Curriculum Development

Anderson, L.C. (2007). **Institutional and IACUC responsibilities for animal care and use education and training programs.** *ILAR Journal* 48(2): 90-95. ISSN: 1084-2020 (print)
Abstract: Training and instruction of personnel are important components of animal care and use programs because they help to ensure the health and welfare of the animals and the integrity of the research or testing results. Training also helps to promote the consideration of alternatives, recognition of animal pain and distress, appropriate use of pain-relieving agents, aseptic technique, pre- and post-procedural care, and personnel health and safety. While individuals who provide the care for or conduct research or testing in laboratory animals should take personal responsibility for ensuring that they have the skills to perform their duties, the institution is ultimately responsible for ensuring their competency. The institution is also responsible for providing the training or instruction that is required by federal legislation, regulations, and policies. The institutional animal care and use committee (IACUC) is responsible for ensuring, as part of their review of research activities, that the personnel are capable of performing the procedures described. The IACUC must also assess the institution's training program as part of their semiannual animal care and use program review and make recommendations regarding training to the institutional official. This article provides a comprehensive overview of the US regulatory mandates for training and personnel qualification

Anonymous (2002). **Training in surgical skills: international perspectives, new approaches.** *Veterinary Record* 151(18): 523-6. ISSN: 0042-4900 (print)
Descriptors: Education, Veterinary, Surgical Procedures, Animals, Australia, Great Britain, Humans, International Cooperation, Professional Competence, United States.

Arluke, A. (2004). **The use of dogs in medical and veterinary training: understanding and approaching student uneasiness.** *Journal of Applied Animal Welfare Science - JAAWS* 7(3): 197-204. ISSN: 1088-8705
Descriptors: animal experimentation, laboratory animals, education, veterinary, ethics, medical students, cadaver, dogs, humans, Massachusetts.

Bernado, T.M. (2003). **New technology imperatives in medical education.** *Journal of Veterinary Medical Education* 30(4): 318-25. ISSN: 0748-321X
Abstract: A great deal of effort has been expended on trying to determine whether traditional instruction, online learning, or some combination of the two is of greater educational effectiveness. This may be the wrong question. Rather than determining whether one delivery mechanism is superior to another, it is more important to choose the best method(s) of delivery to achieve specific educational objectives, taking into consideration the different learning styles and circumstances of the target audience. Although appropriate use of technology offers potential for improved learning, there are other compelling reasons to use technology in medical education, such as reaching a different audience or accessing unique expertise that would otherwise be unavailable. This article explores the ramifications of three important drivers of technology adoption for medical education: (1) public access to medical knowledge on the Internet; (2) change in what constitutes medical knowledge; and (3) the impending shortage of educators.

Some approaches are proposed, including veterinary examples, to the challenges presented by these changes.
Descriptors: education, veterinary, internet, teaching, humans, educational models.

Baumans, V. (2006). **Alternatives to the use of laboratory animals in veterinary education.** *ALTEX* 23 (Suppl): 68-70. ISSN: 0946-7785 (print)
Abstract: About 75 million vertebrates are used worldwide per year for experimental purposes, of which 10 million within Europe. On average, about 2% is used for education and training purposes. The basis of legislation on the use of animals for experimental purposes is the Three Rs principle of Russell and Burch: replacement, reduction and refinement. Most legislation contains provisions to protect the animals such as the definition of legitimate purposes for animal use, competence of scientists and animal staff, the use of alternatives and prevention of unnecessary pain and distress. One of the legitimate purposes is the use of animals in education and training, only permitted when the objective cannot be achieved by comparable effective audiovisual or any other suitable methods (Art 25, ETS123). In many countries, the use of animals for educational purposes in the veterinary curriculum requires approval by the Animal Ethics Committees. Many alternatives have been developed and are already in use in veterinary education such as interactive videos and computer simulations, in vitro cell cultures, slaughterhouse material, plastinated organs, dead animals from a humane/ethical source and clinical case-based practice. The debate on the use of animals in veterinary education should include the question who benefits: the laboratory animals, the animal patients, the animal owners, the veterinary students, the teachers and/or the management? Concerning the quality of the veterinarian trained with or without live animals, no difference in surgical performance could be shown so far. Future aims should include a listing of case studies on available teaching materials in a database and a large-scale controlled international study on replacement methods in veterinary education.

British Pharmacological Society and the Physiological Society. **Tackling the need to teach integrative pharmacology and physiology: problems and ways forward.** *Trends in Pharmacological Science* 27(3):130-133. ISSN: 0165-6147 (print)
Abstract: Despite continued efforts to reduce the numbers of animals used in biomedical research, there are still some research areas in which alternatives cannot be used and animal experimentation is essential. Studies using animals must be carried out by highly trained personnel to ensure experimental success and to minimise pain and distress for the animals. However, recent surveys in the UK have revealed a shortage of skills in techniques involving the use of animals. A survey conducted in 2004 jointly by the British Pharmacological Society and the Physiological Society suggests that only approximately 2% of biomedical graduates in the UK receive training in in vivo experimentation, and that this type of training is likely to be reduced in the future. Evidence from other countries suggests that the problem is widespread. In this article, we discuss the results of the survey by the BPS and the Physiological Society and propose a series of recommendations to address the problem.

Colby, L.A., P.V. Turner, and M.A. Vasbinder (2007). **Training strategies for laboratory animal veterinarians: challenges and opportunities.** *ILAR Journal* 48(2): 143-155. ISSN: 1084-2020 (print)

Abstract: The field of laboratory animal medicine is experiencing a serious shortage of appropriately trained veterinarians for both clinically related and research-oriented positions within academia, industry, and government. Recent outreach efforts sponsored by professional organizations have stimulated increased interest in the field. It is an opportune time to critically review and evaluate postgraduate training opportunities in the United States and Canada, including formal training programs, informal training, publicly accessible training resources and educational opportunities, and newly emerging training resources such as Internet-based learning aids. Challenges related to each of these training opportunities exist and include increasing enrollment in formal programs, securing adequate funding support, ensuring appropriate content between formal programs that may have diverse objectives, and accommodating the training needs of veterinarians who enter the field by the experience route. Current training opportunities and resources that exist for veterinarians who enter and are established within the field of laboratory animal science are examined. Strategies for improving formal laboratory animal medicine training programs and for developing alternative programs more suited to practicing clinical veterinarians are discussed. In addition, the resources for high-quality continuing education of experienced laboratory animal veterinarians are reviewed.

Conarello, S.L. and M.J. Shepherd (2007). **Training strategies for research investigators and technicians.** *ILAR Journal* 48(2):120-30. ISSN: 1084-2020 (print)

Abstract: Training programs for research personnel are discussed as a key resource that must be part of an effective animal care and use program. Because of the legal responsibility to ensure that research staff are qualified to use animals, many institutions have justified the necessity for a training coordinator and/or trainers for their animal care and use programs. Effective training programs for research personnel must meet the needs of the client base (research scientists and staff) so that they are relevant, practical, and timely. To meet these objectives, it is useful to involve the scientific staff in the analysis of their learning needs. To meet a performance standard necessary for quality research, a large percentage of the institutional staff must participate in the training program. Often it is the principal investigators who set the tone for their staff members regarding the importance of receiving training. Garnering support from this client base will create a culture that encourages training and engenders a positive attitude about humane animal care and use. One effective approach is to incorporate nonanimal models as alternatives to live animals to teach humane handling techniques and methods, thereby contributing to refinement, reduction, and replacement (the 3Rs). Also discussed are the necessity of timely feedback from clients, documentation of personnel training for regulatory purposes, and the collection of training metrics, which assists in providing justification for the granting of additional fiscal support for the program. Finally, the compliance procedures and opportunities for essential refresher training are discussed and related to high performance standards, humane animal use, and quality research, all of which contribute to the 3Rs.

Cunningham, P.F. (2008). **Animals in psychology education and student choice.** *Society and Animals* 8(2):191-212. ISSN 1063-1119 (print); ISSN: 1568-5306 (online)

Abstract: This article identifies some of the important issues that underlie student-teacher conflicts regarding animal experimentation and dissection in psychology education. Understanding the reasons why students object to animal laboratories, why some teachers may refuse students access to non-animal alternatives, and why other teachers support student choice

is an important first step in resolving student-teacher disputes regarding the use of animals in the psychology classroom. The article discusses why establishing an openly declared student choice policy at schools that use animals in psychology education is a reasonable thing to do and describes how a student choice policy works in practice.

Dobrovolny, J., J. Stevensa and L.V. Medina (2007). **Training in the laboratory animal science community: strategies to support adult learning.** *ILAR Journal* 2007;48(2):75-89. ISSN: 1084-2020 (print)
Abstract: The essence of learning is change; learning is the process by which learners customize new information to make it personally meaningful and relevant. Training is the process of helping students make those changes. Research indicates that adults learn differently than children or adolescents and that adults consistently use the following six learning strategies: prior experiences; conversations; metacognition; reflection; authentic experiences; and images, pictures, or other types of visuals. Each of these learning strategies can be combined with the other strategies and often build upon each other. A recent study on how health care professionals learn indicated that the learning strategy they used most often was reflection, which supports learning before, during, and after training. Numerous examples are provided in this article describing how to integrate each of the six adult learning strategies into laboratory animal science training. While lectures and other types of direct instruction are appropriate, they are inadequate and ineffective unless they are integrated with and support adult learning strategies. Both the US Department of Agriculture regulations and the Public Health Service Policy mandate that research institutions must ensure that all personnel involved in animal care, treatment, or use are qualified to perform their duties. Applying adult learning strategies to training for the laboratory animal science community will enhance learning and improve both the science and the humane care of the animals, which is a goal our community must continuously strive to achieve.

Gruber, F.P. and D.G. Dewhurst DG. (2004). **Alternatives to animal experimentation in biomedical education.** *ALTEX* 21 (Suppl 1): 33-48. ISSN: 0946-7785 (print)
Abstract: In education, it is important that students are not put in a position in which they are forced to participate in animal experiments or to use dead animals, killed especially for such purposes. Continued use of animal experiments to demonstrate known facts or teach skills which can be taught using non-animal methods evidences only a lack of sensitivity towards students who still maintain respect for life. In countries where animal testing in education is reduced to close to zero, there is no evidence that the students who are being trained are less capable or qualified. There are sufficient alternatives available at relatively low-cost and with proven educational efficacy to allow the vast majority of students who study biomedical science courses to qualify without using animal experiments. However, in many universities across Europe, there is still a resistance to adoption of such methods amongst faculty. The global situation is probably worse with animals still being used in high school teaching in some countries such as the USA.

Grunwald, T. and C. Corsbie-Massay (2006). **Guidelines for cognitively efficient multimedia learning tools: educational strategies, cognitive load, and interface design.** *Academic Medicine* 81(3): 213-23. ISSN: 1040-2446

Abstract: The field of medical education has consistently embraced new technologies in an attempt to improve the training process of our nation's doctors. There are thousands of available multimedia learning tools (MMLTs), but no quantitative scale exists to assess their efficiency and overall educational value. The authors review existing literature and suggest guidelines for creating cognitively efficient medical MMLTs. In 2004, the authors searched PubMed to identify articles regarding mutimedia learning, including educational strategies and existing MMLTs. The primary search terms included "multimedia learning," "cognitive load," and "surgical education." The resulting articles were evaluated and reviewed for educational and interface design techniques, and a list of common features was generated. The authors cross-referenced these features with extensive theories of cognitive load to create a list of methods that demonstrated improved learning. Techniques common to existing MMLTs often neglect to account for theories of cognitive load and may be detrimental to the learning process. The authors outlined important educational considerations and guidelines for the design of effective MMLTs. With large resources being spent to produce MMLTs, more research is necessary to establish successful design techniques. The authors summarized existing research, outlined educational issues in multimedia design, and proposed future directions for study.

Hansen, B.D. (2003). **An alternative model for teaching emergency procedures.** *Journal of Veterinary Medical Education* 30(3): 270-273. ISSN: 0748-321X (print)

Abstract: Emergency/critical care is a new veterinary specialty that poses special challenges in veterinary education. Traditional methods of teaching emergency procedures in the teaching hospital place novices in a high-stress, high-stakes environment not conducive to learning or to optimum patient care. Our innovative emergency-procedures laboratory enables students to acquire a high degree of proficiency, in a realistic setting, with focused, controlled instruction and practice, replicable in schools with or without emergency/critical care facilities.

Descriptors: education, veterinary, emergency medicine, models, educational, animals, humans.

Hart, L., M. Wood, and H. Weng (2005). **Mainstreaming alternatives in veterinary medical education: resource development and curricular reform.** *Journal of Veterinary Medical Education* 32 (4): 473-80. ISSN: 0748-321X--Print

Abstract: Veterinary medical educators are charged with preparing students to enter practice in veterinary medicine during a four-year, intensive, professional education program. This requires giving students in laboratory training that involves dead, anesthetized, or conscious animals, so that they become proficient in the expected range of veterinary knowledge, skills, and abilities. Undeniably, experience with animals is essential to prepare students for a profession in which animals comprise the total domain. However, the consumptive use of animals for teaching students, especially in laboratories, is increasingly subject to regulatory requirements, while also being scrutinized by animal protection groups, and has become a common focus of contention among veterinary students. Not surprisingly, the use of animals in teaching has sharply declined over the past few decades, as new teaching resources and methods, involving less consumptive use of animals, have been incorporated. This change in veterinary medical education has occurred on such a wide scale, in almost all veterinary schools and colleges, that the educational

approach can serve as a model for further developments within the veterinary educational community and, indeed, for animal-related material in secondary schools and undergraduate higher education. This article highlights examples of the leadership provided by veterinary educators in developing alternative teaching resources and methods, while maintaining the high level of proficiency expected from traditional educational approaches.

Martinsen, S. and N. Jukes (2005). **Towards a humane veterinary education.** *Journal of Veterinary Medical Education* 32 (4): 454-60. ISSN: 0748-321X--Print
Abstract: There is a vast array of learning tools and approaches to veterinary education, many tried and true, many innovative and with potential. Such new methods have come about partly from an increasing demand from both students and teachers to avoid methods of teaching and training that harm animals. The aim is to create the best quality education, ideally supported by validation of the efficacy of particular educational tools and approaches, while ensuring that animals are not used harmfully and that respect for animal life is engendered within the student. In this paper, we review tools and approaches that can be used in the teaching of veterinary students, tools and approaches that ensure the dignity and humane treatment of animals that all teachers and students must observe as the very ethos of the veterinary profession that they serve. Veterinary education has not always met, and still often does not meet, this essential criterion.

Medina, L.V., K. Hrapkiewicz, M. Tear, and L.C. Anderson (2007). **Fundamental training for individuals involved in the care and use of laboratory animals: a review and update of the 1991 NRC Core Training Module.** *ILAR Journal* 48(2): 96-108. ISSN: 1084-2020 (print)
Abstract: Public trust demands that individuals who do research, testing, or teaching with animals use humane, ethical, and scientifically sound methods. Furthermore, the Animal Welfare Act and the Public Health Service Policy require research institutions to provide basic training and to ensure that anyone who cares for and/or works with laboratory animals has the appropriate training or experience relevant to their job responsibilities. Institutions accredited by the Association for Assessment and Accreditation of Laboratory Animal Care International must also provide training programs and ensure the qualifications of personnel. The primary goal of this training is to provide individuals with basic knowledge and to reinforce attitudes and behaviors that help to ensure humane animal care and use. This article provides an overview of the core training module outline and content from the 1991 report of the Institute for Laboratory Animal Research, Education and Training in the Care and Use of Laboratory Animals: A Guide for Developing Institutional Programs, as well as pertinent updates for introducing personnel to information regarding the care and use of laboratory animals. Both mandatory and suggested training topics are reviewed, including relevant regulations and standards, ethical considerations, humane methods of animal experimentation and maintenance, and other pertinent topics. Although the fundamental training course content and delivery will vary depending on the nature and complexity of an institution's animal care and use program, this basic training provides the foundation for more in-depth training programs and supports humane and ethical animal care and use.

Millman, S.T., C.L. Adams, and P.V. Turner (2005). **Animal welfare training at the Ontario Veterinary College.** *Journal of Veterinary Medical Education* 32(4): 447-450. ISSN: 0748-321X (print)

Abstract: The University of Guelph is internationally recognized as a leader in animal welfare and is home to the Colonel K.L. Campbell Centre for the Study of Animal Welfare and to numerous faculty with expertise in the discipline. However, while animal welfare receives significant attention within the agricultural college, its didactic teaching within the veterinary curriculum has been limited. Veterinary students receive four hours of instruction in animal ethics and apply their knowledge within the communication lectures and laboratories, totaling 11-15 hrs. Compulsory coursework explicitly addressing factual components of animal welfare science, welfare assessment, and associated animal-related policy constitute only 12 hrs throughout the four-year Doctor of Veterinary Medicine curriculum. However, an elective final-year clinical rotation and a graduate course specific to animal welfare were offered for the first time in 2004/2005. Student interest in animal welfare is evident through their participation in summer research projects in animal welfare, an animal welfare mentor group, and a student-run animal welfare club that organizes an Animal Welfare Forum each October. Veterinarians have important contributions to make in decision making about animal welfare issues, at clinician and policy levels. Although motivated individuals can seek out opportunities to expand their knowledge of animal welfare, a compulsory senior-level course in animal welfare is needed to develop the necessary depth of understanding of this discipline if veterinarians, as a profession, are to meet society's expectations about animal welfare.

Nevalainen, T., I. Dontas, A. Forslid, B.R. Howard, V. Klusa, H.P. Käsermann, E. Melloni, K. Nebendahl, F.R. Stafleu, P. Vergara, and J. Verstegen (2000). **FELASA recommendations for the education and training of persons carrying out animal experiments (Category B). Report of the Federation of European Laboratory Animal Science Associations Working Group on Education of Persons Carrying out Animal Experiments (Category B) accepted by the FELASA Board of Management.** Laboratory Animals 34(3): 229-235. ISSN: 0023-6772

Abstract: Currently, the implementation of education and training requirements of persons working in this category varies between countries. This document proposes a standard, adoption of which will create greater uniformity in general levels of competence and facilitate the interchange of persons through harmonized and mutually acceptable criteria.

Parry, K. and H. Owen (2004). **Small simulators for teaching procedural skills in a difficult airway algorithm.** *Anaesthesia and Intensive Care* 32(3): 401-409. ISSN: 0310-057X (Print)

Abstract: Difficulty with intubation, ventilation or both is a significant issue for anaesthetists. The American Society of Anesthesiologists' Guidelines for the Management of the Difficult Airway is an algorithm widely used when airway difficulties are encountered. Ideally, anaesthetic trainees should have access to simulators suitable for learning and practising how to manage airway difficulties, but most models have been designed primarily for resuscitation training. The aim of this study was to determine which small airway simulators could be used to practise steps in the Difficult Airway Algorithm (DAA). We identified the essential elements of the DAA relating to endotracheal intubation (laryngoscope, Trachlight and Fastrach), external laryngeal manipulation, dedicated airway devices (LMA, Combitube) and trans-tracheal ventilation using the Enk oxygen flow modulator (Cook). Each element was studied in adult airway models sold for airway management training. The DAA elements were studied in 16 different airway models. No single model achieved our criteria of "good/very realistic" for all elements. All elements of

the DAA could be used in the Difficult Airway Trainer Deluxe (MPL) and Bill (VBM/Mallinckrodt) but it would be necessary to acquire at least two trainers to achieve "good/very realistic" in all techniques studied. Anaesthetic departments planning to acquire small simulators for airway management training should undertake a training-needs analysis and apply this to the performance characteristics of the simulators. Generally, at least two airway training models will be needed to teach all steps of the DAA effectively.
Descriptors: anesthesiology, medical education, intratracheal intubation, manikins, Australia, humans, simulation, instrumentation.

Pritt, S. and N. Duffee (2007). **Training strategies for animal care technicians and veterinary technical staff.** *ILAR Journal* 48(2):109-119. ISSN: 1084-2020 (print)
Abstract: An institutional training program for animal care and veterinary technicians should be planned and implemented to provide these individuals with knowledge and skills for performing their duties within a laboratory animal care and use program. The complexity in the regulatory and scientific features of the animal research environment necessitates a strong training program on diverse topics according to staff duties. Orientation training should include ethics and compliance with relevant laws, policies, and guidelines. Depending on specific staff responsibilities, training may be general or in depth on topics of species-specific biology and behavior, animal facility equipment and operations, animal health procedures, animal research policies, occupational health and safety equipment and practices, computer usage, training, and management. Staff training should be an ongoing mission for incorporating new equipment, practices, and procedures in the laboratory animal program; for providing periodic refresher training to maintain a high level of staff qualifications; and for retraining when skills or knowledge are found deficient. Large institutions often have a dedicated training staff to implement the institutional training program.

Scalese, R.J. and S.B. Issenberg SB. (2005). **Effective use of simulations for the teaching and acquisition of veterinary professional and clinical skills.** *Journal of Veterinary Medical Education* 32(4):461-467. ISSN: 0748-321X (print)
Abstract: Simulation technology will feature prominently in this exciting, yet challenging, time for veterinary medicine. The profession is evolving to keep pace with rapid changes in clinical practice, scientific discovery, and educational strategy, while ensuring that it follows the public mandate to produce competent veterinarians. Among the challenges to meeting this educational goal are limitations-due to important issues such as animal welfare-on the availability of real patients for training. Drawing chiefly on the experience in human medicine, this article explores the use of simulations in veterinary medical education to provide safe and ethical alternative opportunities for learners to practice essential clinical and professional skills.

Siegford, J.M., T.M. Bernardo, R.P. Malinowski, K. Laughlin, and A.J. Zanella (2005). **Integrating animal welfare into veterinary education: using an online, interactive course. Veterinarians in the United States and abroad are faced with growing public concern for the welfare of animals, particularly those in production.** *Journal of Veterinary Medical Education* 32(4): 497-504. ISSN: 0748-321X (print)
Abstract: To prepare veterinarians to exert the leadership expected by the public and industry,

steps should be taken to provide instruction in animal welfare at veterinary colleges. The ultimate goal is to offer courses in animal welfare in a consistent manner on a global scale, utilizing existing expertise in an efficient and cost-effective manner. Given the intense curricula of veterinary schools and the scarcity of instructors trained in animal welfare, a nontraditional approach is needed to educate veterinary students in the United States and abroad in animal welfare. Michigan State University (MSU) is developing a graduate-level, online interactive course in animal welfare assessment. The course will approach the topic of animal welfare education from a holistic, multidisciplinary standpoint (encompassing ethics, economics, and behavior) and address issues important to the general public and the international community. The MSU course will draw on renowned international animal welfare experts, allowing students to receive high-quality education that would be difficult in any other circumstance. The course will bridge an important gap in the veterinary curriculum and offer a complete and congruous education in animal welfare to veterinarians worldwide. The MSU course will also serve as a model for collaboration in content assembly and course delivery, by using technology to leverage global expertise in the interests of educational equity. In addition to innovative technology, such as the use of Web-collaboration software to create the course, a variety of media that enable students to interact with the material will also be incorporated throughout the course. Thus, the course will not only utilize the Internet to provide access to high-quality material, but will also require the active participation of the student, which is needed for effective learning.

Smeak, D.D. (2007). **Teaching surgery to the veterinary novice: the Ohio State University experience.** *Journal of Veterinary Medical Education* 34(5): 620-627. ISSN: 0748-321X (print)
Abstract: Surgical training in veterinary medicine has evolved rapidly over the past several decades. Catalysts for change include pressure from concerned students and the public to reduce the use of live animals in teaching; less-than-effective preparation of students for live surgery experience; an overall reduction in faculty time and effort devoted to skills training; college budgetary reallocations mandating reductions in expensive group laboratory experiences; and more specialized case-load patterns in clinical rotations, which have reduced students' exposure to common surgical conditions. In response to these trends, methods for surgery educators to reduce, refine, and replace live animals in surgery training courses at veterinary schools have received broad attention. When these methods are used effectively in a curriculum, it is no longer necessary to sacrifice animals for adequate student training. This article describes a successful and ethical surgical training program used at the Ohio State University College of Veterinary Medicine (OSU-CVM). This program provides early exposure to skills training using surgical simulators and auto-tutorials, ensures that basic skills are mastered before students are exposed to cadaver practice, and requires application of model-based skills to cadavers, with final matriculation to intensive exposure to multiple live-animal procedures via a collaborative surgery program with a local shelter.

Tabas, J.A., J. Rosenson, D.D. Price, D. Rohde, C.H. Baird, and N. Dhillon. (2005). **A comprehensive, unembalmed cadaver-based course in advanced emergency procedures for medical students.** *Academic Emergency Medicine* 12(8): 782-785. ISSN: 1553-2712 (online)
Abstract: BACKGROUND: Preparing medical students for residency in emergency medicine involves education in many areas of knowledge and skill, including instruction in advanced emergency procedures. OBJECTIVES: To outline the logistics involved in running a training

course in advanced emergency procedures for fourth-year medical students and to report students' perceptions of the impact of the course. METHODS: The course is a cadaver-based training laboratory that utilizes several teaching modalities, including a Web-based syllabus and online streaming video, didactic lecture, hands-on practice with models and ultrasound, and hands-on practice with unembalmed (fresh) cadavers. The course focuses on seven emergent procedural skills, including deep venous access via the subclavian, internal jugular, and femoral veins; tube thoracostomy; saphenous vein cutdown; intraosseous line placement; and emergency cricothyrotomy. The course is taught by attending emergency physicians and anatomy department faculty. After completion of the course, students reported their self-assessments on a five-point Likert scale. Data were evaluated using a paired t-test (two-tailed). RESULTS: Thirty-three students completed the evaluation. The students reported a mean (+/- standard deviation [SD]) increase in their understanding of the indications for all procedures from 3.3 (+/- 1.1) before to 4.8 (+/- 0.4) after the course ($p = 0.004$, 95% CI = 0.7 to 2.0). The students reported a mean increase in their understanding of how to perform all procedures from 2.1 (+/- 0.9) before to 4.6 (+/- 0.6) after the course ($p = 0.003$, 95% CI = 1.9 to 3.0). The students reported a mean increase in their comfort level performing all procedures from 1.6 (+/- 0.8) before to 4.2 (+/- 0.7) after the course ($p < 0.001$, 95% CI = 2.0 to 2.9). CONCLUSIONS: These findings support the value of an advanced emergency procedural training course using an unembalmed cadaver-based laboratory and incorporating several teaching modalities.
Descriptors: cadaver, medical education, emergency medicine, curriculum, educational measurement, health knowledge, teaching materials.

van der Valk, J and B.F. van Zutphen (2004). **Reduction through education: the insight of a trainer.** *Alternatives to laboratory animals: ATLA* 32(Suppl 2): 1-4. ISSN: 0261-1929 (print)
Abstract: One of the articles contained within European Council Directive 86/609/EEC states that "Persons who carry out experiments or take part in them, and persons who take care of animals used for experiments, including duties of a supervisory nature, shall have appropriate training". In effect, this article stipulates that only competent individuals are allowed to work with laboratory animals. At least three groups of individuals can be identified with different responsibilities toward experimental animals: animal technicians, scientists, and veterinarians/animal welfare officers. The responsibilities and duties of the individuals within each of these categories differ. This paper focuses on the training of scientists. The scientist designs, and often also performs, animal experiments. Therefore, scientists must be educated to develop an attitude of respect toward laboratory animals, and must be trained so that, if an experiment must be performed with animals, it is designed according to the highest possible scientific and ethical standards. In The Netherlands, the law stipulates that scientists intending to work with animals must have completed a course in laboratory animal science. This compulsory course started in 1986. The Department of Laboratory Animal Science at Utrecht University is responsible for the national coordination of this course. Participants must have an academic degree (at the level of MSc) in one of the biomedical sciences, such as biology, medicine or veterinary medicine. Although the course is an intensive 3-week, 120-hour long course, which covers both technical and ethical aspects of laboratory animal experimentation, it cannot provide full competence. It is designed to provide sufficient basic training and knowledge to enable students to design animal experiments, and to develop an attitude that will be conducive to the implementation of the Three Rs. However, full competence will always require further training

that can only be acquired as a result of practical experience gained while working in the field of laboratory animal research. Evaluations subsequent to the course have revealed that more than 98% of the students regard the course as indispensable for all scientists working in a research area where animal experiments are performed. They agree that the course not only contributes to the quality of experiments and to the welfare of animals, but also to a decrease in the number of animals used in experiments.

VandeWoude, S. (2007). **Development of a model animal welfare act curriculum.** *Journal of Veterinary Medical Education* 34(5): 600-604. ISSN: 0748-321X (print)
Abstract: Animal-welfare issues are often controversial and frequently have an emotional component. Veterinarians have extensive knowledge, experience, and scientific perspective and are arguably the professionals best suited to advise and develop recommendations on animal welfare. The development of an Animal Welfare Act (AWA) teaching module is a first step toward educating veterinary students about animal welfare. This article presents the current development status of this curriculum project, which is intended to be a valuable addition to the evolving veterinary education on animal welfare.

Willems, R.A. (2007). **Animals in veterinary medical teaching: compliance and regulatory issues, the US perspective.** *Journal of Veterinary Medical Education* 34(5): 615-619. ISSN: 0748-321X (print)
Abstract: Veterinary schools in the United States are regulated as research facilities under the federal Animal Welfare Act by Animal Care (AC), a division of the USDA's Animal and Plant Health Inspection Service (APHIS). The schools are inspected at least annually by AC inspectors, who are all veterinarians. In a recent poll, these inspectors identified several areas that have caused compliance problems for veterinary schools. In addition, several emerging issues also appear to be posing potential regulatory problems as societal expectations and ethical considerations change.

Wood, M.W., L.A. Hart, and H.Y. Weng (2005). **Effective bibliographic searching for animal alternatives in veterinary medical education: the UC Davis web site.** *Journal of Veterinary Medical Education* 32(4): 468-72. ISSN: 0748-321X (print)
Abstract: To prepare students in just four years to enter veterinary practice, veterinary medical educators offer an array of laboratory and clinical experiences coordinated with didactic instruction. Recent curricular changes have reduced the numbers of animals involved in painful or terminal procedures. For each use of animals, veterinary educators are required by the USDA's policies 11 and 12 to complete animal-use protocols that include questions on alternatives to procedures causing more than momentary pain or distress. Veterinary medical educators seeking improved teaching resources and methods or completing animal-use protocols may find it frustrating to locate the relevant information, which is dispersed across many databases. This paper addresses a gap facing veterinary educators by presenting user-friendly searching tools that are targeted toward (a) locating teaching resources and (b) conducting effective bibliographic searches on standard teaching laboratory procedures, as required for animal-use protocols. These tools simplify searching by providing streamlined access to the resources being sought. Facilitating efficient and effective searching by users can improve teaching and simplify compliance with USDA requirements.