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Learning and Teaching Support Network
LTSN Subject Centre for Geography, Earth and Environmental Sciences

Planet

Supporting learning and teaching in Geography, Earth and Environmental Sciences



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PLANET

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What is PLANET?

PLANET is the bi-annual publication of the LTSN Subject Centre for Geography, Earth and Environmental Sciences.
Its aims are to:

- Identify and disseminate good practice in learning and teaching across the three disciplines of Geography, Earth and Environmental Sciences and present examples and case studies in a "magazine" format.
- Provide a forum for the discussion of ideas about learning and teaching in the three discipline communities.
- Provide information for readers on Subject Centre activities and on related resources, conferences and educational developments.

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Guest Editorial

Michael Bradford
Pro VC for Teaching and Learning,
University of Manchester

The two-way relationship between Teaching and Research

Having attended part of the annual residential workshop for new lecturers in May at the University of Birmingham on teaching and learning run by LTSN-GEES, I thought it would be timely to write a short piece about the two-way relationships between research and teaching. I am interested in the links but, as a former Head of School of Geography and now a Pro-Vice-Chancellor for Teaching and Learning at the University of Manchester, I have also become increasingly aware of the magnitude of the lecturer's job and the enormous tensions and conflicts that it involves. Alan Jenkins (Oxford Brookes University) and Mick Healey (University of Gloucestershire) were leading one of the sessions on linking teaching and research at the LTSN-GEES Birmingham workshop and are currently running a national project on this topic (see article in this edition of PLANET on page 27 Ed). I have co-ordinated a learning and teaching programme for new academics across the University of Manchester since 1997 and in this article I draw on some focus group discussions with some participants who completed the course in 1998 and 1999.

There has been much recent debate about the association between research quality and teaching quality, especially at the departmental level. Much of the discussion is about associations between scored outcomes of the RAE and TQA (Subject Review) and the reasons for these, with relatively little research into any underlying processes. The discussion can therefore sometimes become somewhat sterile. It is rarely of help to new academics who are confronted with a working context where research and teaching seem to be competing for their attention. Academics' time has recently been partitioned and commodified ('research time' became a concept during the 1980s). This process has been exacerbated by accounting procedures that separate out teaching and research, such as profiling, which are partly meant to help sort out the tensions. Rarely is the two-way relationship explored. Here, I shall briefly explore that inter-relationship and the processes through which research and teaching can reinforce one another at the level of the individual academic. Better articulation of their relationship at the programme level can also improve the experience of students, but that is for another time.

At the broad level, there are two obvious ways in which the distinction between research and teaching may be blurred: pedagogic research and the concept of scholarship that may underlie both. I take those as given. In our programme for new academics at the University of Manchester, they are asked to give a short presentation, which could form part of a first year lecture session, that demonstrates how they would use their own research in teaching and learning at that level. Although these academics are from a broad set of disciplines, their uses of research are applicable to the GEES disciplines. Before they approach the task, they are asked what may be gained from using their research at this level. Most suggest that they will convey their enthusiasm for their own research and that this alone may excite students. When students are questioned about the use of research in teaching, they invariably do speak about the enthusiasm and stimulus conveyed. Sometimes they suggest that it is the only way that they know what research their lecturers are involved in, or indeed that their lecturers did anything beyond teaching them. When a number of academics use their own research in their first year lectures then students gain an appreciation of some of the research being done in the department as a whole. It can aid their identification with the department. It can also, for some, suggest where they are heading in their studies, an early indication of the research frontier.

There are a number of ways in which academics use their research in their lectures, and it is useful to make them explicit to students. Some use a theory or model to inform the structure of their lecture or set of lectures. This might be something that they have developed themselves in their research and it helps to organise students' thinking. It might be a theory that they have critiqued in their research, and they use it as a way of demonstrating both the underlying ideas and a critique of them.

Many use a case study from their own research to enliven their lecture, to show how a theory relates to the 'real' world, to relate theory to practice, or to illustrate the complexity of an issue. For example, I use a government-funded evaluation of a local urban development corporation to demonstrate the process of urban policy evaluation as well as the issues related to the policy instrument itself. Students are asked in what ways it might be difficult to evaluate the policy instrument, attributing causal links being one of them. So a research approach to the case study is used explicitly.

The research process, then, may be demonstrated through lecturing. Physical geographers, for example, can explicitly demonstrate scientific method. When the demonstration remains implicit, the opportunity to link forward to future undergraduate dissertations and more generally to research practice is lost for most students. An interactive lecture, however, can involve students in thinking through the research process, deciding the steps to be taken or generating further ideas or hypotheses.

Many of the above may be incorporated into a problem-based approach to a lecture which may begin with the students' own ideas being elicited by the lecturer. One peer described one of the presentations as a 'form of a puzzle – from the students' simplistic solution to the terribly complicated truth'. One may debate the philosophy underlying this comment, but it shows how the lecturer has involved their students in the research problem and led them through the issue.

These are all examples from lecturing rather than teaching and learning more generally. They do not involve problem-based or enquiry-based learning that may involve students more directly in a research process of their own. No great revolutions are then necessary to make the links between research and teaching. Even a traditional lecture session can be used. It requires being more explicit and, for some, greater interaction than perhaps they are used to.

The focus groups of academics three years or less into their careers yielded some expected and some unexpected comments about the impact of teaching on research. Our expectation that teaching improved people's research presentations was confirmed. Teaching had also given greater depth to their research, because they had to place it in a wider perspective and they had to understand it even more thoroughly when discussing it at that level. Their concepts and thinking were sharpened. Research questions had also arisen out of questions from undergraduates that could not be answered. In one case, the process of designing a first year course unit had even affected the research direction as it posed questions that the literature had not asked. In short, teaching had an effect in a number of ways on staff's research.

Articulating the links between teaching and learning, and research helps lecturers to see that these two major aspects of their professional careers are not as separate as the present environment in UK universities would suggest. I very much welcome more work on developing the two-way links and look forward to seeing people's examples.

If you have any case studies which you would like to share, please contact Alan Jenkins (alanjenkins@brookes.ac.uk) or Mick Healey (mhealey@glos.ac.uk) who are co-ordinating a LTSN project on linking teaching and research (see page 27)

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Profile on…Yolande Knight

– THE – Planet PROFILE

What Does She Do?

Yolande is the most recent recruit to LTSN-GEES and is responsible for developing and managing the Centre's advisory and enquiry service. As Resource Co-ordinator, she also oversees the harvesting, evaluation and dissemination of GEES learning, teaching and assessment resources in collaboration with the GEES discipline communities. Yolande is also responsible for the continuing development of the LTSN-GEES Resource Database.

Background

Yolande was brought up in Surrey and obtained her first degree in Genetics at the University of Birmingham. She completed a Ph.D. in Agricultural Plant Science at the John Innes Institute in Norwich before moving to the University of Leeds. She worked as a post-doctoral research fellow for 5 years whilst at Leeds, where she became involved in the supervision, tutoring and lecturing of undergraduates. In 2000, she joined LTSN Bioscience at its inception, where she was able to extend her skills and interests in educational development.

Professional Interests

Yolande's professional interests lie within educational development and she is particularly interested in the areas of linking teaching with research and resource-based learning. She retains an active interest in the sciences, but is especially keen to develop her knowledge in human geography and the wide range of topics this encompasses.

Personal Interests

As surf buddy to the Centre Manager, Yolande spends a good deal of time under the sea. When not drinking salt water, she writes fiction, having had a number of short stories published in anthologies. In the depths of winter, when North Cornwall has frozen over, she travels to even snowier climes to practise her gully riding and jumps (see above).

Flood Hazard Management: Using an Alternative Community-Based Approach

John Harrison, University of Stirling

Abstract

The teaching of environmental hazards provides opportunities to explore different modes of learning, including role-play and internet-based exercises. This paper describes flood hazard games developed at The University of Stirling in the Department of Environmental Sciences which simulates conflicting views within a community and which attempts to take learning into areas requiring imagination and creativity. Flood hazard scenarios are provided, which include physical and community aspects of risk and a detailed list of the principal players. Students are required to role play as environmental consultants and to work through the game in self-selected groups. The outcome of the game is a draft flood management plan which must be presented to representatives of the local council, who have commissioned the work. Student engagement with the exercise has been impressive and feedback has been very positive.

Introduction

The teaching of environmental hazards provides an ideal platform for developing students' understanding of the social, cultural, economic and political aspects of decision-making. Traditional approaches to the teaching of environmental hazards have been focussed on the literature-based description of physical processes, evaluation of risk, cataloguing of cost, and the formulation of mitigation strategies (e.g. Cutler and Hay, 2000; Jones, K. 1980). There are, however, opportunities to develop the critical use of internet sources, of which there is no shortage in this field, and self-learning opportunities where the student can formulate their own response to the risks posed by particular hazards. For example, in the field of flood hazards, there are a number of web sites offering historical information such as the Meteorological Office educational resources site www.met-office.gov.uk/education/historic/flood.html or pictorial records such as www.shrewsburyfloods.co.uk. There are also simulations and role-play exercises such as those developed by Pauline Kneale at the University of Leeds (www.environment-agency.tv/education/studies/case.htm which attempt to root learning in the reality of handling hazards at community level. In this way, it is possible to deliver skills in team-working and problem solving while placing academic learning into the work context.

While this is a very helpful approach to learning, it falls short of providing insights into the realities of decision-making at community level where factors such as personality, local networking, roles within the community, local traditions and the franchising of individuals and groups within the consultation and decision-making processes are vitally important. Decisions are affected by whether key players are assertive or passive and by when, and how, they chose to play their hand. The problems posed by a flood hazard thus involve real people with real personalities and with particular vested interests. Solutions require the reconciling of theoretical solutions, involving river engineering and catchment management, and community priorities, while at the same time reconciling conflicting interests within the community.

If we are to develop meaningful learning environments, it is vital that we provide opportunities for students to step into this 'real' world of decision-making where their personality and their imagination can be used more powerfully to influence outcomes. Otherwise, we are in danger of leaving students with the impression that "formula solutions" to environmental problems can simply be imposed upon local communities. In an attempt to take learning into this more person-centred aspect of decision-making, flood hazard games have been developed in the Department of Environmental Sciences at The University of Stirling which provide a "field of play" and a set of local "players". Students may not alter the field of play nor may they add players, but they are required to use their imagination to give character to the players. The objective is to leave the field of play with a draft plan which will help a local community deal with the problems of coastal and river flooding.

Scene Setting

Two scenarios have been developed which are used on alternate years in an environmental hazards unit offered to both third and fourth year honours students. Although both are based on imaginary locations, the situations are, in effect, compilations of real-world situations and can be found at: www.envsci.stir.ac.uk/floodgame/index.htm. The focal point in both scenarios is a fixed map area, which forms part of Avonside District, within which there is the small town of Avonbury. Outside Avonbury the majority of the map area is rural, with isolated small villages. In Case Study 1, Avonbury is a market town which stands at the confluence of two rivers and experiences river floods. In Case Study 2 Avonbury is a former port and fading seaside resort where the problem is a combination of coastal and river floods. There are case histories and notes for both, together with a recently commissioned report which suggests that climatic change will lead to an increased flood risk. Avonside District Council, the local government authority for the area, is to commission a full flood management plan for the area and is inviting environmental consultants to tender for Stage One of this process. This tendering process forms the basis of the exercise, the objective of which is to produce an outline draft report addressing the following:

- the physical nature of the flood risk and future prospects;
- a review of the damage experienced by previous floods and how well local services coped with the emergencies;
- recommendations for damage limitation in the form of a structured community response to flood events, based on flood warning. This should consider the roles of all professional and voluntary agencies, and should pay particular attention to the need to protect the local economy and transport infrastructure during flood events;
- recommendations for long-term flood protection measures along the coast and the valley of the Avon to reduce the risk within a 25yr planning horizon set by Avonside District Council;
- a summary timescale for the implementation of short-term and long-term flood alleviation measures.

Reports are to be presented verbally to representatives from Avonside District Council on the basis of which a full flood management contract will be awarded. The learning environment tries, therefore, to match some elements of the competitive bidding environment in which consultants operate. The principal deviation from reality, which is recognised as a significant one, is that there is no requirement to fully cost all the proposals, only to "keep costs within perceived reasonable limits".

Playing the Game

Basic Skills and Related Teaching

Students will have completed an environmental techniques module in the previous semester which provides training in group working and in verbal presentation. Related teaching is given in a lecture format, with notes provided on a local information network on the assessment and management of risk in the context of floods.

Duration of the Game

From initial briefing through to the presentation of the final written report, the game can last up to 8 weeks. Student groups organise their own schedule of group meetings.

Procedures

- Students form themselves into self-determined "consultancies". Students not in groups, which is always less than 10% of the class, are assembled into one group by the course co-ordinator.
- At a compulsory opening session, groups are issued with all the briefing notes, rules of the game, and the required format for their presentation. Briefing notes provide information on the physical nature and history

of the flood problem, the physical and socio-economic geography of the area, and the main 'players'.

- Groups choose their own mode of working through the briefing notes. Some select strictly management based approaches, working through the problem together, formulating and revising or rejecting solutions. Others adopt role play as a means of unearthing potential conflicts of interests within the community.
- Groups must decide for themselves what supplementary information they require in order to develop their plans. This is made available at a weekly three-hour, open-door session with the "Avonbury Reference Librarian" (course co-ordinator). Only questions of fact are allowed and no opinion is offered on particular proposals. The requests include, for example, heights of bridges, forest plantation management statistics, and floor areas of available halls for public participation meetings. Not all questions can be answered and the students have to accept that in some cases no data are available (again simulating the "real world"). This "missing evidence" may include, for example, routine discharge characteristics for tributary streams and local climate data. All answers are logged by the reference librarian co-ordinator so the information provided remains consistent.
- In an order determined by the drawing of lots, each group presents their proposals to representatives of Avonside District Council, thinly disguised as departmental colleagues! Time is allowed for detailed questioning which requires groups to justify some of their proposals. Assessment of a group's performance is determined on a range of common criteria which include content, structure (including ability to answer questions), and delivery.
- Each student is then allowed a further 10 days after the presentation in which to produce their own individual flood management report. This will be based on their group activity but will also take into account comments made at the verbal presentation.

Performance and Assessment of the Flood Game

The average registration for the Environmental Hazards module has been between 30 and 40 students per year, which generates 8-9 groups of four or five members for the flood game role-play exercise. As groups self-select their membership, they live with the consequences of their choice and no adjustment is made for a group member who fails to pull their weight. Although there is a risk of a student "hitching a ride" with a promising group, in reality the students tend to self-select like-minded individuals. To date, free-loading has not been a serious problem. The exercise makes up 50% of the assessment for the module which is divided into 10% for the presentation and 40% for the written report.

The vast majority of students invest a considerable amount of effort in developing their proposals for dealing with the flood risks. Groups can be seen, and sometimes heard, in all corners of the University working through the game. As the librarian, the course co-ordinator's contact with groups during this process is limited to the provision of factual information and it is not always easy to gauge the direction in which plans are heading. While many of the questions are clearly leading towards what one would expect as reasonable outcomes, others appear ill-targeted and irrelevant. The temptation to re-direct should be resisted but it may be appropriate to ask why a particular item of information is required.

The final reports have contained an impressive array of well-designed flood hazard information leaflets, posters and information packs which have used a range of available graphics packages. Suitable photographic material has been downloaded from the internet to add to the effectiveness of the presentations.

The atmosphere of competitive tender is maintained throughout the exercise. The Librarian does not divulge any questions asked by other groups. The majority of students carry this through to dressing for the part in the final presentation. Consultancies are given formal names and "councillors" have been provided with their business cards on more than one occasion. Why shouldn't learning be enjoyable?

In the four years in which these exercises have been offered, student feedback has been invariably very positive, rating highly on all criteria. Comments have suggested that the role-play concept is popular, but unfortunately generally under-used, in teaching environmental sciences. The following quotes appeared on recent student module evaluation questionnaire forms:

> *"Flood study was very interesting and required a fair bit of searching – our plans changed several times. Very different to other coursework - we appreciated a taste of the real world"*
>
> *"The Avonbury flood project was a brilliant idea – I gained a lot from it"*

The chance to allow the imagination to drive the learning process rather than adopting strictly programmed learning appears to appeal to most students, although there will always be those who ask that their learning be closely prescribed. If there is a disappointment in using the game, it is the tendency for a growing minority of students to go for imposed engineering solutions in which flowing waters, be these fresh or salt, should be tightly confined within endless concrete walls. A recent well-meaning suggestion in this area has been to offset the visual impact of several kilometres of high concrete wall by the extensive painting of pleasant murals upon them!

Summary

The flood hazard game offers a basic template which can be adapted for application to other hazards taught in the GEES disciplines (e.g. volcanoes, earthquakes etc.). There are opportunities to modify the field of play to match in with other modules within a degree programme. It would be possible for example to lay more emphasis on the technical or engineering aspects of flood management, or on the socio-political aspects of how a community functions when facing a common threat. More emphasis could be placed on costing the proposals if one were delivering teaching in, for example, environmental economics. The complexity of the problem and the number of players can also be changed, allowing it to be used at a range of different credit levels. Above all, it allows students on a science-based degree programme to learn something about the practical application of environmental sciences to problem-solving in a manner which promotes imagination and creativity.

The role-play material described in this paper can be accessed by the students on the local information network in the Department of Environmental Sciences at the University of Stirling. In addition, all of the flood game materials are currently being put onto the environmental sciences website at: www.es.stir.ac.uk for external viewing.

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Optimal use of MS PowerPoint for teaching in the GEES disciplines

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Abstract

Presentation software such as MS PowerPoint is increasingly being used to deliver classroom teaching. A questionnaire survey was conducted in the Department of Environmental and Geographical Sciences at Manchester Metropolitan University to determine staff and students' perspectives on its use. Findings of the survey are summarised here and particular attention is given to considerations of relevance for teaching and learning in the GEES disciplines. The use and pedagogical effects of special PowerPoint features to introduce colour, images, graphics, animation, layering and hypertext links are discussed and recommendations made for their optimum use.

Introduction

Increasingly, traditional face-to-face lectures are being delivered using presentation software such as Microsoft (MS) PowerPoint. There are mixed views about the pedagogical value of presentation software (e.g. Creed, 1997 and Rocklin, 1998) but it is clear from work involving student evaluations that its use can enhance learning (Hunt, 1998 and Lowry, 1999). A questionnaire survey of staff and students in the Department of Environmental and Geographical Sciences at Manchester Metropolitan University was conducted to ascertain their perspectives on the use of MS PowerPoint for lecture delivery. The detailed findings of the survey are discussed at greater length elsewhere (Nicholson, 2002). The aim in this paper is to focus on some of the issues raised in responses that have a particular bearing on teaching and learning in the GEES disciplines and to offer some guidance on the use of MS PowerPoint based on both personal experience and that of colleagues.

The survey was conducted through February and March 2002 in the Department of Environmental and Geographical Sciences at Manchester Metropolitan University, eliciting responses from 20 staff and 77 undergraduate students (36 first year; 27 second year and 14 third year). The survey revealed that MS PowerPoint is used at least occasionally to deliver lectures by around two thirds of staff, and many also use the software to generate overhead transparencies and handouts. Difficulties associated with the use of presentation software largely revolve around lack of familiarity with the technology and provision and availability of projection equipment. Students find the provision of MS PowerPoint-generated handouts particularly useful and lecturers like the way in which presentations given using MS PowerPoint can assist in controlling the speed of both lecture delivery and notetaking by students. Staff and students are agreed that the clarity of structure and content of lectures is improved when MS PowerPoint is used for delivery and there is widespread use and appreciation of colour, images and simple graphics.

There is evidence, however, that many of the specialist features of MS PowerPoint, which can potentially introduce a dynamic component to lectures, are under-exploited. This is a great pity, because imagery, graphics and dynamic elements, such as animation, can be of particular benefit in teaching GEES disciplines.

Colour, images and graphics

More than 70% of lecturers who used MS PowerPoint considered the use of colour, images and graphics to be of particular pedagogical value in teaching. This compared with 84% of students who agreed that the use of colour and images was helpful. There are a number of ways in which the use of colour, images and graphics can enhance learning:

1) The use of colour, graphics and images can liven up 'dry' conceptual topics and stimulate interest. For example, in an otherwise relatively dry lecture on the history of geomorphology, I use scanned or web-copied images of key historical figures - the image of G. K. Gilbert on horseback usually raises a chuckle! It is important that the use of colour and images is relevant and reinforcing, otherwise it can become a distraction as Anderson and Sommer (1997) point out. For the same reason, it is important to keep colour schemes simple and consistent.
2) Images and graphics can help students visualise processes and complex interactions. At its simplest, a topographic map could be alternated with digital photographs of the mapped area (Hunt, 1998). Alternatively, several images can be juxtaposed on the same slide to enable comparisons to be made. This might be valuable, for instance, when attempting to explain soil development, continental drift, long-term coastal erosion or stages of river flooding.
3) Images and graphics can also be used to emphasise linkages between separate elements of a concept to aid comprehension and recollection (Anderson and Sommer, 1997). For example, the 'draw' tool in MS PowerPoint can be used to create a simplified diagram of the hydrological cycle or a flow diagram which demonstrates inputs and outputs in a drainage basin.

There are many sources of images and graphics:

Create your own

Simple graphics can be created using the 'draw' tools in MS Word and MS PowerPoint, or purpose-made software such as CorelDraw can be used to create more advanced graphics.

Imported graphics

Graphics can be imported from other software programmes. In particular, charts can be imported from MS Excel and clip art is available within MS PowerPoint and Word.

The World Wide Web

The web is a massive source of useful images. Advanced search tools in engines such as Google.com and Altavista.com can be used to search for images and it is possible to specify whether your search should include graphics or images, colour or black and white, and file attributes such as type and size. Care must be taken not to contravene copyright legislation, particularly if MS PowerPoint files are subsequently published onto the Internet.

Scanned images

Photographs and diagrams can be scanned in from textbooks and other published sources. Digital photographs of field locations can also be easily incorporated into PowerPoint slides or alternatively, 35mm slides can be scanned in. In the latter case, resolution may be lost and it is worth considering using a separate slide projector if good resolution is necessary.

Image banks

Libraries of images can be purchased very cheaply – for example the Geomorphology CD-ROM recently compiled by Slattery (2002), which contains 870 images of landforms and processes for a purchase price of US$25.

In response to the Manchester questionnaire, one lecturer raised the issue of the time-consuming nature of converting 35mm slides into digital format by scanning. This is a particular issue for teaching in the GEES disciplines, where it is common to make use of a large number of field images. This constitutes a disincentive for some staff to make use of PowerPoint. It is not an easy issue to resolve but there are several ways forward:

- Given the generic nature of the issue across the GEES disciplines, raise awareness at managerial level and press for technical support to undertake mass scanning of slides;

- Attempt to pool departmental resources between academics and enable access to centralised digital slide collections;
- Use a slide projector alongside a data projector (though this requires good co-ordination, appropriate lecture theatre and screen set-ups and availability of all the necessary hardware);
- Bite the bullet and scan away - think of the time you could potentially save by not having to load and unload slide carousels! Think also of the scope you develop for using your digital images in other teaching (e.g. handouts and on-line resources) and publicity materials.

Progressive revelation and animation

Just 24% of lecturers who used MS PowerPoint considered the use of animations and layering to be of particular pedagogical value in teaching. This compared with 73% of students who agreed that the use of animations and layering was helpful. Post-questionnaire discussions with staff indicate that the apparent lack of enthusiasm for animations and layering reflects a lack of familiarity with this more advanced feature of the software, rather than any real belief that it cannot be used to great pedagogical advantage. Certainly, staff with experience of using the layering feature talk enthusiastically about its role in helping to control the speed of both lecture delivery and notetaking, and of the pedagogical value of progressively unwrapping complex concepts.

The 'custom animation' feature of MS PowerPoint enables several 'layers' of a slide to be built up and revealed progressively. The simplest use of this feature is to reveal items progressively in a bulleted list. I had recent personal experience of attempting to achieve the same effect with overhead transparencies using a sheet of paper to uncover bullet points. It was a reminder of how 'busy' one can feel when delivering a 'conventional' lecture compared to the ease of mouse clicking when using MS PowerPoint!

The animation feature can be used to unwrap complicated ideas, equations or graphics in MS Powerpoint. For example, the separate components of an imported Excel chart can be revealed along with a verbal explanation. Thus, the axis labels, several data series and their legends can be revealed step by step. A similar approach can be used to derive complex equations or to build up the annotations on an image. For example, I use layering to reveal annotations, strategically drawn lines and arrows to identify features on SEM micrographs of weathered rock. I use the annotations in conjunction with student volunteers who identify possible weathering features - and thus the software facilitates such interactivity. Progressive revelation not only helps to unravel complex topics and aid student learning but also adds an element of suspense, encouraging student attention (Sammons, 1997).

It is easy to import ready-made animation sequences and video clips (with sound if desired) into MS PowerPoint presentations to enable more sophisticated, dynamic explanation (Johnson, 2002). These can be downloaded from the web, or if resources permit, specially created by in-house media services. Video clips are particularly helpful for explanation of processes which are fundamentally dynamic in nature (Jackson, 1997). Thus, real footage of landslides and weather phenomenon, for example, has the potential to contribute much more to the student learning experience than can be achieved by just words or even static images.

Hypertext links

Only 5% of lecturers who used MS PowerPoint considered the use of hypertext links to be of particular pedagogical value in teaching. This compared with 48% of students who agreed that the use of hypertext links was helpful and 47% who said they had 'no experience' of hypertext links having been used in lectures.

The lack of enthusiasm among staff for the use of hypertext links may, in part, reflect the fact that networked computers are rarely available in small teaching rooms, though it is evident that this feature is also rarely used even when networked facilities are available. Responses to the questionnaire also indicate that around 50% of staff had experienced some form of technological problem in using MS PowerPoint to deliver lectures. In the majority of cases this amounted to minor glitches in setting up the slideshow at the start and had no major ramifications for the remainder of the lecture. However, these experiences probably generate a heightened sense of techno-phobia when it comes to using hypertext links because one is venturing beyond the relative safety of the PC into the World Wide Web! Reassurance is the best way to reduce stress here and this can be achieved best by checking links beforehand. As a matter of course, links should be checked to ensure they are still 'live', but it is also worth checking links immediately prior to the lecture to ensure connections are not down due to server maintenance or just very slow due to heavy traffic. Another strategy is to limit the amount of time you spend in the lecture at any one site – use web links to give students a taste of the material available and give them the web addresses so they can re-visit them during private study time. This means that if there is a problem with one particular site, then the impact is small. (The reader may also consider using the Lotus product Screencam (www.lotus.com.screencam). This enables you to record the accessing of web pages so that you can replay them offline in a presentation, thereby avoiding the risk of the network going down or enabling you to show the links even when not able to go online - Ed).

If suitable hardware and connections are available, hypertext links can be used to draw on external sources of expertise, data, case studies, images, maps and multimedia during a lecture (Rossen et al., 1997). This enables the tutor to capitalise on resources which cannot be downloaded because of copyright or other restrictions. Use of web links also saves time re-creating materials which are already available (effectively re-inventing the wheel). Web resources of particular value to the GEES disciplines include current news media (e.g. video and sound clips of recent natural hazard events), real time data (e.g. weather conditions and satellite imagery) and maps and atlases (e.g. of almost anything!). Information gateways such as the Resource Discovery Network (RDN) have vast sources of web links worth exploring (www.rdn.ac.uk/). (The LTSN-GEES resource database, soon to be launched will also have an array of learning and teaching resources for use in lectures and presentations, as well as links to many other e-resources - see page 26 of this editon - Ed).

Links can be inserted directly into MS PowerPoint slides so there is no need to exit from the slideshow or go to a browser. Hypertext links can also be used *within* a presentation to move around between non-consecutive slides. This is particularly useful for reiterating points and for dealing with students' questions - you can refer back to an earlier slide without having to exit from 'slideshow' mode. It is also possible, if you have the relevant files at hand on disk, to link directly to a slide in another slideshow. I sometimes use this facility to recap topics covered in earlier lectures.

Discussion

So fundamentally, why do some of the features of MS PowerPoint appear to be under-explored? The questionnaire responses revealed several reasons:

Lack of awareness of potential pedagogical (and practical) benefits
It is to be hoped that this article will help increase awareness of the possibilities for using features such as images, animations, layering and hypertext links in teaching. Perhaps more effective would be dissemination of good practice between tutors at departmental level.

Technological difficulties: Software
There is clearly a learning curve involved in exploring the wider features of MS PowerPoint to deliver lectures but it is relatively painless to achieve quite impressive results. Even supposedly advanced features such as animations and layering are really not that difficult to gain expertise in. A good plan is to practise newly found skills in a small-group environment – preferably an informal departmental group or in front of 'more

understanding' third-year students! Peer evaluation of presentations is usually very productive but rarely practised. One of the difficulties is that staff training often focuses on novice users of software, neglecting intermediate users to 'find their own way'. At best this can be frustrating and time-consuming, and at worst, skills may never be developed beyond a basic level. This is an institutional staff-development issue but again, the potential benefits of exchanging ideas and skills between academics at departmental level cannot be overstated.

Technological difficulties: Hardware

Training, practice and hardware provision are the critical words in relation to hardware constraints. Institutions do seem to be slowly increasing provision of projection and computing equipment but networked connections are often overlooked.

Time to develop.....

It is inevitable that developing visual electronic resources at the 'front end', whether it be creating new graphics, collecting useful URLs or tracking down and importing video clips is a time-consuming business. Nevertheless, in addition to the pedagogical value to students, you may save time at a later stage. MS PowerPoint presentations are quick and easy to update and manage.

Whatever features of MS PowerPoint are used to enhance learning, it is vital always to remember that the medium is NOT the message! The style of presentation is important because it influences organisation and structure of delivery but it is the content which is paramount. This seems an obvious point to make but when you have witnessed presentations (usually at conferences, I have to say) that have been overwhelmed with text boxes flying around and whizzing in and out in all directions, and colours..... it's a point to reiterate! It is always worth obtaining student feedback on the impact that the use of presentation software has had on student learning (Lowry, 1997).

Conclusions

GEES disciplines rely heavily on the use of visual information to explain, record and investigate ideas and concepts. Many complex ideas can more easily be presented to students using a variety of multimedia, coupled with MS PowerPoint special features such as graphics, layering, animation, hypertext links and multimedia. The beauty of presentation software such as MS PowerPoint is that all of this multimedia can be 'seamlessly integrated' (Jackson, 1997) using one file and a single set of equipment.

Acknowledgements

Many thanks to those staff and students in the Department of Environmental and Geographical Sciences at Manchester Metropolitan University who completed the questionnaires. Thanks also to colleagues who were willing to discuss with me some of the issues raised.

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A CD-based courseware package for the teaching and consolidating of geological field skills

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Abstract

This article explores a CD-based courseware package for the teaching and consolidating of geological field skills used for the interpretation of folding sequences in deformed rocks, focussing on examples from Anglesey in North Wales. The article briefly considers the advantages and disadvantages of virtual fieldwork and then discusses the rationale, structure, development and production of the CD courseware package.

Introduction

A wealth of information relating to Earth's history, what Holmes (1965) called the "pages of earth history", may be read by geologists from the rocks and minerals of our planet's crust and mantle. The degree of detail which can be read from the rocks is generally underestimated both by non-scientists and, more worryingly, by scientists outside geology. The most powerful interpretation comes from a combination of field-based studies with analytical, computing and remote-sensing techniques based on modern instrumentation and underpinned by the principles of the physical sciences. Field-based studies are therefore absolutely fundamental to the geosciences, as fieldwork supplies raw data for detailed interpretation (e.g. of relative time relations, sedimentary environments, conditions of formation of minerals and ores, etc.) and, on the larger scale, allows the testing of theories proposed as a result of the synthesis of this detailed evidence. Further, these data are potentially invaluable for allowing extrapolation into our planet's future, something which looks ever more important in the context of possible global environmental change. Professional geologists, trained in field skills (Charsley, 1997) amongst others, are required to do this work for society.

An important example of a field technique required by professional geologists is the need to construct relative time-scales. One of the situations where this arises occurs when we study rocks from the roots of ancient mountain belts. These rocks contain data about the deformation, metamorphism, magmatism, fluid-rock interactions, exhumation and other processes which were involved in the mountain building events. A powerful technique for determining the number and sequence of deformation events uses the overprinting relationships of minor structures (folds, cleavage/schistosity, crenulation fabrics, lineations, veins, faults) in the deformed rocks (e.g. Cosgrove, 1980). Once the sequence is determined, it can be used as a structural time-scale (e.g. Johnson, 1962) and all of the other information (depths, temperatures, intrusion, fluid migration and ore-forming events, etc.) can be related to it. Erecting such time-scales, therefore, constitutes an important skill for professional geologists. This is the subject addressed in the CD discussed below.

How do we teach this skill?

The technique is best taught in the field as illustrated by The Derby University field-course which takes place in Anglesey and is part of the structural geology module for second year Geology undergraduates. This fieldtrip is long established and has been running for twenty years. Since the mid 1980s it has been co-ordinated by two of the authors NFCH and JFWS (latterly APW) who have been responsible for developing the teaching materials and approaches which form the basis of the CD package. Some of the teaching is based on our own research (Hudson and Stowell, 1997). The field-course is immediately preceded by lectures (APW) setting the scene and is followed by mapmaking and other workshops (e.g. fractal analysis). The field course has no "look-see" element. It is entirely devoted to the development of interpretation and structural-mapping skills. It has a field-based assessment in which candidates produce a field notebook, from observations on a small group of rock exposures, under examination conditions and in a controlled amount of time.

Field teaching is essential for students intending to be professional geologists (Geological Society, 1996). However, students' understanding can be improved by other delivery methods when used in conjunction with field teaching (Burnett *et al.* 1997). The CD package discussed in this paper aims to enhance the learning experience through improvements to pre-fieldwork preparation and fieldwork follow-up studies. The material addressed in the CD is only a part of the curriculum of field skills taught on the course.

The package will eventually contain three CDs, which will take three years to develop and test. This article will focus on the first CD, "Geological field skills for structural geologists I: interpretation of deformation sequences from minor structures, a virtual field-instruction package based on the rocks of Anglesey, N. Wales". Its contents include: recognising and differentiating bedding and cleavage, folds, axial-plane cleavage, cleavage fans, lineations and crenulation fabrics. It also covers identifying overprinting relationships of minor structures in deformed rocks including folded cleavages and lineations, refolded folds and refolded crenulation fabrics. Planned for the future are "Geological field skills for structural geologists II: interpretation of major structural geometry from minor structures" and "Geological field skills for structural geologists III: use of the stereographic projection".

Advantages and disadvantages of virtual field learning and teaching (VFLT)

While the pros and cons of VFTL have already been discussed elsewhere (e.g. Stainfield et al. 2000), we consider the main advantages as:

1) Improving the efficiency of learning and teaching in the field;
2) Relieving pressure on time during field courses through better preparation;
3) Relieving pressure on resources by reducing the number of preparatory field days;
4) Informing non-geologists about geological techniques and methods.

It was the first of these that attracted us. The specific advantages for teaching and for informal and formal assessment from our point of view are that VFLT:

1) Provides an opportunity to prepare for fieldwork using pictures of actual fieldtrip outcrops;
2) Allows graphics and text to be added to photographs of the structures;
3) Gives the opportunity for formative practice and testing of field (i.e. close up space) skills;
4) Allows computer-based assessment to be built into the package.

The main disadvantage of VFLT is that development time is quite intensive. The need for planning well in advance cannot be over stressed and the time commitment should be balanced against other competing activities (RAE publications, grant applications and other teaching commitments) before beginning such a project. Some dangers, real or perceived (Burnett *et al.* 1997), are that managers might think VFLT replaces field teaching or even replaces staff.

Rationale and structure of the VFLT CD package

A) The preparation section of the CD deals with background information setting the geological scene for the field course and presents a bibliography. This material was originally addressed in a pre-field course lecture. Figure 1a overpage shows a touch sensitive map of Anglesey from this section which provides a summary of the geology of the rock units by clicking on each of them. More detail can be obtained for Holy Island where most of the field locations occur, through a second larger-scale touch sensitive map.

B) Teaching and learning structure of main sections

1) Pre-fieldwork sections are based on key fieldtrip locations and address terminology, identification of particular structures, notation systems and the interpretation of overprinting relationships. Figures 1b and 1c are screen grabs showing an annotated teaching exposure and an example field sketch of that exposure from one of the tutorials. These tutorials build up in difficulty, starting with a location where only one deformation event has occurred and ending with three deformations. They can also be used for revision after the field course.
2) Post-fieldwork sections are based on locations which have not been seen on the fieldtrip. Students can access these via hot spots on maps (Figure 1d) to try out their skills and receive feedback from the VFLT package. Tutorials have text-entry responses (Figure 1e) and label positioning.
3) The pre-assessment section is formative and is based on an Authorware quiz format using the built-in question styles (Figure 1f) which are quick to program. This tests general knowledge of the appropriate techniques and offers feedback.

C) An assessment section of the VFLT package could be accessed by password on the CD but it is more likely that we will deliver this across the web for our own students using our well-tested methods (Mackenzie *et al*., in press - see next edition of PLANET).

Use of passwords

Pre- and post- fieldwork tutorial sections and the quiz are protected by a series of passwords that must be accumulated by completing the sections. The passwords allow access to progressively more complicated material. The final assessment section can only be accessed by password after the quiz has been completed. The passwords will be generated randomly for each student to avoid them becoming student currency. We have considered using quiz questions instead of passwords to control progressive access to tutorials but rejected this because it can deter weaker students.

Developing and producing the package

We have been considering a package of this type for some years. Initial attempts (by JFWS and NFCH) to produce a teaching video in the early 1990s were unsuccessful when we discovered that the required image quality could not be achieved. Recently, DMM has encouraged undergraduates to undertake BSc projects that involve an element of tutorial production using Authorware and in 1999 MS elected to carry out such a project on structures in Anglesey, supervised by DMM and NFCH. The photography, the initial CD design and the primary programming were carried out by MS. The project involved structural geology, photography, tutorial design and programming and resulted in a project report and a CD. Feedback was sought at this stage from other students. The CD proved very illuminating because we had a student's eye view of the learning curve immediately. However, a significant amount of re-ordering, redrawing and reprogramming has been necessary. The following production sequence is based on this experience.

After producing a rationale for the package, as discussed above, the first production step was to carry out individual fieldwork to select the best exposures for demonstrating the structures. It was not possible to do this task whilst simultaneously running the fieldcourse. In the event, MS used many of the fieldtrip locations for the teaching sections and chose new ones for the follow-up section. NFCH strongly recommends next writing material in the form of a storyboard as used in the film industry. Each view required is sketched in sequence and given a frame number. The text is written out to the right of each sketch. The designer can then see the whole flow of the tutorial and the material is easily communicated to third parties, such as programmers. Photographs can then be collected specifically for each frame, preferably on an overcast but bright day when the light is diffuse. It is best to have photographs developed whilst you are still in the field as the failure rate can be high. MS began using digital photography but soon found the quality was inadequate and reverted to a single lense reflex (SLR) camera. Programming is the next step and we recommend Authorware, as it is user friendly and therefore efficient in terms of time. The package can then be tested on students who have already been through the course (third year in this case) to obtain feedback prior to full testing. Adjustments will probably still be required.

We believe that this VFLT package will make a significant contribution to our teaching. The package is also designed to "stand alone" so that it can be used by others. We would be happy to communicate with any potential users and would welcome feedback. It will eventually be available to order through the CIAD web pages at Derby. We also hope that it might bring some understanding of a small part of field geology to non-geologists through the GEES subject centre. Finally, we hope that the approach we advocate in this article will be of interest to others, including non-geologists, who are considering producing VFLT packages.

End Note

The particular contributions of the authors to the project are indicated in the text by their initials: Smith (MS); Hudson (NFCH); Mackenzie (DMM); Watson (APW); and Stowell (JFWS).

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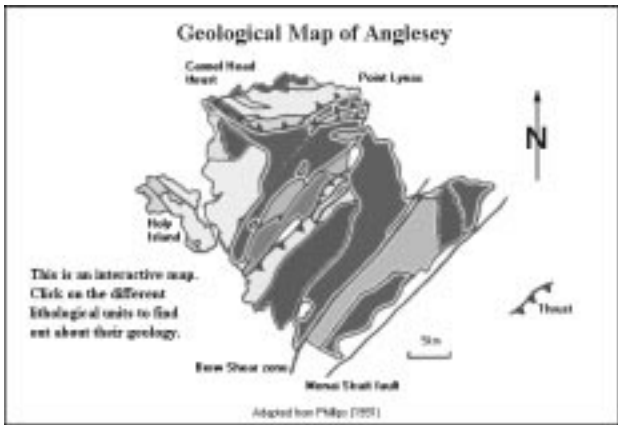

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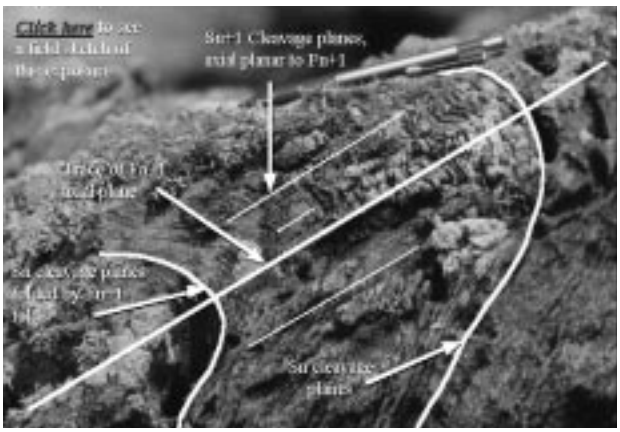

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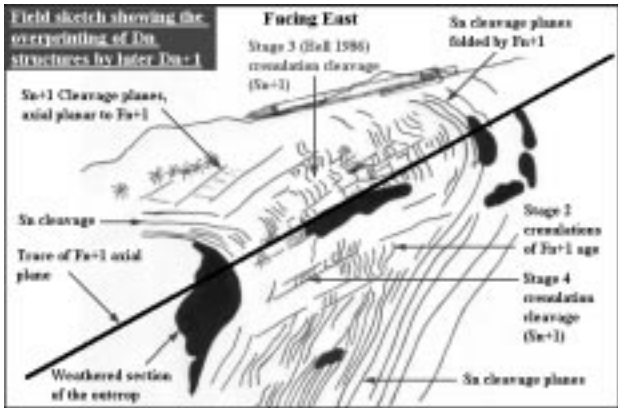

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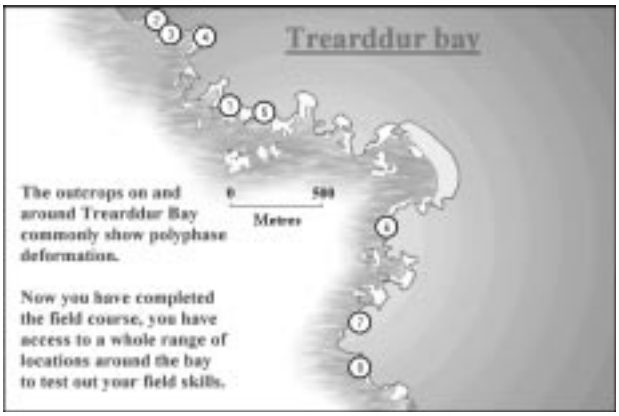

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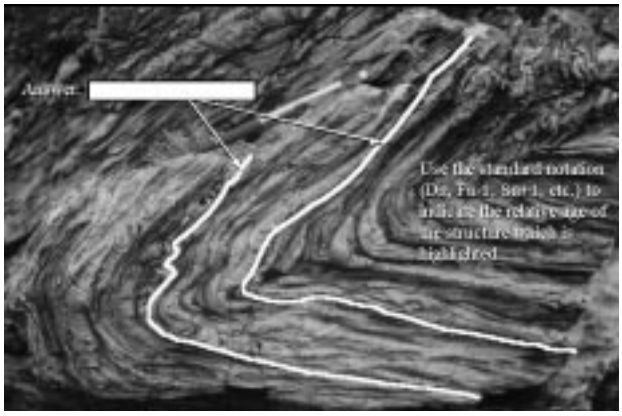

(e)

(f)

Figure 1 Screen grabs from the CD. (a) Touch sensitive map from the introductory section. (b) Annotated exposure and (c) example field sketch, from the pre-field course section showing the overprinting relationships of the structures. (d) Map with hot spots giving access to the exposures for the post-field course section of which (e) is an example. (f) Example question from the pre-assessment quiz.

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Action research study to assess how well students transfer skills of communication into their second year

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(An earlier version of this paper was presented at the 2nd Annual Skills Conference at the University of Hertfordshire in July 2001)

Abstract

We have noticed that students in Geography at the College of St Mark and St John are not easily 'transferring' their communication skills developed in year one into year two. Shepherd (2000) claims that skill transfer is the outcome of a complex set of interactions and successful transfer relates to a range of factors from which he produces an informal model. This research adopts this idea and addresses transfer, not from just one context to another but also, from one year to another. It focused on a cohort of year one Geography students taking a module, which emphasised the importance of skills in general, and communication skills in particular. They were then tracked into their second year. Our overall aim was to determine whether the assumption we had made that skills transfer happens between years is substantiated. A questionnaire was used to collect quantitative and qualitative data based on the following research questions:

- *Which communication skills do students 'perceive' that they have developed in year one?*
- *Have they been able to use communication skills developed in year one in their second year?*
- *Have they developed these skills further?*

The results showed that our students are not finding it easy to transfer their knowledge about communication skills between years but there is some evidence of improvement in skill acquisition; however, we need further research to investigate this. Finally, we return to Shepherd's (2000) informal model to identify the areas where we could make some improvement in the courses.

Background

At the College of St Mark and St John we have noticed that students are not easily 'transferring' the communication skills developed in year one into year two of their undergraduate Geography programme. A growing body of research is investigating why it is difficult to transfer skills from one context to another (e.g. Perkins and Salomon, 1998; Moorkamp et al.1991 and Neath, 1998). Shepherd (2000) argues that student skills transfer is the outcome of a complex set of interactions and that success in transferring skills relates to a range of factors (Figure 1).

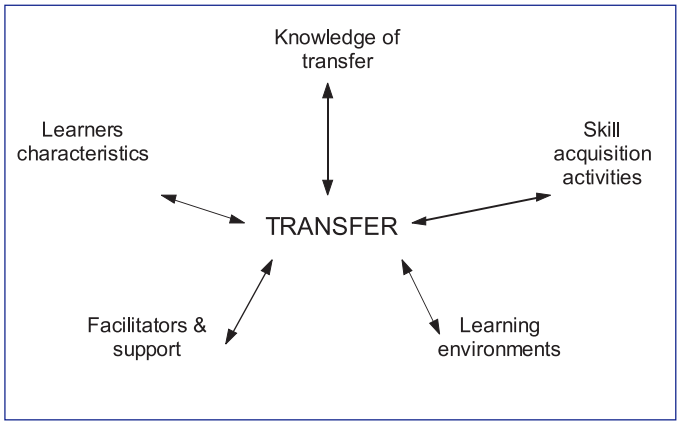

Figure 1: Possible influences on successful skills transfer (Shepherd, 2000 p.45)

It is likely that any problems our students experience in skills transfer will relate to some of these factors. Shepherd (2000) addresses the concept of 'near' and 'far' transfer and claims that there is ample evidence from the world of vocational training that even 'near' transfer (transfer between nearly identical tasks or situations) often fails to occur. This research builds on this idea and addresses transfer, not just from one context to another but also from one year to another.

The research focuses on communication skills in a cohort of undergraduate Geography students. Geographers have a well-established interest in developing key skills into their courses and a good reputation for being adept at applying their skills in different contexts. Kneale (1999) contends that "geography degrees are awash with skills" but that geography students often gain their skills implicitly while becoming geographers. Increasingly, however, students are offered more explicit opportunities to develop the full range of skills defined by the Dearing Report (NCIHE, 1997) and more recently the Geography subject benchmark statement (QAA, 2000) has emphasised the importance of skills in Geography degrees.

Birnie (1999) conducted a survey to identify the skills possessed by geography students entering HE in September 1998. This survey highlighted the wide range of experience we can expect from our incoming students. It showed the predominance of traditional examinations and essay skills and that, in most institutions, nearly a third of students had little or no experience of report writing or presentations.

The students included in our study are all on a modular humanities degree course. As this is a combined honours degree, students will not gain all their skills from their geography modules. They take three geography modules in their first year all of which have an embedded communication skills element. Initially, this study focused on one module in year one, *Contemporary Issues in South West England*, which explicitly emphasises the importance of skills in general and communication skills in particular. This module was planned to increase student awareness of communication skills (Burkill, Corey and Healey, 2000: p40 & Appendix 4:1 p.29). During the introduction to the module all students were introduced to the descriptors for key skills as set out in The Qualifications and Curriculum Authority (QCA) (1999) Key Skills (Communication) at Level Three documentation. (This focuses on the skills one would expect students to possess on entry to HE).

These are:

- taking part in discussions;
- making presentations;
- reading and synthesising information;
- writing documents.

We made a point of providing the students with copies of the Key Skills at Level Three (QCA, 1999) documentation on communication skills and we exemplified how these could be linked with the learning outcomes and assessment requirements for the module (report writing, presenting and listening). They were also shown that the assessment criteria were related to these skills.

In the second year, while the list of skills was not made explicit, students were given further opportunities to develop their communication skills, enabling them to apply them in new situations in the *Geographical Perspectives on Global Issues* and *Explorations in Geography 1 and Explorations in Geography 2* core modules (Figure 2).

Module	Communication Skills Developed:
Communication skills **Contemporary Issues in South West England - Year One Module** • Students were given the QCA (1999) Key Skills at Level 3 documentation Outcomes relating to communications skills: • Taking part in discussions • Presenting research orally **Assessment: all coursework** • Research proposal • Verbal presentation- peer assessed • Written report on research project	**Oral:** Presentations - peer assessed using Hay, (1996) criterion referenced marking sheets. **Written** Project proposal including a study action plan Project report including research methodology and results
Geographical Perspectives on Global Issues -Year Two Module Outcomes relating to communications skills: • Developed skills in working with other students to produce and present work **Assessment:** Coursework: Group practical oral/written report	**Oral:** Discussions Presentations, including visual aids **Written:** Report writing, including diagrams graphs, tables etc. Letter writing
Explorations in Geography I: philosophies, methods and techniques - Year Two Module Outcomes relating to communications skills: • Communicate geographical ideas, principles and theories effectively **Assessment:** Literature review Essay based on a learning journal	**Oral:** Discussions with peers and tutors **Written:** Literature review Learning journal Essay
Explorations in Geography II: practical fieldwork- Year Two Module Outcomes relating to communications skills: • Communicate geographical ideas, principles and theories effectively • Presenting results **Assessment:** Fieldwork preparation Oral presentation of fieldwork results Field report(s)	**Oral:** Discussions with peers and tutors Presentation of fieldwork results **Written:** Field reports

Figure 2: Summary of communication skills incorporated in a Year One module and Year Two core modules

The Study

The overall aim of this action research study was to determine whether the assumption we had made that skills transfer happens between years is substantiated.

Both qualitative and quantitative data were collected. Qualitative data came from module evaluation forms and from a questionnaire, which focuses on perceptions of skill acquisition. Quantitative data also came from this questionnaire based on the following broad research questions:

- Which communication skills do students 'perceive' that they have developed in the first two years of the course?
- Have they been able to use communication skills developed in year one in their second year course?
- Have they developed these skills of communication further?

The questionnaire was distributed to thirty two second year students at the end of year two. After a brief introduction to the purpose of the research, all students agreed to complete the questionnaire. Purposely, there was no explanation of what might constitute a communication skill as their perceptions were important to the study.

The sample (Figures 3 and 4) was dominated by female students, the majority of whom entered with 'A' levels. Over half the sample were mature students (over 21 years of age).

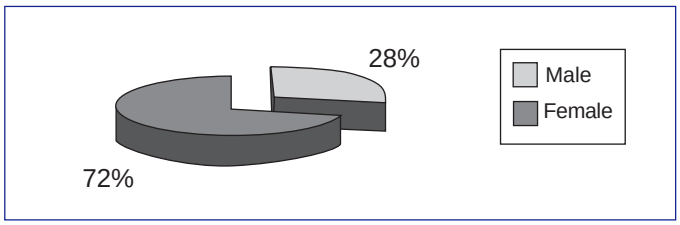

Figure 3: Sample viewed by gender

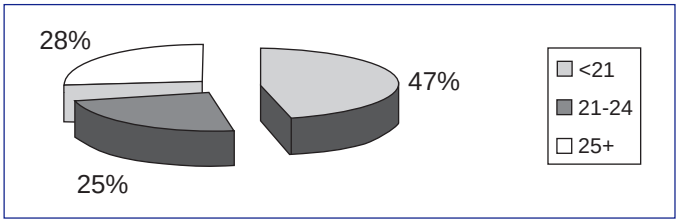

Figure 4: Sample viewed by age groups

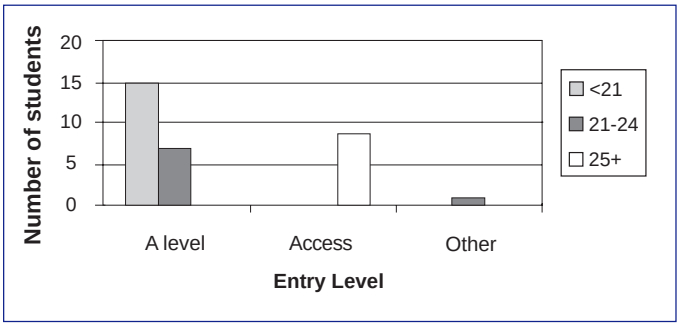

Figure 5: Age group by entry level (raw data)

All of the students over 25 entered via the access route (traditionally these courses provide very solid foundations in key skills); most of the younger group entered via the 'A' level route (Figure 5). They tend to have low 'A' level entry points. Murphy, et al.(1997) suggest that performance at 'A' level strongly influences whether students can meet the thresholds for skills expected on entry to HE (National Council for Vocational Qualifications Level 3).

Baseline Data

The starting point for this research was the evaluation of the *Contemporary Issues in South West England* module at the end of year one, where students clearly felt that they had developed a range of skills (Figure 6).

- Developing research skills in the field;
- Opportunity to improve communication skills;
- Opportunity to improve their personal development;
- Chance to practise research skills;
- Chance to practise presentation skills;
- Chance to practise time management skills;
- Chance to find out about the south-west of England.

Figure 6. The skills acknowledged in students' module evaluation forms at the end of the year one module "*Contemporary Issues in SW England*"

With regard to performance in the year one module, the students did very well in their oral presentations and, even though there were one or two very nervous students, they all met the assessment criteria. In contrast, the presentation of their written work was not as successful and the grades for their written projects were quite disappointing. It must be noted here that the final grades for the module were not known to the students at the time of the module evaluation. If they had been known, then it might be expected that their evaluation of the skills they had gained from the module might not have been quite so positive.

Preliminary Results

Given this list of skills and attributes acquired in the first year (Figure 6), we designed the questionnaire to investigate whether the students had transferred these skills into their second year of study.

The questionnaire asked whether second year students were able to:

- remember which communication skills they had developed in year one and
- transfer and further develop their skills in their second year.

In response to the first question asking which communication skills students used in the first year module, Table 1 shows that presentation skills are high on their list (87.5%), followed by interviewing and questionnaires (43.4%).

Communication skill listed by student	Acknowledged by number of students	(%)
Presentations - oral/formal/ presentation skills	28	(87.5)
Interviews	14	(43.4)
Questionnaires	12	(37.5)
Discussions	5	(15.6)
IT Skills	5	(15.6)
Group / team and individual work	3	(9.4)
Letter writing	3	(9.4)
Making eye contact	2	(6.3)
Report writing	2	(6.3)
Speaking clearly	2	(6.3)
Telephone skills	2	(6.3)
Confidence	2	(6.3)
Giving feedback	1	(3.1)
Presenting data	1	(3.1)
Public speaking	1	(3.1)
Visual aids	1	(3.1)
Written presentations	1	(3.1)
Summarising reading	1	(3.1)

Table 1: Second year student perceptions of communication skills used in first year geography modules in descending order (Figure 2)

94% of year two students described at least one communication skill (usually presentation skills) used in their first year geography modules, and 50% of year two students described 2 or 3 of these skills. With regard to improving their communication skills, 82% said they had improved them in year two. However, only 31% improved more than one skill. For presentations, 37% said it was their first and Table 2 shows this disaggregated by entry level.

	'A' level	Access	other	total
Yes	25%	9%	3%	37%
No	44%	19%	0%	63%

Table 2: Response to "Was the year one presentation your first?"

Student recall of skills

In the questionnaire, the open questions were designed to ensure students had to think about the meaning of the term 'communication skills'. We were attempting to establish whether their 'formal' introduction to these skills in their first year had enhanced their awareness of the skills developed in the second year. We assumed that this would give a measure of awareness. Of the four skills used in the first year only one was consistently referred to by second year students (Table 3). It is worth noting that this skill (presentation) was also the only one that was mentioned by name later in the questionnaire and there is no way of determining whether this overtly influenced the responses.

QCA communication skill	Directly (%)	Indirectly (%)	Not at all (%)
Presentation	28 (87.5)	3 (9.4)	1 (3.1)
Discussion	5 (15.6)	1 (3.1)	26 (81.3)
Reading and synthesising info.	1 (3.1)	0 (0)	31 (96.9)
Writing documents	1 (3.1)	3 (9.4)	28 (87.5)

Table 3: QCA communication skills and the number of year two students mentioning these skills used in their first year

Several second year students included references to skills that are usually described as research skills (questionnaire planning, interviewing) and to C & IT. There was also some evidence of a 'contiguous effect' - students sitting next to each other were clearly influenced by each others' responses (for example three students in a row mentioned letter writing). The overall results suggest a very low awareness of the vocabulary of communication skills and a low overall awareness of any continuity built into the course from year one to year two (apart from presentation skills).

Student perception of improvement and confidence level

As mentioned above, presentation skills were the only ones widely identified and this analysis therefore focuses on this skill. Twenty-one students indicated that they felt that their skills had *improved* since the first year. In some cases they gave examples of contexts in which this had occurred; none referred to improved marks or feedback from tutors. Some additional longitudinal research would be useful to investigate whether perceptions were shared by tutors and students here.

Levels of confidence varied in the first year, with 17 students suggesting that they had low/no confidence in their presentation skills and only five indicating that they were quite or very confident, showing that confidence levels do seem to increase with practice. No students indicated that their confidence had declined (Table 4), although 11 suggested that their confidence had remained the same. However, 6 students are still at the 'not confident' stage. For 37% of these students, their year one presentation was their first (Table 2) tending to support Birnie's (1999) study of entry-level experience.

Confidence level in year two	Improved (%)	Remained the same (%)	No improvement (%)
No. of students	21 (65.6)	11 (34.4)	0 (0)

Table 4: Confidence in giving presentations in year two

It is interesting to consider whether awareness levels, improvement and confidence are in any way related. By grouping students roughly into cohorts showing combined levels of awareness and increased confidence we have been able to suggest that there are some distinct clusters. Generally, students who could articulate the skills they had developed 13 students showed a clear knowledge of terminology and most of these also increased in confidence. In contrast, there is a cluster of 10 students who seem barely able to articulate the skills they have developed and these all lacked confidence and do not seem to have been improving their confidence.

Conclusions

The study seems to show that our students are not finding it easy to transfer their knowledge about communication skills between years. However, this does not mean that the skills themselves are not improving. There is some evidence that they are, but we need to do some further research to investigate this.

In order to explain our findings, we returned to Shepherd's (2000) informal model (Figure 1). We suspect that we are providing a range of appropriate learning activities, sound tutorial support and an appropriate learning environment. However, all of these need tightening and reinforcing from year to year if our students are to clearly benefit from the strategies we have selected.

It is clear that we need to think more carefully about the learning approaches favoured by individual students and the research that is informing our knowledge of skills transfer.

Some recent innovations in our second year course do go some way to addressing these areas (e.g. through the introduction of more focused groupwork and learning journals). One way forward may be through the introduction of Personal Development Planning, which may help students to articulate their skill development across and between modules and years (see article by Duncan and Weatherston in the PLANET special edition on embedding careers education in the GEES disciplines, June 2001 - Ed).

This study, like most small-scale action research has raised as many questions as it has answered (Cohen and Manion, 1980). Our intention is to share this research with the students as we continue to monitor them in year three.

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Fieldwork Education and Technology: A GEES Perspective

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Abstract

This report summarises an LTSN-GEES funded and supported "Fieldwork Education and Technology" workshop held at the University of Leicester in May 2002. Reviews of the presentations outline a variety of ways that C&IT is currently used in fieldcourses. The WWW features in 11 of the 12 presentations. Salient points from expert group discussions at the event provide insights into the driving forces, hindrances and future directions of C&IT with fieldcourses. The article will hopefully be of interest to all those involved in fieldwork teaching in the GEES disciplines.

Introduction

LTSN-GEES is undertaking a national project on "Enhancing Fieldwork Quality through Pedagogic Research" (see: http://www.gees.ac.uk/pedresfw/pedresfw.htm). As part of this, the "Fieldwork, Education and Technology (FEeT)" sub-group is investigating the relationship between C&IT and fieldwork as used in the undergraduate curriculum in geography, earth and environmental science (GEES).

Prior to the May workshop discussed below, as a basic data gathering exercise, all GEES departments in Higher Education institutions were surveyed on their usage of C&IT in fieldwork, using LTSN-GEES departmental representatives. The objective of the FEeT Workshop in May therefore was to provide a forum at which participants could display, exchange and develop ideas on the pedagogical use of C&IT with fieldwork. A series of 10-minute presentations demonstrated the use of technology with fieldwork and discussed some of the educational implications. Participants in the workshop then convened as an expert group to discuss key pedagogical issues relating to C&IT and fieldwork. The main purpose of this short paper is intended to disseminate examples of good practice from the presentations at the workshop.

Workshop abstracts and reviews

The 12 presentations at the May workshop detailed below, clearly reflect the fact that technological developments in computer hardware, software and networks combined with increasing pressures on staff and students, have led to the rise of the use of C&IT within learning and teaching environments in general. Use of IT to deliver course notes and computer-aided learning packages has proliferated considerably over the last few years. Computer-based assessment is now a regular mode of examination in many institutions. Computer technology is able to provide more than just passive teaching and its strengths lie in the ability of students to benefit from interactive and dynamic virtual environments. The workshop presentations demonstrated, in particular, the use of multimedia and the WWW as a successful teaching, learning and assessment tool in association with fieldcourses.

Abstracts of the presentations, together with copies of the accompanying PowerPoint slides for almost all of the papers, can be found at: http://www.gees.ac.uk/pedresfw/pedresfw.htm#C&IT .

Here, we simply summarise the various C&IT uses in fieldwork that these presentations exemplify, with the WWW featuring in 11 of the 12. Each of the papers are now briefly discussed in turn.

So-called 'virtual fieldcourses' (VFCs) appeared in several presentations. **Cromarty in the classroom - a virtual fieldcourse**, by Steve Fletcher of Southampton Institute (steve.fletcher@solent.ac.uk) provided an example of a fieldwork project developed around a virtual learning environment, *Learnwise*. This software enabled the development of a resource-base about Cromarty and coastal management to be used together with collaborative tools in a problem-based fieldwork exercise. Students are required to adopt an enquiry-based and exploratory methodology, as in the 'real' world, and the approach demonstrated the importance of ensuring that the use of C&IT in fieldwork is aligned with the desired outcome of the teaching process.

Barbara Rumsby at the University of Hull (b.t.rumsby@hull.ac.uk) presented a paper co-authored with Richard Middleton, **C&IT Support Package for an Undergraduate Field Study Module on Tenerife** (http://www.hull.ac.uk/geogmods). This reported on the use of a website both pre- and post-fieldwork in Tenerife. The website consists of a comprehensive information base and was unique amongst the projects described on the day, in that formative assessment related to the fieldwork was also incorporated into the site.

Kate Moore (mek@leicester.ac.uk) described some of the visualisation software developed in the University of Leicester's **Virtual Field Course Project** (http://www.geog.le.ac.uk/vfc). This can incorporate maps, spatially referenced multimedia and panoramic imagery to enhance student learning. The software is designed to be generic and a variety of projects have been successfully designed and run using the VFC software as a focus for project preparation, data collection, analysis and presentation.

Another virtual fieldcourse package, illustrating the higher-order user interfaces now available, was demonstrated by Damion Young of the Open University (m.d.b.young@open.ac.uk). **DVD-based virtual field trips for Environmental Science** is a highly interactive package, which guides students through a series of learning experiences whilst visualising both the fieldwork site and the process of measurement.

A virtual field trip based on the Teign Valley region of Devon provides a training module for working in the field and subsequent analytical procedures. As training software and as an introduction to the region it scores highly. However, the software appears dedicated to the one region and is sold as a commercial package that is not customisable to any other area. Nevertheless, some of the Computer Assisted Learning

elements are refreshingly different for the average student user to maintain interest and involvement in the activity.

A second element of the Open University package, focussed on Sevilleta in New Mexico, is the basis for a tutor-marked assessment, and student assessment is indeed another common use of the WWW in enhancing the educational value of fieldcourses. For example, **Development of Web-based Field Classes for the Teaching of Earth Science in the North of Ireland** by Alastair Ruffell (a.ruffell@qub.ac.uk) and Brian Whalley (Queen's University, Belfast) (b.whalley@qub.ac.uk), showed the use of Web-based materials by staff for development of a resource base and by students for assessment. In this case, the emphasis was the use students made of digital photography and the web for presentation of their fieldwork. The annotation of digital images is replacing the use of field sketching, which perhaps indicated that observation is performed less on site and more in the classroom during the analysis phase of the fieldwork. Examples of 'flash' movies, created by a former student, were shown and possibly indicate the next step in uptake of computer presentations as students become more familiar with the technology.

In **Integrating C & IT and Fieldwork: Using Web Sites for Assessment,** Chris Ribchester (c.ribchester@chester.ac.uk) and Derek France (d.france@chester.ac.uk) of Chester College of Higher Education, again reported the dual use of the web for delivery of course information and for student feedback and assessment. The educational impact is clearly one of developing skills and generating a sense of achievement in students from the use of C&IT. The key innovation was to use the production of a website as the means to assess work undertaken during a field visit. However, one noteworthy pitfall was a tendency of some students to trivialise the presentation of scientific reports, sacrificing content to web design.

Clare Milsom of Liverpool John Moores University (c.milsom@livjm.ac.uk) presented **Maximising the student field experience: virtual fieldwork as a formative assessment tool,** co-authored with Chris Settle, Mike Carr and Keith Crompton. Virtual fieldtrips have been developed in the School of Biological and Earth Sciences to help narrow the resource gap in fieldwork budgets and prepare students for field-related assessments. The use of C&IT in this example was driven by the need to relieve students of the pressure, felt by many of them, to get field-based assessment 'right-first-time'. A website simulates field assessment in order that students are prepared better for the field. The use of panoramic imagery provides an interactive view of reality, students being able to zoom in on features of interest in the scene. In addition to the primary aim of maximising the effectiveness of time spent in the field by pre-training, a second objective was the provision of a replacement option for students with special needs.

Web-based support for field mapping in the earth sciences featured in two presentations. **In Web-based support for fieldwork - Mapping in NW Scotland**, Rob Butler (r.w.h.butler@earth.leeds.ac.uk), of the University of Leeds, reported an open-access Internet resource created to support a two-week residential field class. The challenges were to provide interactive support materials to take pressure off staff on the field class (allowing them to concentrate on other forms of student feedback), to provide revision material to allow students to prepare better for the field class and to provide context for the field activities themselves. The structured resource that resulted includes materials available on-site and progressively back in the University (http://earth.leeds.ac.uk/assynt) http://earth.leeds.ac.uk/assynttrip).

In the second presentation concerning support for field mapping, Ken McCaffrey (k.j.w.mccaffrey@durham.ac.uk) described his new project **Introduction of 3-D computer visualization models in an Earth Science undergraduate Mapping training class** at the University of Durham. Again focussing on the Assynt region, this project will use the new digital mapping technologies (combining GPS, Laser RangerTM, GIS data management systems and visualisation software) to construct a 3-D computer model to be introduced in an undergraduate field mapping class. During the field class, the model will be progressively revealed to students in step with their own mapping of the area.

'Visualisation' and the use of Geographical Information Science (GIS) also came together in **Integrating GIS and fieldwork for geoscience undergraduates** by Anne-Marie Nuttall (a.nuttall@livjm.ac.uk) of Liverpool John Moore's University. This project demonstrated a well-integrated approach to using GIS during all phases of fieldwork: pre, during and post. (Data sets for satellite images and elevation maps of many parts of Britain are freely available through (http://www.landmap.ac.uk). The integration of GIS into fieldwork provides both a tool for familiarisation and appreciation of fieldwork observations and also a preliminary introduction to GIS software and concepts.

The way students use websites was the subject of a presentation **Website analysis and redesign using HCI techniques** by Ian Stimpson (i.g.stimpson@esci.keele.ac.uk) of Keele University. He outlined the analysis and redesign of an academic website using human-computer interaction (HCI) techniques. Data mining of access logs, identifying user habits, designing and videoing tasks for test users, and analysing by expert users are all employed in the design and redesign processes. The project was presented as moving to a solution for technical problems. The methodology could, of course, be applied in pedagogical research on the use of websites.

The remaining report was also based on a pedagogical research project. Bob Moore (rmoore@glos.ac.uk) of the University of Gloucestershire, presented **Video in site and social survey**. The objective of the project is for students to develop their skills in observing places over a period of time, the only example in the set of presentations of the substantial use of digital video footage to gain a sense of place. This is to be achieved by way of a more professional and technical competence in the filming, editing, interaction and analysis of digital video images, initially in the field of landscape architecture. The presentation was a work-in-progress evaluation and covered current video usage, the ease of digital video production, and a demonstration of the application of the technology. Particularly interesting was the suggestion that by encouraging students to make a film about a place, they have to consider in greater depth what goes on there and the meanings for the users of that space. An intended result of this approach was that students spent more time in the field than would otherwise have been the case!

Expert Group Summary

An expert group discussion led by Alan Jenkins (Oxford Brookes University) aimed to provide a distillation of thoughts about the major impacts of C&IT on fieldwork teaching at the end of the May workshop. A series of questions were posed and answered individually in an initial round. Small groups then formed to discuss the ideas generated about the key impacts. The following day the group findings were further discussed at a meeting of the FEeT team members, acting as a tighter focus group to refine the summary points from the workshop.

What are the central trends in the use of C&IT in fieldwork?

There is an expanding use of C&IT with fieldwork. The web features most prominently. The employment of web-based resources as a precursor to fieldwork features strongly, but the web is also used in other areas such as assessment and student presentations. The resources are becoming increasingly interactive rather than passive information providers. A wider range of multimedia and virtual environments are also being used, together with GIS and other visualization tools.

Data is used in the field to a greater extent. Integration of primary (e.g. student collected) and secondary data (e.g. satellite imagery or geological maps) is done at the fieldwork base. Field mapping projects are good examples of this. In the field, the use of mobile phones and GPS can be clearly identified.

What central factors are driving the integration of C&IT in fieldwork?

This was answered by the response "because we can!" The availability of the technology is a key motivating force. Cheaper hardware, software and data are now readily available and there is a desire to use them to effect with a variety of educational aims, such as improving training in the

field. Care has to be taken that the driving force is not totally technology led, but that the use of IT has definite pedagogic benefits. This technology drive can be linked with a wish to make more effective use of student time, particularly time spent in the field. Motivating staff to gain skills training and to ensure that IT skills are integrated into fieldwork training for the students is another perceived need. Accessibility, on several levels, is a key factor. Legislation requiring provision of opportunities for people with special needs, and accessibility to dangerous, inaccessible or distant sites were all seen as factors supporting the use of IT with fieldwork.

Readers might like to refer to the special edition of PLANET on special education needs and disabilities (PLANET, Special Edition Three, April 2002). Available free from info@gees.ac.uk

What central factors are hindering the integration of C&IT in fieldwork?

All of the positive factors in support of C&IT could also be viewed in a different light as hindrances. Costs of hardware and data for use in the field can still be prohibitive to some institutions and use of cutting-edge technologies to many more. Transport of computer hardware to fieldwork areas may also be a problem. It was interesting to note that no institutions either represented at the meeting or in the survey were yet using palmtop computers. Additional time is needed for staff development and skills uptake to implement the use of new technologies. Time is also needed particularly in the initial phase, to develop learning and teaching materials for use on-line. The combined cost issues and lack of relevant skills may cause a widening breach between institutions with funds and skills and those without them.

First reflections on the general trend of the expert discussion suggest that many of the responses were still very technology biased. The technology is leading the use of C&IT rather than new pedagogic thoughts generating novel ways of teaching fieldwork.

What are the central educational impacts for how staff teach and students learn from the use of C&IT in fieldwork?

The educational impacts of C&IT for staff and students seemed less easy to identify than the ergonomic impacts. The skills gap and skills development by staff were mentioned. The expectation of gains in time is illusory in the initial phases, as it takes considerable time to develop skills and resources. However, the goals and learning outcomes of fieldwork have not changed significantly; what have changed are the skills to be developed, for example, using GIS/GPS instead of maps and compass. Students are more aware of the fieldwork topic or region through more structured preliminary training. As C&IT becomes more embedded in the curriculum, the use of the technology becomes more transparent (that is, it becomes just another tool). However, there is a danger that fieldcourse venues will become 'fossilised' over time, as teaching material becomes dated. There is more emphasis, however, on self-learning and problem-based learning than formal lectures and 'Cook's Tours'. Students therefore become more responsible for their own learning.

What is a realistic expectation over the next 5 years for the use of C&IT in fieldwork?

C&IT will become further embedded in the curriculum in general. There will be increasing resources available via the web. Ideally, technology will be more fully integrated in the whole experience of fieldwork and at all stages: pre-, during and post-fieldwork. If implemented well, C&IT can generate a greater feeling of engagement with, and understanding of, the topic or region.

However, major changes over the next five-year period are dependent on a combination of lowering the cost of technology and increased funding. Unless this happens, the use of C&IT may become institutionally divisive: richer institutions will benefit from more and better technology.

Possibly a major breakthrough may come if students are required to purchase their own hardware, particularly in the form of palmtop computers or mobile phones with effective internet access. At this point, true integration of IT with fieldwork becomes possible.

Following the FEeT workshop in May, and a subsequent one-day data analysis training workshop for the project team at Coventry University, the survey responses, expert-group summaries and a focus-group transcription are undergoing further analysis. A future publication is planned for a peer-reviewed scholarly journal and a shorter final paper will also be submitted to PLANET.

Any PLANET readers interested in disseminating their own use of C&IT in fieldcourses can submit their website to be linked to the online C&IT-in-fieldwork resource base (http://www.gees.ac.uk/pedresfw/pedresfw.htm#C&IT), by contacting the Subject Centre (info@gees.ac.uk).

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HAVE YOU SEEN THIS?

Disability Update
SENDA 2002: Are you Ready?

With September 2002 fast approaching, many lecturers, departments and institutions will now (hopefully!) be working hard to implement their accessibility policy. Most GEES colleagues will be aware that September is the month in which the Special Educational Needs and Disabilities Act (SENDA) (2001) comes into effect with regard to learning and teaching (see for example the article by Skill, PLANET Special Edition 3, April 2002 - copies available from info@gees.ac.uk).

The summer of 2002 will therefore be one of much activity in all GEES disciplines in preparation for September. There are many materials available to assist in the preparation for SENDA, including a book recently published jointly by the LTSN Generic Centre, TechDis and the University of Wales Institute Cardiff, entitled "**Accessible Curricula: Good Practice For All**". This book is a great reference guide for making each aspect of teaching (lectures, laboratory work, field-trips, assessments etc.) as accessible as possible. It can be downloaded free from the TechDis website (www.techdis.ac.uk/pdf/curricula.pdf) and copies have been sent to every institution's Disability Office, Staff Development Office, and Pro-VC for Learning and Teaching. Further hard copies are available from UWIC Press (details can be found at the end of the above pdf file).

To undertake a more thorough review of your teaching materials, the Scottish Higher Education Funding Council Teachability project is an excellent guide through what is a thought-provoking procedure (see article by Simpson, A., PLANET Special Edition 3, April 2002). It can be a relief to a lecturer to discover that disabled students do not necessarily have to receive an identical experience to non-disabled students in absolutely every instance. In certain cases, once you have undertaken the Teachability review and determined what is 'core' to your module or course, it may transpire that there are several alternative experiences and pathways students can take to achieve the core course objectives and develop the required skills and knowledge.

If you have questions regarding technology and disabilities, then please contact TechDis (details below).

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