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Using of Lab Animals as a Conceptual Model in to a Program of Non-formal Education

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Abstract

One of the most important questions in research ethics is the use of animals in research. It is very important to learn many aspects of laboratory animals' situations. The total number of animals used in 2013 in the EU amounted to 12.2 million. Mice, rats and rabbits represent 77.5% of the total number of animals used. Bulgaria has a modern legal framework for the protection of laboratory animals. The purpose of this study was to present a conceptual model of a program of non-formal education at students studying biology "The use of animals in research" - specific problems such as requirements and recommendations for health monitoring of experimental animals; experiments with them for scientific research or in instruction, disease diagnosis, development of medicine or chemical products or for other comparable purposes; permission for using; issues and documents, as well as International standards. The program was implemented in cooperation with the National Center of Infectious and Parasitic Diseases - Sofia.

Student's participation in activities using the methodology of non-formal education, gave a direct opportunity for practical application of knowledge and skills in the field of formal education at Sofia University "St. Kliment Ohridski".

Key words: lab animals, conceptual model, non-formal education

Introduction

The use of animals in scientific research developed with a progress in medicine as a science, which had its roots in ancient Greece. Still Aristotle (384-322 BC) first used animals for experimental purposes; creates works "Historia Animalium" and "De partibus animalium" (Baumans, 2005, Baumans and Van Loo, 2013). Historically discoveries in the biomedical field are unthinkable without conducting experiments with laboratory animals (Baumans, 2005). In XX century increased the use of animals for experimental purposes. There is a trend towards increased use of animals, which is associated with the appearance of transgenic animals. Animal research remains essential in efforts to meet increasing demands for global health care. From many years ago in research and testing, animals are subjected to experiments that included everything from testing new drugs (Durbin and Robens, 2006) to infecting with infectious diseases (Takahashi-Omoe and Omoe, 2007), toxicity testing (Weideman, 1993), in cancer study like excellent standard to discover methods to prevent, diagnose and treat malignancy (Lankau, 2014), as tests for military defense purposes (Combes, 2013), teaching (Jukes, 2014), cosmetic testing (Balss and Clothier, 2010) and *etc*.

Every year in the USA, over 25 million animals are used in biomedical experimentation. This includes dogs, cats, ferrets, rabbits, pigs, sheep, monkeys, chimpanzees and others. Another interesting fact is that in 2013 in the EU the total number of animals amounted to 12.2 million (Baumans and Van Loo, 2013). The use of animals is the largest in France and UK, which is explained by the fact that in these countries there are many pharmaceutical companies. So far in different countries have developed and validated a variety of practices and regulations. Academic and professional organizations comprising researchers, veterinarians and others were pioneers in the creation of laboratory animal welfare standards. The Institutional Animal Care and Use Committee (IACUC) regulate all vertebrates in testing at

institutions receiving federal funds in the USA (Plous and Herzog, 2001). The Association serves as a forum for presenting and exchanging scientific information on all phases of laboratory animal welfare through its many educational activities and certification programs. The first law in Europe associated with the prohibition of animal cruelty was passed in 1876 in the UK (Baumans, 2005). The ethical questions raised by performing experiments on animals are subject to much debate over the 20th century. The Council of Europe and the European Union remain in the country in this topic. The Council of Europe is preparing a constitutional framework for the protection of vertebrate animals used for experiments - "European Convention for the protection of vertebrate animals used for experimental and other scientific purposes" (ETS 123/86; FELASA). The main tasks set by this law are: to reduce the number of animals used for experimental and other scientific purposes to a minimum; to ensure adequate care of animals used for experimental purposes; to eliminate unnecessary pain, suffering, distress or permanent harm to the animals; when this is not possible, they can be minimized; to avoid unnecessary repetition of the trial.

Bulgaria also has a modern legal framework for the protection of laboratory animals, which is an adaptation of the Directive by 1963. On June 10, 2003 adopted an ordinance for the protection and welfare of experimental animals. Bulgaria is synchronized with EU legislation and applies from January 1, 2007 – Veterinary low (ICLAS, 2013). Namely is that scientist who can meet the requirements of humane work in laboratories and as young should be well educated and to know that even during training is required to pass a course in the science of laboratory animals. The purpose of this study was to present a conceptual model of a program of non-formal education at students studying biology “The use of animals in research” - specific problems such as requirements and recommendations for health monitoring of experimental animals; experiments with them for scientific research or in instruction, disease diagnosis, development of medicine or chemical products or for other comparable purposes; permission for using; issues and documents, as well as International standards. The program was implemented in cooperation with the National Center of Infectious and Parasitic Diseases – Sofia (Bulgaria). Student’s participation in activities using the methodology of non-formal education, gave a direct opportunity for practical application of knowledge and skills in the field of formal education at Sofia University "St. Kliment Ohridski" (Bulgaria).

Stages of the conceptual model “The use of animals in research”

First stage - determination the profile of the students in terms of:

- motivation for learning – we use a survey;
- learning style – the students check their own learning style
- by Kolb (online);
- the learners' needs;
- the level of learning experiences.

The main didactic principles of the program are:

- Using many examples and many methods of non-formal learning.
- Using folders, including comments on the strengths and weaknesses set of methods and materials.

Forms of organization are: workshops, newsgroups, seminars. The students are involved in non-formal learning activities. They are done individually or in tandem such as peer review of materials or plans, reading, visiting interesting links, etc. non-formal educational programs. The program is organized on a modular basis; each of the modules is described by unified algorithm.

● Modules Of The Program

► **Modul I -** history of legislation on protection of animals: the first such law was passed in 1876 in the UK and affects the cruel treatment of animals. In 1891, Germany adopted a law prohibiting vivisection. 1944 - Act for the welfare of animals in Sweden (this law is supplemented and alteration consistently in 1988, 1998, 2003). 1996 - Act for the welfare of animals in the USA. 1977 - Law concerning animal experiments (the Netherlands). In 1983, the Council of Europe adopted the European Convention, which concerns the subject, and in 1986 adopted Directive 86/609 of the European Union. 1986 advanced the adoption of national laws on the protection of laboratory animals in the Member States of the European Union.

► **Module II** – Included International Standards and Basic Legal documents for Europe. Convention concerning the protection of animals used for experimental and other scientific purposes (affects the member states of the Council of Europe adopted in 1983) and Directive 86/609, adopted in 1986 on the protection of animals used for experimental and other scientific purposes (compulsory for member states of the European Union).

► **Module III -** Key scientific organizations: NRC / ILAR - develop guidance for the care and use of laboratory animals; PHS / NIH - focus on policy on

human care and use of laboratory animals; CCAC - guide for the care and use of laboratory animals; ESF - European Science Foundation; its goal is to develop cooperation between researchers in Europe. It issued a statement alleging that the animals used for experimental purposes have their inherent value that is different from that of the animal only as a material used for scientific purposes.

► **Module IV** – Ethical committees - make ethical evaluation of each protocol that will be used for work, and which foresees the participation of animals. Estimated what would be the benefit of this experiment and whether this benefit will justify the suffering will be subject animals.

► **Module V** - Alternative methods: scientific methods that can provide the same information as the standard methods. Principle of the three "R" (replacement, reduction, refinement):
- **Replacement** in conducting experiments on live animals with other techniques (*in vitro* tissue and cell cultures, computer models, videos, *etc*.).
- **Downwards** - reducing the number of animals used for experiments. This can be done by standardizing animals used - to standardize their genotype, which reduces variations in the experiments, and this makes it unnecessary recurrence of experience. Animals must be kept in non-infectious environment - this will prevent unnecessary disease and will again reduce the number. The conditions under which animals are kept must be controlled - climate in the housing, food, cells. The conditions for the experimental procedures must also be under control.
- **Concern** - that supposed to reduce the discomfort of animals used. Qualities depend on the researcher thus held service animals. Terms of procedure also needs to be reviewed to minimize the time during which it is considered that the animal suffers. If suffering is very strong it is preferable to animal euthanized.
- **Basic alternative methods:**

  - *In vitro* methods - cell and tissue culture;
  - Mathematical models and computer simulation (Utrecht University has developed this kind of software);
  - Use of an animal with a lower degree of neurophysiologic sensitivity.

► **Module VI** - requirements and recommendations for health monitoring of experimental animals; experiments with them for scientific research or in instruction, disease diagnosis, development of medicine or chemical products or for other comparable purposes; permission for using.

Results

To assess the quality of the program used the survey, the most commonly used method of data collection. The survey is a study, which is gaining the necessary information by answering a purposeful system of questions to a group, participants in the case of a program of non-formal education at students studying biology "The use of animals in research" - 26 students. The survey represents formulated written set of questions to which respondents record their answers within narrowly defined alternatives.
In this survey we used the following types of questions: open; closed; positive statements for assessing the quality of the program used Likert scale /Likert scale/ 5 means end-stage approval, and 1 - extreme disapproval. According to the respondents the quality of the program as a whole is optimal (92%). Overall, the program has met the needs of the respondents - so say 85% of the trainees. Around 74% of respondents indicated that it was appropriate information, and only 6 percent undecided in its assessment under this criterion. In criterion optimal duration of individual modules, 81% of respondents indicated that they agree completely, i.e. modules are optimal duration, 18% of them agree, but with certain reservations, and only 4% are hesitant to respond. 78% of students agree that it complements their work meaningful, 88% say that this form was a good opportunity to connect with colleagues. As a good example of active learning indicated 85% of respondents in the training. Will summarize the views of the respondents to the open question what you most like about the training? Were there moments in it that you evaluate as very good?

The following citations: "I am personally pleased we managed to get along (especially judging by the result), there were no conflict problems, the atmosphere was very positive! I learned a lot! "Overall, the initiative was very good, congratulations! If still have a similar format, I will participate with pleasure!
When asked if there is a possibility that training be conducted again, what in its organization and content would you change? Respondents' answers are tied to the organization in carrying out his weekend format and employment of students during the week is out, as well as opportunities for electronic distance learning.

Conclusions

The analysis of the data assumed that the program objectives are generally achieved.

Accumulated knowledge of such practical training could use students when applying for a job or continue their education in graduate programs at home and abroad. Statistics show that much easier is the access to the labor market of people with practical skills and knowledge, and the most difficult young people with an entirely theoretical. Interest in training courses and qualifications is growing steadily, and free internships in law firms, accounting firms and others. Young people right now understand the need for practical experience to be able to sell at the asking price of the labor market. They considered as a good practice formal and non-formal education to complement each other.

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