

## **AUDIOVISUAL METHODS FOR TEACHING IN VETERINARY SCIENCES: AN ALTERNATIVE AND COMPLEMENTARY TOOL**

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### **Abstract**

The European Higher Education Area requires to update our educational approach from the system of lectures to other ones based on innovative teaching techniques and self-learning. This makes available a high number of educational resources, as those related to the Information and Communication Technologies (ICT), which have an important role in the standards of Bologna. The need to use animals in the training of professionals in Veterinary is undeniable as well as to provide them with the appropriate level of welfare related to their status of living beings. However, taking account the University policy on animal protection and the objective of reducing the number of animals in the practices (European Convention for the Protection of Animals used for experimentation, teachers and other scientific purposes), ICT can be very useful in the area of Health Sciences, and particularly in Veterinary Sciences, to improve understanding of the theoretical part of the subjects. Over the past years, our team in the Veterinary School of the University Complutense of Madrid has been developed various ICT to complement the traditional teaching practices in various subjects. These projects have been based on electronic format as digital video discs (DVDs) that include images and commonly manipulations in a reduced number of animals that are found in centers of teaching, research and in factory farms. This material clearly shows and explains the most important physiological phenomena and management techniques in a real and integrated way. It has been done for laboratory animals (rat, mouse, rabbit) and medium-sized animals as dogs used for clinical practices. On the other hand, these kinds of methodologies have also been focused to give an audiovisual explanation about basic management of exotic animals (domestic and wild birds and reptilian). In this case, their access, study and handling is great difficult. Also, this electronic format is used to explain some reproductive techniques absolutely essential, as artificial insemination technique for researchers or from a productive point of view for the students. Thus, in the modern context of teaching this material based on the new audiovisual and communication technologies can guarantee the students access to more educational material, minimizing the number of animals used and with the necessary quality for a complete understanding of those procedures. The result is an interactive and accessible e-learning tool that can be listened or read. It is adapted to the graduate as well as the postgraduate students, for practical and theoretical sessions, and can be applied to different species of animals and in several subjects in the Bachelor of Veterinary and related sciences. An additional advantage is the use in any time and place since the audiovisual hardware is practically eternal. In conclusion, this project is a complementary tool that facilitates the training of students combining the new technologies and the possibility to learn some animal procedures in detail that otherwise would be impossible to examine.

Key words: audiovisual, e-learning, animal handling, veterinary science.

# 1 INTRODUCTION

Improving the quality of education through the diversification of contents and methods and promoting experimentation, innovation, the diffusion and sharing of information and best practices are UNESCO's strategic objectives in education [1]. A shift from teacher focused on instruction to learner centered instruction is needed to enable students to acquire the new 21<sup>st</sup> century knowledge and skills. Also, it is well known that students learn more when they are involved actively in learning process than when they are passive recipients of instruction. That's why the European Higher Education Area requires to update our educational approach from the system of lectures to other ones based on innovative teaching techniques and self-learning [2].

Therefore, the educational process would be highly effective if the instructor introduces some modifications in the conventional mode of teaching such as the use of multimedia technologies, since almost all Universities around the world can access to a computer, Internet and e-mail [3]. In this sense, the Information and Communication Technologies (ICT) have made many innovations in the field of teaching and also have introduced a drastic change from the old paradigm of teaching and learning. One of the best tools we have is the *e-learning*. It is essentially a computer-assisted learning for the network-transfer of skills and knowledge, which comprises all forms of electronically supported learning and teaching. This makes available a high number of educational resources related to the ICT, which have an important role in the standards of Bologna and implies and adaptation of infrastructure and human and material resources. In addition, the combination of traditional face-to-face classroom methods with more computer-mediated activities create a learning tool, that also facilitate the education and integration of people with disabilities and the interaction with distance learners and international students.

Veterinary degree has particular characteristics to take account derived to the use of animals. The Veterinary profession has a stewardship role for the health and welfare of a major segment of the animal kingdom. However, the need to use animals in the training of professionals in Veterinary is undeniable as well as to provide them with the appropriate level of welfare related to their status of living beings. Traditionally, the practical sessions have been characterized by the use of laboratory, farm and exotic animals, to explain in a real and integrated time the most important physiological phenomena or handling techniques described theoretically in the lectures. Proposals for animal use are based on the potential for learning new information, or for teaching skills or concepts that cannot be obtained using an alternative method, and that implies the use of a high number of animals for practical sessions. However, the national, international and community policy recommendations for the protection of animals used for experimentation, teachers and other scientific purposes [4,5,6], is based on the concept of "the three Rs: replacement, reduction, and refinement" put forth by Russell and Burch, [7] which point out that, still in certain practices, the number of animals must tend to diminish, from a regulatory point of view as ethical one.

This makes necessary using alternatives that involve a reduction of the animals when planning and conducting practical sessions. Over the past years, our team in the Veterinary School of the University Complutense of Madrid (UCM) in collaborating with many teachers has been developed various ICT to complement the traditional teaching practices in various subjects. These projects have been based on electronic format as digital video discs (DVDs) that include text together with images and commonly manipulations in a reduced number of animals that are found in centers of teaching, research and in factory farms. This material employs the visual and auditory forms that clearly shows and explains the most important physiological phenomena and management techniques in a virtual but real and integrated way.

Therefore, in the area of Health Sciences, and particularly in Veterinary Sciences, the ICT can be very useful in improving the understanding of the theoretical part of the subjects with audiovisual content without using animals repeated times. In particular, the multimedia software available on digital video discs (DVDs) can play a powerful role with applications in labs and lectures, tutorials and practical sessions in any time and place since the audiovisual hardware is practically eternal. By this system,

new teaching methods and technologies, which respond to the challenges posed by the changes that today require University studies in Europe minimizing the number of animals used, are promoted, within the different areas of knowledge.

## **2 OBJECTIVE**

The project aims to enhance the comprehensive training of veterinary and post-graduate students in the discipline of Physiology, Animal experimentation, Pathophysiology and Clinical Propaedeutic Veterinary and Animal Reproduction by using digital video discs (DVDs) as an alternative method to use animals repeated times and with a content, methodology and visual details improved.

## **3 METHODOLOGY**

### **3.1. Selection and planning the practical sessions with animals.**

In this part, the teaching team selected the most appropriate content of the practical sessions as well as the most appropriate methodology for their development. The reduction criteria of animals prevailed in the design. All procedures were approved by the Animal Ethics Committee of the Veterinary Faculty and were in compliance with the Spanish guidelines for care and use of animals in research [5,6]. Suitable protocols in the facilities were followed prior to use the animals, which include adaptation, nutrition and wellness of them. Once the practices were selected, a storyboard and filming schedule were prepared: days needed, hours to film and the places where they would be made.

### **3.2. Acquisition of the material needed.**

Once the scheme was designed, everything necessary for the implementation of the project was acquired.

### **3.3. Practical implementation of selected practise.**

In this phase, the teaching team, led by a project manager, shifted to the centers where the animals were allocated (research laboratories, farms and animal facilities). Before video recording, we took into consideration issues such as the easiest way to visualize, choose the lighting, the most appropriate camera angles and methods, taking into account that the film was the basis for the practice for the students. This stage was one of the most laborious and difficult of the project due to the need of coordination of numerous people and the need of repeat the same procedure from different angles to get a better-shot selection for the edition process.

### **3.4. Study the results and draft edition of the material.**

This involves the study of the films recorded and the creation and/or edition of graphics, pictures, sound and video. In agreement with the design of the main project, the order of the sequences filmed was modified and customized for the final presentation. A musical background was selected that allow reading the text attached and listening the comment of the images.

### **3.5. Edition of the finished product.**

In this final stage, the integration and synchronization of all these elements into one final application was performed. The package of the application into a distributable format for the end-user were made, once edited and revised. There are many multimedia technologies that are available for developers to create these innovative and interactive multimedia applications [8].

## 4 RESULTS

As a result, nowadays a sustainable number of DVD are available:

- 2004. Experimental procedures in laboratory animals I.
- 2005. Experimental procedures in laboratory animals II.
- 2006. Experimental procedures in animals: dog.
- 2009. Development of alternatives to animal use in teaching: birds.
- 2010. Development of alternatives to animal use in teaching: reptiles.
- 2011. Experimental procedures used in the reproduction of lagomorphs.

This material consists in modules that describes and show the management of the laboratory animals (rat, mouse, rabbit) (Fig. 1a, 1b, 1c) and medium-sized animals as dogs, used for clinical practices (Fig. 2).

Fig.1. Handling of a mouse (1b), a rat (1b) and a rabbit (1c) that belong to the DVD of “Experimental procedures in laboratory animals I and II”.



Fig 2. Common way for immobilization of a dog in clinical practice that belongs to the DVD of “Experimental procedures in animals: dog”.



On the other hand, these kinds of methodologies have also been focused to give an audiovisual explanation about basic handling of exotic animals (domestic and wild birds and reptilian) (Fig. 5, 6) since, their access, study and handling is very difficult.

Fig 5. Blood extraction in a bird that belongs to the DVD of “Development of alternatives to animal use in teaching: birds”.



Fig. 6. Drug administration in a reptilian that belongs to DVD of "Development of alternatives to animal use in teaching: reptilian".



Also, this electronic format is used to explain some reproductive techniques absolutely essential, as artificial insemination technique (Fig. 7) and estrous synchronization methods for researchers or from a productive point of view for the students.

Fig.7. Artificial insemination procedure in the rabbit that belong to the DVD of “Experimental procedures used in the reproduction of lagomorphs”.



## 5 PROJECT BENEFITS AND APPLICATIONS

Thus, in the modern context of teaching this material:

- Minimizes the number of animals used.
- Is an interactive and accessible *e-learning* tool that can be listened and read.
- Is adapted to the graduate as well as the postgraduate students.
- Can be used for practical and theoretical sessions, in several subjects in the Bachelor of Veterinary and related sciences.
- Can be used in any time and place since the audiovisual hardware is practically eternal.
- Can be used in different physical (classes, seminars, computer rooms, libraries, etc) and virtual spaces (through the Virtual Campus of the UCM, internet, intranet).
- Can be applied to different species of animals.
- Allow us to introduce demonstrations with exotic animal species in teaching practices and perform demonstrations that otherwise would be infeasible due to its difficult handling and accessibility.

It is a tool to improve teaching techniques and self-learning that can guarantee the access of the Veterinary students to an improved educational material without affecting their integral formation, since it includes more methods with more content and visual details and with the necessary quality for a complete understanding of procedures explained.

## 6 CONCLUSION

The opportunities associated with the development of computer-based technology in contributing to effective life science education have grown exponentially within the past decade. The projects mentioned in present work are a complementary tool that facilitates the training of Veterinary students combining the new technologies and the possibility to learn some animal procedures in detail that otherwise would be impossible to examine. It has many benefits and applications for students and also has good pedagogical effectiveness. Creating multimedia projects is both exciting and challenging and plays a supporting role to face-to-face lectures. Thus, it is also of great interest for us to increase the applicability and feasibility of these technology-based materials. We intend to improve these recordings, together with the development of other multimedia tools, as an interactive and accessible *e-learning* methods, which can be also adapted to people with disabilities, international students and diverse learners, to remove obstacles and promote education in the European convergence following the guidelines of the European Higher Education Area.

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