

## [P31] PDAs in fieldwork: a pilot study on green energy from the Lake District

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### Introduction

Fieldwork is an essential component of the learning process in all undergraduate Awards in geographical sciences. Whilst some fieldwork activities rely only on observations and basic fieldwork skills (e.g. measurements, sketching, maintaining a field notebook), other activities lend themselves to the use of IT in the field. This pilot study introduces an on-going research project on the use of PDAs in the field to enhance geographical fieldwork skills (Savill-Smith and Kent, 2003).

### Background

This study took place during a Level 2 compulsory field week to the Lake District for students on Geography, Environmental Science and Environmental Management Awards. One of the field trip topics involved an environmental impact assessment of green energy in the Workington area. There were 3 main objectives:

1. To assess whether green energies could replace nuclear and/or coal generated electricity in the local area.
2. To evaluate the environmental impact of green technologies on the local environment, if they did replace conventionally generated energy.
3. To estimate the potential reductions in CO<sub>2</sub> emissions for the Workington area by converting to green energies.

### Fieldwork activities

The exercise was carried out on 2 separate days with relatively small groups of 12-14 students. PDAs were used to assist in data collection in 2 main ways. Firstly by allowing calculations to be made in field so that field observations might be enhanced or reviewed and secondly to provide easy access to a number of maps and other images.

During a visit to the Visitors' Centre at Sellafield nuclear power station, students were assigned with finding out the relative proportions of electricity-generating technologies in the UK and to assess their environmental impact. The Centre has excellent displays where a wealth of information can be gathered. Students then visited a wind farm, a village hall powered by solar energy and a hydroelectric energy facility near Ullswater. At each location students were given a few simple calculations to perform on PDAs that were pre-programmed using Excel. Students were expected to input basic data based on field observations and the PDAs calculated various pre-set parameters.

As an example, the Excel file for Oldside Wind Farm produced the following outputs:

- i) The energy output for an individual turbine, taking into account variables such as total wind speed and daily variations.
- ii) The maximum and realistically probable energy output for the wind farm on an annual basis.
- iii) Estimates for the annual local energy demand, based on a set population and estimating the number of houses. N.B. for this exercise the local industrial energy demand was ignored, but this could also be incorporated in future years.
- iv) The actual footprint size of a wind farm required to satisfy the local energy demand.
- v) The amount of potential reduction in CO<sub>2</sub> emissions should this hypothetical wind farm be built.

These calculations were then used to debate in the field issues associated with the environmental impact of the new hypothetical wind farm.

### **Advantages of using the PDAs**

Although it is possible to provide students with facts and figures in handout form to initiate debate in the field, there is a clear advantage in students 'discovering' their own information. Ownership of data is a key issue in educational achievement and it seems that students engaged more meaningfully with the exercise by working out parameters for themselves, rather than simply reading relevant data from a handout. Otherwise, the advantages were:

- i) Data input onto the PDAs was quick and calculations were easily achieved on an Excel spreadsheet.
- ii) The PDA screen was easily visible in bright sunshine.
- iii) All students 'coped' well with the technology, despite a few concerns from some students prior attending to the field day.
- iv) The zoom tool on the PDA makes maps much more accessible.
- v) A real understanding of environmental footprint issues was achieved to a much higher level than on previous trips.

Feedback from students included comments such as '...helped me understand environmental impact', 'Better than a simple handout. . . .', 'Not at all intimidating', 'Good to work out the reduction in carbon emissions for wind and solar energy. . . .'

## **Conclusions and future work**

This pilot study has suggested that there is scope for using PDAs in a fieldwork context. As students seemed to adapt to the technology without any obvious difficulties, the research will extend into other field applications using Visual Basic programming instead of Excel. This will enhance the accessibility of the files on the PDAs whilst still allowing calculations to be made. Other potential applications will include profile plotting (e.g. surveying, levelling), video clips, maps, GPS surveys and a number of mapwork applications. It is also planned to have follow-up exercises in class using data collected on PDAs.

## **References**

Savill-Smith, C. and Kent, P. (2003) *The use of palmtop computers for learning: a review of the literature*. Learning and Skills Development Agency, London.