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Enhancing the learning experience in undergraduate geoscience fieldwork through the use of hand-held technologies

FITZPATRICK, MERIEL E.J.

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University of Plymouth

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Project Reference Number:	174
Title:	Enhancing the learning experience in undergraduate geoscience fieldwork through the use of hand-held technologies
Key Contact:	Dr Meriel FitzPatrick
Department:	SoGEES (Geology)
Telephone:	01752 584769
Fax:	
Email:	mefitzpatrick@plymouth.ac.uk
Description:	<p>Aims of project</p> <ul style="list-style-type: none"> ○ To evaluate the effectiveness of electronic and lab-based exercises in preparing students to use PDAs in the field; ○ To investigate the pedagogic impact of PDAs during fieldwork; ○ To enhance the learning material delivered through PDAs to support learning in the field. <p>Background to project (or context)</p> <p>The idea for this project emerged from a development project which evaluated the use of learning technologies during Stage 1 and 2 geoscience fieldwork located in Kingsand/Cawsand, (FitzPatrick, 2009). This previous project provided significant insight into the student experience of using PDAs (Personal Digital Assistants) during fieldwork, and raised some interesting questions about how this technology could be further developed and enhanced for use at other sites. This project proposes to extend FitzPatrick (2009) by developing similar learning materials relating to an important geological site at Coverack, The Lizard, Cornwall.</p> <p>Rationale</p> <p>This project aims to help enhance an individual's quality of learning by allowing each individual access to a website and samples, which will assist their understanding of some important geological concepts such as some of the complex processes occurring at depth in the crust. The proposed technology enhances the student's experience in the field and can help reduce barriers to learning, explaining concepts as they are required and can also be repeated as many times as is necessary. The materials developed may also be of use to other colleagues for other field courses, not only for Stage 1. The ultimate aim is to</p>

develop and integrate web-links on to the PDAs to aid analysis and interpretation.

Methods used

Surveys: Qualitative and quantitative data was collected from across the cohort both before and after the fieldwork. Surveys addressed the following: engagement with preparatory exercises, perceptions of the pedagogic value of PDAs. Pre and post-fieldwork data will be compared in order to ascertain if /how students' perceptions of fieldwork change during the fieldtrip. It was planned to interview participants afterwards but due to students' and staff availability and the proximity to the exam period this was not possible. This omission can be addressed in future field trips.

Site: Coverack Bay, on the Lizard, Cornwall is a very interesting location geologically speaking, where we find a rare example of oceanic crust being exposed at the Earth's surface, thus providing a unique opportunity for students to observe and understand some of the complex processes which occur at depth in the crust. This provides an exciting opportunity to develop PDA-based learning materials, which would enable students to participate in self-directed field-based exercises in order to further their understanding of igneous processes. It is therefore a very good location in which to demonstrate some aspects of geology which students have only heard about before in lectures. Stage 1 Geoscience students visit Coverack as part of their residential field trip to St Ives. The geology is quite complex and this project aims to improve the students' understanding of the geology through the use of the PDAs.

Field data and photographs: The majority of time spent on this project was initially spent preparing the materials for use on the PDAs. A student was employed (July – August 2010) to help develop the materials for use on the PDAs. Fieldwork to Coverack was undertaken to collect data about the location, geology and sites and to take photographs for use on the PDAs. The initial data and images were transformed into a series of PowerPoint slides which were then uploaded onto the PDAs, as part of the Mediascape software. The slides have a specific order and lead the student through a series of questions and then give answers or ask the participant to try again.

PDAs (Personal Digital Assistants): Developing the use of hand held devices in the field enables independent fieldwork to be undertaken at specific locations by small student groups equipped with PDAs and integrated GPS units. Once in the field, PDAs, running MSCAPE software, provides automatic prompts to field locations where key observations can be made, and will detail the

activities to be carried out at each location. The PDA leads students from first principles of observation and measurement, through recording methodology. This approach has been successfully piloted with 1st and 2nd year undergraduate Geology students using a field location close to Plymouth (Anderson et al., 2010).

Results

Out of 39 Stage 1 students who took part in the exercise alongside the normal field day at Coverack, 32 returned the Pre- fieldtrip questionnaires and 30 returned the Post-fieldtrip questionnaires giving an 82% and 74% response rate respectively. All the participants were enrolled on the BSc Geology course. The ration of male:female was difficult to ascertain as only 30 responded to this question, but there were significantly more males than females.

The results can be divided into three areas:(i) general attitude to fieldwork, (ii) perceptions of learning through fieldwork and (iii) perceptions of the use of the PDAs. On both Pre- and Post-questionnaires their attitude to fieldwork was positive, but increased from 75% before who agreed that they generally enjoyed fieldwork, to 86% who agreed they were looking forward to future fieldtrips. Their perceptions of learning through fieldwork were shown by the response to the question “ What is the most important aspect of fieldwork to you?” 66% replied “seeing geology in the field”, 16% “reinforcing theory” and 12% “practicing field skills”. Their perceptions of the PDAs were varied but this was dependent on the PDAs functioning correctly which unfortunately some did not. Some of the PDAs kept crashing and losing the satellite signal. Overall there was agreement that the information provided on the PDAs was useful and appeared at the correct locations.

One member of staff voiced their opinion during the day saying that they were “a bit concerned that the students were spending more time trying to get the PDA to work rather than focussing on the rocks.” One student told me afterwards that they thought “the PDAs were great and very helpful”, however others thought “it was not very useful as it did not work very well.”

Unfortunately due to staff and student availability after the Easter holidays and the proximity of the exam period it was not possible to carry out interviews after the field trip and this is something which can be addressed in future evaluations of the PDAs, on subsequent fieldtrips.

To summarise many advantages of using PDAs to help students develop their field skills have already been demonstrated

	<p>(FitzPatrick et al. 2010, in press). The results here confirm and support previous conclusions, although there are still areas to be improved e.g. the PDA screen; navigation through the sites; better organisation of the site information.</p> <p>The continuation of this type of student-led fieldwork is very important for the continued development of students' field experiences and engendering a feeling of independence. Further evaluation of the PDAs and materials will continue and improvements will be made if or when necessary.</p>
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