

An evaluation of the educational effectiveness of fieldwork within environmental science awards at the University of Wolverhampton

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[This report is a summary of a longer document. For further details please contact the authors]

Background and rationale

Fieldwork is considered to be a major component within geography, earth and environmental sciences curricula and is advocated as an effective learning environment by virtually all those who are involved in learning and teaching in these disciplines. It is included in the QAA Benchmarking Statements in Geography, and Earth Science, Environmental Science & Environmental Studies (QAA, 2000a; QAA, 2000b).

Kent *et al.* (1997) suggest that the objectives of any fieldwork exercise need to be clearly identified, since they condition the type of fieldwork and its success as an educational exercise. In addition the design of a fieldwork programme must be integrated into the structure and learning objectives of the degree that it supports. Fuller *et al.* (2000) consider the following to be key educational objectives of fieldwork:

- Development of observational skills
- Facilitation of experiential learning
- Encouragement of student responsibility for their own learning
- Development of analytical skills
- Provision of a taste of research
- Kindling of a respect for the environment
- Development of personal skills
- Lessening of barriers between staff and students on residential courses

The project undertook discipline pedagogic research to answer questions about the educational effectiveness of fieldwork. There is currently little research in the area to enable practitioners to judge what is effective practice. However, this study aimed to link the current theory (Livingstone *et al.*, 1998; Lock, 1998; Cottingham *et al.*, 2000) with practice as carried out at the University of Wolverhampton.

The conceptual framework used in the project was based on Biggs' (1999) theory of constructive alignment. This approach examines the 'goodness of fit' between the aims of the course, its assessment procedures, the nature of the learning environment, student cultures and motivations and learning styles and approaches.

The research

The aim of the research was to ascertain whether students studying awards in environmental sciences find fieldwork a valuable way of learning about the environment.

The objectives were to:

- establish the intellectual value of fieldwork
- define the role of fieldwork in the teaching of the subjects within environmental science
- determine the range of skills developed by students undertaking fieldwork

The research is contextualised by the ever-present need to ensure cost-effectiveness in student learning and to ensure that such learning is also realistic, innovative, focussed and relevant.

A questionnaire was undertaken as the main choice of methodology for the collection of data. This was seen as the most beneficial way of collecting a wide variety of information on the benefits of fieldwork. The research undertook to question all the undergraduates enrolled on undergraduate awards in environmental sciences. All final year students were asked to complete a questionnaire (see Appendix 1) during the module EA3007 Fieldwork Practice. All second year students were asked to complete the questionnaire during a compulsory week long residential field course in Abergavenny midway through the second semester. First year students were asked to complete the questionnaire during a compulsory week long residential field course in either Barmouth or Penrith (depending on their award) at the end of the second semester.

In addition a focus group interview (average size 6) was also used to enhance the questionnaire as a data gathering technique (Cohen *et al.*, (2000)). Any issues which were worth pursuing from the questionnaire were followed up through the focus groups and each group was asked specific questions about their fieldwork experiences. The interviews were recorded (with permission from all individuals within the groups) and transcribed later.

The outcomes

For the purposes of this report only the responses of the students in the final year of their degree course are discussed. The responses of students in years 1 and 2 in addition to year 3 form part of a longer paper (contact the authors).

Results of the questionnaire survey

Section A: personal detail

There was a total of 63 responses from the final year cohort of students. Of these 37 were male and 26 were female, the majority (24) were aged between 22 & 25 years, 23 were between 18 & 21 years, 8 between 26 & 30 years, 6 between 31 & 40 and 2 students were over 40 years of age. The majority of students (21) were on the BSc Environmental Science award, 14 were studying BA/BSc Geography and 13 were studying Environmental Management. Other awards had fewer students, Ecology (7), Physical Geography (5), Applied Environmental Geology (1), Human Geography (1) and Water Science (1). All students had attended at least one residential field course which was a week in duration, and not part of a module, most students had attended two. All students had experienced fieldwork of one or half a day's duration as part of practical work within modules. Half of the group had experience of fieldwork in overseas locations as well as in the UK. The majority (50) of the students considered that the amount of fieldwork they had undertaken whilst studying at the University of Wolverhampton was about right, 9 students felt that the provision was inadequate and 4 felt that they had undertaken an excessive amount of fieldwork.

Section B: General attitudes to fieldwork

All but one of the students felt that fieldwork was an effective way to learn about the environment. The following were the most common reasons (in order of popularity):

- Allows you to put theory into practice
- Provides hands-on experience
- Facilitates more effective learning
- Provides an indication of post-university work which is useful when looking for a career
- Allows you to gain confidence to perform practical techniques
- Facilitates learning about the practical aspects of the subject

Students had a wide variety of ideas to make fieldwork a more effective method of learning about the environment. It is possible only to list a few of these (in order of popularity):

- Attend more field trips
- Have more teaching staff on trips and more resources to hand
- Allow students more freedom to plan their own day and activity
- Provide more field trips to demonstrate specific practical points in modules
- Make fieldwork more interesting

The majority (59) of the students felt that fieldwork encouraged them to develop a respect for the environment and most (53) felt that it enabled them to go to places that they wouldn't normally visit. Fieldwork experiences enabled most of them (59) to relate models and idealised textbook examples to real world situations, provided new insights into the ways in which environmental processes operate in reality (58), encouraged them (53) to focus on the real world and were necessary to a true understanding of environmental systems, processes and patterns (57).

The majority of students (56) felt that fieldwork was an indispensable part of their award and most students (49) felt that their fieldwork experience was more effective when it was offered as a separate fieldwork module.

All the students felt that fieldwork could not be replaced by lectures, laboratory practicals, distance learning and the virtual field course. A number of reasons were given for this, mainly:

- It is necessary to experience the real world
- It is an invaluable part of the award
- There is no substitute for "hands on" experience and learning
- It is an opportunity to experience what they are learning about
- A virtual field trip would not show all the elements that you would see on a real fieldtrip
- Not possible to improve on the real thing

However, they did feel that:

- Additional teaching methods would also be useful
- Practical and virtual field trips may also be effective
- A variety of techniques may help to make the topic more interesting

Section C: Fieldwork Skills

Only 25 of the students always enjoyed their fieldwork experiences with most of them (33) only enjoying their experiences of fieldwork some of the time.

In general, students felt that:

The main benefits of fieldwork were:

- Learning to work in groups
- Enhanced understanding of the environment
- Opportunity to visit new places
- Opportunity to put theory into practice
- Enhanced confidence
- Opportunity to gain “hands-on” experience
- Learning and applying new techniques

The three main personal benefits of involvement with fieldwork were:

- Working in groups
- Increased knowledge about the environment
- Learning practical techniques

The three main “frustrations” of involvement with fieldwork were:

- Problems associated with working in groups
- Problems associated with the length of the trip, the long working days and being away from home
- Bad weather

The main intellectual skills gained from fieldwork were:

- Being able to learn theory from practice
- To put theory into practice
- Being able to draw on a range of practical and theoretical knowledge to solve on-site problems

The main personal and inter-personal skills gained from fieldwork were those associated with working within groups. Communication skills were learned in order to negotiate and debate with other group members, liaise with the public and workers in the environment and even to chat with staff.

Students felt that their fieldwork experiences had enabled them to gain and extend the following skills:

Skill	Yes	No	No response
<i>Level 1</i>			
Observation	54	0	9
Interpretation & identification	54	0	9
Basic problem solving	44	10	9
Sampling, measuring & recording	52	2	9
Survey methods	47	7	9
<i>Level 2</i>			
Identification skills	53	0	10
Measuring & sampling	50	3	10
Observing & recording	53	0	10
Information gathering	51	2	10
Data analysis	43	10	10
Experimental design	37	16	10
Integration	38	12	13
Safety	51	1	11
<i>Level 3</i>			
Identification & observation	57	0	6
Communication & transferable skills	58	2	3
Recording	55	3	5
Measuring & sampling	54	3	6
Advanced design methods	35	21	7
Advanced analysis	38	17	8
Safety	51	7	5

Section D: Fieldwork research

Students were asked to indicate whether they felt that their fieldwork at University had:

	Agree	Disagree	No response
Helped me to develop key learning skills	53	6	4
Encouraged me to take responsibility for my own learning	47	11	5
Allowed me to study topics in depth	43	17	3
Allowed me to develop more relaxed social contact with tutors	50	8	5
Encouraged the development of my teamwork skills	53	7	3
Developed my sense of curiosity about the environment	55	5	3
Often lacked clearly stated learning objectives	24	33	6
Been unrelated to other parts of my course	19	39	5
Not built on my previous learning and knowledge	14	45	4
Not built on my previous field experiences	14	45	4
Not required the active involvement of students	9	50	4
Been undertaken with insufficient preparation by tutors	11	48	4
Been undertaken with insufficient preparation by students	31	26	6
Been undertaken without prior experience of field techniques	25	34	4
Been undertaken without prior training in the use of field equipment	28	29	6
Often been set within unrealistic time constraints	29	30	4
Been insufficiently varied in terms of delivery	23	34	6
Been undertaken at inappropriate times during the academic year	27	31	5
Been of inappropriate length	21	37	5
Been financially expensive	23	36	4
Involved too much "travel" and not enough "activity"	17	43	3
Been too tutor-directed	15	45	3
Been inadequately / inappropriately followed-up with further learning activity	26	33	4
Been inappropriately assessed	18	40	5
Not been accompanied by tutor feedback	32	27	4

Evaluation

It is clear from this research that there are a wide variety of things that students can learn from their fieldwork experience. These vary in range from the very practical ability to use equipment and the development of identification skills, through gaining a wider experience of the environment as a whole and thus being able to relate theory to practice, to the accumulation of intellectual and personal skills. It has become clear that the full range of the advantages of fieldwork are multifarious in nature.

It would seem that fieldwork provides a very valuable learning experience. Some of these experiences could be measured by certain learning outcomes but a number are immeasurable, these were those considered by students as memorable and/or life experiences. Students felt particularly that they had developed key learning skills through fieldwork and that their curiosity about the environment had been heightened.

Students felt that not only had they developed their overall environmental knowledge through doing fieldwork but had also developed their inter-personal skills by having to do fieldwork. The focus group found that it came as a surprise to them that they had had to draw on the different facets of their own personalities to be able to get the best out of themselves and others within the context of group exercises. In addition to their more subject specific skills they felt that these new honed skills would be invaluable both in an employment context but also in life.

A more in depth study of the environment gained from fieldwork was expected to enhance students' intellectual skills. Students were in agreement that they had gained more knowledge of the environment through practical methods of learning. This particular knowledge was as broad as the environmental course where fieldwork was applicable to it. Student also felt that they had developed analytical, communication and time management skills through fieldwork.

Students at the University of Wolverhampton clearly felt that it was not possible to replace fieldwork with any other learning method and that it was not possible to gain a degree in environmental science without having done any fieldwork. Fieldwork was seen as an integral part of the study of the environment. The fieldwork experience could be enhanced by the use of other means such as a virtual trip or laboratory practical work. Some students recommended incorporating these into the initial preparation for a trip to provide some background information and in work during the trip to enforce what had been learnt in the field.

In conclusion, fieldwork provides students with a wide range of benefits that are difficult to quantify and measure. For all those involved with fieldwork it would seem that the benefits far outweigh the costs of running these courses.

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