




Digital Technologies in the Teaching and Learning of Human Anatomy: Analysis of the Perceptions of Higher Education Academics

Camila Maria Bandeira Scheunemann¹ 
 Caroline Medeiros Martins de Almeida¹ 
 Paulo Tadeu Campos Lopes¹ 

Universidade Luterana do Brasil, Programa de Pós-Graduação em Ensino de Ciências e Matemática, Canoas, RS, Brazil.

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ABSTRACT

The discipline of human anatomy in higher education has sought to restructure its approach and methodological strategies; in this context, digital technologies are presented as alternative means that can be incorporated in the study of this discipline. This exploratory qualitative research had as objective to analyze the perceptions of health academics about the use of digital technologies for the teaching and learning of human anatomy. The participants were 20 academics of the discipline of human anatomy of courses of the health area of a private university of the metropolitan region of Porto Alegre. The data were collected from a questionnaire, composed of questions related to the teaching and learning of human anatomy and the use of digital technologies for this component. The data were analyzed from the Content Analysis. Scholars have pointed out in their perceptions that digital resources contribute to the learning of anatomy; among the features most cited by them and indicated to be used are YouTube and social networks. The research pointed to contributions to present, from the perceptions of the students, the importance of considering the digital resources because they are incorporated in their daily life. We verified the need for further studies on perceptions, since they are indicative of the resources that can be used to learn anatomical concepts.

Keywords: Digital technologies. Human anatomy. Teaching and learning. Higher education. Health education.

Corresponding author. Camila Maria Bandeira Scheunemann.
 Email: camila.b91@hotmail.com

Tecnologias Digitais no Ensino e Aprendizagem de Anatomia Humana: Análises das Percepções de Acadêmicos do Ensino Superior

RESUMO

A disciplina de anatomia humana, no ensino superior, vem buscando reestruturar sua abordagem e estratégias metodológicas; neste contexto, as tecnologias digitais se apresentam como meios alternativos que podem ser incorporados no estudo desta disciplina. Esta pesquisa qualitativa, de natureza exploratória, teve como objetivo analisar as percepções de acadêmicos da área da saúde sobre a utilização de tecnologias digitais para o ensino e aprendizagem de anatomia humana. Os participantes foram 20 acadêmicos da disciplina de anatomia humana de cursos da área da saúde de uma universidade privada da região metropolitana de Porto Alegre. Os dados foram coletados a partir de questionário, composto por questões referentes ao ensino e aprendizagem de anatomia humana e a utilização de tecnologias digitais para este componente. Os dados foram analisados a partir da Análise de Conteúdo. Os acadêmicos apontaram em suas percepções que os recursos digitais contribuem para a aprendizagem de anatomia; entre os recursos mais citados por eles e que indicam para serem utilizados estão o *YouTube* e as redes sociais. A pesquisa apontou contribuições por apresentar, a partir das percepções dos alunos, a importância de considerar os recursos digitais, por estarem incorporados em seus cotidianos. Verificamos a necessidade de mais estudos sobre as percepções, por serem elas indicadoras de recursos que podem ser utilizados na aprendizagem de conceitos anatômicos.

Palavras-chave: Tecnologias digitais. Anatomia Humana. Ensino e aprendizagem. Ensino Superior. Ensino em Saúde.

INTRODUCTION

Digital technologies have been increasingly inserted in the academic world due to their wide use, both by students and by teachers, which incorporate them into an educational environment. These resources have been investigated in these contexts as to their implications for teaching and learning in the most varied fields of knowledge.

With regard to higher education, one of the disciplines of health is the human anatomy, which together with others are part of a basic group, which are the components of the health area (Foureaux, Sá, Schetino, Guerra & Silva, 2018).

Even with the transformations and improvements of pedagogical methods, the discipline of human anatomy still remains, in several contexts, with an essentially traditional focus (Salbego, Oliveira, Silva & Bugança, 2015). Despite this, several initiatives have been promoted in order to provide opportunities for teaching and learning through the use of different didactic strategies, including those that allow the use of digital technologies.

It is observed in the academic scope teaching methodologies that are not very congenial to the public that attends it, which is immense in the digital age (Foureaux et al., 2018). Placing the student in the role of receiver of information is something that opposes the current role of teaching, because it limits the exposition of their creativity,

curiosity, does not make their learning meaningful, generating a dependence of the student on the teacher. In contrast to this method, it is necessary to promote the construction of knowledge itself, through active student participation (Santos, Junior, Narciso, Vilarinho & França, 2017).

In this perspective, it is worth rethinking the pedagogical practices, considering the possibility of insertion of digital resources in the teaching environments, making use of the potential that can present in favor of an improvement in the teaching and learning processes (Massaro, Mantovani & Rodrigues, 2011).

Gomes, Marinho and Carneiro (2016) corroborate, in arguing that digital resources have made possible a more proactive posture of students, since it allows them to leave the passivity, to adopt another posture, that of knowledge builders, protagonists of their learning.

Society is constantly changing, of which technology plays a central role; these transformations are presented as fast and complex, capable of several unfolding (Recuero, 2009).

In accordance with these aspects, it is relevant to investigate the use of digital technologies for the teaching of human anatomy, based on the opinion of the academics who attend this discipline. Based on this context, this research had as objective to analyze the perceptions of health academics about the use of digital technologies for the teaching and learning of human anatomy, having as a research question: What are the perceptions of health academics on the use of digital technologies for the teaching and learning of human anatomy?

DIGITAL TECHNOLOGIES IN THE EDUCATION AND LEARNING OF HUMAN ANATOMY

The human anatomy component has as its object the study “localization, recognition and characterization of the organs of the human body” (Massaro et al., 2011, p.3). It encompasses the teaching of various systems, such as the skeletal, articular, muscular, nervous, circulatory, respiratory, digestive, endocrine, genital, urinary and lymphatic systems. Thus, this discipline aims to provide:

[...] the learning of the morphological organization of the human body, seeking, from the teaching of the form and functions of organs and systems, the constitution of the body as a whole, providing the general knowledge of the construction, conformation and functional value of the human organism. (Salbego et al., 2015, p.28)

In this way, the human anatomy has a vast repertoire of contents, presenting several concepts that need to be memorized and associated (Foureaux et al., 2018). Lemos,

Junior and Campos Filho (2017) highlight the difficulty involved in learning anatomical concepts, depending on the number of systems and related names.

The human anatomy can be viewed with fear by the students because it requires the incorporation of a different vocabulary, as well as the understanding of this new nomenclature, association of concepts, and their comprehension for the professional activity (Foureaux et al., 2018). of the difficulty of memorizing many structures (Reis et al., 2013).

Foureaux et al. (2018) point to a decrease in the performance of students in human anatomy, a situation that may be due to this need for memorization that the discipline requires, in addition to methodologies that are not very similar to the new generation that attends the university, mostly digital natives.

These factors reveal how timely the constant rethinking of the teaching methodologies related to this discipline, since the understanding of the contents depends on both the learning conditions of the students and the methods used by the educators (Salbego et al., 2015).

[...] it is necessary to further deepen the rethinking of the educational practices employed in relevant themes such as the human anatomy of health courses, especially with regard to the approach of concepts that promote the subsequent apprehension of other anatomical concepts, without which the teaching and learning processes of this discipline are compromised. (Lopes, Costa, Dal-Farra & Almeida, 2013, p.7)

Given these considerations, the teaching of anatomy presents itself as a challenge that can be more easily confronted with the aid of differentiated methodological strategies, and that promote a greater interest on the part of the students (Moraes, Schwingel & Silva Júnior, 2016).

In this sense, digital technologies present themselves as an alternative possibility in the teaching of human anatomy. As Costa, Almeida and Lopes point out (2016a, p.1) “digital technologies present themselves as an important tool for the teaching and learning process in order to provide numerous pedagogical possibilities”. To the extent that the student engages actively, ceasing to be just an information receiver, while maintaining his interest, he eventually constructs his own learning space (Massaro et al., 2011).

Digital technologies are tools of mediation, because through them there can be interaction between the object of study and the student, as well as the change of roles they make possible, since academics, with greater access to information, already come equipped with knowledge, which need to be considered (Pauletti & Catelli, 2013).

Among the various materials available on the Internet that can complement the study of anatomy are images, videos, articles, animations, simulations, among others, which allow more interaction between the student and the material. Smith, Martinez-Álvarez

and Mchanwell (2014) argue that the use of resources with the integration of PowerPoint, videos and animations has shown a favorable return on student learning.

In spite of these resources, it is necessary to emphasize the importance of the traditional teaching and learning methodologies in this discipline, such as practical laboratory classes, which allow physical contact of the students with the anatomical pieces (Massaro et al., 2011). Thus, the use of digital technologies is accentuated as complementary to the other methodologies already employed in the teaching of this discipline.

[...] the technology of anatomical representations of the human body is being updated and the content of the discipline is available to students in various media and technological supports. However, it is necessary to consider whether the use of these technologies corresponds to the students' learning expectations. (Trotta & Spinillo, 2014, p.2)

This points to the need to investigate both the use of technological means in didactic situations and the students' perceptions about this process.

The use of 3D applications were pointed out, in the research of Massaro et al. (2011) as an interest factor, enthusiasm and autonomous learning of academics. The authors emphasize that the use of 3D parts "helps to materialize abstract concepts, broadening the understanding of complex concepts of anatomy" (p.9).

Smith, Tollemache, Covill, and Johnston (2018, p.52) highlight the use of three-dimensional models as "a new category of learning resource available for use in anatomical education." Yammine and Violato (2016) conducted research with 3D models in human anatomy, noting an effective contribution of these tools to the understanding of the spatial location of anatomical organs.

Another example of a didactic strategy to be used through digital resources is games. In the study by Gomes et al. (2016) a game applied to students of higher education, referring to the locomotor system, besides contributing to the learning, included the ludic aspect. Lemos et al. (2017) used the game 'Serius game' in the teaching of anatomy, in the study of the skeletal system, showing efficient resource as aid in learning, bringing playful aspects and greater stimulation.

The videos also present a strategy that can contribute to the improvement in academic performance, being a useful and effective tool that can be used in a complementary way in the teaching of human anatomy, assisting in aspects such as interactivity and interest (Machry, Dias & Andrade, 2018).

In addition to these resources, social networks have stood out as an alternative strategy to traditional teaching methods, since they present themselves as an integral part of the daily life of academics, used especially as a space for sharing and interaction. Among the most common social networks are Facebook, which, in the context of

teaching, can provide greater interaction and integration of students (Lemos, Vieira & Moreira, 2018).

Among the potential of Facebook, which can be well used in education, are the discussions, dialogues, exchange of opinions and experiences among the participants, as well as the availability of materials of the discipline (Costa, Almeida, Nascimento & Lopes, 2016b).

In addition to social networking, one feature that can be used is YouTube. Quintanilha (2017) worked with YouTube through a proposal for the creation of a channel by students, in which they were to post audiovisual materials produced by them that were related to the content of the discipline. Verri, Fabrin, Soares, Milan and Sasso (2014) used the production of videos on YouTube as a pedagogical tool in the discipline of human anatomy, and highlight it as useful for the teaching of this discipline.

Facebook and YouTube are resources that can contribute to the teaching practice, provided they are used with a well-defined goal, since “when the student participates, collaborates, shares, enjoys, is inserted and is an actor of a social network of his own daily life, whose main objective is learning “(Quintanilha, 2017, p.260).

It is essential to correctly integrate didactic technologies and methods, since it is necessary to choose which digital resources to use to support methodological strategies (Trotta & Spinillo, 2014). An example of adopting these social media is presented in the work of Moran, Seaman & Tinti-Kane (2016), which points to the widespread use of Facebook and YouTube by faculty members inside and outside classrooms for teaching purposes, how to upload educational videos or learning materials.

Balakrishnan (2017) reports in his study that students are generally receptive to using social media to learn, so academic institutions should observe student enthusiasm and encourage teachers to incorporate social media as part of teaching activities and learning.

Regarding the perceptions of academics about the use of digital technologies in the discipline of human anatomy, there is a shortage of studies. Some research addresses this aspect in a partial way, mentioning students’ opinions about the use of resources such as conceptual maps, games and social networks. In the case of conceptual maps (Britto et al., 2017), playability and facilitation, in the use of games (Gomes et al., 2016) and networks such as Facebook, which, according to the academics, present themselves as collaborators of group discussions and to solve doubts (Costa et al., 2016b).

DIGITAL TECHNOLOGIES UNDER THE PERSPECTIVE OF VYGOTSKY THEORY

Based on Vygotsky’s socio- interactionist theory, digital technologies can be considered to play a mediating role in teaching and learning.

Vygotsky (2001) points out as a presupposition of his theory the historical-cultural approach, presenting the idea that the individual develops cognitively from the appropriation of historical-cultural concepts of the group to which he is a part, which he internalizes through the relations that lays down.

In this sense, in his theory, the concept of mediation stands out as an important, substantial point for learning, since, according to him, “the rational, intentional transmission of experiences and thoughts to others requires a mediating system” (Vygotsky, 1991, p.14).

In this way, the instruments act in the zone of proximal development, which refers to the distance between what the individual performs alone and what he performs with help, where the mediator acts (Vygotsky, 1991).

Thus, it is understood that digital technological resources stand out as mediating instruments in teaching and learning, bringing new meanings to different spheres and functions, promoting transformations, and presenting as a contribution to broadening the ways of learning (Silva, Carvalho & Maciel, 2012). In this context, digital technologies can strengthen school practices, mediating the learning of digital natives (Costa, Duqueviz & Pedroza, 2015).

METODOLOGY

This research is exploratory in nature, which intends to promote an ambience with the research problem, with the aim of better evidencing it, and providing an overview about a certain fact (Gil 1999, 2002).

For data analysis, we use the qualitative approach, which according to Araújo, Oliveira & Rossato (2017) is characterized as a process of understanding and interpretation, and not only with the simple explanation of the realities. Cohen, Manion & Morrison (2001) ground the paradigm of qualitative research, in that they seek to understand the subjectivity of human experiences, focusing on the actions and intentions of the actors involved in the research and privilege procedures of an inductive nature in the process of analysis and interpretation of the data.

The participants were 20 academics of the discipline of human anatomy of courses of the health area of a private university of the metropolitan region of Porto Alegre. This research was approved by the Committee of Ethics in Research in Human Beings of said institution, under the number CAAE 00134418.0.0000.5349.

During the period of data collection, the contents related to the skeletal, articular, muscular, circulatory, nervous and digestive systems were approached from methodological strategies such as expository-dialogic classes, practical classes with the help of anatomical materials and pieces, and the use of digital technologies, as a group on Facebook, for interaction and posting of materials.

The data were collected from a questionnaire, composed of 10 open and closed questions related to the teaching and learning of human anatomy and the use of digital technologies for this subject. Of these questions, five are presented in this article, since they are the ones that contribute most to this discussion: 1. How would you rate your knowledge in computer science? 2. Do you believe that the use of digital technologies in human anatomy classes can contribute to the teaching and learning of this discipline? Because? 3. In the course of this semester did you use digital resources to study for the discipline of human anatomy? If so, which ones? 4. During the human anatomy discipline a Facebook group was maintained for communication. Do you consider that this resource helped / facilitated your learning in this discipline? Because? 5. What other digital resources do you suggest that can be used in human anatomy class?

The data, being related to the perceptions of academics, were analyzed from the Content Analysis of Bardin (2011), being the corpus of the analysis the questions and the answers of the questionnaire; the categorization was carried out a posteriori, that is, after the application of the instrument of data collection. The categorization, in the results, is presented in the form of tables, composed by category, subcategories, number of answers, percentage of answers and students. It should be noted that the number of frequencies may be higher than the number of participants, since a response may be part of more than one subcategory.

RESULTS AND DISCUSSION

To clarify the profile of students, it is important to characterize the group of participants in this research. The human anatomy class in question was composed of academics from several courses in the health area, distributed as shown in Figure 1:

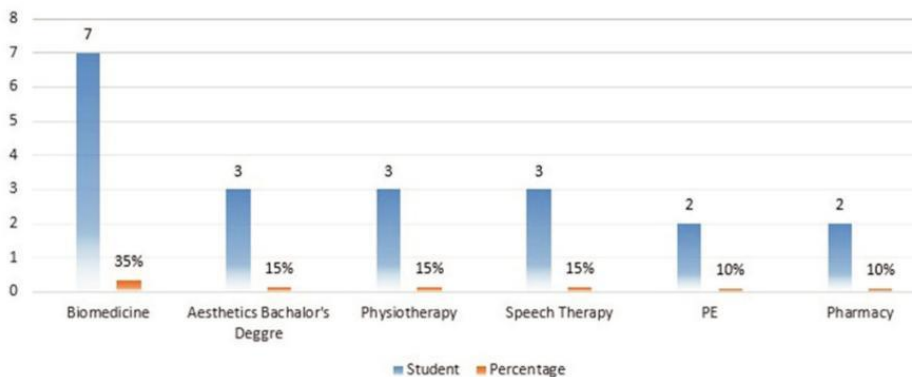


Figure 1. Number and percentage of students participating in the research and their courses.

According to Figure 1, we noticed that the group is heterogeneous in terms of courses. The most expressive is Biomedicine, with 7 students (35%); the Aesthetics, Physiotherapy and Speech Therapy courses present three students (15%), and the Physical

Education and Pharmacy courses present two students (or 15%). This mix of academics from different courses can be a factor that challenges the teaching strategies, since it makes it difficult to orientate the teaching of the discipline in function of the course.

Normally, the curriculum component of human anatomy is present in the curriculum of health disciplines, such as Biology, Physical Education, Physiotherapy, among others, usually inserted at the beginning of the courses, providing support for the following disciplines (Filho, Borges, Figueiredo, Villalobos, & Taitson, 2016). For the health professional, it is extremely important to understand and learn the concepts related to the human anatomy, since this knowledge allows a better security in their professional performance (Lemos et al., 2017).

In relation to the current semester of the research participants, we can observe Figure 2:

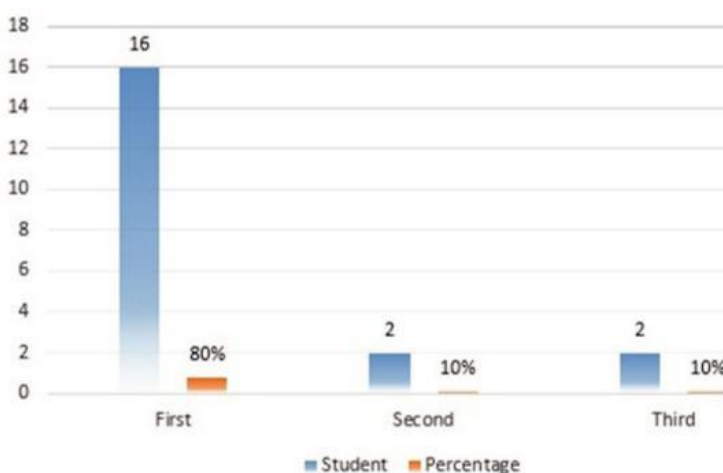


Figure 2. Semester of students participating in the research.

Based on Figure 2, we found that most of the students (16 participants – 80%) are attending the first semester, while only two (10%) are in the second semester and two (10%) are in the third semester.

Usually, the disciplines included at the beginning of an undergraduate curriculum aim to prepare the student for the next steps of the course, building the necessary skills for the rest of the training process (Brown, White, & Power, 2017).

From Figure 2 we can see that the discipline of human anatomy focuses primarily on the first semesters of the course, which indicates that it will serve as a basis for these students in their basic knowledge, providing support for the rest of the course, as well as for their professional activity.

Next, we highlight the questions applied to participants related to their perceptions about digital technologies. The first question, “How would you rate your knowledge in computing?” Has its analysis presented in Figure 3:

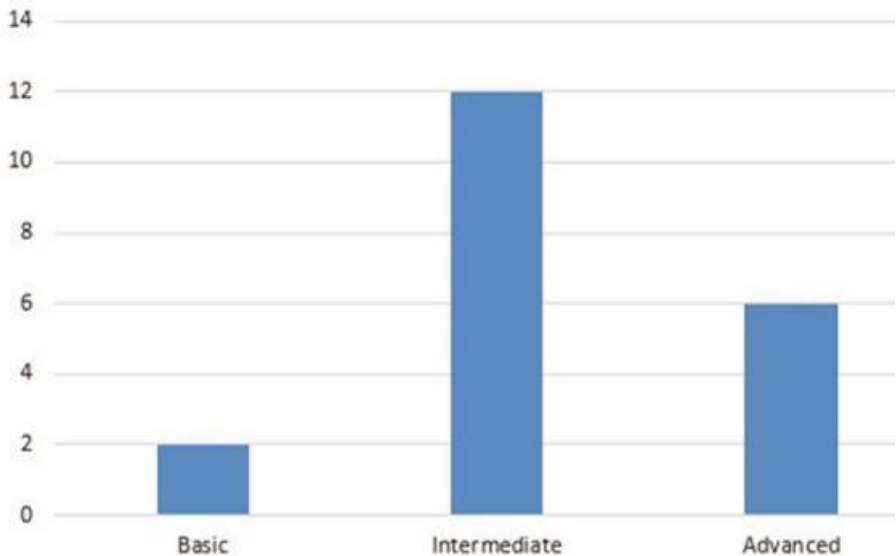


Figure 3. Participants' computer skills, according to their perceptions.

From Figure 3 we observed that 12 students (60%) believe that their knowledge in computer science are intermediate, while 6 students (30%) pointed out as advanced and only two students (10%) as basic. The objective of this question was to verify the perception that the scholars have about their own knowledge in computer science, since this degree of discernment can indicate how much they believe to understand in this area, as well as, the familiarity or facility to handle the digital resources.

In Frame 1, we highlight the categorization for the question: “Do you believe that the use of digital technologies in human anatomy classes can contribute to the teaching and learning of this discipline? Because?”. For this question, 19 students (95%) answered “yes” and one student (5%) answered “no”.

CATEGORY	PRIMARIE SUBCATEGORIES	n	ANSWERS (%)	STUDENTS (%)
Contribution of digital technologies in the teaching and learning of Human Anatomy	Visual aid	4	20.0	20.0
	Ease of access / presence in daily life	3	15.0	15.0
	Availability / scope of materials	2	10.0	10.0
	Facilitate the learning of structures	2	10.0	10.0
	Class becomes more practical / objective	2	10.0	10.0
	They provide another point of view	2	10.0	10.0
	Provides richer detail	1	5.0	5.0
	They open the door to knowledge	1	5.0	5.0
	Although it helps, it is not the main form of teaching	1	5.0	5.0
	Does not contribute	1	5.0	5.0
	No justification	1	5.0	5.0
Total		20	100	-

Frame 1. Contribution of digital technologies in the teaching and learning of Human Anatomy.

Based on Frame 1, we can see that, for the participants, the greatest contribution of digital technologies in the teaching of human anatomy is the visual aid that these resources can bring (4 students, 20%).

This corroborates the fact that the current generation presents itself as visual, due to its constant contact with means that use images and videos. The visual aspect, before the digital technologies, was limited to the use of overhead blades, projection of slides or drawings and printed photos; however, the enhancement of several visual resources allows the exploration of images and animations, which can complement textual resources (Xavier, 2011).

The use of diverse strategies helps to heal the individualities of the academics; in addition, they are inserted in a technological context, before which visual and interactive resources can be considered, in favor of better learning (Brito et al., 2017).

Also, students indicated the contribution that the technological media offer regarding their ease of access and presence in daily life (three students, 15%). We are increasingly aware of the frequency with which digital technologies are used in the daily lives of young people. Higher education academics are largely 'digital natives' (Prenski, 2001), who have grown up with the technologies, presenting facilities for access and incorporation of these resources in their most varied activities.

This points to the need for teachers to include in their pedagogical strategies the use of digital resources, which can contribute to increase the public's access to the materials,

as well as provide more support for their learning. An observed difficulty was the amount of relevant information to be worked and the short time that the discipline has, in front of all anatomical content to be explored. In this way, making materials available through digital resources can be a means of complementing classroom activities.

It is of paramount importance to consider the methodological strategies that link teaching with digital technologies, since they enable “creative and varied ways of obtaining and processing information” (Foureaux et al., 2018, p.107). In addition, it is essential for teachers to choose teachers’ materials appropriately, seeking strategies that aim at active learning and to provide varied educational experiences (Hagen, Cooke, Wright, & Rarey, 2017), and to consider the group of students in question, the curricular component and the activity to be performed (Lovato, Michelotti, Silva, & Loreto, 2018). In addition, three students cited the videos in their responses as resources that contribute to learning; two students mentioned the slides, which are also associated with visual aid.

For Vygotsky (2001) the mediation of learning can occur through human beings, a sign (psychological tool), or an instrument (material tool). In this context, digital technologies can be configured as instruments for mediation of learning.

Aiming to verify the use of digital resources by the participants during the discipline of human anatomy, the question was asked: “During the course of this semester did you use digital resources to study for the discipline of human anatomy? If so, which ones? “. The characterization of which is shown in Frame 2:

CATEGORY	PRIMARIE SUBCATEGORIES	n	ANSWERS (%)	STUDENTS (%)
Digital Resources Used to Study Human Anatomy	Video lessons / channels on YouTube	17	44.7	8,0
	Google / Google academic	5	13.1	25.0
	Anatomy sites	4	10.5	20.0
	Social networks	3	7.9	15.0
	Internet	2	5.3	10.0
	Material provided by the teacher	2	5.3	10.0
	Book	2	5.3	10.0
	None	2	5.3	10.0
	Slides	1	2.6	5.0
Total		38	100	-

Frame 2. Digital resources used to study Human Anatomy.

Frame 2 shows that a significant number of students (17 students, 85%) indicate that they have relied on videos / channels on YouTube to study human anatomy contents,

which shows the importance of this resource as a support for students. Some of these YouTube channels mentioned in their responses were ‘Total Biology’ and ‘Easy Anatomy with Professor Rogério Gozzi’.

Other resources cited include Google, generally (5 students, 25%), anatomy sites (4 students, 20%) and social networks (three students, 15%). Considering the use of the internet by students also promotes learning about the skills for its good use, since this access allows to learn to analyze information, write and organize the time; In addition, receptivity to digital media presents itself as a more attractive way of teaching and learning (Almeida, Lopes, & Lopes, 2015).

In the study by Lopes et al. (2013) anatomy students mentioned the internet as a study material, which, for the authors, should be an indication to teachers of the importance of indicating electronic pages for access.

During the first half of 2018 a Facebook group of the discipline of human anatomy was kept in the group of participants of this research. The students were asked about this group: “During the discipline of human anatomy was maintained a Facebook group for communication. Do you consider that this resource helped / facilitated your learning in this discipline? Why? “For this question 18 students (90%) said yes, while two students (10%) said they did not. The justifications were categorized and are presented in Frame 3:

CATEGORY	PRIMARIE SUBCATEGORIES	n	ANSWERS (%)	STUDENTS (%)
Group help kept on Facebook for learning Human Anatomy	It is a medium of communication of easy access, practical and fast	8	32.0	40.0
	Let's ask questions	5	20.0	25.0
	Provides access to online material and information	3	12.0	15.0
	Teacher Posts	2	8.0	10.0
	Increased involvement of students / constant contact with information	2	8.0	10.0
	Does not help, self-service is preferable	2	8.0	10.0
	Lets you follow the schedule	1	4.0	5.0
	Material available in case of absence	1	4.0	5.0
	Facilitates search and learning	1	4.0	5.0
Total		25	100	-

Frame 3. Group help maintained on Facebook for learning Human Anatomy.

The data categorized in Frame 3 show that the students pointed out several favorable points regarding the maintenance of the group on Facebook during the course, such as being a medium of communication with easy and fast access (8 students, 40%), the

opportunity to (5 students, 25%), and the possibility of accessing the materials online (three students, 15%).

Costa et al. (2016b) investigated the perception of university students about the use of Facebook in the discipline of human anatomy, and verified their contributions; in their research, 75% of the participants considered the experience good or great, as well as a practical and accessible form of communication. In the study by Lemos et al. (2018) the students indicated Facebook as a dynamic, interactive instrument that enabled participation and learning. In Quintanilha's research (2017), 88.8% of the students participated in the discipline group on Facebook; 97% considered their existence relevant.

“Through educational fanpages of the social network Facebook, students can realize that learning can occur in the most diverse spaces, including those predominantly of leisure, such as the social networks so practiced by them” (Lemos & Lima, 2018, p.10). Some aspects that should be considered regarding the appropriate didactic use of Facebook in order to use it as a complementary strategy is to disseminate information, to deepen the contents seen in class, to outline the group's objectives and to promote interactions (Fumian & Rodrigues, 2013).

Students were also asked, “What other digital resources do you suggest they can be used in human anatomy class?”, The categorization of which is shown in Frame 4:

CATEGORY	PRIMARIE SUBCATEGORIES	n	ANSWERS (%)	STUDENTS (%)
Suggestions for digital resources to be used in Human Anatomy	YouTube classes and channels	5	18.5	25.0
	No reply	5	18.5	25.0
	Facebook groups and WhatsApp	4	14.9	20.0
	My Account	2	7.4	10.0
	Video classes	2	7.4	10.0
	Internet	1	3.7	5.0
	Cell phone	1	3.7	5.0
	Net classroom	1	3.7	5.0
	E-mail	1	3.7	5.0
	Anatomy Blog	1	3.7	5.0
	Slides to aid explanation	1	3.7	5.0
	Illustrative photos in practical classes, along with written material	1	3.7	5.0
	The ones that are in use	1	3.7	5.0
Do not know	1	3.7	5.0	
Total		27	100	-

Frame 4. Suggestions of digital resources to be used in Human Anatomy.

Based on Frame 4, the students' suggestions come from their perceptions presented in Table 2, where they indicated the use of videos and channels on YouTube as resources. "[...] using YouTube to study curriculum content is one of the many elements that characterize contemporary youth" (Silva & Sales, 2015, p.14).

Corroborating Frame 2, in Frame 4 the most mentioned feature by the students were classes and channels on YouTube (5 students, 25%), which reaffirms the preference of this platform. This same percentage of students also chose not to suggest any resources. Social networks, such as Facebook and WhatsApp, were mentioned by four students (20%).

In the study by Reis et al. (2013) human anatomy scholars mentioned the use of videos as the most used resources for studying textbooks, anatomical pieces and websites, and suggested among the strategies that could contribute to significant anatomy learning. In the study by Montes e Souza (2010), when asked about suggestions for anatomy classes, scholars mentioned the use of photos and videos.

As for the applications, they were quoted by two students. Gondim et al. (2018), when reviewing the research related to the use of applications in the discipline of anatomy, mention that, although there are several applications available that could collaborate for learning in this discipline, there are still few researches that aim to identify their contributions in the performance of academics.

It should be stressed that only the inclusion of technology is not enough to guarantee an improvement in teaching and learning processes, but a change in pedagogical practices is necessary in order to promote an integration between technology and teaching methods (Lemos et al., 2018). In this way, only the insertion of resources is not sufficient, but we must seek their use from defined objectives, with a central focus on the student, and technology as a medium that can mediate teaching and learning processes.

CONSIDERATIONS

The main objective of this work was to investigate the perceptions of health academics about the use of digital technologies for the teaching and learning of human anatomy. In the participants' perceptions, the digital resources contribute to the learning of anatomy, the visual aid they present, ease of access, among other aspects; also said to use these resources in their studies, highlighting videos/channels on YouTube and social networks, which were also the most appropriate to incorporate the resources used in this discipline.

The research presented contributions to demonstrate, from the perceptions of the health academics, the importance that the digital resources have for the students, and as they are part of their daily activities, as well as, for the study of the discipline in question. This allows us to perceive the need for teachers to consider digital technologies as alternatives that can be used in a complementary way in this discipline and to find ways of inserting them into their planning.

We observed the need for further studies regarding the perceptions of the students about digital technologies in the discipline of human anatomy, considering other educational contexts, from other regions and also from other courses, since these perceptions may be important indications of what resources students are accustomed to using and how teachers can take advantage of this digital habit of students in order to learn their anatomical concepts.

We intend, with studies of this nature, to know the opinions of the academics, because they are important, since they are indicative for teachers, from which they can support the improvement and modification of pedagogical strategies, always seeking more active methods, involving the students, from the potential of these resources, with a view to an improvement in the processes of teaching and learning.

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