Incorporating IT and Multi-Media Activity Into Field-Based Undergraduate Research: Geography at Staffordshire University

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Abstract

The use of both specialist and generic computing software is well embedded into teaching curricula. Over the last decade geographers have started to use mobile digital media devices (MDMD) to deliver teaching, especially field work, in new and innovative ways. Delivering teaching materials through MDM has created a number of problems. Geography lecturers at Staffordshire University have used MDMD not as tools to deliver learning and teaching materials, but as tools for the students to use in data gathering. This approach has been embedded throughout the curriculum and a preliminary evaluation of the effectiveness of this project has been undertaken. Initial findings are that students are generally receptive to using MDMD, but surprisingly the more subject specific tools are less favoured. The paper concluded that more research needs to be done, but that in a rapidly changing world of MDMD it is very difficult to keep up with the pace of change.

Background

Learning activities within Geography at Staffordshire University have utilised traditional generic computing and information technology (C & IT) learning tools such as word-processing and spreadsheets as well as more specific geographical computer applications such as Adobe Freehand for cartography and the geographical information systems package ArcGIS. In a fast-changing world, podcasting, global positioning systems (GPS) tools and C & IT user platforms such as YouTube are now commonplace, and students familiar with the use of such technologies and tools (Winterbottom, 2007). Studies have demonstrated that students are willing to engage in learning processes that incorporate mobile technologies (Knight, 2006; France and Wheeler, 2007). Thus it is possible to deliver some traditional teaching (e.g. lectures) in a format that students can access via their personal IT equipment, including play stations, lap-tops and phones (Newman and Jones 2008).

The opportunity to use mobile digital media devices (MDMD) such as mp3 players, phones, GPS receivers and video cameras is expanding at a seemingly ever rapid rate. Incorporating IT technologies into field work is a

ISSN: 1758-2199

relatively new development that has been shown to have positive benefits (Qui and Hubble, 2002; Maskell *et al* 2007.) yet revealed drawbacks. Using MDMD it has been shown, for example, that difficult threshold concepts can be delivered successfully using 3D mapping technology in the field, (McCaffery *et al.* 2003; Maskell *et al.,* 2007). Other positive benefits include efficiency of delivery of material, especially illustrative material (Newman and Jones, 2008) and the empowerment and engagement of students within the learning process (JISC, 2005, Newman and Jones, 2008). Therefore the potential usefulness of MDMD can be seen across a broader range of academic study than just geography as the potential benefits include the release from teaching time and space constraints (for both students and staff), the development of emerging transferable skills and the fact that the use of MDMD lends itself to problem based learning (PBL) (Fletcher *et al.,* 2003).

Problems can be divided into two main categories: pedagogic difficulties and problems of practical implementation. The identified pedagogic problems include:

- a perception of distance between educators and students fostered by remote delivery of teaching materials (the loss of personal contact) (Knight, 2006, Winterbottom 2007, Newman and Jones, 2008);
- the need to identify training for both staff and students to enable best use of the technology, such skills acquisition being driven by the use of technology and not necessarily related to award learning outcomes (Fletcher *et al*, 2003);
- learning is perceived as extending into the personal time and space of the learner, and this can lead to resentment.

The practical difficulties that have been identified range from the very simple issues of battery life and whether non-ruggedised equipment can practically function under all weather conditions (Stott, 2007) to the need for specific training to enable equipment to be used (Fletcher *et al*, 2003) and the feeling of conspicuous vulnerability that the use of sometimes expensive and certainly desirable hardware can engender amongst users in an off-campus urban setting (Newman and Jones, 2008).

A specific ‘problem’ associated with the use of MDMD such as a personal digital assistant (PDA) to deliver teaching materials that has been identified by Newman and Jones (2008) is that in contrast to MDMD, paper handouts facilitated annotation and note-taking more easily than MDMD. In other words, the old tools are possibly still the best! It should also be noted that annotation of diagrams and photos is possible when using a PDA and programmes such as ArcGIS. What this problem highlights is that many of the uses of MDMD and other newer technology ‘e-gadgets’ (Newman and Jones, 2008) is to deliver teaching materials direct to a student, rather than students using the tools as devices to gather information for themselves. Many case studies have been reported within the literature (e.g. Fletcher *et al*, 2003, JISC, 2005) that illustrate examples of directed learning through using ‘e-gadgets’, but far fewer examples illustrate how students use new technology as tools to gather

ISSN: 1758-2199

data. In a survey, Maskell *et al.* (2007) identified strong intentions of Geography, Environment and Earth Science lecturers to incorporate newer technologies such as digital video into field work in the future. Perusing literature concerning using MDMD in teaching (aka '*learning with e-gadgets*') reveals that a major problem is that with such rapid changes in technology, lecturers may be tempted to utilise technology without having the time to pause, reflect and evaluate the effectiveness of using these technologies before they become out-dated.

Geography Fieldwork and MDMD at Staffordshire University

Over the past few years the geography department has been determined to put enquiry-based learning at the heart of geography awards. Key to this objective has been the intent to instil the idea of learning through enquiry, which has been predominantly field-based (e.g Harris and Tweed, 2010, Tweed and Boast, *in press*). Field work has been incorporated both within modules as well as delivered stand-alone field work modules. This paper adds to previous research, by looking at the impact of both dedicated GPS tools and non-specific tools such as digital video cameras and mp3 recorders.

The on-going project aims are:

1. To complete a pathway of student development in enquiry-based learning within geography undergraduate awards
2. To pilot new technologies in a student-centred enquiry-based learning environment
3. To build upon previous experience of using new technologies reported in the literature.
4. To evaluate student reaction to the teaching and assessment modes for the field-based component of the module
5. To monitor impact of the teaching during later years of study.
6. To evaluate the staff and student experience of using new technologies in field-based projects.

The Tools

The use of certain MDMD such as PDAs in field has been demonstrated to be useful for sharing data (Stott, 2007), but there is a suspicion that the tools can be used as a gimmick. We have chosen not to use tools to deliver teaching material, but to use technology as a tool to gather data, rather than the delivery medium for information/data. To this end we have utilised some simple devices and software.

Of the more specialised tools, Memory-Map™ is perhaps the best example. This is a simple software mapping package that allows students to visualise field sites at 1:25,000 scale, make 3D reconstructions of landscapes, plot sampling sites, construct simple cross profiles and directly measure distances. This software is also available on a hand-held ruggedised satellite navigation device (sat-nav), the Road Angel Adventurer™ 7000. Ten of these

ISSN: 1758-2199

relatively cheap tools have been purchased.They are reputedly waterproof and designed for walkers as well as road users. The Road Angel can allow real-time mapping in the field and like other PDA and hand-held GPS units, the Road Angel connects directly to a PC, thus data generated both in the field and in the IT laboratory can be exchanged. The use of Memory-Map/Road Angel requires little training compared to software such as Digimap and ArcGIS and thus facilitates the use of the tools to solve problems without the need for lengthy specialist training.

A number of non-specialist tools have been used in field work. Simple digital cameras and digital video cameras designed for use with the internet have been acquired for students to borrow. The videos recorded are compatible with simple, freely-available video-editing software; again little training in using the software (such as Microsoft Movie-Maker) is required. Video cameras have a number of advantages over still cameras, as Moore, (2002) identified: the ability to 'pan' scenes makes videos more effective than still photo-montages, zoom facilities allow selective focusing for analysis of detail , a degree of dynamic realism is engendered when video tracks through a site; video has the added bonus of sound effects. In addition, a number of digital mp3 recorders have been made available for students to borrow. Whilst the use of voice recorders is not a new idea, recording directly into mp3 format opens up the possibility of using a variety of applications as the format is very flexible and editable using free software such 'Audacity'.

Project work in the curriculum

During induction week at level 1 students participate in 'First Steps' (an induction programme for new geography undergraduates). New students undertake a guided tour of university environs. Digital Cameras are supplied to students who are asked to take images that encapsulate 'geography' of certain specific places en route. This data gathering forms part of a formative poster production exercise, where students are made familiar with certain software applications to present their images. Later in level 1 in the students study 'Foundations of the Landscape', a module intended to deliver threshold concepts in physical geography in order to prepare students for their level two studies. The module covers a range of geomorphological topics such as slopes, weathering and the action of glaciers, but the module contains no dedicated traditional lectures or practicals concerning the action and attributes of rivers. Instead, this key component of the module is delivered through a PBL approach, incorporating a field investigation of a stretch of the River Trent as it flows through the city of Stoke-on-Trent. Students are required to design a research methodology, identify equipment needs and a data collection strategy. As part of the exercise students are instructed in the use Memory-Map™ and the hand-held Sat-Nav units. The students are told that the exercise is to be assessed through a report produced as a 5 minute video. The students are told that the videos may be posted on YouTube, and this seems to provide good incentive for the quality of videos.

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In levels two and three MDMD are made available for various courses; but use of such technologies is often at the discretion of the students. 'Investigating Geography' is a module that has field work elements that builds upon level 1 experiences, in particular the river Trent study. 'Sustainable Communities' is a locally-centred enquiry-based project that engages students in community environmental issues. There are traditional Geography field work courses: at level 2 there is a residential course based in Exeter, in level 3 a residential field course is based in Barcelona. The Exeter field course has research design at its core; equipment is made available but no specific requirement is made that students must use MDMD. One of the objectives of the Barcelona field course is to produce a field guide and on-line field guide (Virtual Catalonia) and so there is more requirement to use MDMD: Students are required to produce a narrated film or powerpoint show and thus must use the mp3 recorders in order to complete their assessments.

Preliminary Results

Our findings presented here are only partial, and represent a mid-point in our studies. Preliminary questionnaire surveys and module feedback forms have highlighted issues and identified further areas for research, but nonetheless we have identified some early trends and outcomes that will inform future use of MDMD in field work.

Level One: Positive Outcomes

The use of cameras in the 'First Steps' exercise was initially a success in that all students used the cameras to produce and share images. Videos submitted for assessment of the field exercise in the 'Foundations of the Landscape' module achieved a high standard, demonstrating excellent observation and reflection in the field. Students have proven themselves innovative in use of video when they do engage with the technology (incorporating still images, powerpoint slides and even music), despite complaints over lack of guidance.

Level One: Negative Outcomes

More recent uses of digital cameras in the 'first steps' exercise has been less successful. Students have shunned the departmental cameras in favour of their own cameras (especially those on their mobile phones) and this has restricted our ability to 'pool' images on a server for widespread use. As regards 'Foundations of the Landscape', questionnaires have produced feedback that suggests some resistance to the use of video by students, despite the apparently high quality of video produced. Lecturing staff have also identified pedagogic issues of referencing source material in videos, in that a more natural form of spoken commentary tends not peppered with multiple references unlike an essay, although it is possible to produce a bibliography in the ending credits of a video.

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Level Two: Positive Outcomes

As part of the 'Investigating Geography' module Students were required to build a physical model (flume) of a part of the river Trent in Stoke-on-Trent in order to test ideas developed at Level 1. This involved some field surveying where students used memory-map to establish GPS controls. Students also decided to use a digital camera to make time-lapse films of their flume. This was then incorporated into a video that they submitted as part of their assessment. This submission was their choice, not the lecturer's requirement.

A similar development occurred in the 'Sustainable Communities' module. Students in the most recent iteration of the module were required to produce a report on 'greening the campus', and they chose to use video footage used to illustrate problems. The films demonstrated a reflective appreciation of both the tool (panning, zooming and using sound) and the images (appreciating the selective and spatial nature of still images). The Exeter field class also witnessed students using MDMD voluntarily. Students took extensive film footage that effectively replaced the notebook, thus the video was not used in summative assessments, but utilised by students to prepare their assessment reports.

Level 2: Negative Outcomes

Following earlier experience at level two and at level one, there has been very poor uptake and use of the Sat-Nav devices. Experience has taught the students that the units had little value: they suffered from unreliable data storage, poor battery life and in bright daylight the screen was not always visible.

Level Three: Positive Outcomes

The main opportunity to use MDMD at level 3 is on the Barcelona field class. Assessment is based upon a narrated video and the mp3 voice recorders were utilised again as a useful form of field note taking and a useful record of work done at the time. A major advantage is that use of technology (including use of lap-top computers) allowed for assessments to be completed nearer to tasks.

Level 3: Negative Outcomes

At level three there is less voluntary uptake of MDMD in assessment tasks for different modules. The opportunity does exist, but there is no specific requirement.

Academic Staff Observations

When specifically directed to use equipment, students do so, with varying degrees of enthusiasm, but when choice is introduced, more resistance to

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using equipment is seen. In particular the Sat-Nav/GPS technology is not valued despite being more 'subject specific'. At level 3 this is unsurprising, students have become familiar with more sophisticated GIS software and for those who are inclined, there is a greater flexibility using dedicated hand-held GPS units. Analysis of module feedback and questionnaire data reveals a surprising level of negativity by level 1 students toward the use of MDMD as research tools, yet when their use is incorporated into assessments, the results are very positive. This may reflect the timing of the questionnaire surveys which were undertaken before final submission of the assessments. It may be that the fear of preparing the videos was not matched by the experience of producing the videos. At levels 2 and 3 it is seen that students are willing to use MDMD as research tools and seen to be important means of data collection for both inquiry and reflection. The use of video in particular enables them to demonstrate field research proactively and the use of videos, poster presentations and narrated shows that are displayed and archived for future use seems to promote a greater sense of ownership of the research undertaken by the students.

Initial Conclusions

In order to get a complete picture of the reaction to embedding the use of MDM across the curriculum it appears that questionnaire surveys need to be altered and perhaps supported by focus group interviews in order to fully assess and appreciate student reaction to the use of these newer technologies. From our perspective it seems that when incorporated into assessment, the use of MDMD appears to succeed (inasmuch as students did not suddenly fail assessments *en masse*). Despite some negative reaction from some students at level 1, module feedback has suggested that some students certainly appreciate new assessment strategies. It would be interesting to read accounts of other disciplines attempting to embed MDMD into their curricula. Geography is a broad –based discipline that can poke its intellectual nose into a wide variety of spaces. It would be interesting to contrast experiences with other disciplines, both more and less technologially leaning, to appreciate a range of undergraduate reaction to using MDMD. In publishing these initial findings we hope to stimulate wider response.

There are many questions that still need to be addressed, over a longer study period. Training in the use of MDMD and pedagogic aims of their use is student centred, but is the balance right? Some students expect to be 'taught' and are resistant to the idea of discovery. This leaves us with a problem of how to continue using the technology. One answer is to further develop the culture of using the technology, and to develop appropriate media for using the technology. Using YouTube has its problems: do we want the whole world to see everything our students produce? Yet using internal broadcasting methods is expensive. Using posters creates the need for display space.

The big question, still unanswered, is whether we are necessarily incorporating MDMD for right pedagogic reasons? We like to think we are at Staffordshire University, but we have to consider the extent to which the

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technology we are using is governed by need, desire or is it cost? The use of MDMD in field work is a rapidly evolving area for geographers. In the time between setting up the projects described, and writing this report, the Road Angel Sat-Nav device has been withdrawn from sale, and as I write ArcGIS are announcing their latest i-phone app! One feels we are constantly playing catch-up with one arm and a leg tied behind our backs!

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ISSN: 1758-2199