

*Research Article***Teaching Ethics to Bioscience Students – A survey of Undergraduate Provision**

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Abstract

A survey has been carried out to investigate the provision of ethics teaching to students following Bioscience programmes at UK Universities. We report that 69% of undergraduate programmes described by respondents included an ethical component, although it may not be appropriate to extrapolate this value nationally. When ethics is taught, it is a little more likely to appear in the second year of a degree than in the third year, but with only limited use being made of the first year. In the vast majority of cases this teaching is carried out by bioscience staff from within the institution, but with the frequent involvement of staff from other Departments (e.g. Philosophy) and/or invited experts from outside the University. The majority of bioscience respondents were aware of the requirements for ethics in subject benchmark statements. A certain level of apprehension about teaching ethics was noted. Requests were made for additional teaching resources, including case studies, audio-visual material and briefing documents on the key issues, along with their collation via a bespoke website.

Keywords: Bioscience, undergraduate, ethics, teaching, survey

Introduction

In March 2002, the UK Quality Assurance Agency for Higher Education (QAA) introduced undergraduate Benchmarking Subject Standards for Bioscience, as part of their broader programme of benchmarking academic standards (QAAa, 2002). The Statement for the Biosciences makes numerous explicit references to the provision of ethics teaching in biological syllabuses. For instance it declares that, *'whatever the subject discipline, 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'* (Section 3.1). With regard to approaches to study and forms of subject knowledge likely to be common to all biosciences degree programmes, the requirement is one of *'engagement with some of the current developments in the biosciences and their applications, and the philosophical and ethical issues involved. Awareness of the contribution of biosciences to debate and controversies, and how this knowledge and understanding forms the basis for informed concern about the quality and sustainability of life'* (Section 3.2).

Additionally, the QAA's basic threshold standards in bioscience include having 'some understanding of ethical issues and the impact on society of advances in the biosciences'; whereas a good student should 'be able to construct reasoned arguments to support their position on the ethical and social impact of advances in the biosciences' (Section 5.3). Similar sentiments to these are also found in the QAA's subject benchmark statement for Agriculture, Forestry, Agricultural Sciences, Food Sciences and Consumer Sciences (QAAb, 2002); all of which also fall within the remit of the Learning and Teaching Support Network (LTSN) Subject Centre for Bioscience.

In view of this emphasis on ethical awareness, along with the lack of any significant published data on the extent of undergraduate ethics provision in the biosciences in the UK, the LTSN Special Interest Group in 'Teaching Ethics to Bioscience Students' sought to establish a 'snapshot' of activity at the commencement of benchmarking, and to identify aspects of teaching in this area for which colleagues sought assistance.

Methods

A survey form was constructed as an on-line, electronic questionnaire consisting of a mixture of nine simple and compound questions with open and closed elements, along with the opportunity for self-identification (see Table 1). It was declared in the rubric that the survey form was designed for completion with reference to an individual undergraduate programme, as ethics provision may differ within a department/school depending on the programme followed. It was addressed to Programme leaders and Course teams.

Table 1. Outline of survey questions. A mixture of text boxes and tick boxes were provided for the responses

1. Programme title	<i>Text box</i>		
2. a) Is there an ethics component in the above programme?	yes (go to question 3)		
	no		
2 b) (If no) Do you intend to introduce an ethics component?	yes	Please comment on your answer and then go to question 6	
	no		
3. Is Ethics specifically identified in the programme and appropriate course/module descriptions?	yes		
	no		
4. How is the ethics provision delivered?	Embedded in the curriculum (Tick)	How (<i>text box</i>)	
		Level 1	
		Level 2	
		Level 3	
		Masters	
	Specific modules/courses (Tick)	Title (<i>text box</i>)	Compulsory
			Optional
		Level 1	<i>Comments</i>
		Level 2	
		Level 3	
Masters			
5. Who delivers the ethics teaching? Tick all that apply	Bioscience staff from own unit		
	Bioscience staff from another unit		
	Non Bioscience staff from within own institution		
	Other		
6. Prior to this survey were you aware that the benchmark statements for our disciplines: 'Biosciences' and 'Agriculture, Forestry, Agricultural Sciences, Food Sciences and Consumer Sciences' state that the students should be aware of and be able to discuss ethical issues within their discipline area?	yes		
	no		
7. What support/resources would be useful for teaching ethics to Bioscience students?	<i>Text box</i>		
8. Any other comments regarding teaching ethics to biosciences students?	<i>Text box</i>		

The survey form was posted on the LTSN Bioscience web site on 25th November 2002 and completed forms were mailed automatically to the project team. The survey was advertised to potential respondents in a number of ways. An initial e-mail message to all 145 LTSN Bioscience Representatives (formerly Departmental Contacts) asked for their help in alerting the most relevant staff member in their School/Departments to the existence of the survey. This was followed up on 27th January 2003 with an additional message to Representatives whose School/Department had not made an identified response. A link to the survey form from the Bioscience homepage alerted browsing visitors to the project and this was supported by a 'News' web page report between 6th December 2002 and 8th January 2003. Survey responses were collected over a period of 107 days, from 25th November 2002 to 11th March 2003.

Respondents generally produced a set of consistent contributions. On occasions, however, answers offered were incompatible with the specified question and as such those particular items had to be disregarded in the evaluation. Similarly, some respondents ignored some questions or question components. This means that on occasions the total numbers of responses for some questions are different to those for related questions.

Six responses were identified as being from Scottish Higher Education Institutions (HEIs), where honours degrees are typically delivered over four years. However, the survey form only allowed for years to be assigned to the three undergraduate levels typical of the rest of the UK. Any potential ambiguities were resolved by reference to the relevant HEI's web site. On the recommendation of colleagues working in Scotland, Years 1 and 2 were equated with Year 1 on the survey form and Years 3 and 4 equated respectively with Years 2 and 3 on the survey form.

Results and Commentary

Responses

A total of 64 responses were received from 62 individuals, of which 11 included reference to postgraduate provision. However, the primary focus of this survey analysis is on the 58 undergraduate-related responses received. These were from 56 individuals working at 47 separate institutions, of which 25 were pre-1992, 15 were post-1992 and 7 were anonymous. This survey response represents a significant proportion (45%) of the 104 UK Higher Education Institutions known by the LTSN Bioscience to be delivering bioscience degree programmes.

Programmes (Table 1, Question 1)

Of the 58 responses concerning undergraduate courses, 45 addressed individual programmes of study, while the remaining 13 offered details of multiple programmes. Upon analysis, these multiple responses gave an additional 47 apparent programmes (six responses with 2 programmes; five with 3; one with 5; one with 15), giving a grand total of 92 undergraduate programmes (Table 2). All of these programmes, with the exceptions of podiatry and radiography, can be seen to be broadly within the area of Bioscience.

Table 2. Alphabetical list of 92 programmes derived from 58 responses to the survey. Duplicated programmes are indicated via totals in parentheses, as are a few clusters of similar programmes presented by the same institution and left together in the analysis.

Agriculture, Agriculture with ...
 Anatomical sciences
 Animal and feed technology scientific aspects of
 Animal Science
 Animal Science, Equine Science (x 2)
 Animal Welfare, Animal Care, Animal Health & Welfare
 Biochemical science
 Biochemistry (x 6)
 Biochemistry joint degrees
 Biological and Computing Science (Bioinformatics)
 Biological Science(s) (x 12)
 Biology (x 5)
 Biology, and specialist degrees
 Biology, Zoology, Botany Degree Programmes
 Biomedical Sciences (x 10)
 Biosciences
 Biotechnology (x 2)
 Cell & Molecular Biology
 Cell Biology
 Computational Biology
 Conservation and land management
 Ecological Resource Management
 Environmental Biology
 Environmental Sciences (x 3)
 Environmental science - Applied
 Food and consumer sciences
 Food and nutrition
 Genetics
 Human Biology (x 4)
 Human biology and health science
 Human sciences
 Land based enterprise, Leisure and countryside management
 Life Sciences
 Medical Biochemistry (x 2)
 Medical Genetics
 Microbiology (x 4)
 Molecular Biology (x 2)
 Molecular Biology and Genetics
 Molecular Microbiology
 Neuroscience (x 2)
 Nutrition and dietetics
 Pharmacology (x 2)
 Physiology
 Plant Science
 Podiatry
 Radiography
 Zoology

Ethics component (Table 1, Question 2)

69% (63/92) of the undergraduate programmes were reported as containing an ethics component. However, caution should be maintained in extrapolating this level of provision to the national picture, since many of the respondents to the survey probably had a particular interest in bioethics teaching and so were a self-selecting group. Of the 31% (29/92) of undergraduate programmes which were reported not to contain an ethics component, the intention to introduce one was specified for 10% (3/92).

Identification of ethics in the programmes (Table 1, Question 3)

Ethics was stated as being specifically identified in the programme and appropriate course/module descriptions for 54% (50) of the 92 reported programmes. This is 19% less than the 69% of undergraduate programmes initially reported as having an ethics component (Table 1, Question 2a). This apparent discrepancy may reflect class and/or tutorial discussion that was not considered substantial enough to be included in any descriptive programme/module documentation.

Embedded provision vs specific modules (Table 1, Question 4)

In this next section of the survey, consideration was given as to whether ethics teaching was embedded into broader modules or whether it was delivered with a strong emphasis in specific ethics-related module(s), in much the same way that skills education is often discussed.

Of the 63 undergraduate programmes including an ethics component, 84% (53/63) were reported as having ethics embedded across the programme and 87% (55/63) were reported as having specific ethics-containing modules. Both approaches were often adopted for a single programme such that 71% (45/63) showed both embedded and specific module provision, while 13% (8/63) had only embedded provision and 16% (10/63) had only specific module provision.

Where provision was described as embedded, it was delivered mainly across all three Years (37%; 19/51). Alternatively some retained it exclusively in Year 2 (31%; 16/51) or Year 3 (14%; 7/51) or Years 2 and 3 (14%; 7/51) or Years 1 and 2 (4%; 2/51), but never exclusively in Year 1. Overall Year 2 and Year 3 were used more frequently than Year 1 (See Table 3).

Table 3. Pattern of undergraduate Year usage for embedded ethics teaching to bioscience students
Responses on Year usage were analysed for a total of 51 bioscience programmes. 86% (44/51) of these programmes used Year 2 either alone or in conjunction with other Years. The equivalent proportions for Year 3 and Year 1 are 65% (33/51) and 41% (21/51), respectively.

Year of delivery	Pattern of Year usage						
Year 1	•			•	•		•
Year 2		•		•		•	•
Year 3			•		•	•	•
Totals	0	16	7	2	0	7	19
%	0	31	14	4	0	14	37

The 55 programmes that were reported as including specific ethics-containing modules included descriptions of 114 specific modules. Of these, 41% (47/114) were compulsory and 59% (67/114) were optional.

These specific ethics-containing modules were delivered mainly in Year 2 (54%; 61/114) or Year 3 (36%; 41/114). Less frequent delivery times were Year 1 (4%; 5/114), Years 1 to 3 (4%; 4/114), Years 2 to 3 (2%; 2/114) and Years 1 to 2 (1%; 1/114). This preference for using years 2 and 3 is similar to that seen with the embedded provision above (See Table 4).

Table 4. Pattern of undergraduate Year usage for specific ethics-containing modules provided for bioscience students
Responses on Year usage were analysed for a total of 114 specific ethics-containing modules. 60% (68/114) of these modules used Year 2 either alone or in conjunction with other Years. The equivalent proportions for Year 3 and Year 1 are 41% (47/114) and 9% (10/114), respectively.

Year of delivery	Pattern of Year usage						
Year 1	•			•	•		•
Year 2		•		•		•	•
Year 3			•		•	•	•
Totals	5	61	41	1	0	2	4
%	4	54	36	1	0	2	4

The survey did not specifically address reasons for any differences in the relative frequencies of ethics teaching in the various Years. However, regarding the apparent infrequency of teaching in Year 1, it seems reasonable to speculate that this may reflect crowding of programmes with 'basic biology' or the difficulties presented by tackling discursive topics with large class sizes. Conversely, the preference for Years 2 and 3 may result from the increasing academic and emotional maturity these students may bring to their studies when compared to Year 1.

Who delivers the ethics teaching? (Table 1, Question 5)

Concerns were raised about who should deliver the ethics teaching; should it be moral philosophers, bioscientists, or both? As one respondent put it "We do not have access to appropriate personnel from other departments and

there is a mixed feeling amongst Biology staff as to whether this is 'our' job". Despite these reservations, the survey found that the vast majority of ethics teaching to bioscience students is by bioscience staff. Of the 41 institutions for which information on responsibility for delivery of ethics teaching was provided (Table 5), 90% (37/41) involved bioscience staff. By contrast 37% (15/41) involved staff from outside their own institutional Bioscience unit, and in 10% (4/41) of cases, this was without any contribution from within the Bioscience unit. 27% of cases (11/41) used non-bioscience staff from their own institution, a figure which would certainly include some contribution from philosophy departments where they existed. 22% (9/41) of responses cited the use of "others" and this, we know from additional comments made, includes visiting lecturers that are experts in one or more aspects of ethical thinking.

Table 5. Pattern of staff usage for undergraduate ethics teaching to bioscience students
Responses on staff usage were analysed per institution from a total of 41 institutions. 90% (37/41) of these institutions used bioscientists either alone or in conjunction with other categories of people. The equivalent proportions for non-Bioscience Unit staff and Others are 27% (11/41) and 22% (9/41), respectively.

Staff source	Pattern of staff usage										
	•				•	•	•	•	•	•	•
Own Bioscience Unit	•				•	•	•	•	•	•	•
Another Bioscience Unit		•			•			•	•		•
Non-Bioscience University Staff			•			•		•		•	•
Others				•			•		•	•	•
Totals	22	0	3	1	4	3	2	0	1	3	2
%	54	0	7	2	10	7	5	0	2	7	5

Awareness of ethical benchmark statements (Table 1, Question 6)

All but one of the 56 individuals responding to the survey answered the question regarding their awareness of ethics being benchmarked. 82% (45/55) of them stated that they were aware of the benchmarks. All of the remaining 18% (10/55) who indicated a lack of awareness of the benchmarks nevertheless reported programmes that were providing ethics teaching. Six individuals from the group who were aware of the ethics benchmarking, reported programmes without identifiable ethics. While two of these stated the intention to introduce ethics, the remaining four reported that there was no intention to do so. The reasons for not introducing bioethics in these four cases were attributed to a lack of resources, including appropriate personnel.

It is once again likely that individuals responding to the survey may be more aware of ethics being in the benchmarking statements than typical bioscience staff; hence it is unwise to extrapolate this figure as representative of awareness across the UK as a whole.

Desired support/resources (Table 1, Question 7)

There were 48 wide-ranging requests made in response to the open question on desirable support and resources for the teaching of bioethics. The responses can, however, be grouped under five headings. The categories of requests and their proportions are: experts and specialist staff (17%); staff development (6%); suitable textbooks (8%); more time (6%); teaching materials and resources (44%) of which 17% specifically mentioned a website. Case studies were specified by several respondents.

The majority of comments regarding the need for experts and specialist staff focussed on a shortage of the latter. The few respondents who identified the lack of time devoted to ethics teaching highlight the perception by some of an under emphasis on ethics in many bioscience degree programmes. By far the greatest number of requests was for suitable teaching materials, either as off-the-shelf activities that could be adapted or lists of useful, current materials to collect, all probably made available via a bespoke web site.

Conclusions

This survey has provided a useful snapshot of the ethics provision being given to bioscience undergraduates across the UK, at around the time of publication of the QAA benchmarks for academic standards in the biosciences. While estimates obtained for the absolute extent of provision must be treated with caution, the data gathered on the nature of the provision and perceived needs are most informative.

The majority (69%) of the 92 reported undergraduate programmes were stated as containing an ethics component, although care should be taken extrapolating this value nationally. Most of this provision was limited to undergraduate Years two and/or three. When present it was commonly both embedded (84%) and delivered via specific ethics-containing modules (87%). Usually both of these delivery modes were used (71%). The majority of the specific modules were optional (59%) and occurred in Year 2 (51%). Embedded ethics was spread more widely but appeared mainly in Year 2 and/or Year 3. The factors that influence the choice between using particular Years to place ethics teaching need further clarification. However, where bioscience programmes exclusively offer a choice of modules in the final year, then Year 2 may well be seen as the best alternative for any compulsory ethics teaching.

A large majority of respondents (82%) were aware of the ethics specification in the relevant QAA benchmarks. However, despite this awareness a few bioscience programmes contained no identifiable ethics. If unidentified in module documentation, the teaching of ethics would be expected to be susceptible to the vagaries of 'staff interest' and 'teaching time' constraints and so could not be relied upon to deliver on the appropriate benchmarks. If, on the other hand, the ethics benchmarks were documented in the intended learning outcomes and assessment criteria, then delivery would be strongly favoured. Unfortunately the nature of the survey questions precluded establishing the extent of writing the ethics benchmarks into learning outcomes or assessment criteria.

The vast majority of the undergraduate bioethics provision in UK Universities is taught by bioscientists (90%), with or without contributions from other individuals. That Universities make extensive use of their own bioscientists to teach bioethics is not particularly surprising. It is of interest that one third consider the involvement of other 'experts' advantageous and that 10% appear to use them exclusively.

The most popular request for resources for use in ethics teaching was that of teaching materials of one sort or another (44%), possibly delivered via a bespoke web site (17%). Alternatively staff expertise was considered an issue by many (17%) respondents. A perceived lack of in-house expertise was a recurring theme in the survey and some requests for the provision of staff development were made. In response to all these requests for support, the Learning and Teaching Support Network (LTSN) Special Interest Group in 'Teaching Ethics to Bioscience Students' is continuing its e-mail discussion list and national programme of staff development workshops and is also developing its provision of resources for the teaching of ethics (LTSN, 2004).

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