

# Perceptions of students and teachers about traditional and active didactic strategies in a veterinary anatomy course

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## SUMMARY

Active learning strategies were gradually implemented in the veterinary anatomy course at the University of Antioquia. In the cohort of the second semester of 2018, in the first module (musculoskeletal system), we used the traditional methodology (master classes both in theory and in practice), and active teaching strategies were used in the rest of the course. Faculty perceived some dissatisfaction among the students with this change. The objective of this work was to understand the perceptions of students and teachers about the traditional and active didactic strategies of the course, during this academic period through semi-structured interviews and focus group. The students perceived the combination of traditional learning strategies with active strategies as ideal. The traditional approach seems more comfortable to them, because the teacher provides all the information. However, they saw rote learning and the large amount of information as a disadvantage. They perceived that formative assessment allows for the consolidation of knowledge. The teachers highlighted the importance of using several

methods that allow for adapting to the different learning styles of the students. In addition, they considered that their role is to guide students so that, through analysis, interpretation and research processes, they learn to build their knowledge. We conclude that students are highly dependent on traditional learning strategies, so it is necessary to stimulate the use of tools supported by constructivism. Also, more administrative support should be given for faculty to have the training and enough paid time for the preparation and application of active learning strategies.

**Keywords:** Veterinary anatomy – Traditional class – Anatomy education – Active methodologies – Teaching strategies

## INTRODUCTION

The new educational approaches that are based on active learning theories and outcomes have generated the need to implement new pedagogical practices that allow for a deeper understanding

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of veterinary anatomy, where students put into practice their knowledge and skills to solve anatomical problems (Van Ginneken and Vanthournout, 2005). Active learning methods based on constructivist strategies outperform passive strategies, at least in the initial stage of learning (Kooloos et al., 2020), making them effective learning tools for teaching veterinary medicine (Diamond et al., 2020). Active learning methods include all the learning activities that engage students in the educative process and that make them reflect continuously about their learning (Bonwell and Eison, 1991), which allows the development of higher order abilities in the students, increase retention of knowledge and enable better performance in tests (Bristol et al., 2019). On the other side, traditional strategies include all the activities in which the student is a passive receptor of the knowledge, while the teacher has the active role in the teaching and learning process (Vitorino et al., 2020).

The Veterinary Anatomy course at the Faculty of Agrarian Sciences of the University of Antioquia has a systemic approach, with a simultaneous study of the comparative anatomy of domestic animals (canines, equines, swine and ruminants). The teaching and learning process has historically been characterized by the use of a traditional approach. However, as of the 2015 curricular reform, other teaching strategies began to be gradually introduced, since the new curricular guidelines are based on outcomes and are based on active learning.

During the second academic semester of 2018, active learning methodologies were implemented with greater intensity in all modules, except for the first module (locomotor system), in which only the traditional methodology was used, consisting in lectures and demonstrative explanations in practical sessions (Fig. 1). During this period, some of the students expressed certain dissatisfaction with the strategies used, since they were adapted to traditional methodologies in which the student does not challenge himself to have an active attitude during learning.

Within the teaching methodologies supported by the active learning tools, the following were included: the reviewing of a reading material by the students prior to the class, elaboration of concept maps in small groups of students, briefing sessions (Lachman and Pawlina, 2015), formative assessment and dissection –the latter because it allows the students to integrate knowledge, to solve problems and to develop logical thinking through doing (Cake, 2006).

In addition, at the end of each class session, feedback was given to the students, with the help of the results of the formative assessment. Also, teachers presented the learning objectives at the beginning of each module, so the students could be clear about what is intended for them to learn.

In order to change the rote memory approach, activities of formative assessment were set up. Students were allowed to review the results of the quiz, study and present them again, until obtaining clarity in the anatomical concepts

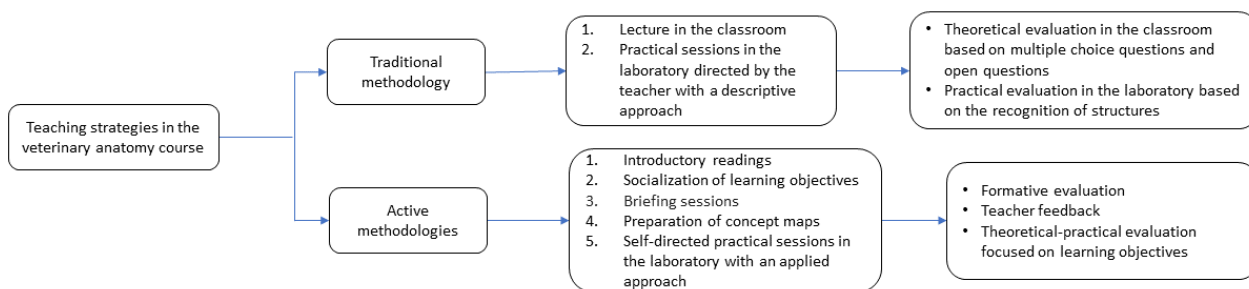


Fig. 1.- Flow chart showing the teaching strategies and assessment tools used in the course.

through constant feedback from the teacher. The partial exams were replaced by an evaluation focused on learning objectives and theoretical-practical questions (objective structured practical evaluation -OSPE- type) with 3 minutes for the resolution of the questions (Yaqinuddin et al., 2013), and the implementation of extended matching items was part of the changes.

During the practical sessions, students were asked to search the structures that were related to the topics addressed during the theoretical class in the cadavers and other anatomical specimens, making use of anatomy texts and a study guide. The teacher guided the students in the identification of the structures when there are difficulties or doubts in the recognition. Finally, a review of the structures was carried out on the cadaver, in which students and teachers participated at the same time, relating each structure to its specific function.

In order to inquire the students and teachers' interpretations regarding the new methodologies, it was proposed to understand the perceptions of students and teachers about the didactic strategies of the veterinary anatomy course of the Faculty of Agricultural Sciences during the second academic period of 2018.

## **MATERIALS AND METHODS**

Qualitative descriptive research oriented in the hermeneutical paradigm for understanding the perceptions about the didactic strategies of the veterinary anatomy course was carried out with a group of students and teachers of the undergraduate veterinary medicine of the University of Antioquia. This study was approved by the Bioethics committee of the Faculty of Medicine, University of Antioquia.

The potential participants were 52 students who took the Veterinary Anatomy course during the second academic semester of 2018 and 5 teachers. A call was made via email to all students, inviting them to participate in the research on a voluntary basis, they were made aware of the dynamics of the research and the objectives of the project. The sample was intentionally non-probabilistic based on the interest of the researcher. The inclusion

criterion was to have finished the course during the indicated academic period and the exclusion criterion was to be a repeating student. Semi-structured interviews and a focus group were carried out. Of the total population, 13 students were interviewed (25%). The number of students was determined according to the concept of theoretical saturation, that is, the point at which data collection and information analysis did not generate new information (Victoroff and Hogan, 2006). The focus group was carried out with 3 students (5.8%).

Three of the teachers (60%) voluntarily participated in this research. The principal investigator (RBM) was excluded from the interviews to avoid bias.

All participants filled out the informed consent form endorsed by the Bioethics committee of the Faculty of Medicine, University of Antioquia. There was no financial remuneration for participation in this study.

The interviews were conducted by a veterinary medicine student with knowledge in qualitative research (SQZ), who was previously trained by one of the research advisors (NCM, Magister in higher education in health with experience in qualitative studies). The training was focused on theoretical and practical aspects of the semi-structured interview.

At the beginning of the interviews, each participant was informed of the research objectives, the definition of perception and a contextualization related to the learning strategies used, where the traditional didactic strategy was called methodology 1 and the active methodological strategies were called methodology 2. All interviews and the focus group were duly recorded.

After collecting the information, each interview was transcribed verbatim in Microsoft Word. Each participant was assigned a code in order to protect his/her identity. Using the Atlas.ti version 7.5.4 program, the information collected was analyzed to categorize the perceptions of the participants from three pre-established categories: traditional method, active method and perception. The pre-established categories were defined based on

the literature review. An open categorization was carried out, from which new categories emerged that made possible to deepen the understanding of perceptions. Finally, the results were triangulated by comparing the data from the interviews of the students and teachers, the focus group, and the scientific literature (Fig. 2).

The validity of this research is supported by the textual transcription of each interview and the exhaustive categorization and triangulation of the information from the collected data and documents from the scientific literature.

## RESULTS

The data obtained shows that, although students had a greater predilection for the use of the traditional learning methodology, it seemed ideal for them to learn in a veterinary anatomy course that also alternates the use of active strategies. Similarly, teachers stated that anatomy teaching should use various methods that allow adapting to the different learning styles of students.

Regarding traditional teaching, four main categories were identified: lectures, memorization,

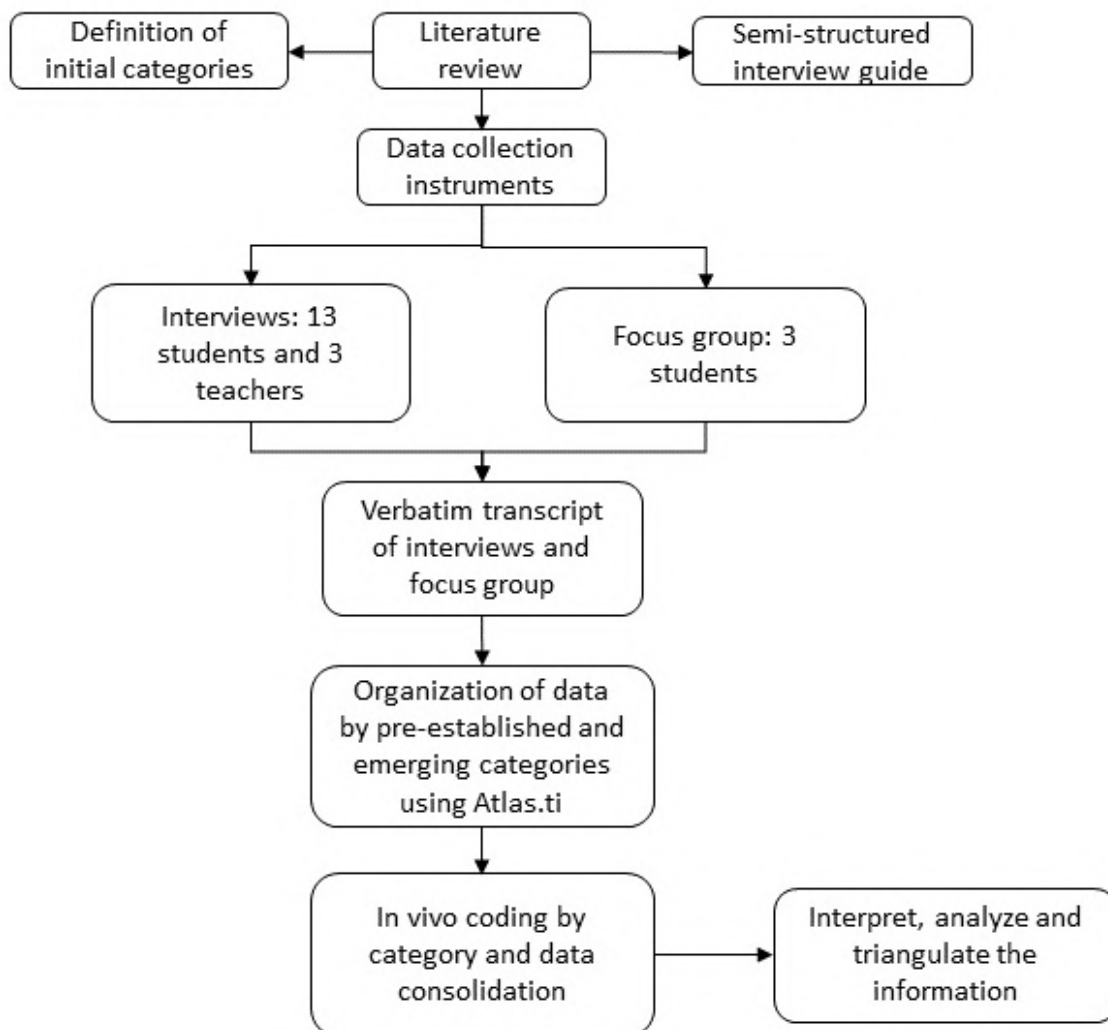


Fig. 2.- Flow chart showing the collection and analysis of the information.

density of the topics and assessment. Lectures were valued positively; in general, the students expressed that this is a learning strategy that allows for the explanation of detailed theoretical aspects of a structure or a topic in depth. In addition, they considered that it is comfortable, since the teacher provides all the necessary information. However, they considered rote learning, the amount of information handled in the development of the lecture and the assessment to be the main drawbacks in this methodology.

For teachers, lectures allowed for a good handling of the information, because it makes possible to present a topic in an orderly manner, it provides quick information to the student and it allows for the presentation of concepts that may be complex for the student. However, it is an unattractive teaching methodology, in which the learner becomes a very passive individual and gets used to being given facts without the need to do any learning effort. They stated that it is one of the most frequently used methodological strategies, but it is necessary to select its content and make appropriate use of it, since students lose their attention when a lecture becomes too extensive. Teachers also considered thematic density to be one of the main difficulties of lectures. Related to active learning strategies, in the open categorization of student interviews, four main categories emerged: formative assessment, concept maps, briefing sessions, and clarity of concepts. The students considered that the formative assessment allowed them to consolidate their knowledge or reinforce concepts not yet understood.

Regarding the concept maps, this tool was identified as favorable for the learning process, although there were some negative comments related to the time given for the completion of the task (approximately 20 minutes), difficulties in relation to team work and, finally, a personal factor related to the learning style (one student that thought that in this way he does not learn).

Briefing sessions were also evaluated positively, since they tended to give context to the anatomy by integrating anatomical knowledge with common basic clinical aspects of veterinary medical practice. Finally, in this type of strategy, the lack of

understanding of anatomical concepts stood out as the main difficulty, since the students felt that the teacher did not offer them a theoretical class as such. Although most students considered that active strategies are based on the construction of knowledge autonomously, the general perception is that with the traditional method they obtained greater learning.

Teachers considered that the implementation of new didactic strategies other than lectures requires adequate training in pedagogical aspects and that experience is a fundamental aspect for the proper development of these methodologies. They also mentioned that it helps arouse student interest. They considered that when teaching strategies have specific learning objectives, the student is clear about what to learn and what can be assessed. Explicit learning objectives also guide the teacher in the teaching (content prioritization) and assessment process. Teachers believed that it was satisfactory to work with these teaching and learning strategies, and considered that their role is to act as a guide so that students, through a process of analysis, interpretation and research, learn to build their knowledge. However, they stated that the time required for the implementation of active learning strategies is one of the most challenging aspects. Although the opinion of the teachers about the briefing sessions agrees with that reported by the students, they highlighted that the strategy is difficult to elaborate.

## DISCUSSION

In this study we analyzed the perception of students and teachers about the didactic strategies that were used during the second academic period of 2018 in the veterinary anatomy course of the Faculty of Agrarian Sciences of the University of Antioquia.

The preference of students for the traditional didactic strategies are in accordance with a previous study in which a large part of students perceived that they learn better with lectures than with teaching activities based on active learning (Vitorino et al., 2020), although constructivism-based learning methods have been shown to

improve student performance on short-term exams compared to traditional teaching methods (McGreevy and Church, 2020; Michael, 2006). In addition, it has been observed that students give less educational value to teaching strategies that generate anxiety and some active learning techniques tend to generate more anxiety than lectures (Hood et al., 2020), and a perception of increased workload (Silverthorn, 2020). However, other studies have shown that active learning strategies improved student satisfaction with positive effects on student learning (Dooley et al., 2018; Keegan et al., 2012; Monahan and Yew, 2002). Anatomy students perceived team-based learning as a more rewarding and enjoyable learning strategy than regular lectures-based teaching (Inuwa, 2012; Ozkadif and Ekencastn, 2012).

The reasons that support the predilection of traditional methodologies for learning anatomy could be related to the limited experience and pedagogical training of the teachers in charge of the course in the implementation of active methodological strategies (Morzinski, 2005; Moore et al., 2002).

Students have a resistance to change to new learning methods, even more when traditional teaching approaches are the main strategy used in primary and middle education (Schwerdt and Wuppermann, 2011). Lectures are the most frequently used methodology in the teaching of students in higher education (Schmidt et al., 2015) and, in the case of veterinary anatomy, this approach prevails today (Ozkadif and Ekencastn, 2012). Student resistance to new teaching methods is one of the challenges when trying to migrate from a traditional to a student-centered teaching model (Silverthorn, 2020). It is necessary that students take greater responsibility in their learning process, however, some of them decide to assume a passive role (Bohaty et al., 2016).

Regarding the benefits of multimodal teaching for different learning styles perceived by teachers in this study is consistent with Hauer and Quill (2011), who stated that several teaching approaches facilitate the achievement of knowledge, skills and attitudes in students. In addition, when veterinary anatomy students combined various

study methods, they obtained better academic performance (Ward and Walker, 2008), and when lectures were used in conjunction with active learning strategies, students paid greater attention to classes (Bunce et al., 2010). Likewise, medical students considered that learning was carried out actively with group interactions with the use of a multimodal teaching strategy for learning anatomy (structured practical sessions) (Akeel, 2021). This author highlighted the importance of incorporating multimodal teaching strategies in contemporary curricula, since these adapt more easily to the learning styles of students (Edgell, 2011) and help to maintain student interest (McGreevy and Church, 2020).

In contrast, the perceptions of the students are immersed in a dependence on traditional learning methods. All this supports the idea of continuing on focusing the teaching of veterinary anatomy through a great variety of didactic strategies that promote the autonomy of the student in the acquisition of their knowledge (Sugand et al., 2010; Dooley et al. 2018).

Among the main difficulties perceived by students about the traditional strategies, learning by rote stands out, in accordance with what has been reported in other studies, which reported that the main method for the appropriation of anatomical terminology is memorization (Santos-Treto et al., 2010; Ortiz and Merchan, 2012), mainly because they are required to reproduce verbatim in assessments (Ortiz and Merchan, 2012). Memory learning hinders long-term retention process, much more when functional and practical relationships with veterinary practice that provide context and application are not established (Ward and Walker, 2008). Learning by rote has been related with negative aspects in academic performance in contrast with deep learning approaches (Ward and Walker, 2008; Castañeda, 2015). Therefore, we highlight the need for implementing different teaching strategies in veterinary anatomy courses to stimulate deep learning approaches that are related to the understanding of information and long-term learning.

Formative assessment without a rote memorization approach helps to reduce the tension and

stress of the students. The fact that the teachers keep learning objectives in mind, allows assessment methods to remain aligned with the teaching strategies (Biggs and Tang, 2015). Our positive students' perceptions on formative assessment are in accordance with Bhattacharjee (2020), who reported the creation of formative evaluation strategies in veterinary anatomy course through the use of social networks. Formative assessment allows the teacher to know the difficulties in student learning or the objectives not yet reached (Ruze et al., 2020).

The negative opinions of the students regarding the use of concept maps agree with the study reported by Diwakar et al. (2007), due to the limited time for its elaboration and the predilection for individual work. Sufficient time (on average 3 hours) is required for the process to develop in an analytical and conscientious way to obtain quality results and favor meaningful learning (Diwakar et al., 2007).

In accordance to Vitorino et al. (2020), the lack of comprehension of the anatomical concepts when active strategies were used could be attributed to a high dependence on learning through traditional methods, due to a difficulty in recognizing the key concepts in content.

The positive perception of the use of the briefing sessions for both students and teachers lies in the benefit of giving context to the anatomical knowledge by the integration with common basic clinical aspects of veterinary medical practice. Veterinary anatomy students have considered the necessity to implement clinical aspects as a teaching strategy (Küçükaslan et al., 2019). Briefing sessions seek to develop clinical reasoning skills in students through clear objectives based on the understanding of basic anatomical concepts, reflection and critical thinking (Lachman and Pawlina, 2015). Veterinary medicine students need to develop higher-order skills such as reflection and critical thinking from the most basic courses, such as anatomy, to achieve a deeper learning (Bohaty et al., 2016; Kim et al., 2013).

Finally, although the purpose of the focus group was to expand the amount of information

collected to ensure better understanding of the topic, the number of participants could limit the discussion regarding the perceptions of the students and the possibility of obtaining more significant information in terms of diversity and quality that could be of interest for the study. For Mishra (2016), although focus groups with only three participants can be successfully implemented, there is a risk of having a limited discussion. Otherwise, having large focus groups could interfere with the amount of information collected.

## CONCLUSION

We conclude that students are highly dependent on traditional teaching strategies for learning anatomy, which makes necessary to diversify the teaching strategies that allow for the adaptation to the different learning styles of the students. This would help to stimulate the development of autonomy in students so that they can assume a true commitment in their learning process; motivation to seek information in a variety of literature sources, even beyond those reported by the teacher; inquiry and discussion among peers, so that the acquisition of knowledge becomes a construction rather than a one-way transmission.

Likewise, this research showed the importance of reflection about pedagogical and curricular aspects by teachers, implementing new didactic strategies in order to strengthen the teaching and learning process. This endeavor must be supported by an administrative commitment focused on the implementation of policies that strengthen pedagogical training programs and including extra hours for preparation of classes in the work plans.

## Study limitations

From the methodology proposed in this research, it was thought to carry out 3 focus groups to have a better understanding of the studied phenomenon. However, due to the quarantine decreed by the National Government of Colombia since March 2020 for the Covid-19 pandemic, a single focus group could be carried out. It was not possible to interview the teachers who taught the traditional methodology due to time constraints. It would

have been interesting to know their position on traditional and active teaching strategies. In this study, the perceptions of a group of students and teachers about the didactic strategies of the veterinary anatomy course at the University of Antioquia were assessed, so it is necessary to take precautions when generalizing the results. Not all teachers had the same level of training in teaching and assessment strategies related to active modalities.

## REFERENCES

- AKEEL MA (2021) Exploring students' understanding of structured practical anatomy. *J Taibah Univ Sci*, 16: 318-327.
- BHATTACHARJEE S (2020) #anatomymcq - A pilot study on using the Twitter survey tool as a formative assessment strategy. *MedEdPublish*, 9: 1-21.
- BIGGS J, TANG C (2015) Constructive alignment: an outcomes-based approach to teaching anatomy. In: Chan LK, Pawlina W (eds). *Teaching anatomy: A practical guide*. 1<sup>st</sup> Ed. Springer International Publishing, New York, pp 31-38.
- BOHATY BS, REDFORD GJ, GADBURY-AMYOT CC (2016) Flipping the classroom: assessment of strategies to promote student-centered, self-directed learning in a dental school course in pediatric dentistry. *J Dent Educ*, 80: 1319-1327.
- BONWELL CC, EISON JA (1991) Active learning: creating excitement in the classroom. ERIC Clearinghouse on Higher Education, Washington.
- BRISTOL T, HAGLER D, MCMILLIAN-BOHLER J, WERMERS R, HATCH D, OERMANN MH (2019). Nurse educators' use of lecture and active learning. *Teach Learn Nurs*, 14: 94-96.
- BUNCE DM, FLENS EA, NEILES KY (2010) How long can students pay attention in class? A study of student attention decline using clickers. *J Chem Educ*, 87: 1438-1443.
- CAKE MA (2006) Deep dissection: motivating students beyond rote learning in veterinary anatomy. *J Vet Med Educ*, 33: 266-271.
- CASTAÑEDA LA (2015) Enseñanza de la anatomía orientada al desarrollo de competencias en la carrera de Bioingeniería. Universidad Nacional del Litoral, Santa Fe: Argentina. Tesis de Maestría en didáctica de las Ciencias Experimentales. 127 p.
- DIAMOND KK, VASQUEZ C, BORRONI C, PAREDES R (2020) Exploring veterinary medicine students' experiences with team-based learning at the Universidad Andrés Bello. *J Vet Med Educ*, 47: 421-429.
- DIWAKAR V, ERTMER PA, NOUR AY (2007) Helping students learn veterinary physiology through the use of concept maps. *J Vet Med Educ*, 34: 652-657.
- DOOLEY LM, FRANKLAND S, BOLLER E, TUDOR E (2018) Implementing the flipped classroom in a veterinary pre-clinical science course: Student engagement, performance, and satisfaction. *J Vet Med Educ*, 45: 195-203.
- EDGELL H (2011) Teaching anatomy with multiple techniques. *Teaching Innovation Projects*, 1: 1-5.
- HAUER J, QUILL T (2011) Educational needs assessment, development of learning objectives, and choosing a teaching approach. *J Palliat Med*, 14: 503-508.
- HOOD S, BARRICKMAN N, DJERDJIAN N, FARR M, GERRITS RJ, LAW FORD H, HULL K (2020) Some believe, not all achieve: the role of active learning practices in anxiety and academic self-efficacy in first-generation college students. *J Microbiol Biol Educ*, 21: 7-11.
- INUWA IM (2012) Perceptions and attitudes of first-year medical students on a modified team-based learning (TBL) strategy in anatomy. *Sultan Qaboos Univ Med J*, 12: 336-343.
- KEEGAN RD, BROWN GR, GORDON A (2012) Use of a simulation of the ventilator-patient interaction as an active learning exercise: comparison with traditional lecture. *J Vet Med Educ*, 39: 359-367.
- KIM K, SHARMA P, LAND SM, FURLONG KP (2013) Effects of active learning on enhancing student critical thinking in an undergraduate general science course. *Innov High Educ*, 38: 223-235.
- KOOLOS JG, BERGMAN EM, SCHEFFERS MA, SCHEPENS-FRANKE AN, VORSTENBOSCH MA (2020) The effect of passive and active education methods applied in repetition activities on the retention of anatomical knowledge. *Anat Sci Educ*, 13: 458-466.
- KÜÇÜKASLAN Ö, ERDOĞANS, BULUT İ (2019) Turkish undergraduate veterinary students' attitudes to use of animals and other teaching alternatives for learning anatomy. *J Vet Med Educ*, 46: 116-127.
- LACHMANN, PAWLINA W (2015) Choosing between lecture and briefing sessions. In: Chan LA, Pawlina W (eds). *Teaching anatomy: A practical guide*. 1<sup>st</sup> Ed. Springer International Publishing, New York, pp 89-96.
- MCGREEVY KM, CHURCH FC (2020) Active learning: Subtypes, intra-exam comparison, and student survey in an undergraduate biology course. *Sci Educ*, 10: 1-15.
- MICHAEL J (2006) Where's the evidence that active learning works? *Adv Physiol Educ*, 30(4): 159-167.
- MISHRA L (2016) Focus group discussion in qualitative research. *Techno Learn*, 6: 1-5.
- MONAHAN CM, YEW AC (2002) Adapting a case-based, cooperative learning strategy to a veterinary parasitology laboratory. *J Vet Med Educ*, 29: 186-192.
- MOORE DA, LEAMON MH, COX PD, SERVIS ME (2002) Teaching implications of different educational theories and approaches. *J Vet Med Educ*, 29: 117-123.
- MORZINSKI JA (2005) Mentors, colleagues, and successful health science faculty: lessons from the field. *J Vet Med Educ*, 32: 5-11.
- ORTIZ SRS, MERCHÁN NYT (2012) Significado del aprendizaje y la enseñanza de la anatomía: contribuciones desde las percepciones de los estudiantes. *Zona Próxima*, 17: 24-37.
- OZKADIF S, EKECASTN E (2012) Modernization process in veterinary anatomy education. *Energy Educ Sci Technol-PT B*, 4: 957-962.
- RUZE A, AMUTI S, LIPAN N, LIU F (2020) A new holistic assessment system and its impacts on student performance in regional anatomy. *Int J Morphol*, 38: 863-868.
- SANTOS-TRETO Y, MARZABAL-CARO Y, WONG-CORRALES LA, FRANCO-PÉREZ PM, RODRÍGUEZ-BLANCO K (2010) Factores asociados al fracaso escolar en estudiantes de medicina del Policlínico Facultad Vicente Ponce Carrasco. *Revista Médica Electrónica*, 32: 0-0.
- SCHMIDT HG, WAGENER SL, SMEETS GA, KEEMINK LM, VAN DER MOLEN HT (2015) On the use and misuse of lectures in higher education. *Health Prof Educ*, 1: 12-18.
- SCHWERDT, G, WUPPERMANN AC (2011) Is traditional teaching really all that bad? A within-student between-subject approach. *Econ Educ Rev*, 30: 365-379.
- SILVERTHORN DU (2020) When active learning fails... and what to do about it. In: Mintzes J, Walter E (eds). *Active learning in college science: the case for evidence-based practice*. 1<sup>st</sup> Ed. Springer Nature; Switzerland, pp 985-1001.
- SUGAND K, ABRAHAMS P, KHURANA A (2010) The anatomy of anatomy: a review for its modernization. *Anat Sci Educ*, 3: 83-93.
- VAN GINNEKEN CJ, VANTHOURNOUT G (2005) Rethinking the learning and evaluation environment of a veterinary course in gross anatomy: the implementation of an assessment and development center and an e-learning platform. *J Vet Med Educ*, 32: 537-543.



VITORINO RW, FORNAZAIRO CC, FERNANDES EV (2020) Evaluation of performance and perception of learning in teaching human anatomy: traditional method vs constructivist method. *Int J Morphol*, 38: 74-77.

VICTOROFF KZ, HOGAN S (2006) Students' perceptions of effective learning experiences in dental school: a qualitative study using a critical incident technique. *J Dent Educ*, 70: 124-132.

WARD PJ, WALKER JJ (2008) The influence of study methods and knowledge processing on academic success and long-term recall of anatomy learning by first-year veterinary students. *Anat Sci Educ*, 1: 68-74.

YAQINUDDIN A, ZAFAR M, IKRAM MF, GANGULY P (2013) What is an objective structured practical examination in anatomy? *Anat Sci Educ*, 6: 125-133.