

Autonomous Laboratory Practices in the Course of Human Histology in the Degree of Dentistry

I. Badiola, L. Gómez, F.J. Sáez

Department of Cell Biology and Histology, Faculty of Medicine and Nursing, University of the Basque Country UPV/EHU

Abstract

The autonomous laboratory practices method is carried out in the following way. Prior to the delivery of the practices, the histological preparations to be worked are deposited in a digital repository scanned in a format that allows their visualization using free access virtual microscopy platforms. Before the face-to-face practice session, the responsible professor facilitates the students virtual preparations of the samples corresponding to said session. Working on their own computer, each student, with the help of bibliographical material searches the sample for the objectives that will be worked on in the face-to-face session, captures the corresponding images, copies in the practices file and points out the objectives at hand. In the face-to-face session, using the real microscope, the students look for the objectives of the practice using the material previously worked as support. Once each objective is located, they make a representative drawing on the practice sheet. At the same time, during this face-to-face class, the teacher monitors the work of each student validating the searches carried out. At the end of the class, each student submits the internship form where both face-to-face and non-face-to-face work appear and, after being evaluated by the teacher, it is returned with the corresponding feedback.

We have a positive perception of the opinion of the students about this new modality that has been corroborated in the specific opinion polls that have been made. To highlight some results, the students have rated the item "Observing the preparations with the virtual microscope has made it easier for me to study them in the laboratory" with a 4.5 out of 5 or, with a 4.6 out of 5 the item "work from this way the laboratory practices has helped me to understand better the concepts worked in the teaching modalities".

1. Introduction

All the university degrees focused on biomedicine impart subjects dedicated to the professional formation in the knowledge of the organization and functioning of the human body. Just as Anatomy describes structures visible to the naked eye, Histology delves into the microscopic structure of the human body formed by tissues in non-pathological situations.

The dentist has to know the composition of the tissues on which he will work to proceed in an effective and safe way, safeguarding as far as possible the health and integrity of the patient.

Therefore, the study of histology is accompanied by a mandatory instrument; the microscope. The microscopic structures that are worked in the study of histology such as cells and tissues are indistinguishable to the human eye and it is necessary to amplify the images. It is an eminently visual discipline. The student can always access histology books based on microphotographs to build virtual images of the compositions of the organs in his mind, but true learning and mastery are done by working on the ground. The management of the microscope working on human and animal samples gives the student competence in the proper management of the optical microscope for the study of tissues [1]. For this reason,

most of the subjects related to histology in the biomedical sciences have practical teaching methods in which students individually manipulate optical microscopes in the search of histological objectives. Traditionally, the practical sessions dedicated to the use of the optical microscope for the study of human tissues in the different subjects related to a greater or lesser extent with histology were carried out in a very directed manner in which the student followed the instructions of the teacher. In almost all cases, the students adopted a passive situation and the teacher explained the objectives to be sought during the practical session. The fact of not being able to provide previous situations in which the students worked on the future objectives resided in the impossibility of the students to be able to access a microscope outside the physical class of practices. This situation has been solved in part with the emergence of the virtual microscope. Virtual microscopy is based on computer programs that simulate optical microscopes. Nowadays there are free programs that can be downloaded and they allow visualizing scanned histological samples as if we were working on an optical microscope.

2. Methods

The procedure of the practices is described in a chronological manner:

1. The teacher provided the students with the link to download each one on their computers the programs of the viewers that simulate the digital microscopes.
2. The teacher also provided the students with the link to the repository where the scanned images are stored as well as the practice sheets. The practice sheets are structured in the following manner. On the left there is a space to fill the scanned images captured from the viewers. On the right there is space to fill in the face-to-face session.
3. Once the students have the virtual microscopy viewer installed, and the scanned samples downloaded to the computer along with the practice file, the autonomous and non-contact work begins. Following the instructions on the card look for the indicated objectives. For this, it can be supported in the bibliography provided by the teaching team that is based on Histology Books-Atlas, textbooks, web pages as well as notes on the classes of other teaching modalities. The students look for the objectives and take a still picture when they find it on the screen using the method known as „screenshot“. The still picture is embedded in the left part. After printing, the objectives are indicated by hand using lines and arrows that more specifically determine each objective.
4. Once in class, the students are placed individually in a microscope position and acquire the collection of histological samples stored in individual boxes (a collection for each student). The sample is placed and taking as a guide the non-face-to-face part, the objectives are looked for in the microscope. Once found, the presence of the teacher is requested to certify the correction of the field located according to the objective sought. If the search is correct, the teacher certifies it by signing the part corresponding to the classroom work and the student proceeds to draw what he observes under the microscope indicating the objectives. In case the search is not correct the teacher will guide the student in the search through the interaction between both based on the reasons that caused the error.
5. At the end of the face-to-face class, the cards will be handed in so that they can be corrected by the teaching staff and delivered with the pertinent comments as well as the evaluation.

3. Results and Discussion

The subject Histology in the degree of Dentistry pivots on two learning outcomes:

1. Know in detail the microscopic structure and organization of the basic tissues of the human body and its organization in the tooth and the oral cavity.
2. Recognize the different human tissues, their characteristic structures and their disposition in the oral cavity and the tooth under the microscope or in microscopic images.

The different activities that are included in the proposed modalities try to influence these two results. The activity that we present is included in the learning outcome 2 but it is not the only activity. In addition to the proposed practice with a face-to-face and face-to-face part for the achievement of learning outcome 2 and its evaluation there is an activity in which the student individually explains three histological samples using a microscope that has a monitor attached. It consists of three exercises distributed throughout the course on a regular basis. The evaluation of this activity together with the evaluation of the cards make up the evaluation of the practical part that consists of 70% of the final grade and a numerical value of 6 is required to approve this part. Obviously, the skill to perform the three identification exercises on the monitor are acquired by making the cards and working on them. The first important result that can be concluded is the high rate of passing of the practical part of the subject. During the 2017/2018 academic year there was 100% passing with 37% outstanding. Second, comment on the results obtained from surveys made to the students anonymously about the perception of the activity. This survey was carried out at the conclusion of the course with a series of items that had to be valued between 0 and 5, with 0 not agreeing and 5 strongly agreeing. The students have rated the item "Observing the preparations with the virtual microscope has made it easier for me to study them in the laboratory" with a 4.5 out of 5 or, with a 4.6 out of 5 the item "work from this way the laboratory practices has helped me to understand better the concepts worked in the teaching modalities".

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