MANCHESTER 1824

The University of Manchester

Centre for Excellence in Enquiry-Based Learning

Project Case Study

Embedding Interdisciplinarity: The Evolution of an Undergraduate EBL Module

Charlotte Woods, School of Education;
Julia McMorrow, Geography, School of Environment and Development;
Isobel Braidman, School of Medicine;
Susana Lorenzo-Zamorano, Spanish and Portuguese Studies, School of Languages, Linguistics and Cultures;
Caroline Bowsher, School of Life Sciences, Biological Sciences

Abstract

Over the three-year history of this project, the Enquiry-Based Learning (EBL) course unit under consideration in this case study has evolved considerably. It has been run annually but it is the most recent version (2005/06) that is the main focus of this article. The eleven-week, credit-rated unit is unusual in that it provides undergraduates from a number of different Schools with an opportunity to collaborate in interdisciplinary enquiry. In its most recent incarnation, students from Geography, Medicine, Education, Modern Languages and Biology undertook desk research and pooled their disciplinary knowledge in developing strategies for addressing complex societal and environmental problems.

The article provides brief background about how the unit came about and how its design has evolved. A large number of conference papers, publications and in-house presentations have arisen from the project, and some of these are detailed in the references section. Throughout the three years of the project, the evaluation strategy has combined the collection of quantitative and qualitative data. The methods and the findings from the most recent set of data are put forward and further project developments proposed.

Background and Origins

The idea for the course emerged from a Teaching Research Development Network symposium, 'Working together across the disciplines', held in 2002. Academics working on undergraduate programmes in a number of departments expressed an interest in collaborating. This led to a pilot course being run in 2003/04, adapting the first part of a Communication Skills course unit design used successfully over many years in the (then) School of Geography.

The interdisciplinary project that is the focus of this report represented Part 1of a 10-credit course unit, offered during weeks 1-6 of Semester 1. In the pilot (2003/04), twelve undergraduates from the Schools of Geography, Medicine and Education collaborated in interdisciplinary teams of three in conducting desk research into complex interdisciplinary problems. Teams were required to pool their disciplinary expertise in proposing strategies to address their self-selected problems, both in the form of a group oral presentation and as a written report.

Participants continued their studies within their own departments in their discipline groups in weeks 7-12. The Geography students re-joined other Geography undergraduates for Part 2 of the Communication Skills course. The format and assessment varied between disciplines, but example tasks undertaken in weeks 7-12 included an additional oral presentation and the maintenance and analysis of a reflective journal.

In the following academic year (2004/05), the project saw the addition of staff and students from Modern Languages (Spanish) and Biology. In the light of evaluation findings from the pilot, modifications to the course structure and learning tasks were made. Most notable were (i) the introduction of WebCT, a virtual learning environment (VLE), to counteract some of the communication difficulties encountered by the interdisciplinary student teams on the pilot; (ii) to encourage closer integration of content from the participating disciplines, the replacement of the written report, as an assessment task, with a team poster; and (iii) the requirement that teams select problems with a societal or environmental focus for their

interdisciplinary enquiry, a feature of three of the four projects chosen in the pilot.

The modified course design employed in 2004/05 was judged favourably by students in the second year of the project and was retained largely unchanged in 2005/06. The staff team also remained unchanged and 21 students took part in the course in 2005/06 as follows:

1. 7 x BA and BSc Geography, year 2;
2. 1 x BA Language Literacy and Communication (Education), year 3;
3. 5 x BA Spanish, year 3;
4. 7 x BSc Medicine, Intercalated degree;
5. 1 x BSc Biological Science, year 2.

There were a number of differences in the way the course fitted into the regulations of the various home disciplines. For example, all students taking the unit were volunteers, except the medical students for whom it was a compulsory part of their course. All students were awarded credit for the unit, except the biological scientists.

As in the previous years, in 2005/06, students continued working in weeks 7-12 in disciplinary groups in various ways.

Rationale

From both the staff and student perspectives, an important aspect of the unit was the theme of societal responsibility. The importance of encouraging a focus on social awareness and humane values is very much to the fore in recent HE research and policy, nationally and internationally (Barnett 2003; Kezar 2004; Scott 2004). It is also fully in keeping with the *Manchester 2015 Agenda*, which refers to 'the moral responsibility of all staff and students to contribute as educated, informed, tolerant citizens to the enrichment of social and cultural life and to the advancement of human well-being in their own communities and around the world'; helping students 'to develop…humane values' and encouraging its staff and students 'to concern themselves with problems of inequality, violence, poverty and deprivation nationally and internationally'. Global and societal issues are

best addressed in interdisciplinary fashion, requiring students to communicate their knowledge and skills across traditional subject boundaries (Huber 2002; Jenkins 2002; Eisen *et al.* 2003). Many of the learning outcomes for this unit, therefore, had communication as their focus.

The approach taken attempted to maximise student choice (e.g. about the topic of enquiry and ways of working) while providing resources to support learning and a series of 'milestones' to help keep the EBL projects 'on track'. Such 'open' course designs, with a clear purpose and supportive structure but involving minimal direction of group negotiations, are considered to encourage interaction between team members, as participants not only have to discuss disciplinary content but also have to plan and make choices (Reynolds 1994). This 'hands off' approach has the advantage of allowing teams to cohere 'naturally' and establish their own norms, though active facilitation was provided to stimulate discussion, monitor progress and provide clarification and information as required.

Like its Curriculum Innovation-funded forerunners in 2003/04 and 2004/05, the pedagogy underpinning the project serendipitously included a number of other features that sit well with the University's strategic vision (http://manchester.ac.uk/aboutus/facts/vision). Enquiry-Based Learning, interdisciplinarity and the use of WebCT to facilitate learning are elements consistent with the *Manchester 2015 Agenda's* strategic goals of encouraging creativity, innovation and the use of ICT in pedagogy. Furthermore, there was considerable emphasis on partnership with students through elements such as peer assessment, the negotiation of topics for enquiry and the significant contribution of students to the future development of the unit. 'Students as Partner' is very much on the institutional agenda and was the theme of the 2005 Teaching Research and Development Network Symposium[1].

[1] Teaching Research and Development Network Annual Symposium, 27 May 2005 University of Manchester.

Approach

Appendix 2 provides a comparison of the unit session by session in its pilot and most evolved forms. Typically, in the 2005/06 version, students had one two-hour timetabled session per week, with staff from each of the five disciplines present to offer disciplinary expertise and to act as facilitators. One timetable slot was also provided each week when students could meet with their team-mates if they so wished, without their tutors. Tutors also took responsibility for providing feedback on postings to the VLE for specific teams. To follow is a brief explanation of some of the tasks and activities devised for the start of the course, to give something of a flavour of the unit and an idea of the types of support for EBL that were built into the course design.

At the start of the course, icebreaker activities were organised with the aim of building a strong sense of classroom community. Both face-to-face and on-line icebreakers were provided, the latter also serving to familiarise students with the VLE. A supportive classroom climate is considered especially important in an EBL context where students may perceive an extra degree of risk in taking responsibility for their own learning. This is especially so in *interdisciplinary* learning, where students negotiate with those with different assumptions and ways of working, and scholars suggest that taking care to encourage a supportive climate is especially apposite (Ivanitskaya *et al*. 2002). Further steps taken to build and sustain such an atmosphere included putting group photos on the VLE, and social gatherings, with modest refreshments, in the first and final sessions.

An important feature of the unit was the structured learning approach to the EBL process, which was intended to assist those for whom student-centred learning was a relatively new experience. As this was to be a generic unit, open to any discipline, a grounding in EBL could not be assumed. Whilst the medical students were very familiar with problem-based learning (PBL), others had mixed experience of this and other forms of EBL. The unit was structured around a series of milestones, with a worked example for each. Teams were required to make postings to WebCT discussion board for each stage by a specified time. Examples were provided online by tutors for each

of the stages, using a topic chosen in the first run of the project, 'AIDS in a South African mining community'. This provided 'scaffolding' for those who might otherwise feel this to be a somewhat daunting way of learning. It provided a structure, a timetable and concrete examples for those new to EBL. An archive of posters from the previous cohort were also available online as further examples. The 'Track pages' facility in WebCT showed the popularity of these and the sructured examples (Appendix 2).

At the end of the first session, students were assigned to teams of three or four, ensuring that no team had more than one member from the same discipline. Students were asked to complete an individual task: that of finding a 'starter article' to bring to the table to trigger negotiations within their team about a suitable topic for enquiry. Each student was expected to identify one or more such articles dealing with interdisciplinary societal or environmental problems to which each of their team members might be able to make a contribution. Individual students then posted abstracts of these for their team-mates on the VLE and brought the full articles to the next session to act as a basis for negotiation of a suitable enquiry problem (details of the student project teams and of their chosen topics of enquiry are provided in Appendix 3). Example sources for suitable articles and of actual articles were provided by the staff team.

Other tasks were provided for face-to-face sessions and for posting to the VLE throughout the course (see Appendix 3). Worked examples of these tasks, along with guidance about all other major aspects of the course, were highlighted in weekly classroom-based sessions and made available on WebCT (e.g. guidance on poster design, details of assessment criteria, information about useful websites and electronic databases for desk research).

This series of tasks culminated in teams producing posters of their interdisciplinary enquiry-based projects and presenting them orally in the penultimate 'Poster Symposium' session of the course. The poster design was to reflect a high level of integration of knowledge from the various disciplines in analysing and addressing the chosen societal problem. As well as being assessed on group presentations based on the posters, in the final

'Question Time Symposium' session of the unit students were assessed on their ability to prepare and respond to both spontaneous and more searching 'seen' questions that had been posted on WebCT by members of other teams and staff a few days earlier. Again, with the aim of promoting interdisciplinary exchange, individual team members were required to respond to questions related to another discipline than their own, having been briefed beforehand by the appropriate specialist team-mates.

The use of WebCT was a significant feature of the unit, facilitating communication within and between teams. The VLE was fully integrated into the unit by including an orientation session in week 1 and building in a series of web-based tasks to familiarise participants with the environment and encourage its use (see Appendix 3). It acted as an environment for: (i) social and project-related communication; (ii) making support documents readily available; (iii) a vehicle for submitting tasks at each milestone in the EBL process and for receiving feedback on them; and (iv) the display of visual material and project outputs (e.g. photos of participants and completed posters).

Assessment

The staff team were keen to involve the students in all aspects of the course so peer assessment counted equally with that of tutors in assessing the quality of the teams' output: their posters and oral presentations. Staff and student participants were therefore provided with assessment forms on which to rate, on a five-point scale, aspects of: (i) the content and design of team posters; and (ii) the teams' oral presentations and handling of questions. Participants were also asked to assign a classification to each team (1, 2i, 2ii, 3, Fail). The forms provided space for comments on the best features of the outputs and suggestions for improvement.

The numerical ratings and degree classifications assigned by the staff and student participants formed the basis of a percentage mark for each team, to be forwarded to the relevant examination boards. Only for the Spanish students was the grade incorporated in the year average. For other students, the mark merely served a formative purpose, with a pass/fail grade being recorded. In order to enhance the degree of co-operation

within teams, no individual assessed elements were included, all members of a team receiving the same mark. Verbal comments noted on the forms for each team were collated and passed on to students to provide formative feedback.

Evaluation

Research Methods

The course in its current format was only delivered for the second time in 2005/06 and was thus at an early stage of development. It was therefore considered essential to not only gather adequate numerical data for summative evaluation purposes, but also to capture more open-ended impressions for formative purposes. The evaluation of the project drew on both quantitative and qualitative data. Numerical data were derived from:

- course unit evaluation forms, completed by participants at the end of week six (i.e. the end of the interdisciplinary team projects);
- student self-evaluations, completed in the first session and at the end of week six.
- WebCT 'Track page use, showing most visited pages (Appendix 2)

The principal qualitative data were interviews with participants. On the continuum between a very structured and entirely open-ended format for the interviews, a semi-structured approach seemed most appropriate. This allows for: (i) the inclusion of open-ended questions; (ii) time for follow up probes; and (iii) some flexibility in ordering questions as the interview unfolds. Questions were included to: (i) gain information about students' reactions to the course; (ii) gain their views on how it might be modified or improved; (iii) see whether they had gained insights into their own or others' disciplines as a result of the course; and (iv) try to determine what, if anything, was distinctive about EBL in interdisciplinary teams, as compared to mono-disciplinary group projects.

Interviews were conducted as follows:

- 2 x interviews with individual students;
- 3 x mono-disciplinary group interviews with students of Spanish, Geography and Medicine;

- 2 x student project team interviews;
- open-ended items on course evaluation forms.

Consistent with the principles of informed consent, participants were given full information about the commitment implied by the evaluative research, assured of anonymity and given the possibility to withdraw from the research at any time. Given that the interviews were conducted by insiders (a member of the staff team and a student), to try to counteract the tendency for students to say what they think the staff team want to hear, informants were encouraged to be as open and honest in their comments as possible for the benefit of course development. Interviews were audio-recorded, transcribed and analysed thematically.

The student data were triangulated against the impressions of the staff team as captured in fieldnotes during meetings and teaching sessions. The staff team also read the data and this article in draft form, to verify the trustworthiness of the interpretation.

Results

The course unit evaluation form required students to rate aspects of the course on a scale of 1-5 from 'very good' to 'very poor'. The majority rated all aspects either 'very good' or 'good', the most common strengths mentioned in the open-ended questionnaire items being: (i) the opportunity to work with 'new' people/those from other disciplines; (ii) learning new approaches to research and study; (iii) seeing problems from a different or more holistic viewpoint; and (iv) the freedom to choose topics/work independently (see Appendix 5).

Either two or three of the six aspects were rated 'poor' by 2 of the 18 respondents, both Medics. It should be borne in mind that the unit was compulsory for these students and that one of them had recently transferred from another university so was unused to the form of learning through enquiry (PBL) already very familiar to the Manchester Medics. The majority of the Medics in 2005/06, and all of those in 2004/05, rated the unit highly. This suggests that the course is highly appropriate for them but may require 'selling', especially to any newcomers to The University of

Manchester. A rating of 'poor' was given by both these students for the quality of the unit overall, by one student for the experience of working across disciplines, and by both students for the assessed tasks. Unfortunately, no specific comments on the assessed tasks were written by these two students. However, the main criticisms of the course cited by them seemed to stem from the slow start to the course and, in one case, perceived problems with incorporating a Spanish component into the team's project.

The point about speeding up the pace of work earlier in the course to allow more time for the production of the poster later on was echoed in comments by the rest of the group when asked how the course could be improved. Another comment that recurred was questioning whether the course should be for volunteers only. Such comments emerged both from non-Medics, who were all volunteers, and Medics, who were not. The fact that the Medics were obliged to take the course seems to have been a cause of discontent for a small but vocal minority of the group.

Pre- and Post- Unit Student Self-Evaluation Forms

Both at the start and at the end of the course, students were asked to rate their confidence in their ability to carry out nineteen activities successfully, abilities which the unit sought to develop (explaining concepts to those from another discipline, being open to ideas from unfamiliar disciplinary perspectives, negotiating with the team, refining research problems, poster design, oral presentation, providing constructive feedback, etc). Twenty – one pre- and 19 post-course questionnaires were completed. An increase in mean confidence ratings between the start and end of the course was noted for thirteen of the nineteen abilities. Most notable gains in mean confidence rating were for the following:

- Negotiate effectively with my group in identifying a societal or environmental problem to work on that is acceptable to all parties (+ 13.8%);
- Use my design skills to help the group prepare an effective poster for our project (+ 15%);
- Respond to questions from the floor with confidence (+ 18.8%).

Interestingly, a *decrease* in mean confidence rating was in evidence for six of the nineteen items. In the case of five items, these were minor (a drop of around 2.5%), but for one, 'To complete the tasks I have agreed to undertake to an acceptable standard and by the deadline', a decrease in mean rating of 21.6% emerged. This is perhaps explained by the fact that, in interviews, a number of students seemed to be experiencing guilt at not putting the same amount of time and effort into their projects as their team mates, or feeling that a lack of time had impaired the quality of their work (see Appendix 6 for results).

In group and individual interviews with students, comments about the course in general, about the quality of staff support and about the learning and assessment tasks were favourable in almost all cases, and echoed those on questionnaires. A number of students mentioned an increase in confidence as a result of the course, such as in this student-student interview:

> Q: *Do you feel this course has given you an advantage for the future?*
>
> R: *Definitely! I've included it on my CV just because I felt it was the best group project I've done. I really enjoyed it and I've got a lot more confidence from doing it.*

Producing posters and giving oral presentations were generally perceived to be worthwhile tasks:

> *I think we felt really proud when we did the actual poster because those two had never done a poster before. We were all quite excited about (it). I think you can give the research poster more respect once you've done it.*

Responding to pre-seen questions in the final session was appreciated as an opportunity to 'really show what we know'. Writing abstracts and using the VLE were also novel activities for some students and were singled out for favourable comment, for instance, on WebCT:

> *I think it contributed a lot actually. We used it an awful lot, especially in the last two weeks. I think without it we wouldn't have been able to meet the deadlines.*

Less favourable reactions also echoed those made on questionnaires. By far the most frequent comment made was that work on the initial group tasks was too protracted. A common perception was that these could be reduced in time and/or number to allow for substantial progress on the poster to begin earlier. A partially related point was the fact that some of the medical students felt there was insufficient time to go into their enquiry problem in sufficient depth. Given the complex and intractable nature of the problems they were dealing with, they felt their posters were too 'basic' and the task somewhat 'contrived'. One student considered that PowerPoint presentations would be more appropriate and another proposed straightforward peer teaching of disciplinary content as an alternative. It was suggested that more face-to-face contact would have been of benefit, though it is not clear how far this was the view of the wider group, as it was not proposed in questionnaire feedback.

As with the questionnaire data, less favourable reactions to the course typically came from a small minority of the Medics, some of whom seemed unhappy that the course was compulsory for them. These students considered that they had received adequate preparation in explaining their discipline to those outside it through their degree programme. Some also experienced guilt, feeling they were not pulling their weight in their teams because of their inferior motivation for taking the unit. It is important to note that the interview in question was conducted only halfway through the course, and the teams to which these individuals belonged still produced effective posters and presentations. It is possible that their attitude may have changed once they began working intensively on their posters and presentations. In contrast to the largely favourable comments on WebCT, another Medic commented that there had been 'far too much reliance on the internet. You can't beat face-to-face.'

There was a good deal of evidence of new insights, or reinforcement of ideas, about students' own or other students' disciplines and how they might complement one another, as illustrated in these quotations:

> *I just found that it reinforced something that I kind of feel about Geography in that it's very integrative in approaches to problem solving. Instead of looking for a single option, knowing that you have to come at*

a problem from several different peoples' views and even if one approach is right, you can't just ignore the other opinion, even if it's a destructive opinion or anything like that. You can't ignore it because it's what people hold and if it's what a large number of people hold, it's going to be an obstacle to your solving peoples' problems. I think that Geography has a role to play there. (Geography student)

I didn't realise how 'sciency' Geography could be.

The medic's [discipline] was completely scientific and yours [Education] was more like mine in that you look at all the different factors involved. It's good to have a mixture of thinking of the broad issues and then focussing down.

The Medic is very thorough. Like, he went into far too much detail to what was needed for this poster when he was doing his research; but I would say that that's what he's trained in to do as a Medic. He was just extremely thorough in his work.

A small minority of students felt that it was difficult to incorporate the disciplinary knowledge of the Spanish students, especially given the societal/environmental focus, except by setting the problem in the Spanish-speaking world. Their reasoning suggests a lack of understanding of what the discipline involves, however, and suggests the course might benefit from activities that enable students to consider their own disciplinary assumptions and preconceptions:

I feel that the only real skill that they bring is the ability to speak Spanish.

I don't understand the point of saying let's do something to include the Spanish student because then that's pandering to their lack of interdisciplinary breadth.

Other students did not view this as a problem, several specifically mentioning how much they welcomed the historical, cultural and political background this group could bring:

I was really impressed with the languages people. They're quite like geographers in some respects because they've got their hands in a lot of pockets basically because they don't just study the language and we don't just study maps.

Students were largely favourable towards the idea of extending the range of disciplines in the project, with Law and Engineering being mentioned. Some students' comments suggest doubt about introducing less obviously relevant disciplines (such as art and philosophy), but, again, this may be largely due to a naivety about what these subjects entail, or lack of openness about finding out, or simply 'jokiness':

I don't think we want any fine art students here.

If you had a philosophy student, you could just sit round and talk.

All students on the course considered that they had had some prior EBL/PBL experience at University, so were asked whether EBL across the disciplines was in any way different. The feature of the interdisciplinary unit that seemed to make it distinctive from prior EBL experiences was often similar to those given as motivations for taking the course and for its most enjoyable aspects, and the comments were similar to those made in questionnaires. Students welcomed the opportunity to research a topic of their choice and one not directly related to their degree programme. They liked the fact that the problems were current and 'real', rather than scenarios or exercises invented by tutors. Interestingly, many of the topics chosen in this and previous years were very cutting edge, anticipating major news stories by several months (e.g. bird flu, mortality through traffic accidents in the developing world, recycling, sport relief).

Other distinctive aspects included: seeing how other disciplines approach research/problem-solving in different ways; finding out what students on other courses are learning; the challenge of explaining one's own discipline content and ways of working; the novelty of working with new people in new locations; the novelty of working closely with team-mates throughout the process (contrasted with PBL, typically involving individual research to be pooled at the end); having their pre-conceptions about other disciplines challenged; relevance to the interdisciplinary nature of future professional life; and finding out about new techniques or resources (e.g. note-taking techniques, ways of displaying information, electronic journals and databases).

Anecdotal evidence suggests that the course had an impact on some individuals over the longer term. Some interdisciplinary teams have remained firm friends since the project. A number of students have told tutors over the years that it was the best course they had done while at university. One student in 2005/06 was so inspired by his team's project on the plight of Brazilian street children that he has gone to work with them as a volunteer.

The Staff Perspective

From the point of view of the staff team, judging from the evaluation data, our observations of the way the groups worked together and the quality of the posters and presentations produced, the EBL course design employed in this unit is one that can work effectively. The opportunity that it provides is, for both staff and students to work with colleagues from other schools is, we believe, something that is inherently worthwhile. We have all gained insights into different disciplinary practices and have had first-hand experience of the challenges, given our different backgrounds, of jointly preparing presentations and written reports. In 2005/06, in addition to two presentations at meetings for CEEBL project-holders, papers were given at the HE Academy Annual Conference (Woods *et al.* 2006) and to the Languages, Linguistics and Area Studies Subject Centre (Lorenzo-Zamorano 2006).

As in any group-based EBL, there is potential for inter-personal conflict to arise, but over the two years that we have run the course in its current format, all groups have succeeded in overcoming any such potential difficulties and in producing work of good quality. Many students have spoken with great enthusiasm about the experience and compared the unit very favourably with other study experiences at the University.

Discussions among the staff team over the three years of the project have highlighted a number of specific challenges involved in organising EBL that crosses disciplinary boundaries. Foremost among these is the question of staffing and how this should be funded. This is a common problem in interdisciplinary work. As institutional and supra-institutional structures (the Research Assessment Exercise, the Quality Assurance Agency, etc) are

run along disciplinary lines, such courses have no natural ‘home’ in Higher Education Institutions, no dedicated staff and, therefore, no security in the longer term (Lattuca and Stark 1994; Bird 2001; Canning 2005).

In terms of course development, challenges arise from the variation required to make the unit fit with degree programmes from different schools (e.g. in whether it is five or ten credits; voluntary or compulsory; accredited or non-accredited; assessed as pass/fail or with a percentage mark). If the EBL unit model devised is to be employed more widely on campus, it seems likely that it would need to be adapted so that it can stand alone as a 10-credit option.

Further Development

It is likely that extending the course to 10 credits, and raising awareness about it across the campus, will be the primary tasks of the staff team in the next phase of the project, if it continues. Data suggest that, if it is to be compulsory for any students, or where EBL approaches are unfamiliar, a degree of ‘selling’ of the concept will be appropriate.

Developing the course into a 10-credit option would give scope for more in-depth enquiry into the students’ chosen problem, which would answer the criticism by some students that their research did not go far enough after the six week block, and offer alternative forms of interdisciplinary communication, such as press releases. Furthermore, it would allow more time to be set aside for each team to respond to seen questions, an important element of the course that was reduced in 2005/06 to accommodate the increased class size. Modifications to the course to accommodate these ideas have already been discussed by the staff team. It would also allow time for more activities, with the explicit aim of raising awareness among students about the nature of interdisciplinary communication and developing their competence in this area. Data reveal large differences in the readiness of students to engage in interdisciplinary exchange and this is something that could be worked on. A forthcoming paper presents some ideas that could be helpful in this respect (Woods 2006).

References

Barnett, R., 2003. *Beyond all reason: living with ideology in the university*. Buckingham: Society for Research into Higher Education/Open University.

Bird, E., 2001. Disciplining the interdisciplinary: radicalism and the academic curriculum. *British Journal of Sociology of Education*, 22(4), 463-478.

Canning, J., 2005. Disciplinarity: a Barrier to Quality Assurance? The UK Experience of Area Studies. *Quality in Higher Education*, 11(1), 37-46.

Eisen, A., Cimino, A., Aparicio, H., Marsteller, P and Kushner H., 2003. Race and science: using a comprehensive interdisciplinary approach to address complex issues. *College Teaching*, 51(2), 46-52.

Huber, L., 2002. From general education to interdisciplinary studies. *Higher Education Policy*, 15, 19-31.

Ivanitskaya, L., Clark, D. Montgomery, G. and Primeau, R., 2002. Interdisciplinary learning: process and outcomes. *Innovative Higher Education*, 27(2), 95-111.

Jenkins, J. A., 2002. General education in the University of Massachusetts Amherst: a new rationale. *Higher Education Policy*, 15, 45-54.

Kezar, A., 2004. Obtaining integrity? Reviewing and examining the charter between Higher Education and society. *The Review of Higher Education*, 27(4), 429-459.

Lattuca, L. R. and Stark, S. J., 1994. Will Disciplinary Perspectives Impede Curricular Reform? *The Journal of Higher Education*, 65(4), 401-426.

Lorenzo-Zamorano, S., 2006. Cross-faculty interdisciplinary work, or how to work with the 'others'. *Disciplines in dialogueII: interdisciplinary teaching and learning conference, 13-14 July 2006 Subject Centre for Language, Linguistics and Area Studies, University of Birmingham*.

McMorrow, J. Woods, C., Braidman, I., Lorenzo, S. and Bowsher, C., 2006. Embedding interdisciplinarity; developing a generic EBL team project module for undergraduates. *Centre for Excellence in Enquiry-Based Learning First Annual Symposium, 30 June 2006 University of Manchester*. Available from: http://www.campus.manchester.ac.uk/ceebl/events/archive/projectsymposium2006/

Reynolds, M., 1994. *Groupwork in education and training; ideas in practice*. London: Kogan Page.

Scott, P., 2004. Ethics 'in' and 'for' Higher Education. *Higher Education in Europe*, 29(4), 439-450.

Woods, C., McMorrow, J. and Braidman, I., 2004. Interdisciplinarity in the undergraduate curriculum: a pilot study. *British Educational Research Association Annual Conference, 16-18 September 2004 University of Manchester*. Available from: http://www.leeds.ac.uk/educol/documents/142877.htm

Woods, C., 2006. Researching and developing interdisciplinary teaching: towards a conceptual framework for classroom communication. *Higher Education* (in process). Available to subscribers of the online journal from: http://www.springerlink.com/content/b111317n23161394/'

Woods, C., McMorrow, J. and Braidman, I., 2006. Interdisciplinary learning in the UK HE sector: challenges and possibilities. *Discussion session at the HE Academy Annual Conference, 3-5 July 2006 University of Nottingham*.

Appendix 1: Learning Outcomes for the Unit

By the end of the course unit students should have:

- Developed skills of interdisciplinary communication, i.e. explaining aspects of your own discipline to others and developing an understanding of other disciplines' ways of working
- Identified, refined and addressed a societal or environmental problem suitable for small-scale, interdisciplinary enquiry
- Through preparation of a poster presentation, developed an awareness of the ways visual and oral means of communication can work together to enhance understanding
- Achieved a higher level of confidence in presenting a logical, structured argument in the form of a team oral presentation and in responding to questions
- Developed your ability to use WebCT and online learning
- Developed an ability to provide constructive feedback on the work of your peers
- Provided evidence of reflecting critically on working in an interdisciplinary team and gained experience in reflecting on your learning
- Taken an active role in future development of the course unit under the ethos of 'students as partners' in course development.

Appendix 2: Most Visited Pages of WebCT Unit using 'Track Page Use'

WebCT page	No. of times visited	Percent
Poster Guidelines	58	13
AIDS Poster Abstract	47	10
Assessment	38	8.2
WebCT Tasks Summary	35	7.6
What Happens in Part 2?	32	6.9
AIDS Topic Statement	26	5.6
What happens in Part 1?	24	5.2
AIDS in S Africa Starter Article	23	5
AIDS Poster	22	4.8
Skills self-assessment form	22	4.8
Learning Journal Examples	20	4.3
Poster Assessment Form	20	4.3
2005 Teams	18	3.9
Learning Journal	14	3
Course Overview	13	2.8
AIDS Poster Plan	9	2
Choosing a topic	9	2
Not on the Label starter article	7	1.5
Team 7: Abortion in Argentina	7	1.5
Deprivation-Regeneration starter article	6	1.3

Appendix 3: Pilot and Adapted Unit Outlines Compared

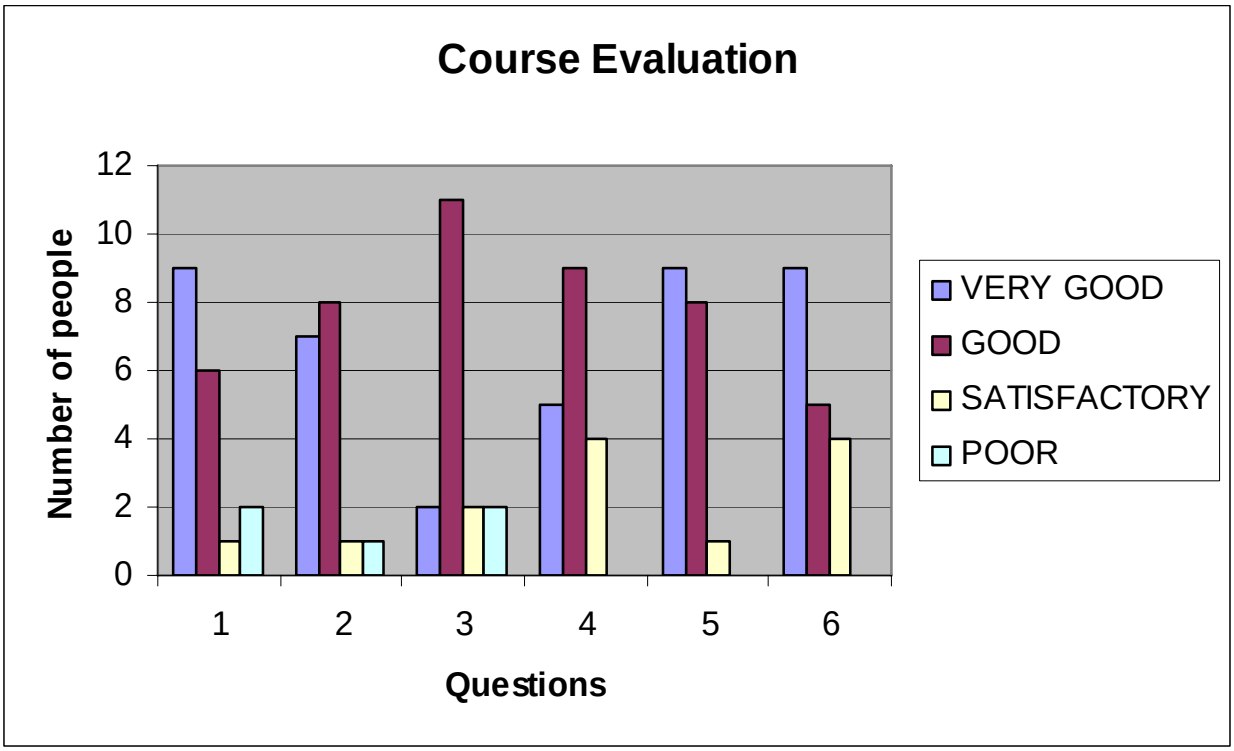
Week	PILOT VERSION	ADAPTED (2005/06) VERSION
1a	Icebreaker (with refreshments). Course orientation. Individual students identify 'starter articles' on potential societal problems to tackle in ID teams.	Icebreaker (with refreshments). Course orientation. Individual students identify 'starter articles' on potential societal problems to tackle in ID teams.
1b	**Choosing a topic.** Each team discusses its members' 'starter articles', agrees on ID problem for team to tackle on the course.	Introduction to VLE and virtual icebreaker. Students post abstracts of 'starter articles' to VLE and read others' before next session.
2a	Informal oral presentation of project proposals. Feedback.	**Choosing a topic.** Each team discusses its members 'starter articles', agrees on ID problem for team to tackle on the course and posts topic on VLE for feedback before next session.
2b	N/A	Optional timetabled class when teams can meet without facilitators.
3a	Work in project teams, with facilitators present. Monodisciplinary student group interviews with educational researcher in disciplinary groups.	**Problem definition and question framing.** Teams outline & receive feedback on their topics; define the provisional problem and questions to be addressed in their poster; post summary on VLE for feedback.
3b	N/A	Optional timetabled class when teams can meet without facilitators.
4a	Hand in of ID project reports. Oral presentations by 3 teams, discussion and feedback. Copies of reports circulated for review by students and staff for next session.	**Storyboard**. Informal presentation of ideas for the poster on a flipchart for feedback on content and layout. Interim course evaluation. By next week, teams post poster abstracts on VLE, prepare posters, anticipate likely questions, and brief other team members accordingly. Before following week, students read other teams' abstracts and draft questions. Monodisciplinary student group interviews with educational researcher.
4b	N/A	Optional timetabled class when teams can meet without facilitators.
5a	Remaining presentation. Discussion and feedback on the presentation and on all teams' written reports. Feedback on course. Refreshments.	**Poster Symposium session**. Viewing of posters and initial framing of questions; informal oral presentations by teams, followed by spontaneous questions from the audience; students and facilitators complete Part 1 assessment for each poster/team; teams agree one more penetrating 'seen' question per poster and post on VLE.
5b	N/A	Optional timetabled class when teams can meet without facilitators.
6	Group and individual interviews with educational researcher.	**Question Time symposium.** Second viewing of posters. Question-time when teams answer 'seen' questions and any other questions from the floor. Completion of Part 2 of the assessment for each team by students and facilitators. Feedback and refreshments. Follow-up interviews arranged with educational researcher.

Appendix 4: Interdisciplinary Topics and Team Composition

Team	Contributing disciplines	Project Title / topic
1	Geography; Education Medicine	Communication breakdown in the aftermath of Hurricane Katrina
2	Geography Medicine Biology	Dropping like flies: the malaria problem in Zimbabwe
3	Geography Medicine Spanish	Road safety: it's no accident (using ** as a case study of road safety in the developing world)
4	Geography Medicine Spanish	Meninos do Rua: how to win the battle with HIV among Brazilian street children
5	Geography Medicine Spanish	Air pollution in Santiago, Chile
6	Geography Medicine Spanish	The global challenge of tuberculosis (using Spain as a case study)
7	Geography Medicine Spanish	El dia del nino por nacer: a lesson to learn of an opportunity to teach? (Examining the problem of illegal abortion in Argentina)

Topics chosen by previous years' cohorts included: Recycling (comparison of the UK and Spain); Spanish flu; social impacts of political violence in Peru; arsenic poisoning of ground water in Bangladesh; obesity in children in the UK; HIV/AIDS in a South African mining community; bias in drug research (focussing on the need for anti-malarial medicines); and impact of tuition fees in the UK.

Appendix 5: Summary of Course Evaluation Data

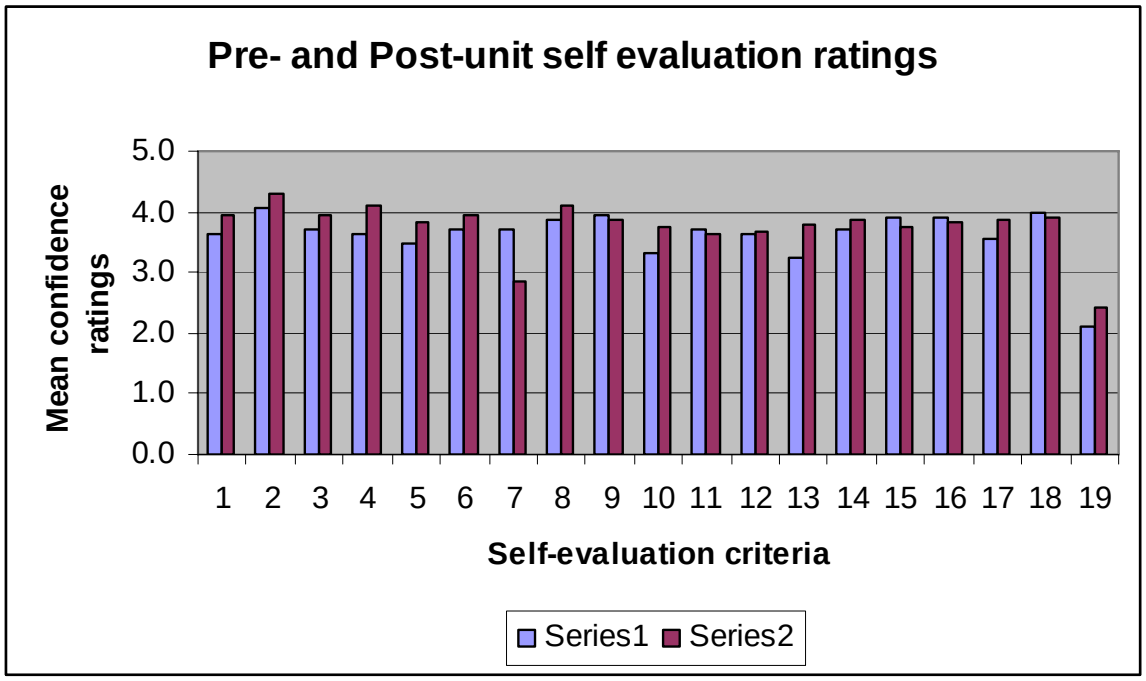


Questions:

How would you rate the following aspects of the course?

1. The unit overall.
2. Working across disciplines.
3. Assessment tasks.
4. Course documents.
5. Support from staff team.
6. Use of WebCT.

Appendix 6: Pre-/Post-Unit Self Evaluation Ratings



Series 1 = Mean pre-course ratings

Series 2 = Mean post-course ratings

1. Explain concepts and ways of working I have learnt in my university studies (e.g. approaches to research, tools of analysis) to students from other programmes.
2. Be open to the ideas from other disciplines to help me think about a problem in a new way.
3. Collaborate in a productive way, on a challenging group project, with students from other programmes assigned to work with me.
4. Negotiate effectively with my group in identifying a societal or environmental problem to work on that is acceptable to all parties.
5. Assist the group in refining the research topic so that it is manageable within the time and resources available.
6. Negotiate effectively with the group the tasks to be completed by individual members in order to bring the project to a satisfactory conclusion.
7. To complete the tasks I have agreed to undertake to an acceptable standard and by the deadline.
8. To use electronic and paper-based resources to locate sufficient, relevant information to contribute to the project.
9. Use my writing skills to help the group prepare an effective poster for our project.

10. Use my design skills to help the group prepare an effective poster for our project.
11. Prepare a clear, logical argument to present orally.
12. Deliver an oral presentation to tutors and fellow students with poise and confidence.
13. Respond to questions from the floor with confidence.
14. Access and use a web forum effectively to communicate with other course participants.
15. Evaluate the oral presentations given by my peers using the criteria provided.
16. Evaluate the posters developed by my peers using the criteria provided
17. Provide constructive oral and written feedback to my peers on their presentations and posters
18. Provide constructive feedback to staff about the unit and how it might be developed in future
19. (Except geographers. Optional for medics and biologists). Actively engage with the process of maintaining an honest, self-reflective journal of my experience of interdisciplinary learning and use this to try to understand better my own strengths and weaknesses as a collaborative learner