

## **Animal experimentation: an integrated approach to teaching techniques, ethics and alternatives from Level 2 undergraduates to postdoctoral research associates**

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**Subject Area:** Animal Experimentation

This case study has been developed from data gathered through observations of the teaching component; interviews with the tutor; and focus groups and questionnaires with students from the current and previous cohort.

### **Background**

Animal experimentation evokes strong feelings. This report concerns an integrated approach which addresses two main issues: the lecturer's strong belief there is a moral responsibility to provide an education in ethics, animal welfare and the 3Rs (Replacement, Refinement and Reduction) to anyone who uses animals or animal tissue in their studies, and to help address the global shortage of *in-vivo* scientists. Given the majority of biomedical science undergraduates will use isolated tissue samples in their degree, the process starts at Level 2 with a compulsory seminar session and subsequent facilitated discussion. During this session the students begin to consider/confront their own views on animal experimentation, the aim being to provide sufficient knowledge of the science, ethics and law so students can make an informed decision for themselves as to whether such studies are acceptable. Level 3 provides the opportunity to take the Integrative Biomedical Sciences module (BMSC3126). Co-taught with industry, the module combines education (lectures on ethics, law, *in-vivo* studies in different research areas) with practical training and hands on experience of experimental techniques (animal handling, surgery). Ethics is embedded throughout the module with students adopting a persona in a filmed debating session, asked to consider the ethical implications in practical reports and alternatives to animal experiments are discussed in an end-of-module essay. To aid student learning and experiences, the tutor has developed substantial online support and teaching materials (e.g. discussion forum, reflective logs, videos of techniques, illustrated presentations of practicals). In contrast to similar modules in other institutions, students are exposed to complex experimental preparations, designed to show the full potential of *in-vivo* techniques. Without prior access to these online materials, this would not be possible.

Provision is not restricted to undergraduates but extends to postgraduates/PDRAs, taking these individuals far beyond the minimum legal requirements. Students act as an ethical review committee, discussing a project licence application to increase understanding of ethical review processes, they consider and collectively discuss whether they are applying best practice in animal welfare in their own studies and debate the arguments for and against animal experimentation. This integrated provision, providing an education and training in *in-vivo* sciences from undergraduate to PDRA is unique in the UK.

### **Reasons for introducing this teaching method**

The lecturer is acutely aware of the global shortage of *in-vivo* skills and the serious misconceptions that undergraduates hold about animal experimentation. He also strongly believes that education should be combined with training. As described above, he has developed a suite of activities that reflect students' levels of interest and responsibility. Debates are central to this teaching and provide an excellent medium for learning. By taking on a persona (scientist, patient, anti-vivisectionist or reductionist) students are forced to engage with different points of view and at the same time develop debating skills and clarity of argument. The following quote from a student's reflection log illustrates the point, "*Before, if offered the choice between a computer and mouse model, I'd gone for animal model straight away. Computer modelling was something a bit geeky – not for 'proper' scientists. I am now slightly ashamed of this narrow-minded view and am much more open to at least trying alternative methodologies.*" Undoubtedly preparation for the debate sessions is hard work but there is also a sense of fun and enjoyment; "*I found the ethics debate a lot more fun than I thought it would be*" and "*... once the session started everyone seemed to really enjoy a really good argument*" all helping to make the learning more memorable.

## Lecturer perspective

The lecturer believes he is providing an education in animal experimentation, not just skills training. This is supported by external approval: BMSC3126 has been described as providing “*excellent learning*” in a recent Biosciences Federation report<sup>[1]</sup>; his undergraduate and postgraduate materials and practices have been adopted by other institutions and industry; he has been an invited speaker at conferences of Learned Societies; run workshops on this teaching at other institutions and for Professional Bodies; the National Centre for the 3Rs has provided funding to disseminate the work nationally. Equally as important he has seen changes in student attitudes as a result of this new provision. Undergraduates no longer see animal tissue as just another laboratory reagent and now try to get the maximum out of any practical involving animal tissue. Over 50% of postgraduates have altered their laboratory practice to increase animal welfare and minimise distress.

## Student perspective

Students clearly value this provision; the Level 2 animal ethics seminar is invariably described as “*the best part of the module*”. “*It was both interesting and informative on the legal & ethical issues surrounding the use of animals in research.*” BMSC3126 was oversubscribed by 3x this year and those fortunate enough to get on the course would strongly recommend it to peers (score=4.95/5.0). “*What I learnt on this module is all I talk about at interviews*” was one comment from the student interviews. Another was “*thanks to this module I can now read [scientific] papers a lot quicker*” suggesting benefits go wider than this immediate topic area. Direction was another strong theme coming out of the interviews, not only the careers advice given by the lecturer but also the student’s sense of self and what they would like to do. Thanks to BMSC3126 they were exploring avenues they did not even know existed 6 months earlier. They all believe it will be of significant benefit to them in their future careers (score=5.0/5.0) and it certainly has got them PhD interviews/studentships. It has increased postgraduate awareness of both their, and others’, laboratory practices, as one student commented: “*opened my eyes to methods for improving animal welfare*”.

## Issues

There are two issues; cost and ethics. The teaching of animal studies is very expensive, few institutions can afford to provide this teaching. Industry funding helps ameliorate this. The second is the use of animals to provide training for students who might not utilise this training in the future. This is overcome by restricting enrolment to a select group of students who wish to develop [*in-vivo*] scientific research careers.

## Benefits

The students on BMSC3126 have the luxury of being taught a challenging subject in a small group. Students come from 8 different programmes. The intentional switching of students between groups for different activities means that students benefit from their peers different skills and knowledge, thus enhancing student learning and experience. The small numbers of staff who contribute, the intensive nature of the teaching along with group working results in the development of real sense of community; there is clearly a social dimension to the learning on this module.

The module has a notable impact on employability. Students are acquiring highly sort-after skills; in 2009, 11/14 students will be going onto PhD studies. Another student, who subsequently undertook an *in-vivo* final year project with the lecturer, was awarded the British Neuroscience Association 2008 Undergraduate award.

## Reflection

The alignment between the lecturer’s desire to provide an education in animal experimentation and the students perceptions (at all levels) demonstrates well planned and delivered teaching. Change of student attitudes, laboratory practice and increased student employability are as clear evidence of the impact of this approach as anyone could want.

[1] *In vivo* sciences in the UK: sustaining the supply of skills in the 21st century. Available at [www.bsf.ac.uk/asg/reports/invivo\\_brochure.pdf](http://www.bsf.ac.uk/asg/reports/invivo_brochure.pdf)