases have been entered separately to allow particular geomorphological themes to be highlighted. Piedmont junctions, lakes and playas, alluvial fans and aeolian structures form in distinct geographical contexts relating to underlying geology and terrain as well as the more general climate characteristics of the region; by highlighting papers for selection by theme, our hope is that students' awareness of these contexts is reinforced. Future versions of the software tool might include also further base mapping 'layers' for geology and/or elevation, depending on student evaluations; our initial goal was to provide a simple, streamlined interface.



Examples of georeferenced media using the GeoJournal Tool in ArcMap. (a) Georeferenced Abstract and weblink, (b) Georeferenced journal article, (c) Georeferenced movie, and (d) Georeferenced Image

Discussion

At this point in time, the technical aspects of the first GeoJournal prototype have been completed and implementations have been developed for two field sites, that of California (above) and a second version for Almeria in SE Spain. Both are field sites widely used by the International geographical/geological community, such that with successful local evaluations the project is poised to maximise practical engagement with the geo-tagging concept. Firstly however, we need to know the impact of the GeoJournal tool on the learning process, both in terms of bringing together links between in-field learning and subsequent independent follow-up by students and also the degree to which a tool such as this can encourage both wider and deeper engagement with the scientific literature. Evaluations using Laurillard's (2002) framework will take place in 2007/8 with the students of Leicester's Californian Drylands module GY3091. This module will evaluate GeoJournal as a post-hoc reflective tool; it is expected that the Almeria example will be explored as an in-field learning tool that integrates both the scientific literature and GeoWalk podcasts in conjunction with Kingston University.

A number of technical issues arose when designing GeoJournal, in particular concerning the development environment. While ArcMap has a widespread following as GIS software, for Universities of departments not subscribing to the software the purchase cost would be prohibitive; in many senses then, the dissemination of GeoJournal is implicitly targeted at present at those who are spatially aware yet the spatial perspective it places on the literature could arguably be of much broader value to a range of disciplines where papers have locational context. As a prototype, ArcMap was an efficient and cost effective development route for Leicester students, but broader dissemination of the concept could be achieved by a Google Earth 'map hack' in future.

Interestingly, in our literature searches for California and subsequent to the tool development phase, we came across a web site promoting geographical location as metadata tag for papers but where the explicit link to base mapping had not been made (American Geological Institute, 2007); writing code for Google Earth and linking with such a community could have potential for massively increasing the uptake of the GeoJournal notion. Further, as the tool developed to incorporate photographs and movie files on request from subject staff members, we might equally ask whether an ArcMap (or Google Earth) stand-alone tool is appropriate or whether the GeoJournal should be reconceived as a component of a virtual field course (VFC). Software such as VR BrochureFX, designed to build flash web interfaces, are better designed to manage and connect different forms of visual media in the manner of a VFC, but are not equipped to manage pdf or word documents. Philosophically however, our tool differs from a VFC in that it seeks to connect students with the standard scientific literature base but in a new way: it is intended to support students in making connections between papers as they stand and build literature interpretation skills, rather than providing extracted or reformatted knowledge with an emphasis on visual material and quantitative data sets as is commonly the case in a VFC (Dykes *et al.*, 1999; McMorro, 2005).

In terms of ease of use, the tool has been designed for development by non-GIS expert members of staff. Assistance may be required with the downloading and projecting of a new geographical base map for a new tool, but otherwise GeoJournal should be self sustaining as regards the updating and maintaining references and other materials. Staff at other Universities will need to update web links according to their own institution's Athens permission codes; in-field versions of GeoJournal that link to digital copies of papers on disk will require copyright permission protocols to be followed on an institution-by-institution basis. The abstracts and locational information however form the skeleton of a portable and transferable tool. Once basic evaluations have been carried out, the general template and skeletal geographical exemplifiers for California and Almeria will be placed on the web site for general dissemination within the geographical community and promoted via the HEA subject centre GEES.

References

- Dykes, J., Moore, K. and Wood, J. (1999) Virtual environments for student fieldwork using networked components. *International Journal of Geographical Information Science* 3, 397-416.
- Fuller, I., Edmondson, S., France, D., Higglitt, D., Ratinen, I. (2005) International Perspectives on the Effectiveness of Geography Fieldwork for Learning. *Journal of Geography in Higher Education* 30, 89-101.
- Healey, M. (2005) Linking Research and Teaching to Benefit Student Learning. *Journal of Geography in Higher Education* 29, 183-201.
- Laurillard, D. (2002) *Rethinking University Teaching: A conversational framework for the effective use of learning technologies*. 2nd Edition. London: Routledge/Falmer.
- McMorrow, J. (2005) Using a Web-based Resource to Prepare Students for Fieldwork: Evaluating the Dark Peak Virtual Tour. *Journal of Geography in Higher Education* 29, 223 - 240.
- Panelli, R., Welch, R. (2005) Teaching Research Through Field Studies: A Cumulative Opportunity for Teaching Methodology to Human Geography Undergraduates. *Journal of Geography in Higher Education* 29, 255-271.
- Scott, S., Fuller, I., Gaskin, S. (2005) Life without Fieldwork: Some Lecturers' Perceptions of Geography and Environmental Science Fieldwork. *Journal of Geography in Higher Education* 29, 161-171.
- GeoRef Information Service (2007) American Geological Institute, Alexandria, VA, viewed on 7 July 2007, <http://www.agiweb.org/georef/index.html>