



STUDENT OPINION FOR CLASSICAL ANATOMICAL EDUCATION ASSOCIATED WITH DIFFERENT TEACHING STRATEGIES

¹Jalles Dantas de Lucena, ²Osvaldo Pereira da Costa Sobrinho, ²Katarina Maria Brasileiro Leal, ¹Roberta Oliveira da Costa, ²Francisco Orlando Rafael Freitas, ³José Roberto Pimenta Godoy, ¹Deiziane Viana da Silva Costa, ⁴Luiz Guedes de Carvalho Neto, ¹Ana Angélica Queiroz Assunção Santos, ^{*1}Gilberto Santos Cerqueira, ¹Francisco Rafael Oliveira da Silva, ¹Delane Viana Gondim and ⁵Iolanda Gonçalves de Alencar Figueiredo

¹Post-Graduate Program in Morphofunctional Sciences, Department of Morphology, Federal University of Ceará, Fortaleza, Ceará, Brazil

²Faculty of Medicine, Federal University of Ceará, Fortaleza, Ceara, Brazil.

³Faculty of Medicine, University of Brasília, Brasília, Distrito Federal, Brazil

⁴Integrated Faculties of Patos, Patos, Paraíba, Brazil

⁵Department of Nursing, Federal University of Piauí CSHNB, , zip code: 60430-170, Picos, Piauí, Brazil

ARTICLE INFO

Article History:

Received 24th June, 2017

Received in revised form

27th July, 2017

Accepted 29th August, 2017

Published online 30th September, 2017

Keywords:

Anatomy, Education, Learning, Teaching, Medicine.

ABSTRACT

Objective: To evaluate the opinion of Nursing students regarding the methodology developed in the discipline of Human Anatomy, and the insertion of different didactic resources in the classes.

Method: A cross-sectional study with a quantitative approach was conducted with 62 nursing students. It was observed that the majority of the students were women (90.32%).

Results: Of this 92% of the students were satisfied with the teaching methodology used by the teacher in Anatomy classes, with theoretical classes followed by practical classes, associated with the use of different didactic resources. Among these resources were: textbooks, anatomical atlases, cadavers previously dissected (prosections), anatomical models, monitoring classes, and multimedia resources, such as the projection of slides produced in Microsoft® PowerPoint®, virtual atlases, videos and animations, which have passed of 84% of the students. Students highlighted prosecutions, anatomical atlases, monitoring classes and multimedia resources.

Conclusion: Our findings indicated that nursing students were satisfied with the teaching methodologies used, demonstrating that it is necessary to introduce active methodologies such as problem-based learning, problem-solving and time-based learning with the purpose of improving the process of teaching and learning.

*Corresponding author

Copyright ©2017, Jalles Dantas de Lucena et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Jalles Dantas de Lucena et al. 2017. "Student opinion for classical anatomical education associated with different teaching strategies", *International Journal of Development Research*, 7, (09), 15643-15647.

INTRODUCTION

Over the centuries, it has been verified that the traditional model of anatomy teaching for health courses has been through theoretical exposition classes, succeeded by practical laboratory classes (Vaccarezza; Papa, 2015; Alsaid, 2016).

These theoretical classes are generally taught with the aid of didactic resources, such as blackboard and/or whiteboard, textbooks and anatomical atlases (Collipal; Silva, 2011; Benly, 2014). The practical classes are performed using the dissection of embalmed cadavers and the use of previously dissected human anatomical pieces (prosection), a methodology that has

been consecrated in the anatomical environment and has been widely used until now (Louw *et al.*, 2009⁵). However, it is notable that the classic model of Anatomy teaching has limitations, given that the public teaching experiences a new cultural and technological reality, aspects that directly influence the way students assimilate content. In addition, the compulsory teaching time for Anatomy is gradually being reduced either by the inclusion of new disciplines in the curriculum, by the shortage of teachers, or by the expiration of the traditional teaching model used in many institutions (Johnson *et al.*, 2012). Faced with this, current trends in Anatomy teaching point to the evolution of educational methodologies (Alsaid, 2016²; Johnson *et al.*, 2012). The use of new pedagogical strategies has been increasingly effective in improving the classical anatomical teaching model. In this context, some didactic resources have been included in the Anatomy classes, such as the use of slides (Zehra *et al.*, 2012), software (Lewis *et al.*, 2014; Moro *et al.*, 2017), accessed content (Ghosh; Chakraborty, 2015), video production (Casado *et al.*, 2012; Topping, 2014), computer labs (Cabral; Barbosa, 2005; Attardi; Rogers, 2015), anatomical models (Collipal; Silva, 2011), living models and body painting (McMenamin, 2008; Collet *et al.*, 2009; Juriyapong *et al.*, 2016), plastinated pieces (Von Hagens *et al.*, 1987; Fruhstorfer *et al.*, 2011), creation of drawings and staining of pre-printed images (Hansen, 2009²⁰; Alsaid; Bertrand, 2016), 3D printing (Vaccarezza; Papa, 2015; McMenamin *et al.*, 2014; AbouHashem *et al.*, 2015) and imaging examinations (Sweetman *et al.*, 2013²⁴; Heptonstall *et al.*, 2016²⁵), adapting classical anatomical teaching to current reality. The implementation of these resources has a positive impact on the theoretical and practical teaching of Anatomy, facilitating significantly the students' understanding, and improving their performance in the discipline (Alsaid, 2016; Collipal; Silva, 2011; Johnson *et al.*, 2012; Mota *et al.*, 2010; Da Silva *et al.*, 2013; Aragão *et al.*, 2013). The present study evaluated the opinion of Nursing students regarding the methodology developed in the discipline of Human Anatomy, and the insertion of different didactic resources in the classes.

MATERIALS AND METHODS

A cross-sectional study of quantitative involving nursing students was carried out at a higher education institution in the state of Paraíba, in the Northeast region of Brazil. The study population consisted of 90 Nursing students in the first semester and the sample was composed of 62 students, 56 female and 6 male, who completed the compulsory course of Human Anatomy during the year 2010. The instrument used for the data collection was a semi-structured questionnaire containing easy-to-understand questions. This instrument presented elements to characterize the participants regarding sociodemographic information. The students also answered questions related to their perception regarding the methodology and didactic resources used by the teacher to teach the discipline. The data were organized into an Excel spreadsheet and analyzed independently by the researchers. All the students present in the last Anatomy class of the semester were invited to participate in the study by signing the Written Informed Consent Form (WICF), and then answered the collection instrument. The research was approved by the Committee on Ethics in Research with Human Beings of Integrated Faculties of Patos, protocol number CEP / FIP n° 0494/2010.

RESULTS

It was observed that the majority of the students were women (90.32%), Table 1, between the ages of 17 and 25, Table 2. The analysis of the questionnaires showed that 92% of the students were satisfied with the teaching methodology used by the teacher in Anatomy classes, with theoretical classes followed by practical classes, associated with the use of different didactic resources (Table 3). Among these resources are: textbooks, anatomical atlases, cadavers previously dissected (prosections), anatomical models, monitoring classes, and multimedia resources, such as projection of slides produced in Microsoft® PowerPoint®, virtual atlases, videos and animations, which have passed of 84% of the students (Table 4). Students highlighted prosections, anatomical atlases, monitoring classes and multimedia resources - virtual atlases and slides, as the resources that most contributed to learning in the discipline (Table 4). In addition, it is worth mentioning that 85.48% of the students used weekly multimedia resources in their studies (Table 5). However, without abandoning the use of the cadavers, they do not support the replacement of this resource with the most modern technological resources (Table 6).

Table 1. Gender of interviewed

Gender	Number	Percentage %
Male	6	9.68
Female	56	90.32
Total	62	100.0

Table 2. Age range of interviewed

Age range	Number	Percentage %
17 – 20 years	29	46.78
21 – 25 years	23	37.10
26 – 30 years	5	8.06
31 – 40 years	5	8.06
Total	62	100.0

Table 3. Student satisfaction with teaching methodology used by teacher in Anatomy classes

Student opinion	Number	Percentage %
Satisfied	57	91.94
Not satisfied	5	8.06
Total	62	100.0

Table 4. Students' approval regarding the didactic resources used by the teacher in Human Anatomy classes

Didactic resources	Approval	Not Approval
Textbooks	72.58	27.42
Anatomical Atlases	85.48	14.52
Prosections	100.0	0
Anatomical models	72.58	27.42
Monitoring class	100.0	0
Slides in PowerPoint®	88.70	11.30
Virtual atlases	91.94	8.06
Videos	77.42	22.58
Animations	67.74	32.26
Mean	84.05	15.95

Table 5. Frequency of use of multimedia resources by students in the study of Anatomy

Use of multimedia resources	Number	Percentage %
Only in class by the teacher	5	8.06
Weekly	53	85.48
Do not use for lack of PC	2	3.23
Never used	2	3.23
Total	62	100.0

Table 6. Students' opinion on replacement of the cadavers by modern technological resources in Anatomy teaching

Student opinion	Number	Percentage %
Replacement of cadaver	0	0
Non-replacement of cadaver	62	100.0
Total	62	100.0

DISCUSSION

In a general analysis, the results show that students were satisfied with the traditional methodology of Anatomy teaching when associated with the use of different didactic resources used by the teacher, indicating that this association contributed positively to the quality of the Anatomy class, and consequently, with improved learning. This results are consistent with previous studies that defend traditional anatomical teaching associated with the use of different didactic resources, especially those that include new technologies, increasing students' interest in the discipline by improving their performance (Johnson *et al.*, 2012; Casado *et al.*, 2012; Mota *et al.*, 2010; Aragão *et al.*, 2013; Jaiswal *et al.*, 2015). Currently, one of the difficulties in anatomical teaching is the choice of educational methodology and resources that will be used. On the one hand, "traditional" anatomists are reluctant to make alterations in traditional anatomical methodology and continue to teach theoretical expository classes accompanied by dissections of cadavers, believing that the study on the cadaver provides the opportunity to learn anatomical details such as anatomical variations, the relationship between different organs and the three-dimensional structure of the human body, aspects that other didactic resources do not allow exploration (Johnson *et al.*, 2012; Dissabandara *et al.*, 2015). In addition, such anatomists also argue that a multisensory experience provided to students by the cadaver through visual, auditory and tactile feedback cannot be replaced by a computer simulation (Rehman *et al.*, 2012). In contrast, the anatomists considered as "modernists", who defend the use of new techniques and didactic resources available for teaching anatomical (Lewis *et al.*, 2014; Casado *et al.*, 2012; Trelease, 2016). Not only in Brazil, but throughout the world, there is a trend among Anatomy teachers for the search for innovative teaching tools and methods that can enhance traditional anatomical teaching. With the use of different resources in the anatomical teaching, there is a greater involvement of the students in the theoretical and practical classes (Ganguly, 2010), facilitating the learning of contents considered difficult to understand (Mota *et al.*, 2010). In this study, the didactic resources used by the teacher in Anatomy classes were approved by 84% of the students, with emphasis on prosections, monitoring classes, anatomical atlases and multimedia resources. It is worth noting that the dissection of cadavers for the Nursing course is not mandatory in Brazil. Therefore, it is common to use cadavers previously dissected. The prosections of cadavers have been used for some time all over the world. One explanation for this is the difficulty in obtaining new cadavers for dissection (Halliday *et al.*, 2015). In Brazil, in most institutions where cadavers are used for teaching Anatomy, students study through pieces already dissected and previously used by other classes. Although the use of prosections is criticized by some anatomists, it has been used by several courses in the health area, such as Nursing, Dentistry, Physiotherapy, Physical Education, Nutrition, Pharmacy, Occupational Therapy and Biomedicine, since it is considered as a tool that stimulates students to learn anatomical structures and relationships, as

well as their terminology. In addition, it enables students to learn not only normal and common structures, but also anatomical variations (Fazan, 2011). Classes with monitors were approved for all students. Leite *et al.* (2011), emphasizes that the performance of monitoring provides improved learning and fixation of the contents taught in the lectures and practices by the students, as well as for the monitors in the initiation to teaching, with significant gain in professional experience in their academic training. Previous study showed a high acceptance rate of students to the practice of monitoring, especially those of Anatomy (Arruda; Sousa, 2014). Those who attend Anatomy monitoring generally get better performance in the discipline (Miazaki *et al.*, 2011). The use of anatomical atlases in the practical classes was approved by 85.48% of the students, as they considered an important tool in the discipline. The textbooks and the atlas of anatomy represent the main source of theoretical knowledge for the students, in addition, the atlas is considered as the main source of understanding of the structures of the human body after the cadaver. Due to the lack of cadavers in many departments of morphology, associated with the wear and tear of the anatomical pieces by constant handling, the use of the atlas is an aid to these problems (Monteiro *et al.*, 2006). In the last decades, technology has evolved considerably and reached the classrooms and laboratories in all academic areas. With Anatomy it was not different. This allowed, for example, a production of digital versions of anatomical atlases, allowing access to information through computers (Netter, 2014). Most of these atlases are a greater number of visual and interactive resources to the user, which makes them increasingly used by students, and approved by 92% of students. In this study, the use of slides produced other than Microsoft® PowerPoint® in theoretical classes was approved by 88.70% of students. To present visual information, such as animations and images, the most common method is to project through slides (LaPorte *et al.*, 2002). A study conducted at the Pakistani Medical College showed that students in small groups with presentation slides performed better on written tests (Zehra *et al.*, 2012). The authors argued that the use of this tool may have facilitated a theoretical understanding of the contents. Due to the ease and practicality of access to multimedia resources, 85.48% of the students used some of these resources during the individual study of the discipline at least once a week. Boechat *et al.* (2016⁴²) justify easy access to images, sounds and videos resources due to the expansion of the internet, which allows students to use various materials when necessary. The use of these resources has become an important tool in the whole teaching process, besides resulting in an additional motivation in relation to the traditional study of Human Anatomy (Guiraldes del Canto *et al.*, 1995). In addition, despite the insertion of new technologies, the use of cadavers continues to be important for students, so that all interviewees do not support the replacement of the cadaver by the use of modern technological resources in Anatomy teaching. Guiraldes del Canto *et al.* (1995) argue that new technologies applied to the study of Anatomy should be used as a form of implementation of traditional methods, improving the teaching-learning process. They do not represent the replacement of cadavers, textbooks and atlases of Anatomy, but only add and update the discipline through tools that are part of the daily life of students and teachers. Collipal and Silva (2011), leave a warning to the fact that the use of technologies in anatomical teaching arose not to replace the cadavers, but to complement it, to make it clearer, more playful and more attractive, thus improving student learning.

Conclusion

It is necessary that the anatomical teaching is consonant with the new reality of the educational methodologies, using the technological, interactive and playful resources, in order to improve the effectiveness of the traditional teaching model, adapting the demands of the new student public. This article showed that the integration of traditional anatomical teaching with the use of different didactic resources contributed positively to the teaching-learning process of Anatomy. It is also noteworthy that students continue to learn from the cadaver, in addition, this study confirmed that students want to maintain the use of real anatomical parts in Anatomy classes, and that their importance in teaching remains. Thus, this evolution in anatomical teaching must ally classic practices with new resources, aiming to ensure a quality transmission of the content, even with few resources and little workload.

REFERENCES

- AbouHashem Y, Dayal M, Savanah S, Štrkalj G. The application of 3D printing in anatomy education. *Med Educ Online*. 2015;20:1-3. doi: 10.3402/meo.v20.29847.
- Alsaid B, Bertrand M. Students' memorization of anatomy, influence of drawing. *Morphologie*. 2016;100(328):2-6. doi: 10.1016/j.morpho.2015.11.001.
- Alsaid B. Slide shows vs graphic tablet live drawing for anatomy teaching. *Morphologie*. 2016;100(331):210-5. doi: 10.1016/j.morpho.2016.05.003.
- Aragão JA, Fonseca-Barreto AT, Brito CJ, Guerra DR, Nunes-Mota JC, Reis FP. The availability of teaching-pedagogical resources used for promotion of learning in teaching human anatomy. *Adv Med Educ Pract*. 2013;4:157-63. doi: 10.2147/AMEP.S47145.
- Arruda RM, Sousa CRA. Students' Theoretical-Practical Harnessing of the Subject of Human Anatomy in Physiotherapy Courses. *Rev Bras Educ Med*. 2014;38(1):65-71. doi: 10.1590/S0100-55022014000100009.
- Attardi SM, Rogers KA. Design and implementation of an online systemic human anatomy course with laboratory. *Anat Sci Educ*. 2015;8(1):53-62. doi: 10.1002/ase.1465.
- Benly P. Teaching Methodologies on Anatomy- A Review. *J Pharm Sci Res*. 2014; 6(6):242-3.
- Boechat JCS, Gama Filho RV, Sales EC, Silva MA, Manhães FC. A study on teaching-educational approaches in teaching of human anatomy. *InterSciencePlace*. 2016;11(1):42-55. doi: 10.6020/1679-9844/v11n1a3.
- Cabral ED, Barbosa JMN. Students' Opinions on the Use of Computer Rooms for Teaching Anatomy. *Int J Morphol*. 2005;23(3):267-70. doi: 10.4067/S0717-95022005000300013.
- Casado MI, Castaño G, Arráez-Aybar LA. Audiovisual material as educational innovation strategy to reduce anxiety response in students of human anatomy. *Adv Health Sci Educ Theory Pract*. 2012;17(3):431-40. doi: 10.1007/s10459-011-9307-2.
- Collet T, Kirvell D, Nakorn A, McLachlan JC. The role of living models in the teaching of surface anatomy: some experiences from a UK Medical School. *Med Teach*. 2009;31(3):e90-6. doi: 10.1080/01421590802516731.
- Collipal LE, Silva MH. Estudio de la anatomía en cadáver y modelos anatómicos: impresión de los estudiantes. *Int J Morphol*. 2011;29(4):1181-85. doi: 10.4067/S0717-95022011000400018.
- Da Silva KC, Santana OA, De Moraes SRA. Quality and Language of Learning Objects Used in the Teaching of Human Anatomy. *Int J Morphol*. 2013;31(2):455-60. doi: 10.4067/S0717-95022013000200015.
- Dissabandara LO, Nirathanan SN, Khoo TK, Tedman R. Role of cadaveric dissections in modern medical curricula: a study on student perceptions. *Anat Cell Biol*. 2015;48:205-12. doi: 10.5115/acb.2015.48.3.205.
- Fazan VPS. Métodos de ensino em anatomia: dissecação versus prossecção. *O Anatomista*. 2011;1(2):7-11.
- Fruhstorfer BH, Palmer J, Brydges S, Abrahams PH. The use of plastinated prosections for teaching anatomy--the view of medical students on the value of this learning resource. *Clin Anat*. 2011;24(2):246-52. doi: 10.1002/ca.21107.
- Ganguly PK. Teaching and learning anatomy in the 21st century: Directions and the strategies. *Open Med Educ J*. 2010;3:5-10. doi: 10.2174/1876519X010030100005.
- Ghosh S, Chakraborty S. Learning anatomy from the internet. *Clin Teach*. 2015;12:429-31. doi: 10.1111/tct.12414.
- Guiraldes del Canto H, Oddó Atria H, Ortega FX, Oyarzo MP. Métodos computacionales y gráficos de apoyo al aprendizaje de la Anatomía Humana: vision de los estudiantes. *Rev Chil Anat*. 1995;13(1):67-71.
- Halliday N, O'Donoghue D, Klump KE, Thompson B. Human structure in six and one-half weeks: One approach to providing foundational anatomical competency in an era of compressed medical school anatomy curricula. *Anat Sci Educ*. 2015;8(2):149-57. doi: 10.1002/ase.1476.
- Hansen JT. *Netter's Anatomy Coloring Book*. Philadelphia: Elsevier Science Health; 2009.
- Heptonstall NB, Ali T, Mankad K. Integrating radiology and anatomy teaching in medical education in the UK: the evidence, current trends, and future scope. *Acad Radiol*. 2016;23(4):521-6. doi: 10.1016/j.acra.2015.12.010.
- Jaiswal R, Sathe S, Gajbhiye V, Sathe R. Students perception on methods of anatomy teaching and assessment. *Int J Anat Res*. 2015;3(2):1103-08. doi: 10.16965/ijar.2015.161.
- Jariyapong P, Punsawad C, Bunratsami S, Kongthong P. Body painting to promote self-active learning of hand anatomy for preclinical medical students. *Med Educ Online*. 2016;21:1-3. doi: 10.3402/meo.v21.30833.
- Johnson EO, Charchanti AV, Troupis TG. Modernization of an anatomy class: from conceptualization to implementation: a case for integrated multimodal – multidisciplinary teaching. *Anat Sci Educ*. 2012;5(6):354-66. doi: 10.1002/ase.1296.
- LaPorte RE, Linkov F, Villasenor T, Sauer F, Gamboa C, Lovalekar M, et al. Papyrus to PowerPoint (P 2 P): Metamorphosis of scientific communication. *BMJ*. 2002;325(7378):1478-1481. PMID: 12493674.
- Leite AGB, Soares GSL, Silva AL, Oliveira D. A importância da participação nas atividades de monitoria para o desenvolvimento profissional do aluno monitor. *O Anatomista*. 2011;4(2):3-14.
- Lewis TL, Burnett B, Tunstall RG, Abrahams PH. Complementing Anatomy Education Using Three-Dimensional Anatomy Mobile Software Applications on Tablet Computers. *Clin Anat*. 2014;27(3):313-20. doi: 10.1002/ca.22256.
- Louw G, Eizenberg N, Carmichael SW. The place of anatomy in medical education: AMEE Guide no 41. *Med Teach*. 2009;31(5):373-86. PMID: 19811128.
- McMenamin PG, Quayle MR, McHenry CR, Adams JW. The production of anatomical teaching resources using three-

- dimensional (3D) printing technology. *Anat Sci Educ.* 2014;7(6):479-86. doi: 10.1002/ase.1475.
- McMenamin PG. Body painting as a tool in clinical anatomy teaching. *Anat Sci Educ.* 2008;1(4):139-44. doi: 10.1002/ase.32.
- Miazaki AP, Pissolato M, Nadai FR, Carvalho CAF. Interface: Anatomy's monitory and medical formation. *Perspect Med.* 2011;22(2):28-33. doi: 10.6006/perspectmed.22.050211.
- Monteiro BS, Valdek MCO, Cunha ILL, Moraes RM, Machado LS. AnatomI 3D: Um Atlas Digital Baseado em Realidade Virtual para Ensino de Medicina. In: VIII Symposium on Virtual and Augmented Reality. 2006;1-12.
- Moro C, Štromberga Z, Raikos A, Stirling A. The effectiveness of virtual and augmented reality in health sciences and medical anatomy. *Anat Sci Educ.* 2017. doi: 10.1002/ase.1696.
- Mota MF, Mata FR, Aversi-Ferreira TA. Constructivist pedagogic method used in the teaching of human anatomy. *Int J Morphol.* 2010;28(2):369-74. doi: 10.4067/S0717-95022010000200005.
- Rehman FU, Khan SN, Yunus SM. Students, perception of computer assisted teaching and learning of anatomy-in a scenario where cadavers are lacking. *Biomed Res.* 2012;23(2):215-18.
- Netter FH. *Atlas of Human Anatomy.* 6th Edition. Philadelphia: Elsevier, 2014.
- Sweetman GM, Crawford G, Hird K, Fear MW. The benefits and limitations of using ultrasonography to supplement anatomical understanding. *Anat Sci Educ.* 2013;6(3):141-8. doi: 10.1002/ase.1327.
- Topping DB. Gross anatomy videos: student satisfaction, usage, and effect on student performance in a condensed curriculum. *Anat Sci Educ.* 2014;7(4):273-9. doi: 10.1002/ase.1405.
- Trelease RB. From chalkboard, slides, and paper to e-learning: How computing technologies have transformed anatomical sciences education. *Anat Sci Educ.* 2016;9(6):583-602. doi: 10.1002/ase.1620.
- Vaccarezza M, Papa, V. 3D printing: a valuable resource in human anatomy education. *Anat Sci Int.* 2015;90(1):64-5. doi: 10.1007/s12565-014-0257-7.
- Von Hagens G, Tiedemann K, Kriz W. The current potential of plastination. *Anat Embryol (Berl).* 1987;175(4):411-21. PMID: 3555158.
- Zehra U, Athar Z, Hafeez A, Rizvi F, Cantt W. Is the use of PowerPoint presentations a better tool of understanding gross anatomy than cadaveric dissection?. *Ann Pak Inst Med Sci.* 2012;8(1):6-10.
