

Research Article

Attitudes to Teaching Ethics to Bioscience Students: an Interview-based Study Comparing British and American University Teachers

John A Bryant and Cindy L Morgan

School of Biosciences, Hatherly Laboratories, University of Exeter

Date received:22/01/2007

Date accepted:20/02/2007

Abstract

An interview-based survey was carried out with British and American university teachers. In both countries there was widespread (but in the UK, not unanimous) support for the proposition that ethics should be taught to Bioscience students. Reasons included a need to help students engage with the ethical issues associated with their subject and the view that ethics courses would enhance graduates' transferable skills and make them better citizens. Nearly all respondents suggested that ethical theory/moral philosophy should be included in ethics/bioethics courses for Bioscience students but there differences between the USA and the UK in views about who should teach it. In the USA the majority view was that ethics teaching should be left to those with a training or qualification in ethics or related areas while in the UK there was more confidence that biologists could teach this material. Finally, despite the positive attitude in the USA to teaching ethics to Bioscience students, such courses were not a specific requirement in any of the universities represented in the survey; however, American respondents noted that ethics or bioethics courses may be available as options while some courses within Biology dealt with the ethical issues that arose in those courses. Even in the UK, where pressure to teach ethics/bioethics to Bioscience students arises from the QAA benchmark statements, provision of such teaching is still not universal and based on responses given in this survey, is not likely to become so.

Keywords: Attitudes, Bioethics, Bioscience, Ethics, Provision, Teaching, UK, USA

Introduction

In the UK the Benchmarking Subject Standards for Bioscience published by the Quality Assurance Agency for Higher Education (QAA, 2002) contain explicit references to the provision of bioethics/ethics teaching in biological syllabuses. Thus, '*Students should expect to be confronted by some of the scientific, moral and ethical questions raised by their study discipline, to consider viewpoints other than their own, and to engage in critical assessment and intellectual argument.*' The basic threshold is stated as '*to have some understanding of ethical issues and the impact on society of advances in the biosciences*' while good students should be capable of constructing '*reasoned arguments to support their position on the ethical and social impact of advances in the biosciences.*'

In the light of these statements, an on-line questionnaire-based survey was carried out in the UK to ascertain the extent of awareness of the QAA benchmarks and the range of current or planned (as between November 2002 and March 2003) provision for ethics/bioethics teaching in Biology and related degree programmes (Willmott *et al.*, 2004). Responses came from 56 individuals, covering 92 degree programmes in 47 universities (representing 45% of those that are known to deliver Bioscience degree programmes). At that time, 82% of the respondents stated that they were aware of the benchmarking statements and 63 (69%) of the degree programmes about which they answered already contained an ethics component. Of those programmes that, in 2002–2003, lacked ethics components, there were plans in three of them to introduce ethics teaching; for the remaining 29 (31%) no such plans were in place, despite the clear requirements in the benchmark statements.

The purposes of the research presented here were first, to carry out a more in-depth survey of a small number of individual university teachers in order to ascertain their attitudes to teaching ethics/bioethics within the Bioscience curriculum and secondly, to make a comparison with university teachers of Bioscience in the USA. Unlike the UK, there is no national over-arching authority in the USA that deals with bench-marking or curricula. There is more guidance at graduate level that may operate at both state and national levels but in many instances this provides a general 'steer' rather than a specific requirement. The latter is typified by the Ethics Education in Science and Engineering (EASE) programme of the National Science Foundation (National Science Foundation, 2006).

Methods

Interviews were constructed according to the principles presented by Oppenheim (2000), consisting of a mix of closed and open questions. Answers to questions were elicited in face-to-face interviews lasting *ca* 20 minutes each. Respondents were informed that neither individuals nor institutions would be specifically identified in any reporting of the research. For the majority of interviews, answers were recorded on a portable cassette recorder and later transcribed. For four of the interviews, answers were recorded in written note form and transcribed into full text immediately after the interview. Answers were codified and grouped according to norms for discourse analysis (Oppenheim, 2000; Bell, 2005; Weasel and Jensen, 2005) to identify major themes and commonalities.

Interviews were conducted in the USA during the period September to November 2004. Interviewees were 14 university teachers ranging in rank from assistant professor to full professor (including one dean). Of the 14, one took part in an abbreviated interview with fewer questions (as indicated in the Results and Discussion section). They were based in four institutions, typifying the spectrum of university provision in the USA: one small four-year college offering degrees up to Bachelor level, two medium sized universities offering degrees up to Masters level and a large research university, offering degrees up to PhD level.

In the UK, 18 interviews were conducted between December 2004 and February 2005. Interviewees were again drawn from across the range of seniority, from lecturer to professor (including one deputy director of teaching and one head of school). The nine universities represented were mainly pre-1992 universities but also included a former polytechnic and a degree-awarding college of agriculture. No attempt was made to identify the institutions in the previous survey (Willmott *et al.*, 2004) in respect of comparing directly the replies to those in that survey. Four of the interviewees were from universities that were already known to teach ethics to bioscience students and three were attending a Centre for Bioscience event on Teaching Ethics to Bioscience Students, held at the University of Leicester in December 2004 (Centre for Bioscience, 2004).

Interview questions

(a) for UK

1. Do you know that the bench-marking statements published by the Quality Assurance Agency include a requirement that Bioscience graduates should be able to show an awareness and knowledge of the ethical and social issues arising from their subject?
2. Do you think this is a good idea?
3. Can you give me reasons for that answer?
4. Based on what you know, do you think that the QAA statements have led to introduce ethics into Bioscience degree programmes in the UK?
5. Whether or not you perceive there to be a pressure, do you personally think that ethics is a useful part of a degree programme in Biology?
6. If so, should it be compulsory or optional?
7. If ethics is a necessary part of the programme, should it be taught by ethicists/philosophers or by biologists?
8. What do you think such courses should contain?
9. Why?
10. Do you think taking such courses would enhance the transferable skills of the graduating biologist?
11. Can you tell me what the situation is in this university, regarding teaching bioethics?
12. Do you have any other comments?

(b) for USA

1. In the UK, there is now a requirement in nationally agreed bench-marking statements that all graduates in Biology and related sciences should be able to demonstrate knowledge of the social and ethical aspects of their subject. Do you think this is a good idea?
2. Can you give me reasons for that answer?
3. Based on what you know, is there pressure for Biology majors to cover the ethics in their courses at this university or in the USA in general?

4. Whether or not you perceive there is a pressure, do you personally think that it would be a useful part of an American degree program in Biology?
5. If so, should it be optional or compulsory – by compulsory I mean that it is needed to graduate ?
6. If such a course is necessary, should it be taught by ethicists/philosophers or biologists?
7. What do you think such courses should contain?
8. Why?
9. Do you think taking such courses would enhance the transferable skills of the graduating biologist?
10. Can you tell me what the situation is in this university, regarding teaching bioethics.
11. Do you have any other comments?

Results

Teaching ethics to Bioscience students

Unexpectedly, only 67% of the UK interviewees were aware of the QAA benchmarking statements, even though they were published in 2002. Even more surprisingly, this is a lower percentage than that reported in our previous survey (Willmott *et al.*, 2004). Nevertheless 83% thought that teaching ethics to Bioscience students was a good idea while two interviewees were unsure and one was definitely opposed to the idea. In the USA, all the respondents stated that it was a good idea that Biology graduates should have knowledge of ethics but also pointed out that there was no national organisation equivalent to the QAA. The main reasons given for approving the idea are given in Table 1. In both countries, several respondents believed that teaching ethics would make graduates better citizens or better aware of their place (and that of their science) in wider society. Understanding the rapid advances in science, especially biomedical science also featured. One American respondent mentioned, alongside his main reason, the need to inform the public on environmental issues. There were also more generic answers relating to understanding what constitutes ethical behaviour and how ethics operates in the work-place. The answer that teaching ethics to biologists would enable them to inform people that research is good for humanity was unexpected and may relate to the conduct of discussions on topics such as GM crops in the UK and stem cells in the USA (Bryant, 2004, 2006; Bryant *et al.*, 2005).

Of the three UK respondents who were unsure or who actually disapproved of teaching ethics to Bioscience students, two were concerned that lecturers would present their own views rather than enabling students to work out their own, while one did not want to see the amount of biology in the curriculum being reduced because of the introduction of ethics.

Table 1 Reasons for 'approving of' or 'disapproving of' the proposition that ethics/bioethics should be taught to Bioscience students

Reasons for approval (+) or disapproval (-)	USA (n =14)	UK (n = 18)
+ Leads to understanding of decisions/choices in workplace	1	
+ Leads to understanding of social impact of science/biology	3	4
+ Helps to foster responsible citizenship	4	3
+ Helps students/graduates to cope with the rapid progress in biomedical science	1	2
+ Enables students/graduates to inform people of the benefits to society of scientific research	2	4
+ Increases understanding of what constitutes ethical behaviour	2	2
+ Political correctness in current social climate	1	
- Danger of lecturers imposing their own views		2
- Would take away time that should be devoted to teaching Biology		1

These answers may also be tied in to those to Q5 (UK) or Q4 (USA) as to whether ethics/bioethics is/would be a useful part of a course in Biology. In the UK, the same 83% who approved of the QAA benchmark statements thought it to be very useful, or even 'essential', 'a core skill, not a luxury' while the 17% unsure or disapproving did not think that ethics/bioethics would be useful. In the USA, all respondents thought that ethics/bioethics would be useful, using such phrases as 'yes, the issues are becoming extremely complicated' and 'it would be essential.' The strength of support for bioethics was typified by one respondent who stated 'It enables students to counter the shallow world of Hollywood where science fiction rather than science fact colours people's views on bioethical topics.'

Is there pressure to teach ethics to Bioscience students?

In the UK a majority of respondents (14/18) believed that there was pressure to include ethics in Bioscience degree programmes and, perhaps not surprisingly, 10 of these attributed the pressure to the QAA benchmark statements. Nevertheless, other pressures were identified, including requests from students and from academic colleagues. In the USA, again not surprisingly, the majority (8/14) did not discern any pressure to include ethics in the curriculum. However, there were six for whom there was a pressure to do so, mainly because of the concerns arising from developments in modern

biomedical science. Some of this pressure came from students but much was discernible amongst the biology teachers themselves. Reasons for introducing ethics/bioethics into Biology curricula were discussed by Bryant and Baggott la Velle (2003) before the QAA benchmarks were widely known and are similar to the non-QAA pressures mentioned here.

Compulsory or optional

In the UK, where the benchmark statements suggest that all Bioscience students should be exposed to ethics/bioethics, 89% thought that it should be compulsory rather than optional. It was interesting that this number included one respondent who did not approve whole-heartedly the benchmark statements. Of the 89%, one respondent suggested that ethics/bioethics should be embedded across all the biological disciplines available to a student in a given university (see Willmott *et al.*, 2004), while three were concerned about fitting compulsory teaching into the timetable.

In the USA, where current provision of ethics/bioethics teaching for Bioscience students is limited, at least in the four institutions surveyed here (see below: Current Provision) there was nevertheless a clear majority of respondents (79%) who thought that ethics/bioethics should be compulsory. As in the UK, some thought that it should be embedded across the biological disciplines (two respondents) and there was concern about fitting it in to the timetable (two respondents).

Who should teach ethics/bioethics to Bioscience students?

This is a question that is raised repeatedly in the discussions that have followed publication of the QAA's benchmark statements (e.g. Centre for Bioscience, 2006). Lying behind the question are two subsidiary questions: *Can a biologist adequately present the tenets of moral philosophy and ethical theory?* and *Can a moral philosopher or ethicist engage effectively with Bioscience students and with the issues in biomedical science?* In the UK, 33% thought that only biologists should teach ethics courses for Bioscience students while a further 33% suggested that people with dual expertise in biology and philosophy should teach it (Table 2). Team-teaching with a mixture of biologists and philosophers/ethicists was suggested by 22% of UK respondents while only one respondent thought that ethics teaching in the Biosciences should be done entirely by moral philosophers/ethicists. One respondent gave a 'don't know' answer. The responses in the USA were clearly different. Thirteen respondents answered this question, of whom only one thought that biologists should teach these courses. All the rest wanted to see some professional philosophical/ethical input, through employing only philosophers/ethicists (23%), employing academics with dual training (15%) or team-teaching with both philosophers/ethicists and biologists (54%). This pattern of replies in the USA reflects firstly a lack of confidence expressed by several respondents in their ability to teach moral philosophy/ethical theory and, secondly, the fact that any specific courses that are available (see below) are currently taught by philosophers, ethicists, theologians or sociologists.

Table 2 Views about whom should teach ethics/bioethics to Bioscience students

Who should teach ethics/bioethics?	USA (n =13)	UK (n = 18)
Specialists/professionals in ethics/bioethics/philosophy	6	2
Team of ethicists/philosophers and biologists	4	3
Teachers with dual training in ethics/philosophy and biology	2	6
Biologists	1	6
Do not know		1

Course content

The view that there should be some treatment of ethical theory/moral philosophy was widespread (Table 3) and in the UK three out of 18 respondents thought that this should include development of critical thinking and reasoning skills (*cf.* Centre for Bioscience, 2006).

Table 3 Views about what should be included ethics/bioethics courses for Bioscience students

Topics to be included	USA (n =13)	UK (n = 18)
Ethical theory/ moral philosophy followed by case studies	3	4
Ethical theory/ moral philosophy, followed by learning how to apply theory	2	2
Ethical theory/ moral philosophy; biology-based examples; critical thinking and reasoning		3
Ethical theory/moral philosophy; ethical issues arising in the practice and applications of science/biology	6	2
Ethical theory, different world-view perspectives on global science-based issues.	1	4
Ethical issues arising within particular modules or course units	1	2
Should not be taught		1

It follows naturally that respondents wished to see the application of ethical theory to specific topics, with 22% and 23% in the UK and USA respectively suggesting that this was best done *via* case studies. The range of topics mentioned at this point was extensive, ranging from environmental to biomedical, often reflecting the academic interests of the respondent. Broader topics mentioned were the practice **and** applications of science (11% in the UK, 46% in the USA) and global science-based issues in general (22% in the UK, 8% – i.e. one respondent out of 13 – in the USA). In the UK, the one

respondent who disapproved of the idea of teaching ethics to Bioscience students took the opportunity of this question to re-state that disapproval.

Contribution of ethics/bioethics courses to developing transferable skills

All 14 of the USA respondents and 17 out of 18 of the UK respondents (surprisingly including the two who were unsure as whether ethics/bioethics should be taught to Bioscience students) thought that such courses would increase the range of transferable skills. The ability to think critically, to take into account all perspectives and to arrive at reasoned decisions were mentioned by 50% in the USA and 61% in the UK, with most of these respondents specifically mentioning the work environment. Two American and one British respondent thought that ethics teaching would enable Bioscience graduates to avoid ethical mistakes in research or in other work situations while three UK respondents suggested that Bioscience graduates with some training in ethics would be good ambassadors to the public in presenting topics at the science-ethics interface.

Current provision

In none of the four USA universities was there any specific course on ethics/bioethics that was compulsory for Bioscience students. However, in two of the universities, respondents mentioned courses that were provided by philosophers/ ethicists/social scientists/theologians and which could be taken as options by Bioscience students. One of these courses was specifically slanted towards biomedical issues. Despite this provision, very few Bioscience students take these courses. In another of the American universities in this survey (the four-year college, teaching up to Bachelor-level), there is an annual two-day symposium, attended by students at all levels and open to the public, in the general area of Science, Technology, Society and the Media. According the main focus of the symposium in any one year, bioethical topics may be covered, as some were in 2006 but, the symposia do not provide any formal treatment of ethical theory or moral philosophy. In general then, in the USA, Bioscience students are only exposed to teaching in ethics/bioethics if it is embedded in specific courses (and therefore whether or not individual academics wish to include it). In each of the four USA universities in the survey, some courses do indeed contain an ethical component; this was mentioned by six respondents, four of whom included it in their own courses.

In the UK it might be expected, given the QAA benchmarks, that ethics/bioethics would be a compulsory component for Bioscience students in all universities. However, even in this small survey, this is seen not to be the case. In five of the nine universities, ethics/bioethics was compulsory at either level-2 or level-3 and in one university it was compulsory in some degree programmes. It was embedded or diffused throughout degree programmes, including tutorials, in two universities and one university was planning to introduce an optional module in either level-2 or level- 3 in 2005-06. But this does not mean that all universities now have some provision for teaching ethics/bioethics to Bioscience students. At the end of 2003, 28% of the universities represented in the web-based survey (Willmott *et al.*, 2004) had no plans to introduce ethics/bioethics into Bioscience degree programmes.

These latter data map well onto the results of a questionnaire-based survey carried out alongside this interview-based survey (C.L.Morgan and J.A.Bryant, unpublished data). Questionnaires were sent to twelve academic staff representing eleven universities: six pre-1992 universities, three former polytechnics, one former university college and a degree-awarding college of agriculture. In this survey, four institutions still had no plans, as at March 2005, to introduce ethics for Bioscience students, although in three of these, there was a possibility that the situation would be re-considered in 'near future.'

Discussion

Overall, it appears that in the UK the benchmark statements on ethics for Bioscience students have been widely, but not universally accepted. Both from these data and from the previous survey, it is apparent that some universities have responded to the benchmark statements by introducing ethics/bioethics into Bioscience and related curricula. The continuing interest in events on teaching ethics to Bioscience students, organised by the Centre for Bioscience (2006) is further evidence for the need to provide training for those who are new to the subject. Nevertheless, there remains a significant number of individual academics who are unaware of the statements, even in universities in which such courses are running or are being planned. Further, there are universities that do not teach and are not planning to teach ethics/bioethics to Bioscience students.

Is the situation in the UK likely to change? The relevant statements in the QAA benchmarking statements are being ignored in institutions that do not provide ethics teaching for Bioscience students nor have any plans to do so. However, as the QAA itself points out, benchmark statements '*are not a specification of a detailed curriculum.*' Further, their use in external reviews of institutions and degree programmes is not '*as a crude checklist...*' Instead they form part of a '*broad range of evidence*' that enables reviewers (presumably including external examiners) '*to come to a rounded judgement.*' Based on this, institutions may perceive no pressure to introduce ethics/bioethics into Bioscience curricula, even though the majority of the UK interviewees did perceive such a pressure. The benchmark statements for the Biosciences are currently (January 2007) under review and it will be interesting to note whether or not the requirements relating to ethics will be strengthened.

The universal support for teaching ethics/bioethics to Bioscience students amongst those interviewed in the USA was unexpected, even though it was known that the topic is already embedded in some individual courses, including the use of text-books that are an aid in such teaching (e.g. McConnell and Abel, 2002). In extensions to their interview replies, some cited the greater exposure of bioethical issues, including stem cells, cloning and GM crops in the media, while others mentioned the 'politicisation' of these issues and governmental and industrial attitudes to the environment as reasons for thinking that Bioscience graduates needed a grounding in ethics/bioethics.

In the USA, the introduction by the National Science Foundation (NSF) of their Ethics Education in Science and Engineering (EASE) programme may be seen as an expression of the a perceived need that students choosing to undertake further study in Biology should have some training in ethics. The programme provides grants for projects that

'focus on improving ethics education for graduate students and on ethical issues that arise in research or graduate research education, particularly in interdisciplinary or inter-institutional contexts.' (National Science Foundation, 2006).

However, this does not equate to requiring that ethics must be part of post-graduate education. The provision of grants for ethics education at post-graduate level inevitably means that some institutions will apply and others will not. Thus, in follow-up discussions in Spring 2006 at one of the American universities providing education up to Masters level, it was clear that there had been no application for a grant under the EASE programme, neither was there an intention to apply. Further, there was no specific ethics component in Masters degree programmes, despite the enthusiasm expressed in the interviews that Bioscience graduates should receive some training in ethics (although, as at undergraduate level in the same institution, ethical discussion may be introduced into individual courses at Masters level).

Nevertheless, the NSF is an influential organisation and it does involve itself at undergraduate level through, for example, the Research Experience for Undergraduate (REU) programme which provides substantial grants enabling departments and schools to facilitate undergraduate participation in research (see National Science Foundation, 2005). Indeed, one of the universities represented in this survey had previously been successful in obtaining an REU grant. Further, more recently, ethics has been added to this programme. Thus, *'Proposals for REU sites are invited to include an optional component addressing ethics in science or engineering.'* A small supplementary grant is available for this and the NSF provides a link to a website (<http://www.onlineethics.org>: Case Western Reserve University, 2005) that *'contains many useful resources for developing a pedagogically sound ethics component.'* So, although there is no overarching national authority in the USA that might recommend the inclusion of ethics in Bioscience degree programmes, the introduction by the NSF of grant funding at undergraduate and post-graduate levels has started to change the climate.

Finally, if in the USA there is a widespread introduction of ethics/bioethics courses as essential components of Bioscience degree programmes, there is the question of who should teach it. In the interview replies in the USA, it was thought almost unanimously that such courses should not be left in the hands of biologists (even if biologists participate as part of a team). Lack of confidence was a reason given by biologists during interviews, but follow-up discussions in autumn 2005 revealed another possible reason: both biologists and ethicists/philosophers expressed the view that the latter were qualified and trained to teach ethics and therefore that they should do it. This is very different from the situation that is developing in the UK.

Acknowledgements

We are grateful to the Centre for Bioscience for support, to Ms Lydia Livesay for help with transport arrangements in the USA, to Dr Linda Baggott la Velle for advice on interview-based research and to all those university teachers who took part in this survey. JAB thanks Andy Bond, Chris Willmott, Steve Maw and Jackie Wilson for ongoing discussions about ethics teaching.

Communicating author: John Bryant, School of Biosciences, University of Exeter, Exeter EX4 4PS. Telephone:+44(0)1392 264608 Fax:+44(0)1392 263700
Email: J.A.Bryant@exeter.ac.uk

References

Bell, J. (2005) *Doing Your Research Project* (4th edition). Maidenhead: Open University Press

Bryant, J. (2004) Crop plant genetic modification. *Bioethics Briefing 2*
<http://www.bioscience.heacademy.ac.uk/ftp/Resources/ethicsbrief2.pdf>
(accessed 23 January 2007)

Bryant, J. (2006) Stem cells. *Bioethics Briefing 5*
<http://www.bioscience.heacademy.ac.uk/ftp/Resources/ethicsbrief5.pdf>
(accessed 23 January 2007)

Bryant, J. and Baggott la Velle, L. (2003) A bioethics course for biology and science education students. *Journal of Biological Education* **37**, 91– 95

Bryant, J., Baggott la Velle, L. and Searle, J. (2005) *Introduction to Bioethics*. Chichester: John Wiley and Sons

Case Western Reserve University, On-line Ethics Centre (2005)
<http://www.onlineethics.org> (revised 2007) (accessed 17 January 2007)

Centre for Bioscience (2004) *Teaching Ethics to Bioscience Students: engaging with the issues*
<http://www.bioscience.heacademy.ac.uk/events/reports/leics.htm>
(accessed 17 January 2007)

Centre for Bioscience (2006) *Teaching Ethics to Bioscience Students*
<http://www.bioscience.heacademy.ac.uk/events/reports/wrexham06.htm>
(accessed 20 December 2006)

McConnell, R.L. and Abel, D.C (2002) *Environmental Issues* (2nd edition). Upper Saddle River, NJ: Prentice Hall

National Science Foundation (2005) *Research Experiences for Undergraduates* <http://www.nsf.gov/pubs/2005/nsf05592/nsf05592.txt>
(accessed 17 January 2007)

National Science Foundation (2006) *EESE - Ethics Education in Science and Engineering* <http://www.nsf.gov/pubs/2006/nsf06524/nsf06524.htm>
(accessed 17 January 2007)

Oppenheim, A.N. (2000) *Questionnaire Design, Interviewing and Attitude Measurement* (2nd edition) London: Continuum

QAA (2002) Subject benchmark statements: Academic standards – Biosciences.

<http://www.qaa.ac.uk/academicinfrastructure/benchmark/honours/biosciences.asp>

(accessed 23 January 2007)

Weasel, L.H. and Jensen, E. (2005) Language and values in the human cloning debate: a web-based survey of scientists and Christian fundamentalist pastors. *New Genetics and Society* 24, 1– 14

Willmott, C.J.R., Bond, A.N., Bryant, J.A., Maw, S.J., Sears, H.J. and Wilson, J.M. (2004) Teaching ethics to bioscience students: a survey of undergraduate provision. *Bioscience Education E-Journal*, volume 3,

<http://www.bioscience.heacademy.ac.uk/journal/vol3/Beej-3-9.htm>

(accessed 17 January 2007)