From policy to practice: Illustrating the viability of full replacement

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Abstract
The InterNICHE Policy on the Use of Animals and Alternatives in Education is a comprehensive document in 10 sections that addresses all aspects of work with animals and alternatives in life science education and training. The Policy presents guidelines to ensure effective and fully ethical acquisition of knowledge and skills. It includes a definition of alternatives in education and of harm, and presents individual policies on dissection, the sourcing of animal cadavers and tissue, work with live animals for clinical skills and surgery training, and field studies. As well as addressing non-animal alternatives, therefore, it has a significant focus on the ethical use of, and work with, animals and animal tissue. It also addresses the use of animals for the production of alternatives themselves. The Policy demonstrates the possibilities for full replacement of harmful animal use in education and training. Examples from across the world of practical classes that accord with the Policy will be given. Recommendations will also be made for ethics committees, for university policy towards student choice, and for legislation.

Keywords: InterNICHE, Policy, education, training, replacement

Introduction

The InterNICHE Policy on the Use of Animals and Alternatives in Education (Jukes and Chiuia, 2003) was written to facilitate the full replacement of harmful animal use in education, whilst supporting effective acquisition of knowledge and skills. Replacement of harmful animal use does in many cases consist of replacing animals with computer simulations, virtual reality (VR), simple or advanced models, plant material – or even humans, as in student self-experimentation or donated human cadavers.

Non-animal replacement

For a number of courses this is the best approach: it is more appropriate for students in human medicine to work with human tissue, it is more appropriate for plant biology students to work with plant tissue, and it is more appropriate for high school pupils to work with computer programs than to have access to the valuable resource of donated animal or human bodies. Even for students within veterinary and zoology, it is not necessary to include animal tissue or live animals in every discipline or class, and replacement may consist of high quality non-animal methods.

Examples of how the vision of a fully humane education, presented in the InterNICHE Policy, can be met with non-animal methods include the work of Prof. Scroop at the Royal Adelaide Hospital in Australia (Scroop, 2003), using problem based student self-experimentation in physiology classes; and the replacement of live animal surgery by a perfused human cadaver simulator developed by Dr. Aboud, University of Arkansas (Aboud et al, 2004).

InterNICHE has helped bring about replacement by non-animal methods in a number of locations using simulators and computer software, for example in life science departments in Croatia and Romania and veterinary faculties in Russia (Jukes, 2005). Even clinical skills training aimed at treatment of animals can be achieved with non-animal methods, as illustrated by the VR cow ovarian palpation simulator developed by the Department of Computer Science at the University of Glasgow working in close collaboration with veterinarians (Brewster, 2005).

Policy on use of and work with animals

In the disciplines within which professionals will work with animals, the education will by definition require contact with animals at some point. But 'animal contact' is not synonymous with 'harm'. The InterNICHE Policy is to a significant degree a Policy on how to work with animals and animal tissue in an

ethical way and in the best interest of the animals.

An essential aspect of the Policy is the definition of harm – as harmful animal use is the very focus of replacement for InterNICHE. Neutral and beneficial work with animals is considered as an alternative. According to the Policy, harm comprises any action, deliberate or otherwise, that impinges on an animal's current and future well-being by denying or limiting any of the following freedoms:

- Freedom to live
- Freedom to express full natural behaviour
- Freedom to be part of a social structure and ecosystem
- Freedom from hunger and thirst
- Freedom from discomfort
- Freedom from pain, injury and disease
- Freedom from fear and distress

This is a strict definition of harm, but it reflects its serious nature. The Policy specifically refers to killing as a form of harm that should not be subjected upon an animal. This reflects the fact that an animal's future potential for fulfilment and pleasure should be respected as well as the immediate experiences of the animal. The best interests of the animal is the guideline throughout the Policy.

In the following, the Policy's definition of different types of ethical work with live animals and animal tissue is summarised, and examples are given of the Policy put into practice.

Policy on animal dissection

For an animal dissection to be considered ethical according to the Policy it must meet a set of criteria, including the following:

- The animal cadaver is ethically sourced
- The dissection is performed at the university level, and no lower
- The dissection is relevant for the student's career
- Dissections must be conducted within the context of respect for life and respect for the cadaver
- Instructors are ethically aware, and ethics are explored openly and fully.

A number of veterinary colleges, especially in the USA, use only ethically sourced cadavers for dissection classes (Kumar, 2003; Rasmussen, 2003; Smeak, 2003). Another example of the viability of the dissection Policy is shown by Prof. Akbarsha at Bharathidasan University, India, who has replaced dissection altogether in biology courses across many different colleges, teaching anatomy using software and focusing on other evolving and perhaps more relevant teaching objectives such as ecology, microbiology etc. This change followed a critical evaluation of the actual teaching objectives of the course (Akbarsha and Sathyanarayana, 2005).

Policy on ethical sourcing of animal cadavers

The first condition for an ethical dissection is for the cadaver to be ethically sourced. For an animal cadaver to be ethically sourced a number of criteria apply, among others:

- The animal must not have been captured, bought, bred, kept, harmed or killed to provide the cadaver or tissue
- The animal must have died naturally, or been euthanised secondary to natural terminal disease or non-recoverable injury
- The decision to euthanise is made solely in the best interest of the animal
- The animal must have been a wild, stray or companion animal - ie free-living - and not sourced from places where harming or killing is commonplace

Places where animals suffer harm, for example farms, are seen to compromise the ethical nature of the ethical sourcing and are thus not considered ideal. However, the Policy does accept the use of animals from such sources for animals that are hard to source ethically. This is termed acceptable use from 'other sources'. The same strict conditions apply here: the animal must have died naturally, been euthanised secondary to terminal disease or non-recoverable injury, and the cadaver or tissue is destined for disposal. The term 'destined for disposal' refers to 'true waste' that is of no economical value. It does not refer to 'surplus animals', as the practice of defining individual animals as surplus is in itself unethical and the use of surplus animals risks creating a market for these animals.

Tufts University School of Veterinary Medicine, USA, offers one of the best examples where the use of ethically sourced animal cadavers is the standard approach for acquiring animals for anatomy dissections (Kumar, 2003). Tuft's body donation program has been in service for over ten years and replaces the killing of retired greyhounds. In Brazil, the Department of Surgery at the College of Veterinary Medicine, University of São Paolo uses preserved animal cadavers from body donation programs for surgery teaching, exploring new preservation techniques suitable for tropical climates (Silva et al, 2003).

Policy on live animal use for clinical skills and surgery training

The use of live animals in the clinical setting is an integral part of knowledge and skills acquisition for veterinary students. The Policy addresses such use by stating that:

- Clinical skills and surgery training are built around the needs and well-being of individual animal patients, and healthy companion animal

volunteers
- Harm caused to an animal patient during a clinical procedure and/or treatment is acceptable only when it is the minimum harm necessary for successful work aimed at healing the animal

However:
- Clinical skills and surgery training that involves a terminal procedure might be acceptable, but only when an animal is suffering from natural terminal disease or non-recoverable injury; and for whom a decision to euthanise is based on the interests of the animal and not motivated by practical or financial interests
- Harm caused under these conditions should not be subjectively experienced by the animal

In summary, the Policy accepts treatment of patients; beneficial surgery such as spay/neuter of stray animals, which increases their chance of adoption; work with companion animal volunteers where the animal has the right to stop the exercise and receives only positive reward; and, when meeting all necessary criteria, surgery training on terminally ill animal patients under full anaesthesia where the training does not influence the decision of euthanasia nor adds any discomfort to the animal. Additional Policy criteria state that instructors and students should have the necessary skills, and act with care and respect for patients, animal volunteers and guardians.

These criteria are automatically met in many veterinary teaching institutions where student apprenticeship in the standard approach. Some institutions stand out, however, in having integrated positive interaction with animals as part of curricular design based on the similar principles as the InterNICHE Policy: Dr. Rasmussen, formerly of Western University, USA, describes how work with students' and teachers' own companion animals can be achieved. Animals are given positive rewards for participation, the interaction is designed in such a way that it is perceived as play or care, and examinations are stopped immediately when the animal seems anxious. This ensures that the animal volunteers are true volunteers rather than being ordered to endure procedures that they are uncomfortable with (Rasmussen, 2003). It may take a little extra time to learn blood sampling in this way, but the students learn a valuable lesson about animal behaviour and how to approach patients.

Prof. Smeak of Ohio State University, USA, is another example of an educator who emphasises beneficial work with animals. In addition to apprenticeship in the university teaching hospital, Prof. Smeak describes co-operation with shelters, where students participate in beneficial surgery treatment of shelter animals under qualified supervision. Animals are neutered, and those needing surgical care such as removal of skin or mammary tumours do receive this. This is a multi-benefit-situation: students gain training in a realistic setting and the shelter animals receive treatment, with their chances of being adopted increasing with being neutered. Prof. Smeak reports a 100% adoption rate for the animals treated through this program – as opposed to approximately 50% before its establishment. In a period of 5 years, 5000 animals were neutered and treated - meaning that 2500 animals' lives were saved through the surgery course in addition to no laboratory animals being killed for it (Smeak, 2003).

Policy on live animal field studies

The educational study of free-living wild or stray animals is a valuable experience, acceptable when the following criteria, amongst others, are met:
- Field studies are built around the needs and well-being of individual wild and stray animals, animal species, and the ecosystem
- Field studies cause zero or minimal disturbance to an animal, his/her social structure and the ecosystem; or have a beneficial impact on an animal, species or ecosystem
- The animal is not captured, bought, bred, kept, harmed or killed for the purpose of the study, except for capture and/or harm in certain circumstances that are beneficial to the individual animal, species or ecosystem
- Capture and/or harm caused to an animal is acceptable only when the animal is a patient, or will benefit from a clinical procedure; and in certain circumstances for the benefit of the species or ecosystem

The two last instances do not leave open the possibility of exploitation of the individual animal: other conditions clarify that harm caused in these circumstances is acceptable only if minor and temporary and does not impinge on the animal's future well-being or opportunities for survival in any way.

Prof. Bekoff at Colorado University, USA, describes the importance of not interfering negatively with animals studied in the field. The filming of animals performing natural behaviour, and careful frame-by-frame analysis is one of the non-invasive methods which his students use in studies of both domestic and wild animals (Bekoff, 2005). Other methods described by Bekoff include sampling of urine and faeces for hormone analysis.

Policy for making alternatives

Animals are also used for the production of alternative tools themselves, such as films or software

for virtual dissection and virtual experimentation. If animals are required for making alternatives, the InterNICHE Policy sets out the following conditions:

- An alternative for the practical does not already exist or is not practically available, and the alternative will replace harmful animal use
- The animal is not captured, bought, bred, kept, harmed or killed for the purpose of making the alternative
- Use of animal tissue or cadavers should meet the criteria of ethical or acceptable sourcing already stated in the Policy. Similarly, if the making of alternatives is based on use of animal patients or field studies, such as filming of procedures, the conditions covering such use should be met.

The development of alternatives is a very specific situation, but this part of the Policy is being put into practice by InterNICHE itself through its Humane Education Award. This grant program funds the development of alternatives in education and applies the strict ethical criteria of the Policy. In several cases applicants have been asked to clarify their planned use of animal tissue for the process, and have set about to acquire the tissue ethically, typically facilitated and supervised by InterNICHE National Contacts in the region where the alternative is being made. Otherwise, applicants choose simulations or the use of human tissue instead of animal tissue in the making of alternatives. In one instance the use of terminally injured animals from 'other sources' was accepted. Working camels that were injured and whose euthanasia was performed in their best interest were used by Dr. Elnady in Egypt for making camel anatomy software to replace the killing of healthy camels for dissection.

Conclusion

Illustrated by the many examples from across the world of how fully humane education in the life sciences can be achieved, the viability of this approach is fully proven. The InterNICHE Policy is thus both a vision, and a description of what is already happening, as methods other than harmful animal use and with a strong commitment to ethics and quality of education are being implemented and mainstreamed with increasing momentum.

InterNICHE works to facilitate this implementation in different ways. The organisation encourages ethics committees to be pro-active and press for best practice education, and for laws to reflect such an imperative. This means replacement of harmful animal use, with a recognition that this is also the main focus of the 3Rs approach. InterNICHE also works with teachers to encourage the building of infrastructure such as body donation programs and computer laboratories, and to practically implement alternatives. And it supports conscientiously objecting students, providing information and resources to help them initiate change. The InterNICHE Policy is a tool for all these parties in their work to show that full replacement of harmful animal use is both viable and necessary.

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