bioscience education

Short Communication

A Postgraduate Researcher — Undergraduate Interview Scheme: Enhancing Research-Teaching Linkages to Mutual Benefit

Roger Downie

School of Life Sciences, University of Glasgow

Date received: 12/05/2010 *Date accepted: 12/08/2010*

Abstract

A science communication project is described where undergraduates in groups interview postgraduate researchers about their research and the life of a researcher. Mutual benefits to undergraduates and researchers are described in terms of creativity, the research-teaching links agenda and employability.

Keywords*:* research-teaching links, interviews, employability, postgraduate-undergraduate interactions

Introduction

The value of the links between research and teaching in higher education has been the subject of considerable debate and has generated a huge literature: for example, see Brew (2006) and the documents emanating from the Scottish higher education enhancement theme on Research-Teaching Linkages (QAA Scotland, 2008, 2009). This issue is likely to generate heightened discussion in times of economic stringency since it is clear that learning in a research-led environment is expensive.

Traditionally, the main benefits to undergraduates of such learning have been regarded as a) the opportunity, generally in final year, to undertake a research project under the supervision of an active researcher, b) the experience of being taught by academic staff whose lectures are informed by the latest research results, and c) attending seminars given by visiting researchers. Few deny these benefits, but Brew (2006) was critical of the notion that the benefits of learning in a research environment should be available only to senior undergraduates. Surveys by Turner *et al.* (2008) and Robertson and Blackler (2006) have shown that, for many undergraduates, engagement with and knowledge of the research community that their learning is embedded in, are very limited. In some ways, this is not surprising. Courses at elementary levels, even when they include investigative elements designed to develop research skills (e.g. Mackenzie and Ruxton, 2006), are mainly concerned with building fundamental knowledge and understanding of a broad field, and rarely engage with the research being carried out locally.

Dwyer (2001) has described an approach to bringing junior undergraduates and staff researchers together. In small groups, first year undergraduates read a few research papers published by a member of the academic staff of their department (Geography in this case); they then agree on questions they wish to ask the staff member, and interview him/her about the research. Each student then writes a report on his/her findings. This scheme is still in use (Claire Dwyer: pers. comm.). Independently, from 1996, Ailsa Campbell (pers. comm.) developed a similar scheme as part of a Science Communication Course at the University of Glasgow. She and Dwyer both report that these schemes are generally popular with staff and students, though there can be a tendency for students to be in awe of members of staff and it is hard for students to be critical of staff research. On her retirement, I took over as co-ordinator of Campbell's Science Communication course and initiated some changes. The course is aimed at Scottish Level 1 and 2 students in any area of science. For practical reasons

(Campbell had sometimes encountered difficulty in finding enough staff participants for the interview assignment), I decided on a minor change to the interview: the researchers would be postgraduate students or post-doctoral fellows, not members of the academic staff. This change has had some unanticipated benefits and I have come to feel that a scheme of this sort could be valuable throughout the higher education system as a component of the research-teaching interaction. Hence this short paper explaining the scheme.

Mentored science communication research projects: how they work

1. We call for researchers to act as mentors: we limit the call to year 2 and 3 postgraduate students (we need them to have some results to discuss) and post-doctoral fellows. Currently we pay the postgraduates (at Glasgow's standard hourly rate, up to a maximum of 4h; most claim for 2h), which probably acts as some incentive. It has not been difficult to attract enough mentors. Each mentor provides a very brief outline of their research field.
2. We match our undergraduates to researchers by publicising the list of researchers/topics and asking the undergraduates to tell us their top three preferences. With the relatively small numbers (up to 40) in our Science Communication course, we have usually been able to allocate undergraduates to their first or second choice. Undergraduates have generally been in groups of 4 or 5.
3. Using our virtual learning environment (Moodle in our case), undergraduate groups are encouraged to get together and to make contact with their mentor to arrange a meeting.
4. Undergraduates are asked to find out as much as they can about their mentor's research before the meeting, so that they can prepare sensible questions in advance. Sources of information can be the mentor's web site, any published papers, posters or research seminars texts.
5. Mentors and undergraduates are given an outline of the outputs expected from the project. Currently, we ask for three outputs, each of which is assessed. The meeting between the mentor and the group is run as a group interview: this single meeting may be the mentor's only input, though they may spend additional time responding to requests for more information and some mentors in practice have had additional meetings with undergraduates.
6. The first output is a piece of journalism. Each student writes up the interview as a profile of the scientist they have met. In addition to giving an account of the science being done, the undergraduates are encouraged to ask about the researcher's life: questions such as – what is it like to be a full-time researcher; why did you choose this project; do you intend to make a career out of science? They are asked to write as a science journalist giving a rounded picture of the researcher and his/her work. As resources for this aspect of the project, students have received lectures from a professional science journalist, and have received written guidance on writing for newspapers. There is a tight word limit, not significantly more than 900 words, excluding headline and any picture captions.
7. The additional outputs involve the undergraduates working as groups. First, they design a poster based on their mentor's work. Their brief is to make the work accessible to the general public, rather than to a specialist science audience. Each group presents their poster at a poster conference where staff question them on their poster, especially on how they have tackled the problem of audience accessibility. The posters and student defence are assessed independently by two members of staff. As a preparatory resource, the course includes a tutorial on poster design. Second, they make a five-minute television programme about their mentor's work. Each programme is assessed independently by two members of staff. As preparation, students visit out TV studio and discuss possible ways of designing their programme with one of our producers. Both of these outputs are intended to develop the undergraduates' creativity.

Since undergraduate input into group work can be variable, we ask the undergraduates to anonymously assess the amount of effort put into the project by each other member of the group. Individual grades are moderated as a result of this peer assessment exercise, variants of which we have used extensively (Cogdell *et al*., 2004).

Undergraduate responses to the mentored project

To find out what the undergraduates felt they had gained from the mentored project, at the end of the most recent run of the course, I asked the class, through an anonymous end of course questionnaire, a set of targeted questions on the project. They were asked to respond to a set of statements using a 5 point Likert scale (from 1 = strongly agree to 5 = strongly disagree). The results are shown in Table 1. All 26 students attending the final course meeting completed the questionnaire. Since the sample size was small the Likert scale responses 1, 2 were combined as 'agree', 3 = neutral and 4, 5 combined as 'disagree'.

Table 1 *Undergraduate reactions to the mentored project (Likert scale values 1, 2 = agree; 3 = neutral; 4, 5 = disagree)*

Statement	Percentage responses (n = 26)		
	Agree	Neutral	Disagree
a) The project gave me a good idea of the kind of research going on at Glasgow University.	54	27	19
b) The project gave me a good idea of what it would be like to be a full-time researcher.	50	15	35
c) Doing this project made me want to become a researcher.	31	42	27
d) I found it quite easy to grasp what my mentor's project was all about.	42	15	42
e) It was really frustrating working in a group because it was hard to get everyone together.	27	8	65
f) Before doing this project, I had no idea that Glasgow University does much science research.	31	15	54
g) I found the research my mentor was doing pretty boring.	19	19	62

The statements were intended to elicit reactions to various aspects of the project. With regard to the research topic (question d), some students found the research hard to understand, while others did not: this very likely reflected undergraduate ability, postgraduate/postdoctoral communication skills, and genuine differences in complexity of the research: I made no effort to vet projects. Some students found working in groups frustrating (question e); this may reflect concerns about the fair distribution of work within groups (Mellor, 1993): this evens out through the peer assessment.

The project clearly works as an exercise in promoting and informing about the institution's research (a, f). This can otherwise appear remote or non-existent to junior undergraduates. Finally, the project does a good job in helping students get a feel for what the life of a researcher is like (b, c, g). Not surprisingly, not all wanted to be researchers after the experience, and not all found the research they learned about interesting (the low 'boredom' score probably reflected the undergraduates being able to choose their research area).

We also sought reactions to the different outputs. Using a Likert scale again we asked about levels of interest and levels of difficulty/challenge, with 1, 2 = low; 3 = medium; 4, 5 = high. Results are shown in Table 2. None of the students had made a TV programme before and this is reflected in their finding this the most interesting and challenging task. Responses to

the written journalism assignment suggest students found this of less interest and challenge. However, I felt this was because too many regarded it as simply another essay and failed to engage with the real challenge of communicating science and the scientific life to a general audience in an accessible and imaginative way. Some students did, however, rise to this challenge.

Table 2 *Reactions to the different outputs of the mentored project (Likert scale values 1, 2 = low; 3 = medium; 4, 5 = high)*

Reactions to outputs	Percentage responses (n = 26)		
	Low	Medium	High
a) Level of interest			
Journalistic interview	27	23	50
Poster	4	23	73
TV programme	0	8	92
b) Level of difficulty/challenge			
Journalistic interview	20	44	36
Poster	23	46	31
TV programme	12	31	58

Reaction of mentors

I asked mentors to complete a short questionnaire on their experience of the scheme. Responses are shown in Table 3. Although the response rate was low (only four out of eight), there was a good consensus on several of the questions. It was gratifying that most mentors found the exercise useful and that they found that the undergraduates asked sensible questions.

Table 3 *Reactions of Mentors (Likert scale values 1, 2 = agree; 3 = neutral; 4, 5 = disagree)*

Statement	Responses (n = 4)		
	Agree	Neutral	Disagree
a) The students asked me sensible questions about my work.	4	0	0
b) The students found it very hard to under-stand the work I am doing.	0	2	2
c) The students wanted to find out more about my personal life/why I was doing research than I wanted to talk about.	0	0	2
d) It was very difficult to get the students organised to meet up with me.	1	1	2
e) I found it a very useful exercise, trying to make my research clear to first/second year undergraduates	3	1	0
f) I think it would be useful to build an exercise of this kind into postgraduate training for all PG students	1	2	1

Conclusions

In my view, the mentored project described here is a win-win educational innovation. It fits clearly into Healey's (2005) conception of research-led teaching: the undergraduates are learning directly about their mentor's research. However, it is a more enquiry-driven process than the traditional research-led lecture, since the students have to design questions that allow them to discover the process and outcomes of research and the experience of being a researcher. Junior undergraduates benefit directly from the research being done at their own university, and post-graduates gain by honing their communication skills on an audience likely to find their work challenging. International postgraduates, especially those whose first language is not English, find this a particularly useful exercise in my experience.

Using postgraduate students as mentors rather than academic staff has several benefits. Academic staff are hard-pressed enough and being asked to be interviewed, especially year after year, could be a task too many. Cosgrove (1981) was concerned about the sustainability of a staff-based interview project. Postgraduate students are a renewable resource in a research-active department. Another benefit is to do with generation and hierarchy. Undergraduates may find it intimidating to interview members of staff who are generally going to be much older and much more experienced. Postgraduate students are likely to be just a little older than undergraduates and therefore easier to engage with. Dwyer (2001) noted that some staff and students in her scheme found the interaction embarrassing and unnatural.

A few additional benefits: postgraduate students are often employed to act as hourly-paid teaching staff in practical classes etc., but they are rarely communicating there about their own research. This project gives them a chance to do so. By providing undergraduates with some first hand experience of what it is like to be a post-graduate researcher, a strand of the employability agenda is tackled. Learning about the research in the way described here has advantages over attending a research seminar because the under-graduates have to be active, rather than passive learners. They set the agenda and their interrogation of their mentor maximises their opportunities to clear up misunderstandings.

The detailed outputs used in our scheme (journalistic article, poster, TV programme) are linked to a course in Science Communication where each output contributes 10% of the course's summative assessment (the remainder of the assessment comprises a museums review, 20%, and an end of course examination, 50%); but, as a combination of group and individual work, these could be valuable in any science programme where communication skills and creativity are encouraged. Ailsa Campbell, in the earlier version of the course, asked the students to produce an audiotape, rather than a TV programme: this would clearly be cheaper to produce and possibly less intimidating as an assignment for students unused to seeing themselves on screen. The essence of this part of the project is for the group to articulate their views on the research and the researcher, and this could be achieved in various ways.

The scheme for our postgraduate students has been voluntary and we have paid them for their work. However, I feel that the benefits to postgraduates are clear enough that a scheme of this sort could become a normal part of the generic skills training being increasingly embedded in post-graduate courses. I wish to thank the undergraduates and postgraduates who took part in the scheme and who willingly provided feedback on it.

Acknowledgements

I was encouraged to write this paper as a result of favourable comments given at brief oral presentations of the scheme. Ailsa Campbell gave helpful comments on the original Glasgow version of the scheme. Claire Dwyer, Jane MacKenzie and Mary Tatner commented on an initial draft or provided helpful information.

Communicating Author

Professor J.R. Downie
Graham Kerr Building, School of Life Sciences, College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow G12 8QQ. Phone: 0141 330 5157 Fax: 0141 330 5971
Email: roger.downie@glasgow.ac.uk

References

Brew, A. (2006) *Research and teaching: beyond the fringe*. Palgrave MacMillan, Basingstoke

Cogdell, B., Brown, A. and Campbell, A. (2004) Peer-assessment of group work in a large class-development of a staff and student friendly system. In *Self- and Peer-assessment: guidance on practice in the biosciences*, ed Orsmond, P., pp 35-7. Leeds, UK: Centre for Bioscience, the Higher Education Academy

Cosgrove, D. (1981) Teaching geographical thought through student interviews. *Journal of Geography in Higher Education* **5**, 19–22

Dwyer, C. (2001) Linking research and teaching: a staff-student interview project. *Journal of Geography in Higher Education* **25**, 357–366

Healey, M. (2005) Linking research and teaching: disciplinary spaces. In: *Reshaping the university: new relationships between research, scholarship and teaching*, ed Barnett, R., pp 30–42. Maidenhead: McGraw Hill/Open University Press

MacKenzie, J. and Ruxton, G. (2006) Supporting the development of undergraduates experimental design skills and investigating their perceptions of project work. *Bioscience Education e-journal* **8**-2 available at www.bioscience.heacademy.ac.uk/journal/vol8/beej-8-2.aspx (accessed 12 May 2010)

Mellor, J. (1993) Improving individual member accountability in small work group settings. *Journal of Management Education* **17**, 253–9

QAA Scotland (2008) *Research-teaching linkages: enhancing graduate attributes – life sciences*. The Quality Assurance Agency of Higher Education, Mansfield

QAA Scotland (2009) *Research-teaching linkages: enhancing graduate attributes – key findings and recommendations*. The Quality Assurance Agency of Higher Education, Mansfield

Robertson, J. and Blackler, G. (2006) Students' experiences of learning in a research environment. *Higher Education Research and Development* **25**, 215–229

Turner, N., Wuetherick, B. and Healey, M. (2008) International perspectives on student awareness, experiences and perceptions of research: implications for academic developers in implementing research-based teaching and learning. *International Journal for Academic Development* 13, 199–211