APRENDER HISTOLOGIA: PREFERÊNCIA DOS ALUNOS DE MEDICINA VETERINÁRIA NA ERA DIGITAL

LEARNING HISTOLOGY: VETERINARY MEDICINE STUDENT PREFERENCES IN THE DIGITAL ERA

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Resumo: *O objetivo deste estudo foi partilhar a experiência e avaliar as preferências de estudantes de Medicina Veterinária em relação ao ensino de Histologia. Devido à pandemia Covid-19 foram adotadas várias estratégias de ensino. Assim, em paralelo com os métodos de ensino tradicionais (livro de texto, sites de histologia, observação de lâminas físicas ao microscópio ótico [MO]), foram criados dois recursos adicionais: observação tutorada de lâminas histológicas digitalizadas (lâminas virtuais) através do uso do NDPview2 e vídeos explicativos das lâminas virtuais recorrendo ao NDPview2 e à plataforma LOOM. Os estudantes de medicina veterinária do segundo semestre de Histologia foram convidados a participar no estudo, respondendo a um inquérito sobre as suas preferências de aprendizagem. 1º Inquérito: Quando questionados sobre os diferentes tipos de ensino, 52.8% (n=56/106) preferem exclusivamente aulas presenciais e 32.7% (n=35/107) preferem um ensino misto, com aulas on-line e presenciais. Cerca de 70.1% (n=75/107) e 16.8% (n=18/107) dos estudantes consideraram as aulas práticas como "muito importantes" ou "importantes" na compreensão da matéria, respetivamente. Em relação às diferentes componentes das aulas práticas, 67.6% (n=73/108), 88.0% (n=95/108) e 41.7% (n=45/108) dos estudantes classificaram a apresentação inicial, a visualização na aula das lâminas virtuais e a visualização individual das lâminas histológicas ao MO como "muito importantes/importantes", respetivamente. A apresentação do professor (88.8%, n=95/107) e os vídeos explicativos (82.2%, n=88/107) foram as ferramentas de estudo preferidas pela maioria dos estudantes. 2º Inquérito: Sessenta e três por cento (n=56/89) dos estudantes ainda usam material impresso. Em relação ao uso de tecnologia e recursos digitais, 98.9% (n=88/89), 31.4% (28/89) e 32.6% (29/89) dos estudantes usam computador, tablet e telemóvel, respetivamente. Curiosamente, 56.3% (n=49/87) dos estudantes preferem estudar para as aulas práticas de histologia em grupo.*

O uso de recursos de aprendizagem eletrónicos, tais como as lâminas virtuais e os vídeos explicativos, foram bastante apreciados pelos estudantes de veterinária. Consequentemente, estes recursos são considerados vantajosos no ensino de Histologia. Adicionalmente, o uso de dispositivos eletrónicos, incluindo tablets e telemóveis, é frequente nos estudantes de veterinária, pelo que os recursos de aprendizagem deverão ser otimizados para esses dispositivos.

Palavras-chave*: histologia, digital, veterinária, inquérito, ensino, aprendizagem.*

Abstract: *The aim of this study was to share experiences and evaluate veterinary students preferences regarding Histology learning. Due to the covid-19 pandemics, several teaching strategies were adopted. Alongside to the traditional teaching methods (textbooks, histology websites, slide observation under optical microscope [real slides]) two additional digital resources were created, namely: in-class tutored observation of digitalized histology slides (virtual slides) using NDPview2, and narrated videos explaining virtual slides using NDPview2 and LOOM. Veterinary students of the second semester of Histology were asked to answer surveys about their learning preferences. Survey-1: When questioned about different teaching methods, 52.8% (n=56/106) preferred exclusively presential classes and 32.7% (n=35/107) preferred a mixed e-learning/presential system. Furthermore, 70.1% (n=75/107) and 16.8% (n=18/107) of students considered that practical classes were "very important" or "important" to the understanding of this subject, respectively. Considering the different parts of practical classes, 67.6% (n=73/108), 88.0% (n=95/108), 41.7% (n=45/108) of students rated the initial lecture, the in-class tutored visualization of virtual slides and the individual visualization of real slides under the MO as "very important"/"important", respectively. The teacher's presentation (88.8% n=95/107) and the narrated videos (82.2% n=88/107) were the preferred study materials for most students. Survey-2: Sixty three percent (n=56/89) of students still use printed study materials. Regarding the use of technology and digital resources, 98.9% (n=88/89), 31.4% (28/89) and 32.6% (29/89) of students use a computer, tablet, and cell phone, respectively. Interestingly, 56.3% (n=49/87) of students enjoy studying practical histology in groups. The use of electronic learning resources, such as virtual slides and narrated videos, was much appreciated by veterinary students. Therefore, these resources are considered advantageous in teaching Histology. Furthermore, the use of electronic devices, including tablets and cell phones, is frequent among veterinary students and therefore, learning resources should be optimized for these devices.*

Keywords: *Histology, Digital, Veterinary, Survey, Teaching, Learning*

1. INTRODUCTION

Histology is a fundamental subject that is part of most health degrees including veterinary medicine. This subject focuses on the study of the microanatomy of cells, tissues, and organs and therefore practical classes usually rely on the use of optical microscopes and histological glass slides.

Learning histology is sometimes challenging since it includes a great number of new terminologies and concepts (Sherman & Jue, 2009). Fully understanding these concepts is key to later better understand the anatomical and physiological changes that occur during health and disease. For these reasons, efforts should be made by professors to engage students and make learning histology easier and more fun.

Several teaching methods are available nowadays that may be used alone or in combination, including self-guided learning, learning with image projection, problem-based learning, among others (Sherman & Jue, 2009). Furthermore, in

recent years, digital virtual resources started to be introduced in histology teaching and learning, such as the use of virtual histology atlas available online (Sherman & Jue, 2009; Santa-Rosa & Struchiner, 2011).

Traditionally, in the Faculty of Veterinary Medicine of Universidade Lusófona, practical classes used to include a brief expository presentation, followed by tutored observation of histology slides under an optical microscope connected to a projector, and finally students would have time for self-guided learning.

The COVID-19 pandemics created several challenges in the practical teaching of histology, especially because of social distancing and confinement periods. To adapt to these new limitations, the use of digitized histology slides instead of real glass histology slides was introduced, which allowed to easily show dynamic histological microscopic images in a more engaging way both in on-line and in-person classes. Furthermore, this technology allowed professors to prepare videos explaining the histological microscopic images, which were then made available on-line to students as a permanent study resource.

According to the professor's perception, these resources were well received and appreciated by veterinary students. In order to get an objective insight into the veterinary student's perspective, the goal of this work was to characterize their preferences regarding Histology learning.

2. MATERIAL AND METHODS

Classes of Cytology and Histology

In the Faculty of Veterinary Medicine of the Universidade Lusófona, Cytology and Histology is a curricular unit that is taught during the first and second semesters of the first year of a five- and half-year program. The curriculum includes the study of all tissue types, organs and comparative histology regarding mammalians and birds.

The Cytology and Histology program is divided into master lectures and practical lessons. The master lectures are expository classes focused on the main theoretical subjects. Practical classes correspond to 2h sessions that include a brief lecture about the subject followed by guided observation of digitalized histology slide preparations using NDP.view2. After these two tutored class parts, students are given time for self-guided learning using an optical microscope.

Learning resources made available to students or recommended by professors include textbooks, atlas textbooks, the professor's Microsoft PowerPoint presentations and histology atlas websites. As an additional resource, narrated videos of the tutored visualization of digital slides were produced and made available to students through the Loom platform.

Questionnaire and study sample

Two questionnaires were conducted to students of the first year of the Integrated Master of Veterinary Medicine and included questions about studying preferences, using the five points Likert scale (5=Strongly agree/preferred/very important, 4=Agree/Like/important, 3=Neutral, 2=Disagree/Don't prefer/almost not important, 1=Strongly disagree/Least preferred/not important). A total of 108 and 89 students answered the first and second questionnaires, respectively. These questionnaires included 11 questions that were anonymous and conducted during practical classes on a voluntary basis.

Descriptive analysis was performed using Microsoft Excel.

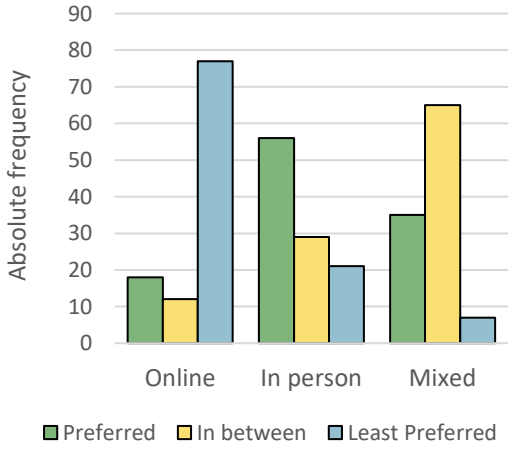
3. RESULTS & DISCUSSION

The first question (Q1) asked students to order the following teaching methods according to their preference from "preferred" to "least preferred": a) exclusively on-line classes, b) exclusively

in person classes or c) a mixed system (Image 1).

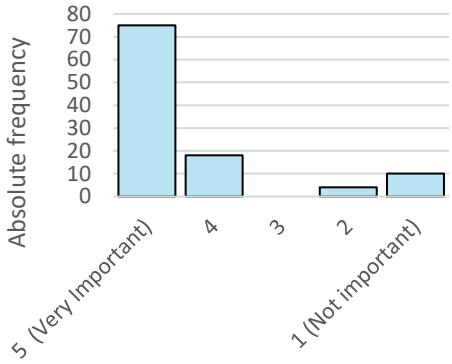
The exclusively on-line system was the least preferred one (72.0%, n=77/107) while the exclusively in person method was the preferred method overall (52.8%, n=56/106). Nevertheless, the mixed system was also preferred by 32.7% (n=35/107) of students (Image 1). These results agree with previous studies where first year medical students were found to be dissatisfied with online classes (Dutta *et al*., 2021). In fact, other studies point out that the face-to-face interactions are important to the students (Hale *et al*., 2009; O'Flaherty & Laws, 2014; Dost *et al*., 2020). These findings regarding on-line classes pose a challenge to teaching since the COVID19 restrictions that may be needed in the future are still uncertain. Thus, professors and students need to work together to develop new learning strategies, such as the creation of asynchronous learning resources or the promotion of online small groups, where students may interact and actively learn with their peers (Jiang *et al*. 2021). The conversion to classes using a problem-based learning format or a flipped classroom could be more engaging to students during on-line classes (Jiang *et al*. 2021; Dost *et al*., 2020).

Image 1 - Q1. Order the teaching methods according to the student preferences.



In Q2, the students were asked to grade how important they think practical classes are for learning histology from 1 to 5 (Image 2). The majority of students (86.9%, n=93/107) considered practical classes as "very important" or "important". These results highlight the importance of practical classes in the understanding of histology.

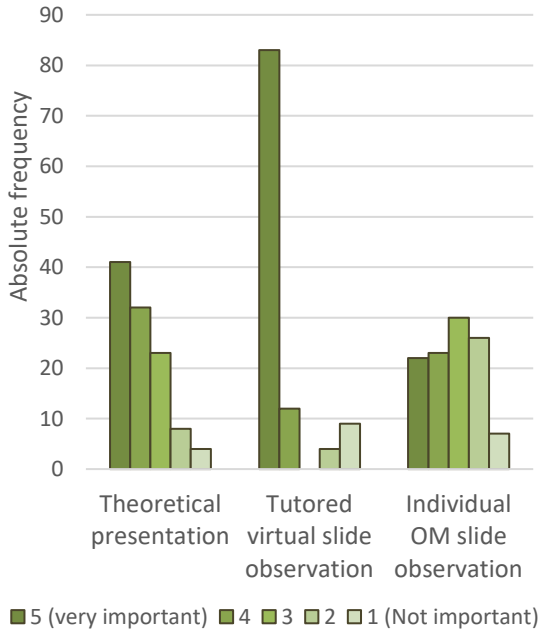
Image 2 - Q2. Grade how important practical classes are.



In Q3 to Q5, students were asked to grade the importance of each part of the practical class for learning histology from 1 to 5 (Image 3). Regarding the brief theoretical introduction in practical classes, around 67.6% (n=73/108) of students considered it to be "very important"/ "important", for their learning process. Most students considered that the tutored visualization of digitalized slides was "very important" (76.9%, n=83/108) for learning histology (Image 3). This finding is in line with the Professor's perception during practical classes that students seem to be very engaged in this part of the class. In fact, this technology allows an active peer learning process by students frequently asking and answering questions out loud. Finally, students were divided regarding the utility of the self-guided observation of histology slides under the optical microscope, where only 41.7% (n=45/108) of the students found this part of the class to be "very

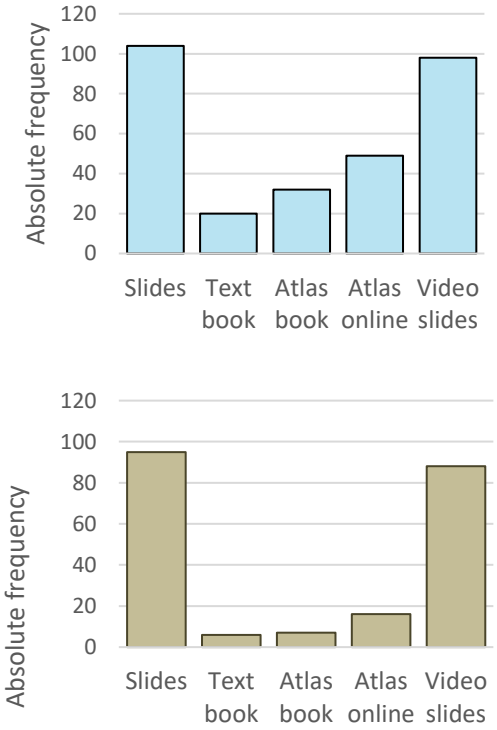
important"/ "important". The optic microscope is a key tool in the daily routine of a veterinarian. These results highlight the need for developing new teaching techniques to engage students into understanding the importance and enjoying the use of the optical microscope. Furthermore, these results contrast with previous findings, where students of a Bachelor of Dental Surgery showed interest in using the optical microscope during practical sessions (Ali & Syed, 2020). This difference may be related with the fact that, in that study, practical classes were performed with resources to digital histology atlas (Ali & Syed, 2020).

Image 3 - Q3-Q5. Grade how important each part of the practical class is.



In Q6, students were asked which study material they use to learn histology and in Q7 students were asked to choose their two preferred studying resources (Image 4). In both questions, the professor's Microsoft PowerPoint presentations (slides) and the narrated videos (video slides), were by far the preferred ones. These findings highlight the importance that professors have in the learning process by preparing appropriate learning resources.

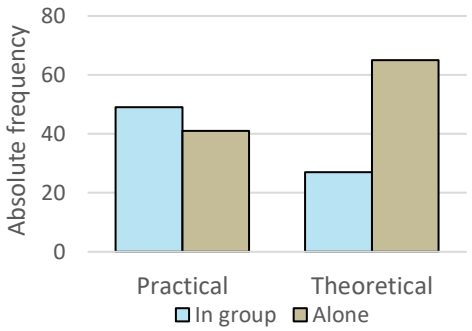
Image 4 - Q6-Q7. Studying resources



Legend: Q6 (first) - Which study resources do the student use (chose all); Q7 (second)- Choose the two preferred study resources among the ones that the student uses.

In Q8 and Q9, students were asked whether they prefer to study histology in groups or by themselves (Image 5).

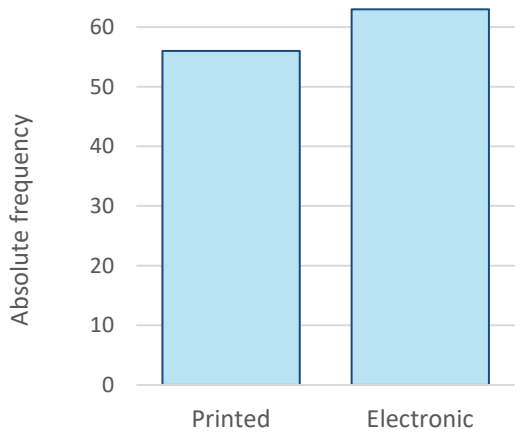
Image 5 - Q8-Q9. Preference regarding studying in groups or alone

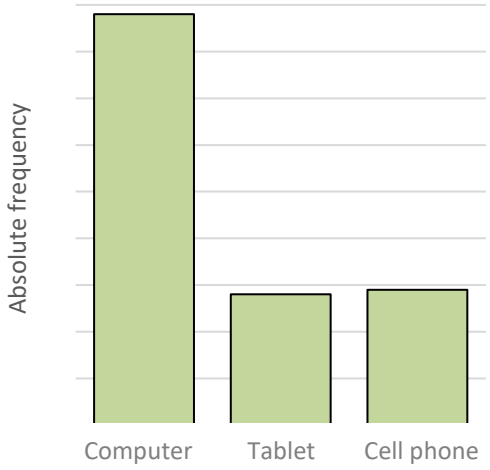


Regarding the theoretical subjects the students seem to prefer to study by themselves, however, half of the students enjoy studying practical histology in groups. This is another interesting finding that might suggest that group activities are likely to engage students in practical classes and it is in agreement with previous studies (Johnson *et al*., 2015; Ali & Syed, 2020). Once again, problem-based learning formats or flipped classes are examples usually pointed as stimulating and engaging for the students, providing motivation and more effectiveness in the learning process (Dost *et al*., 2020; Jiang *et al*. 2021). Furthermore, new and recent educational resources, using games or maps, like Kahoot or GitMind are available and are very enjoyed by the students, either in presential or in online classes (Felszeghy *et al*., 2019; Neureiter *et al*., 2020). In fact, this was also our personal experience as professors when using Kahoot quizzes in histology classes from previous years.

Finally, in Q10 students were asked whether they prefer to study using printed resources or using electronic devices, and in Q11 students were asked which electronic devices they usually use to study histology (Image 6).

Image 6 - Q10-Q11. Preference regarding electronic devices when studying histology.





Legend: Q10 (first - blue)– do students prefer to study using printed resources or using electronic devices; Q11 (second - green)– Which electronic devices does the students use to study histology.

Interestingly, 62.9% (n=56/89) of students still print studying material, revealing the importance of optimizing resources for printing. Furthermore, although the computer is widely used (98.9%, n=88/89), around 31-33% of students also use tablets or cellphones while studying. Considering that technologies tend to become more affordable over time, this percentage is likely to increase, making it also important to optimize resources to be seen and downloaded into these electronic devices.

4. CONCLUSION

In conclusion, presential classes were the preferred method by first year veterinary students regarding histology. The digitized slides and the narrated videos were much appreciated by students and as professors we found these resources to be very useful to improve the students' engagement during classes. Finally, the optimization of study resources for printing and new electronic devices, such as tables and cell phones is important.

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