

GEES Small-Scale Project report

Atmosphere, lithosphere, hydrosphere, biosphere: Cross-disciplinary virtual fieldwork

The project group in the Schools of Social Sciences and Law (SSL) and Biological and Molecular Sciences (BMS) at Oxford Brookes University consists of:

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The aim of this LTSN-GEES funded project is to develop interdisciplinary virtual fieldwork (VFW) applicable to the whole HE community. At Oxford Brookes University, Geology, Geography and Environmental Sciences provide interdisciplinarity by provision of joint honours courses between all three disciplines, and by sharing key linking modules. Some of these modules include a fieldwork element, but there is considerable scope, through the use of virtual fieldwork, for students to be exposed to field settings of which they would not normally have first hand experience. Whilst virtual fieldwork is no substitute for the 'real thing', it can make an important contribution to learning where real fieldwork is not possible for reasons of cost, disability, danger, or events which occurred in the past.

During this project, web teaching and learning resources have been developed to deliver virtual fieldwork (VFW) across the disciplines of geography, geology and environmental sciences, by active collaboration between staff in all these areas. VFW is being integrated into specific modules, particularly those which cross boundaries between the disciplines. The targeted modules are available to students in two or three of the disciplines, for example: Oceanography; Sedimentary Systems; Glaciers & Glaciation; Quaternary Science.

The project has focused on field courses to areas in the UK and overseas in which project members have expertise. VFW has initially been developed to support and enhance existing courses at Oxford Brookes. However, all of the resources are available to be used by the UK Higher Education community, and the wider community, and may be accessed at <http://www.virtual-geology.info/index.html>

Images are one of the most important components of VFW, and some of the funding has been used in acquisition and transfer to digital form of field photographs, diagrams, maps etc. Much of the funding has been used to create staff time to work on the project.

We have produced generic templates, which may be used by staff or students with little or no background in web authoring to develop new virtual field trips. A shell consisting of a simple set of locality pages linked to each other and to a field trip home page allows the addition of text and images in a word processing programme or html editor, to produce a virtual field trip quickly and effectively.

A Javascript routine allows the creation of scrolling panoramas by users with no programming expertise. This gives the user the ability to scroll panoramas within a web page, without the need for plug-ins. With a little more work, for which instructions are provided, the user can produce clickable panoramic image maps and Quicktime panoramas. The use of these panoramas is shown in the "Oxford Rivers in Flood" Virtual Field Trip (VFT). This is a virtual version of an existing field trip to examine the flood hazards presented by Oxford's rivers, and started as a printed 'Thematic Trail' written by Derek Elsom. The online version was originally developed for a geography module, and will soon be used in a first year environmental geology module. It uses

scrolling panoramas taken at different times during recent flood events on the Thames and its tributaries.

In the Physical Geography of the Brecon Beacons VFT, students are introduced to various themes relating to the landscape evolution of the Brecon Beacons, and undertake a range of exercises to develop their understanding of how to interpret landscapes and sediments from different areas. It is intended for use as a basic study resource for students following courses in Geography, Physical Geography, and Geology. This VFT has been partly developed by a disabled final year Geography student, and addresses issues of accessibility to field courses in mountainous areas. It is a good example of how student project and research work may be integrated with the development of web-based courseware.

The Virtual Plant Community Sampling and Analysis VFT uses 'virtual quadrats' to quantify the distribution of plants. The aim was to develop a simulated botanical field sampling exercise to demonstrate the use of MATCH, the widely used plant community identification programme. MATCH contains descriptions of hundreds of UK plant communities based on the main species present and their relative abundances. The descriptions provide a standard against which any field study may be compared to give a percentage similarity between the test sample and named MATCH communities. Past experience introducing students to the MATCH programme revealed several difficulties, starting with the problem of plant identification in the field, and then in preparing the data for analysis in MATCH.

This project uses chalk grassland, a widespread community which students encounter in local field studies. The species list and their respective relative frequencies as listed in MATCH were installed on the computer as the basis of the simulation sampling exercise. The exercise uses an iterative process of random number generation. The results of the five repeated iterations are imported into an Excel spreadsheet that can then be exported to MATCH for analysis and comparison with the standard community type listings.

Each plant species is associated with an image and web page including characteristics useful for its identification. To date the project has achieved the entry of the community listing and the programming of the random number generator to produce the test samples. Identification pages for each species have been included but these will need further standardisation of layout and information, and good pictures need to be included for some of the approximately 140 plant listings. The MATCH analysis programme still needs to be linked to the sampling exercise. In the future, the simulation will be extended to cover many more of the standard community types.

The tropical-subtropical marine VFT has focussed on the various modern environments of calcium carbonate-dominated sedimentation in the Florida Keys, and on the role of organisms and sedimentary processes in the formation and modification of these sediments. This project integrates field photographs (on land, and from boat and snorkelling trips), aerial photographs, remote-sensing images and topographic maps. This VFT will be used in interdisciplinary modules such as Oceanography, and a future new module, Sedimentary Systems. Further development on this theme will include reef VFTs in the US Virgin Islands and in Fiji. Interactivity has been introduced, using self-assessment quizzes built into the web pages.

The group has met regularly to discuss and demonstrate developments and progress. This has proved to be a very useful cross-disciplinary forum within the University. The group will continue to develop the virtual field courses, funded by a Brookes Virtual pilot project. The evaluation of the effectiveness of the resources developed during the project has still to be carried out, and this will start next term, as we begin to use the new VFTs in our modules. As is our current practice, students will be actively involved in testing and evaluating course materials.