

Essay

Approaches to the teaching of bioethics and professional ethics in undergraduate courses

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Date received: 02/03/2005

Date accepted: 18/03/2005

Abstract

The role of ethics in bioscience undergraduate degrees is now widely accepted, but how ethics should be taught, who should teach it and what the curriculum should include are matters for debate. This article discusses teaching strategies: specialist options, or embed ethics in other courses, or both; use of professional philosophers, or bioscientists with ethics teaching training, or both. Experience from a bioethics programme at the University of Glasgow is discussed, including the need or not to teach technical philosophical terminology; the aims of ethics teaching (with a strong distinction made between professional ethics in science and more personal issues like animal experimentation); strategies for sustainability in staffing; and teaching and assessment methods.

Keywords: bioethics; professional ethics; teaching strategies; training in ethics teaching

Introduction

Although ethics has long been an integral component of medical and nursing degree programmes, recognition of the value of ethics in biological science programmes has taken longer. For example, Downie's (1993) survey of attitudes at Glasgow University showed that both staff and students agreed on the importance of the discussion of bioethical issues in undergraduate courses, but also showed that rather few courses included significant ethics coverage. At the first UK seminar on the teaching of bioethics at the University of Westminster in May 2002 (report available at <http://www.bioscience.heacademy.ac.uk/events/reports/ethicsreport.htm>), it was clear that many participants were keen to incorporate ethics into their teaching, but were uncertain how best to do it, or whether they could count on the support of colleagues. Opposition to ethics teaching is now more muted in the face of the very strong recommendations in the Biosciences Benchmark (QAA, 2002): one of the seven generic standards expected of all bioscience honours graduates is that they "be able to construct reasoned arguments to support their position on the ethical and social impact of advances in the biosciences" and one of the intellectual skills expected is "recognising the moral and ethical issues of investigations and appreciating the need for ethical standards and professional codes of conduct". Willmott *et al* (2004) reported that nearly 70% of undergraduate programmes described by respondents to their survey now included an ethical component (though they recognised that

the results may have been biased by the probability of ethics teaching sympathisers being more likely to respond).

If there is some consensus that ethics should be included in bioscience courses, there remain the questions of how to teach it, who should teach it, and what the curriculum should include. Our view is that there are no single correct answers to these questions (rather as there are rarely single answers to ethical questions). Instead, each department or programme needs to find strategies that fit with their existing course structures and teaching resources, just as needs to be done for other generic aspects of modern Higher Education provision such as IT training or employability. In this paper, we use a case history approach to illustrate some of the possible ways to proceed.

Strategies: embed, or specialise, or both?

It is obvious that there are two opposite strategies for ethics education, both with advantages and disadvantages. Ethics may be embedded within existing core courses. This has the advantage of reaching all students but, in a crowded curriculum, it may be difficult to find enough time to provide coherent coverage. For large classes, there may also be problems in providing enough enthusiastic staff time.

An alternative is to design a module on ethics, either compulsory or optional. The optional approach only reaches the students who choose it; a compulsory module may be difficult to agree on, though this has been achieved at the University of Exeter (Bryant & Baggott la Velle, 2003). A possible disadvantage of a dedicated module is the dissociation of the ethical issues from the basic biology of the issues being discussed.

Another approach is to include some introductory ethics coverage in foundation courses, so that all students have an opportunity to think about the issues, but then provide more advanced coverage at higher levels, either embedded in courses, or as specialised options. The advantage of the specialised higher-level optional approach is that it allows students who are really keen to get into ethics in depth to do so. Illingworth (2004) discusses ethics teaching strategies for several curricula, including the biosciences. Willmott *et al* (2004) report on the proportions of degree programmes currently adopting embedded and optional approaches in UK bioscience courses.

Who should teach?

There is a similar range of strategies for dealing with this question. Some universities have professional philosophers who could be called in to help teach bioscience students. However, philosophers are specialists too, and may lack time or interest to convey ethics to science students. The problem may be similar to statistics teaching: a biologist who has taught him/herself statistics may be better able to deal with bioscience students' problems in learning statistics, than a professional statistician.

The alternative is to use bioscience staff to teach ethics. Some may object that their expertise is in science, that they have no credibility as ethics teachers. We regard this as mainly a staff development and training issue.

All staff in Higher Education teach areas beyond their immediate expertise and have to research and prepare teaching in these areas. Teaching ethics is no different, though it does demand enthusiasm for teaching in interactive ways, rather than mainly by didactic modes. In any case, few modern bioscientists should be able to claim never to have considered the ethical aspects of their work, since an ethical question is very commonly included in grant applications and in the publication conditions of many scientific journals. A mixed strategy is to use professional philosophers to cover the more technical aspects such as the methods of ethical enquiry, and biologists to cover cases in the biosciences, where biological expertise is as valuable as philosophy. Willmott *et al* (2004) report that most bioscience degree programmes currently including ethics rely mainly on bioscience staff for delivery, but that visiting specialists commonly deal with specific cases.

A case history: bioethics teaching at the University of Glasgow

One of us (HC) was awarded an EU-funded Marie Curie fellowship to design, implement and test ethics teaching for bioscience students. After consideration of the Glasgow course structure (Box 1), we decided that Level 1 offered opportunities to introduce ethical issues (Box 2), but that the main interventions would occur at Level 3, the year when students established the core of their Honours Course.

The disparate nature of the Level 2 year made it impossible to design a coherent programme at that level, though individual modules did include some ethics coverage. HC's background was in philosophy rather than biology, and she worked closely with specialists in the different bioscience streams to identify and research issues suitable for ethics coverage. For most degree courses, three topics were developed (Box 3), two specific to the degree with the third more generic, on the professional ethics of science. For each course, one of the topics was used as a basis for the introduction of different methods of ethical enquiry (deontology, utilitarianism, existentialism etc). In consultation with course organisers, the basic teaching techniques used were structured discussions or problem-based learning with occasional lectures if a course justified some factual presentation. The efficacy of these teaching interventions was tested using questionnaires on ethical sensitivity and ethical development (Clarkeburn *et al*, 2002; 2003).

Box 1 Degree programme structure at the University of Glasgow¹

Year 1	Foundation course in Biology, plus two other subjects.
Year 2	Flexible modular provision: students choose 12 from a selection of 35 courses in biosciences, but may also choose non-bioscience courses e.g. Psychology, Geography, Chemistry....
Year 3	<p>Junior Honours: students study the foundation course for their degree programme. These are over 20 degrees in four major areas:</p> <ul style="list-style-type: none"> • Human Biology (including Biomedical Sciences and Sports Science) • Molecular & Cellular Biology • Organismal & Environmental Biology • Infection & Immunity
Year 4	Senior Honours: students choose four courses from a wide selection of advanced options, undertake a research project, and carry out advanced generic work in their subject area.

¹The normal Honours course at Scottish Universities lasts four years.

Box 2 Professional and Personal Ethics coverage in Level 1 Biology

<ul style="list-style-type: none"> • A laboratory-based writing exercise on plagiarism and good citation practice: based on Willmott & Harrison, 2003.
<ul style="list-style-type: none"> • A lecture on Professional and Personal ethics in science: makes a distinction between universally-agreed good practice, and issues in science where personal views are likely to differ.
<ul style="list-style-type: none"> • A laboratory-based discussion which links the biotechnology of cloning in animals to the ethical implications of cloning.
<ul style="list-style-type: none"> • A project on “lifestyles” where students evaluate the lifestyles of species other than humans: one aspect asks students to choose an organism for elimination from Planet Earth.
<ul style="list-style-type: none"> • Several lectures in the core lecture programme make specific reference to ethical aspects e.g. genetic modification of crop plants; reasons for wildlife conservation.

Box 3 Ethics topics developed for different degree programmes at Glasgow

Ethics topics	Degrees using the different topics	Mode of delivery
Animals in scientific research	Aquatic Bioscience, Zoology, Biomedical Sciences, Genetics, Molecular & Cell Biology, Immunology, Pharmacology, Physiology	Structured discussion
Malaria control strategies: environmental & health aspects	Zoology, Aquatic Bioscience	Structured discussion
Scientific misconduct & integrity	Aquatic Bioscience, Zoology, Biomedical Sciences, Plant Science, Genetics, Molecular & Cell Biology, Immunology, Pharmacology, Physiology	
Genetically modified organisms	Plant Science	Structured discussion
Embryo research & genetic testing	Genetics, Molecular & Cell Biology	Structured discussion
Choices in vaccine development	Microbiology, Parasitology	Problem-based learning
Clinical testing	Microbiology, Parasitology, Pharmacology, Physiology	Problem-based learning or structured discussion
Drugs in sport	Sports Science	Problem-based learning

Once the Marie Curie project was complete, HC attempted to make provision for the long-term delivery of these ethics interventions by designing a website and by providing training for a cohort of (volunteer) bioscience staff. In the three years since HC left Glasgow, it has turned out that this has not been adequate as a strategy for sustainability: staff retirements and the lack of a person to lead the ethics teaching have combined to reduce effectiveness. Fortunately, Glasgow has an annual internal competition for small teaching development grants, and we have succeeded in an application for training more staff in ethics teaching with the specific aim of identifying individuals who will take ownership of maintenance of the ethics website and refurbishment of teaching materials. With this new funding, we will concentrate on consolidating our Level 3 ethics interventions, but also look into the feasibility of a final year treatment, probably as an in-depth optional course, partly taught by professional philosophers.

Lessons: design or evolution?

We often write about “curriculum design”, but often, as befits biologists, the process is the messier one of evolution: trying out new variants, responding to environmental change, dealing with unpredictable events. In this section, we draw out some lessons from our ongoing experience of developing ethics teaching at Glasgow.

Do students need explicit reference to philosophical terms like deontology, utilitarianism etc?

A possible analogy is Medawar's (1967) discussion of the characteristics of the "good ecologist". Back in the 1960s, an ecologist would not be required to know anything about molecular biology, but Medawar felt that the best ecologists would be those who felt a need to probe beyond the immediate confines of their core subject. So, a technical knowledge of philosophical terms and reasoning is not essential for an introduction to bioethical discussions, but it will be valuable for anyone who wants to go deeper by reading philosophers' discussions of topics such as animal rights. In addition, science students are used to having to master technical vocabulary and learning some of the terms of philosophy may help them to appreciate that ethics is not simply a matter of personal opinion.

What are the aims of bioethics teaching?

Clarkeburn (2000) concluded that it should not be an aim of bioethics teaching to make students behave in a particular way, since this would require indoctrination, a process inimical to the ethos of higher education. However, it may be necessary to distinguish here between professional and personal ethics. We should be aiming for our students to have a good understanding of the best professional practice in science, and for them to have a desire to operate that best practice in their professional lives. But on personal ethics, our aims must be different: individuals simply do differ in their deep-seated views on issues like animal experimentation and human stem cell cloning. Therefore, our aims must be about developing clear thinking and exposing students to a range of differing views. The structured discussion that HC developed on "scientific misconduct and integrity" deals explicitly with this professional/personal dichotomy.

There has recently been considerable alarm at the spread of plagiarism in student assignments, some of it helped by the internet. Much of the discussion has centred on methods of detection and appropriate sanctions. Although these are important, we would prefer to concentrate on a more positive approach i.e. explicit teaching of good professional practice in science. Willmott & Harrison's (2003) exercise on plagiarism is a helpful tool that we have used in first year biology with very positive results. Several recent textbooks include chapters on professional ethics, including Illingworth (2004), Mephram (2005)[correction], and Bryant et al (2005) but we found it a little surprising that one of the main texts on bioethics (Bryant et al 2002;) did not. However, a second book by Bryant et al., due in June 2005, will include a chapter on professional ethics (Willmott, pers.comm.).

What resources are needed for bioethics teaching?

Willmott *et al's* (2004) survey found that staff felt a need for a good supply of teaching resources. With the publication of several recent texts (Bryant *et al* 2002, Bryant *et al* 2005, Mephram, 2005), the Centre for Bioscience's Bioethics Briefings (four so far) and many websites

and published articles, good resources are increasingly available. The main problem is to develop staff capacity. All higher education staff are used to training themselves to teach areas beyond their immediate expertise, and new lecturing staff at universities undertake a course on teaching in higher education (at Glasgow, this is a two year New Lecturer and Teacher Programme), but these are often rather generic in nature. When Glasgow's Medical School decided to re-structure the undergraduate medical course around Problem-Based Learning, it was realised that staff would need to be trained in this technique. Our view is that, unless a department has a large number of enthusiasts for ethics teaching, the best strategy is to identify a group of staff who will deliver ethics teaching, then involve them in a course development and training programme. At Glasgow, our Learning and Teaching Development Fund provides resources to buy staff time for such a programme of development and training. We feel strongly that all universities should have such a fund to promote innovations in teaching.

What methods work best for teaching bioethics and assessing achievement?

Although traditional lectures can cover aspects of an ethics course for bioscience students, our experience is that the course will achieve its greatest benefits from more interactive work, where the students are able to contrast their different views. Generally, this means working in smallish groups, hence the need for a sizeable cohort of trained staff. At Glasgow, a common method is for the students to undertake some set preparatory reading, then to meet in groups of about 20. This group can be split into 4 x 5, with each subgroup tackling a topic, then reporting back to the plenary. This workshop style works very well for bioethics in our experience. As well as straightforward discussions, this method can employ role-plays and other interactive techniques. Even in larger groups, it is possible to achieve some interaction. In our first year biology ethics lecture (given to 600 students), we ask students to give their reactions to a set of bioethical questions by show of hands and then to register their views on the course website. Illingworth's (2004) guide outlines a range of teaching approaches, including some based on the humanities, which have been deployed very successfully in healthcare profession ethics teaching. In assessing "student learning" in our bioethics courses, we have tended to use traditional essays, which clearly fit well with the need to present various viewpoints and evidence, then arrive at a balanced conclusion. HC also developed a 'Learning Log' approach (Clarkeburn *et al*, 2002) which is designed to encourage students to record and reflect on what they have learned. These assessment methods are demanding in staff time, again emphasising the need for an adequate number of trained staff.

Don't expect miracles

One of us (JRD) has long taught bioethics to developmental biology students. One year, he set a question in an experimental design test,

on the teratogenic effects of vitamin A in the diet of pregnant women. The question asked students how they might set about obtaining good evidence to assist the Department of Health to produce clear dietary guidelines. There were several good answers, but also several that began "Take a population of pregnant women; feed them different levels of vitamin A; count the number of malformed babies...". We take from this two messages 1) don't expect miracles from your ethics teaching but, more seriously 2) it is vital to integrate ethics teaching into all aspects of the bioscience curriculum, including experimental design.

Acknowledgements

This article began as presentations to two LTSN Ethics seminars. The European Union's Marie Curie fellowship scheme supported HC. The University of Glasgow's Learning & Teaching Development Fund is supporting JRD's current work on bioethics teaching.

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Correction

In our [original 18/03/2006] article, under the heading "What are the aims of bioethics teaching?" we stated that while Illingworth's (2004) guide and Bryant et al's new book (2005) included chapters on 'professional ethics', Mepham's book (2005) does not. This was an error, deriving from too hasty reading of a flyer rather than having the actual book to hand (JRD's fault, not HC's). We are happy to acknowledge that Mepham's chapter 15 "Bioethics in the Laboratory" as well as other parts of the book cover the area we term "professional ethics" perfectly well. Mepham's book is favourably reviewed by Roger Pearce in Volume 6 of the Journal. Our apologies to Ben Mepham and to readers of Bioscience Education for misleading them.

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