# Re-orienting a physical geography skills programme for careers relevance: An Environmental Baseline Teaching Simulation

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## Abstract

Higher education institutions are under increasing pressure to produce 'employment-ready' graduates. It is necessary to investigate practical and effective ways to embed employability skills within existing degree programmes and structures in order to meet these external pressures and minimise course disruption. This paper describes a case study where a number of traditional 'research and skills' focussed physical geography practical sessions have been re-orientated to increase the overt careers relevance of the material covered, by simulating carrying out an environmental baseline survey, including field and laboratory data collection and analysis and report writing. This project was designed and evaluated in collaboration with an environmental consultant in order to ensure the careers relevance of the project. The project proved popular with students, who appreciated the 'real worldness' of the exercise.

## Introduction

The QAA Code of Practice for Career Education, Information and Guidance is intended to "help higher education institutions to ensure both that they are meeting students' expectations in respect of their preparedness for their future career, and that they are producing graduates equipped to meet the demands of the employment market of today and tomorrow" (QAA, 2001). In addition to these general pressures on addressing employability issues in higher education, research shows that the majority of graduates enter higher education in order to improve their employment prospects (*e.g.* Gedye *et al.* 2004), yet there may often be a paucity of direct careers related material presented throughout their degree courses. However, other higher education practitioners question the growing emphasis on employability in higher education teaching and learning, due to a presumed risk of an erosion of the development of "critical intellectual skills" (e.g. Johnston, 1997, Marantz and Warren, 1998). On the other hand, geographers in the UK have been accused of being less successful than other disciplines in forming effective links with the world of employment (Jenkins and Healy. 1995). Pressures within higher education from increasing student numbers, reduction in the unit of resource for teaching students (Johnston, 1997), and decreasing staff:student ratios present further barriers to the wholescale redevelopment of course material, and therefore solutions must be sought that try to balance these various pressures, such as ways to re-align existing course material. Realistic work-based simulations have been cited as one way of increasing students' awareness about employment issues (Kneale, 1999). The "Environmental Baseline Teaching Simulation" project presented here provides a case study of how a traditional undergraduate "research skills and techniques" practical programme run as part of an established level 2 Physical Geography degree programme can be re-orientated to provide more explicit applicability to potential graduate employment avenues, and hence meet the challenges of The QAA Code of Practice for Career Education, Information and Guidance (QAA, 2001).

As part of the "Environmental Baseline Teaching Simulation" project (EBTS) a publicly accessible website has been developed and can be found at www.esci.keele.ac.uk/ebts. This website provides: 1) further details on the project and its evaluation; and 2) a resource-set based on data collected from these practical sessions to enable other practitioners to run similar projects, without the need for field data collection.

## The Environmental Baseline Teaching Simulation project

The "Environmental Baseline Teaching Simulation" project provides students with the opportunity to conduct a simulated environmental baseline survey. Such surveys are routinely carried out as part of Environmental Impact Assessments undertaken in support of Planning Applications and can form a major part of the work carried out by environmental consultancies, the destination of many geoscience graduates. This project has been developed drawing on the views of an environmental consultant (Technical Director of Geological Services at MJCA), and current literature on employer requirements of "geo" graduates (e.g. Owen, 2001; Penn, 2001).

This project has been developed from a series of more traditional "research skills and techniques" orientated practical sessions, originally designed to introduce students to a range of subject-specific technical skills (both field and laboratory based) associated with the collection and analysis of soils and surface water, from the wooded estate in which Keele University is located (Figure 1). These practical sessions were assessed through the individual completion of a workbook. Although this form of assessment provides clear guidance to the student, useful for large class sizes, such 'box-filling' or 'closed' style of assessment seems likely to encourage surface rather than deep learning, with students unable to see the broader implications of the tasks they are carrying out, or engage fully with the analysis of the data collected. In order to encourage deeper learning, and develop writing skills relevant to many graduate jobs, it was decided to assess the practical sessions through a more "open-ended" environmental baseline report. The report was based on the data that the students collect and analyse in the practical sessions, following the structure and learning outcomes of the original practical programme. In addition to a group report, the students are required to submit an individual "personal reflection". This includes: a series of questions requiring the students to comment on the potential errors of different aspects of the data collection and analysis; a reflection on the perceived value of these practical sessions (principally for future project development); and a "learning matrix". This learning matrix requires students to rate their knowledge and understanding of some of the learning outcomes/skills covered in the project, both prior to and following these practical sessions. The student "personal reflection" was designed to address several aims. Personal experience suggests that there is a tendency for students to

**Figure 1: The major lake within the Keele University campus used as the study site in the Environment Baseline Teaching Simulation**

believe "as gospel" numbers generated through data collection, with little consideration of potential errors generated through the data collection process. The first part of the evaluation was, therefore, designed to encourage students to reflect on potential errors during the data collection. Questions on how well students worked as a group and how this could be improved were also included to encourage students to reflect on their group working experiences, teamwork being viewed by final year students as one of the most important learning outcomes in terms of future career prospects (Haigh and Kilmartin, 1999).

The Environmental Baseline Teaching Simulation has been run in two successive years with modifications being made in the second year as a result of student evaluation and reflection on the project. The field activities were carried out in a small lake drainage basin situated within the Keele campus (Figure 2). Students worked in groups of four to five and were involved in the following activities (not all of the activities were run in both years):

- Project planning, including deciding on what of the available data was necessary to achieve the project's aims, based on an assigned budget
- Risk assessment of field activities

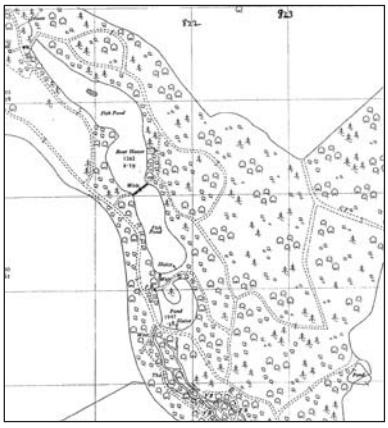

**Figure 2: A map of the upper lake basin within the Keele University campus used as the study site in the Environment Baseline Teaching Simulation**

- Field data collection, including: collection of surface water and groundwater samples and *in situ* measurement of physicochemical characteristics; measurement of groundwater levels; determination of stream discharge using a tracer dilution method; description of soil profiles and soil sample collection.
- Laboratory analysis of samples, including: soil organic carbon content; soil moisture content; soil grain size distribution analysis; soil pH, EC and alkalinity from soil leachates.
- Data analysis, including: determination of net precipitation from meteorological data from the Keele weather station; determination of groundwater flow direction and hydrological continuity between surface water bodies and groundwater; the water budget for the lake; water quality analysis of surface water and groundwater samples.
- Production of an "environmental baseline survey" technical report.

The skills and knowledge that this series of practical sessions aim to develop are consequently wide ranging and include "personal transferable skills" in addition to subject and career specific skills, including: 1) subject-specific field and laboratory skills; 2) group work and leadership skills; 3) an awareness of environmental consultancy careers; 4) written communication skills in the form of a technical report; 5) project planning and working to a budget; and 6) IT and numeracy skills.

## Evaluation of the EBTS project

## Student evaluation

Student evaluation of the project was carried out in two ways: 1) questions incorporated within the "personal reflection"; and 2) an interview with a student who had carried out the practical sessions in their original form and then as part of the Environmental Baseline Teaching Simulation project.

### *Student reflections*

Ninety percent of students rated their enjoyment of the series of practical sessions as between 3 and 5, on a scale of 1 to 5 (with 5 being very enjoyable). Students were asked to reflect on what were the best and worst things about the project. By far the most popular element was the collection of data and fieldwork. Other aspects that were favourably viewed by several students included carrying out spreadsheet-based calculations, working in teams, and the laboratory analysis. Some students (although relatively few) referred explicitly to the "real world" connections, one student writing, that the, "*real lifeness made it a lot more interesting*". In both years students referred to the perceived relevance of the skills learnt, responding that they enjoyed, "*learning the methods used by professionals that could one day be crucial to our careers*", and that they valued the "*practical skills which could be of use in careers*". The aspects of the project that were least popular with the most students included, the spreadsheet calculations required, writing

up the report and some aspects of the data collection, analysis and interpretation. Several students referred to problems associated with working in groups, including the sense of "*doing more than [their] fair share"*. Clearly, problems arise as a result of working in groups and there is some difference in what students enjoy, however in general, the students seemed to particularly appreciate collecting field data and the careers relevance of the project. Eighty eight per cent of students have a greater understanding of careers available in environmental consultancy as a result of this project.

The learning matrix was designed to help students reflect on what they have learnt during the project. Comments on the usefulness of this "learning matrix" included, "*it gives a list of all the skills used during these practical sessions which is useful"*, "*shows how much [I] actually haven't understood and possibly that I should have put more effort in to it"*, "*it does give me some confidence in knowing that my knowledge has improved over this short period"*, and "*definitely tells me the practical has taught me well"*. This suggests that the matrix is useful in highlighting the key skills covered and the students' grasp (or otherwise) of them, and importantly, in giving students confidence in their learning. The feedback from students on the learning matrix suggests that it was seen as a useful exercise, with 82% of students finding the matrix quite useful to very useful in both years the project was run. The role of reflection is clearly valuable in allowing students to get the most from their education while also enhancing employability and enterprise skills (Philip, 2006).

***Student interview***

In order to evaluate the student perception of the changes made to the practical sessions, an interview was held with a student repeating the year, and who consequently took part in the practical sessions both in their original form and in the first running of the Environmental Baseline Teaching Simulation project.

One of the major differences that the student commented on was the change in assessment from a very structured workbook to a less structured report. The student stated that looking back on the practical sessions the report seemed a better assessment, providing greater training for the forthcoming dissertations and a better learning experience by encouraging the student to think about the final conclusions and the "place" of the different aspects within the full project. The introductory presentation by the collaborating employer at the start of the project was seen as a "really good idea," showing that it was not just an "academic piece of work", and emphasised the employment context of the practical sessions. The student referred to a prior lack of awareness of different geography employment options and thought that this sort of project was a good way of showcasing potential employment avenues. Overall, the EBTS project was seen as an improvement on the original practical sessions, particularly as the report assessment involved much more "tying" together of material. The student was very positive about the changes, particularly appreciating the increased employment context, feeling that this sort of activity could be increased within the degree programme.

## Employer evaluation

During the planning of the Environmental Baseline Teaching Simulation project considerable input was provided by the Technical Director of Geological Services at the environmental consultancy, MJCA. Initial discussion about the skills portfolio of an ideal graduate employee helped inform the learning outcomes of the EBTS project. This collaboration also provided the opportunity to make the simulation more realistic, by providing the clear legislative framework under which such work is typically carried out. It was also decided that the consultant would present the introduction to the project and the context of Environmental Baseline surveys and Environmental Impact Assessments directly to the students (hence also introducing the students to figures from local employers), and that the consultant would be able to provide additional feedback on the completed reports.

From the employers' perspective first degree, (BSc and MSci) graduates often lack the skills that enable them to make the transition from university to employment. These skills include the ability to draw together disparate sets of information from diverse sources to form a coherent evidence- based argument that can be communicated in the form of a technical report. All too often it appears that the employer must train new graduates in these skills, the reason for which may in part lie in increasing modularisation of higher education which results in students being trained to pass exams on discrete topic areas rather than allowing the development of independent thinking.

The Environmental Baseline Project is considered valuable in addressing some of these deficiencies as it forces students to make choices over which data should be used, and based on the data available to make a holistic assessment of all the data on which to prepare their report. This method is far more akin to the techniques that will be used in industry and is likely also to provide a less superficial learning experience. Rather than eroding "critical intellectual skills" as some would argue is the case (e.g. Johnston, 1997) such exercises do the opposite and actually help develop the "critical intellectual skills" that the current modularised forms of higher education teaching do not. Such reports also illustrate to students the potential relevance of their academic studies to their future careers.

It is considered from the employers' perspective that all too often those working in higher education feel that the involvement of future employers somehow taints their academic credibility, whereas from the external perspective the result is that teaching is occurring in isolation from the reality of how the knowledge and skills that students develop will be used. There appears to be some reluctance at least in the geography and earth science spheres of higher education to engage with industry beyond those companies who operate in the energy sector. It is not known whether this is through ignorance of the diverse range of potential employment sectors or a belief that there is an unwillingness to engage with academia. Based on a number of recent visits to university careers events it is clear that many students in geography and earth sciences are unaware of potential career opportunities in environmental consultancy for example. It is considered that through engaging directly with industry across a number of sectors that teaching can be made more relevant to the future employment destinations of the graduates, and rather than eroding

the development of critical intellectual skills that these, on the contrary, will be developed further.

## Discussion

A study by Gedye *et al.* (2004) reports that employment considerations are an increasingly important reason why students study for a degree. However, current geography *undergraduates* had a much greater belief that a geography degree would open up a wide range of career options than geography *graduates*, suggesting a potential change in the perceived usefulness of geography in terms of graduate employment when graduates are trying to enter the workplace. One student responds,

'I enjoyed the course because of my personal interest in geography but it did not enable me to follow the career path intended, which was Environmental Consultancy.' (Gedeye *et al.* 2004, p 387)

Such evidence suggests that Geography degrees may be failing to fulfil the employment expectations of at least some students, and that there may be a lack of satisfaction in geography graduates' 'career-readiness.' However, it should be noted that the results for career satisfaction of geography graduates in the study by Gedye *et al.* (2004) are similar to those found for all UK graduates. The study by Gedye *et al.* (2004) also suggests that over 90% of students and graduates alike believe that the curriculum should include skills useful to employment. Thus, despite some debates amongst academics on the role of universities in providing such skills, there seems an overwhelming pressure from students that they should be given the opportunity to develop these skills. The EBTS project also shows that students clearly appreciate the opportunity to develop subject-specific, career-relevant skills.

The role of the university has changed in society. Students and government alike, the funders of the university's core activities, believe that it is the responsibility of universities to provide career-ready graduates and to address the employment prospects of their graduates. This can only be achieved satisfactorily through increased communication between higher education, and both private and public sector employers. Such increased communication should be embraced as an opportunity to benefit all parties: the students, through a relevant and informed careers-orientated programme; employers, through a supply of 'career-ready' graduates requiring less initial training; and the higher education practitioners, though increased student recruitment, awareness of current legislative frameworks and increased opportunities for collaborative research. Clearly there are many benefits to be gained by the re-orientation of components of existing 'traditional' skills programmes to focus on career-relevance. This project shows that curriculum developments to address the employability agenda do not have to involve substantial rewriting of course material and that it is worthwhile assessing whether existing material can effectively be re-orientated to address the changing pressures on higher education curricula.

In order to ensure the career relevance of curriculum changes, it is desirable to involve both private and public sector employers. This ensures that projects aiming to provide 'real world' simulations are: realistic and relevant; placed within a current legislative framework; and address the needs of the employer; therefore providing the students with a greater understanding of work carried out in different employment sectors and the opportunity to develop career-relevant skills. It is notable, however, that in the first running of the project where the introductory legislative framework was presented by the environmental consultant, that no student (other than the student interviewed) referred to this in their reflection on the project. This suggests that the environment in which learning takes place may have a greater effect than the person delivering the material, hence it may be more effective to take students away from their normal 'classroom' environment in order to interface effectively with potential employers.

## Conclusion

This project has shown how a simple re-orientation of existing course material in a traditional 'skills and techniques' module in a physical geography degree programme can provide an effective and efficient way of addressing the responsibility of higher education to address the employment prospects of it graduates. The involvement of employers in the design of material and its evaluation ensures the careers-relevance of any curricula developments while also providing additional opportunities and benefits for the students, employers and higher education practitioners alike.

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