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Item Type	Chapter in book
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Citation	CELT Learning and Teaching Projects 2003/04
Publisher	University of Wolverhampton
Download date	2026-05-18 22:17:09
Link to Item	http://hdl.handle.net/2436/3715

The introduction of ICT in fieldwork to enhance student learning

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Background and rationale

The aim of the project was to introduce a dedicated ICT package into the fieldwork experience in order to enhance student learning in the field at a range of levels and in a number of subject areas. The field kit consists of a laptop computer, digital camera with multi-card reader, global positioning system (GPS), video camera, portable scanner and printer. The kit is kept in a waterproof portable case specifically for student fieldwork use (Plate 1). A digital microscope and video camera is also separately available. The students have been able to use the equipment in the field in order to produce supporting materials to enhance their fieldwork. For example the IT package has been used in conjunction with a data-logger on mapping equipment allowing maps to be printed in the field for detailed recording of field sites. Also the use of digital and video cameras has allowed students to take responsibility for identifying and recording aspects of fieldwork for their reports.

Plate 1. The ICT 'field kit'



The research

The portable field kit was assembled fully during semester 1 and the laptop was loaded with appropriate software such as Microsoft Office, ArcView, Vespan and Canoco, SPSS, Paint Shop Pro and Acrobat Reader. The fieldwork kit has been used on a variety of field trips in the UK and also in the USA (New Hampshire (NH) and Arizona), Russia, and Spain. Equipment from the kit has been used with students from all degree subjects in Environmental and Analytical Sciences (EAS) and from all levels. Some equipment has been used exclusively in the field, while other pieces have been used back at the field centres/hotels.

Evaluation of the project by staff was undertaken at the end of semester 1 with discussions on the use of the kit. Staff field observations and module evaluations, although subjective, were assessed at the end of semester 2. A questionnaire was undertaken with graduate students in October 2004, specifically relating to the use of ICT in fieldwork. External examiners for the awards were also asked to comment on any improvement in the quality and enhancement of student learning following discussions with students and reviewing fieldwork reports.

The outcomes

The project began, with the use of items from the field kit, in Russia in August 2003 and continued throughout semester 1 and 2 of the 2003/04 academic year. The equipment used in the UK primarily focused on the use of digital cameras and global positioning systems on the main field trips (Barmouth, Penrith, Aberystwyth and Abergavenny) with downloading of material to the laptop in the evenings. In addition the equipment has been used more extensively on some of the UK trips with smaller numbers and on the international field trips.

During the USA trip to NH the students collected invertebrates at Livermore Falls for identification, using the digital microscope, and photography (Plate 2). Other images were gathered for inclusion into the river corridor management plans that were completed at Plymouth University, NH during the trip.

Plate 2. The digital microscope and laptop in use



In Russia, in the Tuapse region of the Black Sea coast, an international group of students collected benchmark environmental data as part of an EU funded Tempus project. The fieldwork kit allowed the students to collect data in the field and then collate and analyse the information each evening in their rooms at the University of Tyumen field centre (Plate 3). The students used the information collected during the summer to produce a 90-page fieldwork training manual for the Tempus project.

Plate 3. Collection and collation of data at the Black Sea, Russia



Student questionnaire

The questionnaires given to graduates on EAS awards resulted in 39 responses (19 male and 20 female students): Geography (10), Physical Geography (6), Human Geography (1), Environmental Science (8), Environmental Management (9), Ecology (4) and Water Science and Management (1) awards. From the 39 questionnaires 6 students responded that they had not used ICT equipment in the field (3 EM students, 2 geography students and 1 ecology student). Every field trip offered to undergraduates was mentioned by at least 1 student, with Penrith, Aberystwyth, Abergavenny and the USA being the most cited. A number also mentioned that they had also used the equipment during the course of their research for their honours projects. It was also interesting that some students mentioned the use of equipment (not directly from the kit) was used on trips to Italy and Finland.

Of the equipment included in the kit, the most regularly used were the digital camera and the GPS, closely followed by the use of the laptop for downloading and collating information. The students indicated that they most commonly used the ICT equipment for taking and downloading images, collating information or data and to improve the production of the field reports.

The students were asked for suggestions for other ICT equipment that could, or should, be added to the kit. The most common response was for additional GPS equipment to allow more students access, especially on the larger trips such as Penrith and Abergavenny. Although access to more digital cameras was suggested, it was acknowledged that many students had their own personal cameras and that the ability to download the images was of greater importance (this being possible as a multi-card reader is included in the kit). Two students asked that a digital voice recorder should be included for use with the laptop

for students with special needs. The response from level 1 and 2 students, through module evaluation forms, is to request more equipment in order that more students are able to experience direct use of items, especially related to the GPS and digital camera.

Benefits

The benefits in enhancing student learning by the introduction of a comprehensive fieldwork package have been clearly observed throughout the project. The students have engaged fully with the equipment in the package and the information collected has provided valuable material to support the observations collected in their field notebooks. Also as CDs can be made, or information loaded onto the SAS student server, students can use the information almost immediately, and in their own time, on their return home or to the University.

Students also gain confidence and experience in using ICT in a variety of situations and enhance field skills as illustrated by student statements 'acquired new skills using *the kit*' and 'I acquired a new skill by using a GPS handset'. A student commented that may improve opportunities in a future career 'Using *the IT kit* gave practice with equipment used in the "real" world'.

The response in the student questionnaires to include digital voice recording software into the kit has resulted in the project team considering more fully the requirements for the effective use of ICT in the field for students with special needs. It is hoped that this omission of software to facilitate use by students with special needs will be addressed in the coming academic year

A large number of the images have been collated into an image database resulting in an unexpected benefit with the images being available for future use by staff and students. In addition the staff have begun to use the video camera for recording the use of other analytical equipment and safe working in the field. The video clips can be used, with other images, for pre-trip tutorials and health and safety briefings.

Staff time has been saved as it is no longer necessary to try to get students together to collate data back at the University, as it has already been completed in the field. Also staff do not have to try to provide further information because student information and data has been mislaid or lost.

Evaluation

The staff in EAS have generally been positive with regard the use of the kit. At the end of semester 1 the project team decided that single items should not be removed from the kit for field trips as it results in items being damaged or not being promptly returned. Therefore the kit now has to be used as a total item. As a result being able to take the equipment in one portable case has meant that staff can be sure that simply collecting the kit guarantees in an integrated package being quickly available.

The staff have noticed an improvement in the accuracy in data recording and collation, which has then resulted in the quality of final reports. They have also noticed the inclusion of more fieldwork observations and information in the reports.

Comments from the questionnaires and module evaluation forms have been positive, regarding specific pieces of equipment and the field kit in general. Examples include:

- 'High quality digital pictures for use in reports enhances quality'
- 'Images help with understanding whole situations'
- 'The laptop meant that reports/data evaluation could be compiled on the day of the field trip, rather than later at home/Uni'

- 'IT enabled me to plot the pathways, and the recreational damage inflicted upon them, in terms of erosion... and georeference the route to an OS map'
- 'IT equipment in the field is very useful and enhances report writing afterwards'
- 'Enabled me to present a more "professional" report and to remind me of the sites visited'
- 'Enhanced the content and detail of any write-ups and made fieldwork easier'
- 'Made reports more accurate and detailed'
- 'Provided rapid and easily interpreted data and statistical information for the future reporting'
- 'IT is a crucial part of the fieldwork experience'

The external examiners for the Environmental, Ecology and Geography awards have commented upon the improvement in quality of presentation in subject and field reports. The environmental external examiner specifically commented on the improvement in data recording in field reports and the subsequent improvement in data analysis and discussions.

Overall the main positive elements of the project can be summarised as follows:

- Students have felt a sense of relevance and immediacy with respect to their fieldwork
- The use of ICT has enhanced the importance of teamwork in the collection and collation of data, and, where necessary, the production of reports within a short timeframe
- Students have had a sense of achievement as they were able to discuss their results in some detail with staff from other institutions in the USA and Russia as their data was already collated during the trips
- Staff have commented on the improved report work with the inclusion of more field observations, information and improved, accurate data recording
- The improvement in the quality of the Fieldwork Practice portfolios (the level 3 assessment of the accumulation field reports and reflective review over the 3 years of the degree) has been noticeable, as a result of the growing standard in field reports.

Future developments

The grades for fieldwork reports from 2003/04 have not yet been compared to those with previous years and this aspect of the project evaluation will be completed during this academic year.

Originally the project envisaged using the kit within School of Applied Sciences (SAS) and School of Sport, Performing Arts and Leisure (SSPAL) in order that a more diverse range of subjects could be evaluated. However, the setting up of the total kit, staff evaluation and discussions took longer than anticipated and this resulted in deferment of the use of the kit in SSPAL on social and historical field trips. It is hoped that this aspect of the project will be developed in the next academic year.

It is also envisaged that the image database will be further progressed, alongside development of interactive videos for on-line pre-trip tutorials and health and safety tutorials. As the use of the video camera improves, expertise by staff the quality of these on-line materials will improve.

In light of the students' request for greater access to ICT equipment EAS will try to make more funds available to extend ICT in the field. Also small grant applications will be submitted in order to facilitate the extension for provision of ICT equipment.

Finally the team will make an effort to disseminate the results of the project through the presentation of posters or papers at appropriate conferences and LTSN events. A poster will be presented at the American Geographers Association conference in 2005. Also after analysis of the report grades from the project and previous years a paper will be written for submission in an appropriate journal.

Acknowledgements

The project team would like to thank all staff and students at the University of Wolverhampton, Keene State College, New Hampshire, the University of Tyumen, Russia, and at other international institutions, that have taken part in the research.