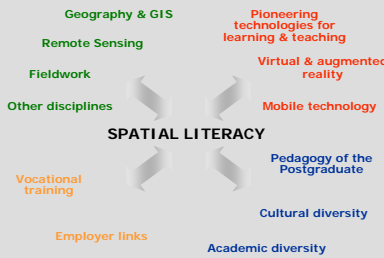


Mobile Technology: Elaborate Toy or Effective Tool? Experiences within Geographical Information Science

Introduction

Historically, learning GIS has been a lab based activity. From the perspective of those closely involved with GIScience, the opportunities for using GIS technologies to enhance fieldwork are many, including contemporaneous digital data entry, adaptive mapping, reflection on sampling or, in conjunction with data loggers, to provide spatially robust readings of environmental variables. In contrast, we note a considerable degree of circumspection on the part of geographical "experts" towards this approach who suggest that the use of digital technologies in the field is merely to engage superficially with "toys". With this dichotomy in mind, it is interesting to reflect on practitioner perspectives within the field teaching literature and our own experiences seeking to implement our integrated field-technology vision.



Project overview

This research sits within the framework of pedagogic strategies promoting spatial literacy in teaching. The development of spatial literacy is important in assisting in the transfer of spatial thinking and Geographical Information Science (GIS) to field disciplines. Recently, students have been equipped in the use of mobile GIS technologies such as GPS enabled PDAs and tablets plus a variety of digital environmental sensors. These skills have been embedded via a series of practical exercises across a range of modules and levels; further to this familiarisation phase, the technologies have been used in support of other geographical applications in the context of independent or semi-independent fieldwork. We look at the benefits and implications of these curriculum changes from the perspectives of technically focused teaching staff, traditionalists and the students who have been involved in these developments.

Technology



- GPS enabled PDAs
- Rugged tablet PCs
- Handheld GPS
- iPods with podcast reference library
- Environmental sensors
- Dataloggers
- Augmented reality headsets
- Motion detectors e.g. wii handsets



Progress so far...

Yr 1	Exeter fieldcourse	Basic GPS tracklogs & tablet for field data entry	
Yr 2	Aylestone Meadows Spanish fieldcourse New York	Basic mobile technology familiarisation (PDAs, tablets, sensors), wayfinding & editing using Arcpad Tracklogs and Tablet GPS GPS Photolinking & Google Earth	
Yr 3	California, local sites & dissertation work	Further mobile technology functions: geotagging, wayfinding, creating points and polygons etc.	
MSc	Bradgate Park & local sites	All of the above + 3D Panorama Virtual reality	

Practitioners' views

There is a current discourse that suggests practitioners are using technology in the field because it is available to them, rather than embedding new technologies to improve teaching strategies.

"use of C&IT is driven by technological developments, rather than new pedagogic thoughts generating novel ways of teaching fieldwork"
Fletcher et al (2003)

The reality is that within recent literature, it is possible to find both approaches that are primarily teaching-led and those that are technology-led. In the case of mobile GIS, the growing economic profile of location based services and GPS supplies a strong curriculum case for its inclusion in fieldwork relating both to active learning and employability. The question is how to show its applied relevance in the context of other modules in such way that mobile technology facilitates and enhance student learning in both GIS and other field modules (e.g. biogeography, geomorphology). Technology should not drive non-GIS teaching; rather, the teaching goals should dictate the appropriateness of particular technologies in different settings.

In the course of work integrating GIS across the broader Geography to date, we identify two practitioners, the "techie" and the "traditionalist" practitioner. In general, the teachers' voices are considerably more bipolar in comparison with the reflections of the students themselves.

The traditionalists



- Like their traditional teaching methods: Reluctant to invest time to learn new technologies.
- Different levels of interaction, but most will only use basic functionality with which they are already familiar e.g. Excel for data entry on a tablet.
- May adversely affect the students motivation to learn with new technologies.

The techies



- Pedagogically driven, promoting the use of mobile technology to increase spatial literacy.
- Showing potential relevance of GIS to topics across the curriculum & other subjects.
- Acknowledge that there is a bigger up front investment but benefits in the long-term.

The students' voices



"Great learning experience. I have always taken pleasure in developing my skills with IT technologies and find it straightforward to understand the processes occurring to manipulate the PDA's, Tablet's and their software".

"By the end of this session, I was a lot more confident about using mobile GIS technologies in the field, having also gained a useful insight on how they might be used in a cartographic context".

"I do not feel it is the case of 'one or the other' with paper and digital field recording methods, I think both have their own case and can be reasonably exploited towards the aim of an investigation."

Reflections

Through a number of student focus groups, reflective statements and general observations, we have evaluated the pedagogic benefits and staff/student attitudes towards the use of mobile GIS technologies in different geographical contexts. The main findings are as follows:

- It is important that the complexity of the technology does not affect the focus of the task. Adequate training and familiarisation classes are essential; there is a considerable scaling up of effort required to move from individual to class use of mobile technologies.
- Technical problems adversely affected the students' opinion of the mobile technology. However, evidence suggests that as staff confidence and experience increases, this has a positive effect on student attitude.
- Students got more out of the equipment when using the more complex functions rather than using the equipment as a 'substitution' for simple field methods.

Training



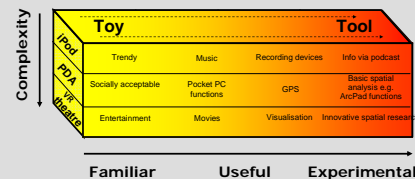
Application



Innovation



- Positive staff and student attitudes were developed only when they were shown the academic 'usefulness' of the fun & familiar. The 'tool' and its purpose were the most significant factors in its acceptance into the curriculum. The diagram below demonstrates how some of these perceived 'toys' are, in fact, useful educational tools.



In order for the pedagogic benefits of mobile GIS technologies to be assessed and embedded across the curriculum, 'exemplar' practices that have been thoroughly evaluated are needed. This is required to build confidence in the tools, by teachers and students alike. Further, by embedding the use of tools at the start of the students career, they are more likely to become established as the 'norm'.

References

Fletcher, S., France, D., Moore, K. and Robinson, G. (2003) Technology before Pedagogy? A GEES C&IT perspective. *Planet Special Edition 5*, p52-55.