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Modernization process in veterinary anatomy education

Sema Ozkadif¹, Emrullah Eken^{2,*}

¹*Selcuk University, Education Faculty, Department of Biology Education, Konya, Turkey*
²*Selcuk University, Faculty of Veterinary Science, Department of Anatomy, Konya, Turkey*

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Abstract

Developments in education system and technology lead to big developments in the education of university students. Due to new approaches, permanent learning of anatomy lecture is performed by steering away from being boring while it was in a quality of a memorizing lecture in students' eyes. Theoretical information is easily combined with practical information and can be adapted to clinical events. Recent developments and opportunities offered to anatomy education are generally performed on computer programs. Lots of animals are killed by dissection method in anatomy education and sometimes dissection of very little parts is failed. Moreover, formaldehyde which is used to keep cadavers also threatens human health seriously. Two-dimensional images of animals obtained by computed tomography or magnetic resonance can be made three-dimensional by computer programs and the required region can be peculiarly studied. In this way, a more successful learning can be performed by steering away from negative effects of dissection. In addition to this, anatomy became a more pleasurable lecture by multimedia devices and other devices which were developed to use in anatomy education.

Keywords: Anatomy; Education; Ethics; Veterinary
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1. Introduction

On this rapidly changing world, education systems are also consistently renewed. It's also necessary to renew in anatomy education for not being behind the changing times. Which subjects of anatomy education should be taught, how and in what way they are given to students are important. Transfer of determined information load vigorously is also very important. It can be provided for anatomy to be dynamic by nesting them with both clinical and basic medical sciences. It's necessary to transfer the anatomy subjects which have gradually had a memorizing lecture quality into a model that is learned appealingly and fondly by students and at the same time which is correlated with clinical events and current issues [1].

*Corresponding author: Tel.: +90-332-223-3617; fax: +90-332-241-0063.
E-mail address: eeken@selcuk.edu.tr (E. Eken).

The main result in anatomy education is that students learn substantially little in the contents of courses. When a large amount of material is given to students, they memorize what they should learn. Frequently they hear or memorize the same words. This memorizing is a superficial learning which can be easily forgotten. Info glut of students reduces their motivation in learning. Precisely, these results reduce the motivation and time of students to practice themselves about what they learn [2].

Education is a process and stagnation is against its nature. For this reason, it's necessary in the course of time to reform education models and programs that are applied in various training units. As a result of reform studies, sometimes various problems may emerge depending on giving off accustomed education model and programs. Emerging problems either melt away within adjustment process or may be transformed into situations that should be solved [3].

Many enterprises and new requirements for anatomy information in recent years lay bare prescribed results related with opportunities presented by computers. Usage of multimedia materials render subject more attractive than nontraditional sources for new generation students. It was aimed to make the subject more attractive with these supporting materials, make lectures more understandable and be followed, provide supporting materials to be used and updated enhance the relationship between academic member and student and develop academic performance for long term [4].

Macroscopic veterinary anatomy education includes killing of animals and conserving them [5]. Cadaver dissection has supported anatomy education since Renaissance. Dissection method gives students three dimensional image of animal anatomy, corroborates and gives details about the information gained by lecturers. It teaches manipulative skills and indirect perception by touching [6]. Moreover, more interactions were formed between lecturers and students in theoretical lectures. This allows identification of unclear anatomy subjects and their relationship with each other by teachers and providing the motivation of students in the first steps of the lecture [7].

It was claimed that there were some problems in present cadaver programs. The most important of these problems was whether cadaver usage was effective and trustable or not [8]. Hundreds of thousands animals are used for the aim of education in Europe. Researchers reveal that excess animal usage in education has a big effect on total number of animals used in science.

Dissection method used in veterinary anatomy education threatens instructors, students and technicians using cadaver. Touching cadaver with hands for the aim of education, research and commerce reveal many important problems [8]. Formaldehyde which is used to preserve cadavers is a toxic compound. It easily evaporates, irritates eyes, nose and throat of the users. Furthermore, it causes nasopharyngeal cancer in human beings at high concentrations [9]. In addition to this, it may also reveal potential health risks such as AIDS and prion diseases. At the same time, cadaver programs are very expensive [8].

It is also claimed that cadaver dissection is an inefficient educational appliance. For example, complexity of medium and inner ear and the reality about its combination with anatomic structures in little sizes make it impossible to teach ear anatomy with traditional education techniques. Since ear parts in little sizes and ear are rested in bone, it's necessary to have dissection skill on the highest degree and this is really impossible for students [10].

2. Opinions aimed to decrease the usage of cadaver

In many countries, ethical committees clearly declare basic principles of animal usage in education and research. However, in our country, approvals of ethical committee are mostly

used for performing researches. In European countries, ethical committees present some alternatives in order to decrease the usage of animals in veterinary anatomy education [8].

2. 1. Models, manikins and mechanical simulations

Plastic models and manikins of various animals used in Faculty of Veterinary are designed to show anatomic structures and for clinical training. These materials are used in order to illustrate processes to students such as taking hold of animals, using as blood model, draining by tubing and needling chest wall [11].

As models, simulations also enable students to practice independently on their own, to learn by trial and error and to repeat the procedure. Since computer simulation contributes to untaxing practical experiences in studies with livestock, it's not an alternative contrary to facts [11].

2. 2. Films and interactive videos

Videotaped images of clinical processes significantly increase the contribution of anatomic information used in anatomy education to clinical practices. A successful speaker and attractive images are successful receipt for a stimulating education. Moreover, instructors finish this education with instructional recorder and compact disks. These materials are generally used in the indication of regions which have limited time, are especially hard to conceptualize and cannot be dissected in detail. The academic member can describe telecasted images during lectures, and if necessary can answer the questions of students by ceasing the images. Much information can be received in a short time by video demonstrations of many dissection-presentations. Moreover, picture can be taken from the sample that is equivalent to focusing distance by zoom of the camera. This method gives an opportunity to ask questions to the instructor and to get their answers. In this way, high level interaction is provided between academic member and the student by the help of film and videos and guide to real dissection [12].

2. 3. Ethics and dead animals caused by anthropogenic reasons

Cadaver is necessary for anatomy, clinical skills and surgical education. However, cadaver should be of ethical sources and obtained from ill or scotched animals by euthanasia in a humanistic way. A healthy animal should not be damaged or killed [13-15]

2. 4. Academic member and problem-based learning

Academic member based learning enables transfer of basic anatomical realities and concepts from an academic member and this provides efficient and effective dissemination of information. However, both academic member based learning and anatomy lecture books do not sufficiently transfer three-dimensional structures of anatomic structures and do not encourage for cooperation or develop problem solving skills [8]. Anatomy education is to comply with problem-based education. Problem-based education encourages independent consideration and group work and aims to resolve basic deficiency in didactic education [8].

2. 5. Radiological anatomy and three-dimensional modeling

Academic member and problem-based educations and dissection classes frequently include radiological modeling. These are Magnetic Resonance Imaging (MRI) or Computed Tomography (CT) [6]. Some researchers revealed that organs can be investigated under *invivo* conditions by converting two-dimensional images obtained with Magnetic Resonance

Imaging (MRI) or Computed Tomography (CT) techniques into three-dimensional images via some programs and by this way, made clinical anatomy lectures more efficient [16]. Moreover, recently developed Multi-Detector Row Computed Tomography (MDCT) helps to comprehend anatomic structures better which are difficult to understand with other methods by allowing the user to turn 3-dimensional image to whichever direction is required. In addition to this, observation of organs such as liver, gall bladder, spleen and stomach which are in inner abdominal is provided with its cutting property of three-dimensional figures. Another property of MDCT is that scanning is very rapid. The whole body of animals can be scanned with a short-time anesthesia and thus a long way is covered in terms of ethics [16].

Radiological anatomy and three dimensional modeling allow using living animals instead of dead samples. For this reason, radiological techniques are used not only for a clinical diagnosis but also as a tool not giving damage in veterinary anatomy. Moreover, these are the most reasonable technological tools which are used in order to decrease the number of animals sacrificed for anatomy and veterinary surgical applications of student [17].

2. 6. *Virtual animal designs and anatomy web-sites*

Internet atlases related with Veterinary Macroscopic Anatomy are based on virtual animal design and provide rich materials for theoretical information. Many similar web-sites related with animal design do not require a membership fee and can be used by students individually or as a group work in [8].

A study performed by German university students indicated that online anatomy sources are more motivating and more entertaining for students than lecture books. The most valuable material related with investigations includes high quality figures and key words enable researches. Moreover, they include modern information. In another study, the students who used web-based materials in order to learn anatomy presented better performance in mid-term and final exams than a control group who do not get the materials [8]. An electronic learning platform was designed in a way that people can practice their own information and skills in parallel with their requirements [7].

2. 7. *Combination of approximation sequence*

The benefits of complex learning in anatomy can be as follows;

- It makes the subject more appealing.
- It modernizes traditional methods used in anatomy.
- It develops transversal sufficiency.
- It provides durable, dependable, permanently accessible and updated materials for students.
- It helps maintenance of adequate knowledge level in their career.
- It improves academic performance.
- It also improves the communication between teachers and student [16].

In a study performed by Medical Faculty of Uludag University, it was determined that the rate of students believing in the necessity of using supplementary course materials except cadaver was 92.1% (n = 176) while the rate of students believing in nonnecessity of them was 7.9% (n = 15). When students were asked for comparison of models used as a supplementary course material with cadaver, it was indicated that 13.1% (n = 25) of them selected models, 15.7% (n = 30) of them selected cadaver studies, 68.1% (n = 130) selected both of them and 3.1% (n = 6) of them selected none of them. When the place of cadaver studies in anatomy was asked, 91.1% (n = 174) of them determined that they should be and 8.4% (n = 16) of them considered them as unnecessary. Just one student indicated that cadaver training was unnecessary [3].

Computer has a complementary property for its alternative, dissection. Application of educational technologies in anatomy training attracts a great deal of attention [17]. Plastination is the most important technique which has been recently developed in order to preserve biological samples. It protects dissected samples exactly from decaying. By this way, it provides time for preserving new samples for anatomy collection and decreases number of animals used in education [18]. It has been universally accepted since it was produced. The fundamental usage of this technique is especially in the production of a wide series of anatomic samples in education. Moreover, it is considered as an important tool for anatomy in the final offers [19].

A large number of studies are performed in order to understand the potential worth of plastination. Methodology of plastination includes the replacement of tissue liquid and tissue fats slowly with a polymer under vacuum. The final products are clean, dry, odorless and durable real biological samples that they can be touched without gloves and they do not require private storage condition and maintenance. These samples also prevent exposure of the staff and the students from toxic substances such as formaldehyde, phenol and alcohol which are used for preservation of classical biological tissues [19].

3. Result

When computer-aided education and visual reality systems are combined with attention and imagination, they obtain fund for students in recovering the decrease in time and broken materials in the classroom. Moreover, they are interesting for students and the students can keep this interest alive for a subject generally lost its popularity and appearing as old. Production of interesting drawings is not enough. In the development of computer-aided learning and visual reality systems, imaging should be used in accurate and propfund education [20].

4. Conclusion

Developments in education system and technology lead to large developments in the education of university students [21-26]. Due to new approaches, permanent learning of anatomy lecture is performed by steering away from being boring while it was in a quality of a memorizing lecture in students' eyes. Recent developments and opportunities offered to anatomy education are generally performed on computer programs [27-30]. Lots of animals are killed by dissection method in anatomy education and sometimes dissection of very little parts is failed. Moreover, formaldehyde which is used to keep cadavers also threatens human health seriously. Anatomy became a more pleasurable lecture by multimedia devices and other devices which were developed to use in anatomy education.

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