Student perception of the use of ICT on learning Morphophysiology

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Abstract. The possibility of working in Morphology using the Technologies of Information and Communication promoting an interactive process focused on the student, who does not leave dependence, sometimes excessive, of the teachers to achieve the objectives. The general objective was to determine the importance of the use of ICT in Morphophysiology learning. A cross-sectional descriptive study with a quantitative approach was carried out. The results of the application of a questionnaire that collected the information in several dimensions. A number of 90 people were surveyed, which accounts for 32% of the population of morphology and physiology basic science students of the Nursing, Surgical Instrumentation and Prehospital Care programs of the Rafael Núñez University Corporation of Cartagena, in the period between February and June 2018. The results show that the use of ICT to support Morphophysiology learning is very well received by students and favors the learning in health sciences. ICT are tools that validate and support the observation and experimentation in the laboratory simulation.

1. Introduction

Since the last decade of the twentieth century, worldwide it has tried to modernize the educational methodology, so that it gradually incorporates the use of specialized software and some information and communication technologies (ICT). One of the changes proposed at the educational level has been to move from the classroom as an exclusive form of teaching, to a mixed model that combines the lessons in the classroom with the use of digital material accessible on the Internet. Education, at all levels, has been in need of change because the very society in which it is inevitably is no longer the same society in which it was raised. The current postmodern society is far, too, from the curricular programs that were once designed. In this stage of transition, education has tried to renew each other towards digital technology under an integrative-educational conception.

Current education aims at the use of information and communications technologies (ICT) as a fundamental tool to strengthen the teaching-learning process. The increasingly frequent use of simulators and other computer aids in medical education is evident, which allows the student to repeat the training as many times as necessary until acquiring the expected skills. Recent studies show that learning curves based on computer media are better than learning curves based on classical training [1].

For authors such as Jean Piaget, all people act when it comes contact with the environment. Their initial actions are open and quickly coordinated in series, the "cognitive structures of learning." these series of coordinated actions are what he calls "schemes" for then divers schemes will the body has developed at a particular time to form a "structure". Then as the organism develops, its cognitive structures change from the "instinctive" through the "sensory-motor" to the "operational" structure of adult thinking, is what Piaget calls "cognitive structures for learning [2].
Piaget explains in the exposition of his theory, how cognitive development is the result of the active adaptation of the organism to the environment, through assimilation and accommodation. As a result, variable cognitive structures are developed, which are, in turn, coordinated schemes, and which, at the same time, combine to form intelligence.

For Vigotsky, with his constructivist theory based on social interaction; The learning-development process expresses a complex unit that seeks to boost development from learning, which implies the use of tools, of pedagogical strategies constructed and innovative, in a logic of accompaniment by the teacher, academic peers, and even the same students among them, which would lead to the production of the combined action between individual and collective work [3].

For Bruner, the assimilation of information by humans is four different ways: visual, auditory, read/write and kinesthetic (VARK: Visual Auditory Reading Kinesthetic), and that such information requires a scaffold, which is a type of support directed by family members, teachers or experts that they carry out with the purpose of channeling and enriching the behavior of an apprentice [4].

The visual learner, you are easier to remember images, graphs, diagrams, photographs, etc., So to study morphology, anatomy, physiology, some authors recommend use texts such as atlas, structures, infograms, ideograms, maps, slides, photographs, visits to museums, use videos in which the visual material is accompanied by an explanation, or in laboratories where a teaching museum carefully observe the anatomical preparations there [5].

Kinesthetic student learns more through processes read and write, have an affinity for textbooks, the dictionaries, glossaries, notes written by teachers and websites with relevant information about Topics to study. Kinesthetics are also very good at using software and web resources that allow them to develop their skills and concerns [5].

From the cyber theory proposed by Norbert Wiener, it is assumed that the knowledge and results found both by associative theories (stimuli and responses) as well as from cognitive theories, can be used in association with computer science, providing the properties and characteristics of computerized system to the structuring of thought. This approach considers learning as a process of communication and control, a process constituted by a set of internal operations or events that are responsible for processing the information, and whose result is issued abroad in the form of observable behavior [6].

According to the UNESCO, in any educational area, strategic objectives should aim to improve the quality of education through diversified content and methods. This should promote experimentation, innovation, dissemination and sharing of information and good practices, the formation of learning communities and stimulate a fluid dialogue on the policies to follow [7].

Melo Santiesteban, Guadalupe; Velazquez Licea Eulalio; Pérez Morales, Alfonso; and cols, posed the research problem: How do ICTs help improve the teaching-learning process in health sciences, especially the morphology and physiology subjects? This study was carried out in the Faculty of Medicine of the Veracruzana University, Mexico; and the period August 2006 to February 2008. The aim this study was to find better strategies for teaching morphology in medical school. They concluded that ICTs contribute to providing information in a different way, which allows us to understand the axiological contents implicit in the subjects of morphology by strengthening the teaching and learning process of medical students at the University of Veracruz [8].

For McNulty, the students learn anatomy with the help of computer programs I webpages, as well as traditional methods such as dissection/prosection, get better test scores than those who never used these computer contents. Most students find computer programs useful for learning and using them themselves. Students who accessed computer resources more frequently scored higher on exams compared to students who never accessed them. Students using resources as web presentations, videos and others can be very useful and available at any time to be reviewed, given the advances in internet and MOs devices vile and their applications, students can save this information or Search for it immediately using “web browsing”. While those who only study anatomy by dissection of corpses, they will forget the concepts and terms more frequently [9].
A study by Dobson, JL, between the fall of 2008 and the spring of 2009, applying an online survey to a physiology undergraduate course at the University of Florida, with the purpose of investigating the relationship between: preferences and styles learning; gender and exam results.

In the survey, students were asked to provide descriptive information about themselves (for example, gender and older) and he asked them to self-assess their preferences sensory modality. Among the results achieved, a total of 901 students completed the questionnaire, 75% of which were women and 25% were men. The most predominant learning style was visual learning (46% for women and 49% for men). It was determined that the type of student learning is fundamental to the achievement of the objectives and the final impact of the course grades [10].

Burn, points out the variety of possibilities to teach with the new information and communication technologies, since these allow at a much larger scale, cheaper in time and more effective in the field of communication, perform the following processes that they can be used for teaching: Interaction (indefinitely review), feedback (deployment of the work process), convergence (integration of different authoring modes: video and audio), and inhibition (being able to deploy the work in different formats and platform for more audiences) [11].

Jenkins states in his studies that the use of ICT, allows in various subjects, "operations with knowledge" among which is the simulation, which allows interpreting and building dynamic models of real-world processes [12].

Algieri, Ruben Daniel Ferrante, Maria Soledad, Mazzoglio and Nabar, Martin Javier made a study whose main objective was to objectively evaluate the results showed that 86.9% (n = 133) of respondents believed necessary the use of other resources ICT during the practical work of Anatomy to complement the learning that is carried out with the cadaveric material. Among the possible pedagogical tools, 72.5% express preferences for classes with PowerPoint presentations; in the second place it was selected using 3D presentations containing reconstructions computer anatomical imaging (70.6%) the educational resource less useful from the viewpoint of students were mockups (16.3%) and classical classes with chalk-board (32%) 87.6% believe that the existence of virtual elements serve the educational process beyond the physical limits of the University [13].

Benvenuto clarifies that technology will continue to provide new tools for teaching use and the answer is not only to provide computer resources to universities, but also to develop in teachers the skills and abilities in the use of ICT [14].

Fernandez, highlights the imperative need to train teachers in the use of ICT from well-founded methodological criteria so that they can select, use, design and produce the audiovisual and computer material that is required to guide student learning [15].

This study that considers the use of ICT by students of the Nursing, Surgical Instrumentation and Prehospital Care programs of the Rafael Nuñez University Corporation, to learn morphology and physiology, will allow the appropriation of new knowledge, the transformation of conceptions methodological, measurement of conceptual limits and improvement of the didactic strategies used, enriching the teaching and learning of morphology and physiology in students of health sciences.

The objective of this research was to determine the importance of the use of ICTs for the learning of morphology and physiology in the Nursing, Surgical Instrumentation and Prehospital Care programs of the Rafael Nuñez University Corporation, during the period between February and June 2013.

2. Methodology
The research approach was quantitative, based on a non-experimental transversal design, with a descriptive methodology. For this purpose, a structured survey was designed, subjected to opinion of experts, to assess reliability and content validity of this instrument.

Respecting the ethical parameters for human studies, student participation was voluntary, respecting their right not to participate. There was no possibility of any type of damage as a result of student participation in the study. The information management was confidential requesting 90 students to answer a simple questionnaire delivered via the web through the institutional email.
A random sample of 90 study subjects was included on a population framework of 253 students, regardless of race, age or sex. A confidence level of 95% and a margin of error of 5% were considered for random sampling. Processing and results analysis was used descriptive statistics, from statistical processing with the program Microsoft Excel 2010, availing ourselves of the resources of graphic tabulation of data and application was made statistical formulas for the measurement of variables.

3. Results
When asked about the place where students access to ICT resources, most prefer doing at home (72%) and a smaller percentage in the library (16%) and other much less common spaces like Teachers room or computer rooms (Look figure 1).

![Figure 1. Place to access to the computer resources most frequently](image)

Regarding access to computer resources, which ICT were most used to study morphology and physiology contents. Giving them from the question some ICT options more frequently known in the academic field. 51 students, that is, 57% of the sample, answered that if they use them very frequently, and 36 students (40%) say they use them but very little. While 3 students (3%) do not use them at all (Look figure 2).

![Figure 2. Frequency o use ICT to study morphology and physiology contents](image)

When asked about the use of search engines such as Google, Wikipedia, among others to study Morphology and Physiology, 94% (85 students) state that they use them frequently for this purpose, compared to 4% (4 students) They don’t use them (Figure 3).

![Figure 3. Use of search engines](image)
When asking the student whether or not he uses ICT in the morphology and physiology simulation laboratory, 62 students (70%) replied that if they used them and 27 (30%) who did not use them to support learning in the laboratory (figure 4).

As the student considers or not the Technologies Information and Communication have favored their teaching and learning morphology and physiology, the 99% state that ICT, if favored in the teaching process learning morphology and physiology, and only 1 student (1%) stated that these have not helped their teaching and learning of morphology and physiology (Figure 5).

When inquiring about the characteristics or qualities of Information and Communication Technologies, which have been able to favor the teaching and learning processes of morphology and physiology; it was noted that one study, you believe these have favored the individualization of teaching. To 63 students the variety of codes information usually offered by ICT (text, sound, images, etc.) encourages them to prefer them to any other remedy. 5 students believe they favored autonomous...
learning. 8 students with the ICT give high motivation which can stimulate to use. For 12 students, what motivates them to rely on ICT when studying morphology and physiology is the ease of using them and the ease of access to them (figure 6).

Figure 6. Features Technologies Information and Communication favors the processes of teaching and learning morphology

4. Considerations
The purpose of this study was to determine the importance of using ICT for learning morphology and physiology in nursing, Surgical instrumentation and Care Prehospital programs of the University Corporation Rafael Núñez, during the period from February to June 2018.

The findings made it possible to confirm specific aspects of the approaches of other authors such as Vázquez-Mata and Guillamet-Lloveras; who affirm that the use of ICT and computer tools of various kinds, favor the teaching-learning process of the students.

The use of ICT to study morphology and physiology is one of the many well-structured and innovative pedagogical tools that motivate the student to learn, either individually or collectively. This study allowed highlighting a series of interesting collaborative processes, which are being carried out in different scenarios such as the university classrooms, library, in a more autonomous place such as the student's house or in the simulation laboratories, aspects that also They have been proposed by Vigotsky, Jenkins, Burn among others.

As Martínez Marrero reflects, and given that some ICTs incorporate images, graphics, diagrams, photographs and videos; This study showed that these tools they are very useful to students couple studying morphology and physiology.

Results show that students using recur sos ICT as presentations, video and others; They are motivated to use this type of resources because in some way and according to their learning style, they have the perception that they are given the appropriation of content, as McNulty, Sonntag, and Sinacore demonstrated.

According to the results of this study, the ICT tools most used by students to support the learning of anatomy and physiology were: ICT that use presentations, videos, interactive images, as they also observed in their Algieri study, Ferrante, Mazzoglio and Nabar.

5. Conclusions
The appropriation they make of ICT, the morphology and physiology students of the Rafael Núñez University Corporation is considerable high. They mostly use ICT tools that allow presentation resources, since they generally offer simple content and that by means of slides or slides, combine diversity in the presentation of information, whether in text, drawings, graphics or videos.

For students, the use of ICT to support simulation, is of great importance, because through these tools can understand better the tissues, organs, system as and physiological processes; tracking concepts, testing hypotheses, better detailing structures and facilitating them to propose better explanations. The interactivity that offer certain ICT tools in simulation labs, used simultaneously with a model or
simulator itself, allows students cognitive exercises, imaging ideas and concepts more extended, thereby strengthening critical thinking when they compare simulators with interactive content.

Universities must continue to promote institutional and academic actions from their management, with the purpose of identifying and strengthening in the students of higher education, skills and abilities necessary for the use of ICT.

In order to strengthen the teaching-learning processes of the sciences that require simulation components, it is convenient for universities to have specific virtual laboratories, which allow developing teaching objectives that are increasingly closer to the experimental. Morphology and physiology laboratories can be partially or totally considered in their infrastructure, such as virtual scenarios that use the so-called Virtual Learning Environments (VAS), which take advantage of the ICT functionalities, thus offering new environments for teaching and learning, freer from the restrictions imposed by time and space in face-to-face teaching and are able to ensure communication between students and teachers.

ICT are not intended to replace the use of simulators and anatomical and physiological models, but instead are tools that validate and support the observation and experimentation in the laboratory simulation, strengthening mental operations that by representations, positively influence the construction of interactive processes, focus on the student from the basic sciences of morphology and physiology.

The use of ICT in simulation exercises involves the incorporation of many resources such as internet, computers, electronic tablets, among others, which not all students can bring to the laboratory due to economic limitations, security conditions, among other factors; It is well worth considering for further studies.

It is necessary to expand the sample in subsequent studies, in order to make it more representative with respect to the total population, as well as making some kind of qualitative interpretation that yield deeper considerations and more comprehensive readings, than those offered by some quantitative studies.

References

[1] Vázquez-Mata, G., and Guillamet-Lloveras, A 2009 El entrenamiento basado en la simulación como innovación imprescindible en la formación médica Medical Education 12 149-155.
[2] Piaget J 1990. The child's conception of the World. New York: Littlefield Adams
[3] Vigotsky L 1979 The development of higher psychological processes Barcelona.
[4] Bruner J 1967 Toward a Theory of Instruction Cambridge Harvard Univ Press.
[5] Martínez Marrero E 2012 How to study anatomy Barranquilla Editorial Universidad del Norte pp 1-32.
[6] Wiener N 1948 The Cyber Theory of Learning Austin Texas the University of Texas.
[7] UNESCO 2004 Information and communication technologies in teacher training. Planning Guide Paris France.
[8] Melo Santiesteban, G and Velasquez Licea EP 2008 Didactics and technology in morphology of medical sciences.
[9] McNulty J Sonntag B and Sinacore J 2009 Evaluation of computer-aided instruction in a gross Anatomy course: a six-year study Anatomical Sciences Education pp 2-8
[10] Dobson J 2009 Learning style preferences and course performance in an undergraduate physiology class Advances in Physiology Education 33 pp 308-314.
[11] Burn A 2009 Making New Media Creative Production and Digital Literacies New York Peter Lang.
[12] Jenkins H 2006 Confronting the challenges of participatory culture: Media education for the 21st century Cambridge UK MacArthur Foundation.

[13] Algieri RD Ferrante MS and Mazzoglio and Nabar MJ 2008 August. http://diegolevis.com.ar
Retrieved September 3, 2012, from http://www.diegolevis.com.ar/secciones/Articulos/tic_medicina.pdf

[14] Benvenuto Vera A 2004 Information and communications technologies (ICT) in university teaching Theoria Vol 12 pp 109-118

[15] Fernández Muñoz R 2005 The university of Castilla la Mancha and the process of convergence to the EHEA. MEC ISBN 84-689-0273-X. Part II