

# *Use of multimedia digital tools in the teaching-learning of Human Embryology subject in students of the Medicine Career of UNAN-Managua*

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## **ABSTRACT**

The use of technology in education is of constant discussion with many results, whether of much or of little success according to varied conditions. With the purpose of evaluating the results of the use of multimedia digital tools in the learning of Human Embryology, an observational, descriptive, prospective, transversal, analytical study with a mixed philosophical approach was carried out. Held with 75 students of the second year of Medicine of UNAN-Managua, during the first semester of 2016. There was no statistical significance between three modalities of study; the first one was made without the use of multimedia tools; and the two others using aids with and without supervision respectively. The most used and accepted tool was short videos. Not all students have equipment to play digital files, the cell phone was the most common device, and there was no statistical significance between the types of electronic devices used by the students and the results of the final grades. The use of qualitative instruments allowed to formulate an action plan to optimize the use of digital tools in the Human Embryology subject.

## **INTRODUCTION**

Learning, study and education play an important role in the development of society, being one of the engines of its developing process. For this reason, education and teaching-learning processes must be permanently adapted to the characteristics of the individuals who are part of them at every time. On the other hand, a real technological revolution is being experienced in the last years that changes the living habits and affects the environment, sometimes saturated or overwhelmed by so much information.

Early indications of research on the use of ICTs in education are found around 1918, but the 1950's is considered the key point of meaningful development. The decade of the 70 brings the mass media takeoff as a great social influence; from this time the development of ITs consolidates the use of computers for educational purposes, specifically in applications known as Computer Assisted Instruction (CAI). With the appearance of personal computers this option is generalized

as an alternative of enormous possibilities (Vidal, 2006).

One of the first meaningful proposals is the one formulated by Solomon and Clark (2007) aimed at finding the most effective and useful means for the teaching-learning process, evaluating in a second place who is given the material, how delivery is made and what is delivered.

This report addresses the evaluation of the use of digital multimedia tools and their influence on the teaching-learning process in a group of students of the second year of medical degree in the Faculty of Medical Sciences of the Rubén Darío University Campus.

This study used simple and friendly digital tools assisted by technology, as a means to be implemented and evaluated in students of the Faculty of Medical Sciences because of their acceptance, utility and contribution to improve learning and serve as a starting point for many future efforts.

## **METHODOLOGY**

An observational, descriptive research was carried out in which different factors were correlated having results after a written test made to the students based on a topic of Human Embryology, different learning scenarios were planned involving the use of digital multimedia tools. Qualitative and quantitative instruments, methods and techniques were used, therefore, a mixed approach was implemented.

The study was divided into three stages: the first one consisted in the design of digital multimedia tools; the second, a face to face encounter with the students to apply on them the corresponding modality of study and its respective evaluation; and a third moment, in which instruments to collect qualitative information were applied, such as focus groups and individual interviews.

In order to elaborate the virtual tools, a consensual planning of the contents was carried out with the help of the teaching staff of the subject of Human Embryology. Digital planning was done with the collaboration of a graphic designer. An interactive multimedia application was developed using the Adobe CS5 Suite. The result of the handling and manipulation of all interactive multimedia material was output in an "exe" format, as an application to be read in Windows environment in any version superior to XP. In addition, an explanatory lecture was recorded with Power Point slides and the teacher's voice in Camtasia Studio 7, lasting 29 minutes and was output in MP4 format. Then chapter 3 of the book "Embryology of Langman in its eleventh edition" was digitized: First week of the development from the ovulation to the implantation. The output format of this document was in PDF.

In the second stage, three groups of students of 25 members each were chosen and assigned the modalities of study to be followed. We proceeded as next: group of study 1 was designated as the "control". They were called for a voluntary participation and they were gathered to receive the conference "First week of development", which was done in the traditional way, with the use of a Power Point presentation with a length of 90 minutes. Immediately they were given a physical copy of Chapter 3 of the book "Embryology of Langman in its eleventh edition": First week of development from ovulation to implantation. Group 2 of the study was voluntarily called for his participation, it was informed that they would receive through emails all the digitized material that included: a video with the teacher's narration of a conference shortened in Power Point with a

length of 29 minutes, the original Power Point conference in its native PPD format, the copy of the chapter of the book in PDF format and the multimedia application designed for this purpose. They were advised how to use the material briefly and they also received written instructions in PDF format. The study group number 3 was called voluntarily and was cited for a supervised meeting in the computer labs of the Faculty of Medical Sciences. On the day of the session 25 computers were enabled and the interactive multimedia application designed for this purpose was loaded. Students interacted with the application for 90 minutes. A teacher of the subject was present to clarify any doubts of the application's content, as well as to explain its use. At the end of the meeting, all available digital material, including the application they used, was downloaded in their personal memories.

All groups were cited four days after their meeting with the teacher to be evaluated by a written test with a value of 100 points, sixty percent of the theoretical content and 40 percent of practical content (drawings, images and names of structures).

## RESULTS AND DISCUSSION

The population studied was between 16 and 24 years old. The origin was mostly urban, with 80%. The female sex prevailed with a 65% participation.

To establish a relationship between the learning level of students using only the traditional method and those using digital multimedia tools to support their studies, a single-factor ANOVA was performed, this being the grade obtained in the evaluation. It was evidenced that no modality of study was superior to the other ( $p > 0.05$ ). The orthogonal contrasts performed to seek specific superiority of some of the treatments were also not significant. The average scores for the three groups were very similar and close to 60, on a 100-point scale of the written test. Outstanding and failing grades were observed in the three groups (maximum 96, minimum 28). This lack of significance is found in other studies, such as the 2004 European Commission report on new learning environments, which concludes that the new learning environments do not depend so much on the use of ICT as such, but rather on the reorganization of the learning situation and the capacity of the teacher to use technology as a support for the objectives aimed at transforming traditional teaching activities. Similarly, in the exploratory descriptive study that analyzes the use of interactive multimedia, as a pedagogical resource in Semiology and its applicability in teaching nursing (Santiago & Shiratori, 2009), who concludes that multimedia is very useful, however, not enough on its own; Also highlights the importance of updating and involving teachers to achieve better results.

In this sense, the information provided by the qualitative instruments seems to show the factors that influenced on this, such as lack of incentive like the pursue of a real score necessary to attend the course, lack of time and dedication, and the lack of planning in the day of study. This tends to think that the responsibility of each individual over the commitment acquired to study conscientiously is relevant to perform a later test without there being a grade to reach. The tools are, therefore, auxiliary to make more or less heavy the day of learning.

The theory makes clear to us that the use of tools belonging to new technologies in the educational process is highly complex and inconclusive, but it sets clear guidelines such as timely intervention of the teacher, updating and involvement of the same, as well as a constant evaluation to find

weaknesses and upgrade strengths. Other studies, such as that carried out by Torales Chaparro in Spain, had a complete and organized structure and was inserted in the Radiology course with a valid score to approve this subject, in a virtual space of study and multiple encounters with teachers. Even with all these organizational advantages, the study was not conclusive in terms of performance improvement using digital media, however, it did achieve a higher rate of students who presented themselves to perform their evaluative tests than those with only face-to-face classes, being much less the deserters of the course in the virtual modality.

Although the orthogonal contrasts match with the ANOVA results, in the sense that they are statistically not significant, the results of the comparative averages showing a slight variation in favor of the students who had a controlled and supervised session with the interactive multimedia allows to suggest that future studies should better delineate and more consistently control the treatments, which would allow a more objective evaluation of the performance of multimedia tools.

The utility in all its aspects resulted in a high percentage among the categories of very useful and useful, none of the respondents considered it as useless. Using the Gamma association test in the utility variables to optimize time and usefulness to understand theoretical contents results in a significant relationship, which can be interpreted as meaning that those students who perceived to use better time also perceived a better understanding of the theoretical contents of the subject. This result is more addressed to the individual aspects of managing time and organization than to the tools themselves. This is in agreement with Ávila and Samar (2002) who conclude that the new technologies of information and communication allow the student to be the main actor in the construction of their knowledge based on situations designed by the teacher.

The students' perception of the role of digital media seems clear, they do not substitute anything, but it complements the study and there was consensus on the need to implement these tools to improve learning throughout the career. This agree with the almost unanimous conclusion of the whole theory consulted, the professor is indispensable and the texts are a means to reach the profound knowledge. In addition, the inadequate use of these technologies may be unsuccessful, since the proposal must be scientifically supported and with a clear and defined didactic basis, otherwise the advantages of these environments will be diminished (Herrera, 2004).

The use and utility of the multimedia application will be discussed separately in these two aspects: in regard to the usage, it stands out the fact that only half of students used it and that the majority of that half was in the session supervised by the teacher. Apparently, this accompaniment generated some interest in using it as a tool. The statistical significance for this relationship was conclusive. Once again it is clear that the presence and motivation of the teacher is a determining factor in the student's attitude towards the assigned material; it is not enough to just deliver the material, it is necessary the motivation that is generated to suggest its usefulness. Those who only received the application via email had a tendency to dismiss it as a study tool

With regard to utility, difficulties arose that did not allow a complete analysis of the application. At first, technical and resource difficulties, such as inadequate audio in short videos, poor image quality in certain videos and excessive theoretical content in some sections, made this tool unhelpful. Another difficulty was accessibility, the output format was for reading in computer operating systems and was not contemplated its use for Android systems that operates in Cell Phones and Tablets, this reduced considerably its opportunity of use since only 61% of the students had a

laptop available and only 40% had a desktop computer in their homes. Another aspect to analyze of multimedia was the context of its use, this tool was sent as one more file and the appropriate form should have been as an integral part of an educational platform, it is to say a structured virtual environment or in its default as App or Application for Android systems, as discussed above. Having the tool isolated and dealing with the technical difficulties expressed by the students, apparently reduced its use and therefore its usefulness, because this study did not contemplate the design of a complete virtual environment in Moodle or another platform.

The use of a short video of 29 minutes, in which a teacher explains the slides as a virtual conference, was the tool with greater use and preference. For the 50 students who received digital material, this video was the only one moment having the experience of a teacher in the subject to be evaluated. It did not represent a substitute of the conference since its length was shortened hence the number of slides, and it lacked the possibility to answer questions or doubts. In spite of that, it was much appreciated as an introductory tool to confront the text of the book with greater elements and understanding. The video fulfills all the characteristics of being multimedia, since it involves sound and image, fulfilling the two channels to process the information suggested by Mayer. This type of material had the advantage of flexibility of time and repetition at will. All the advantages were mentioned and reinforced in the interviews and focus groups to the students.

The digital chapter of the Guide book in PDF format was appreciated for its practical usefulness. Because the students did not take the subject of Embryology in this semester, they lacked the text in physics. However, it is always noted that many of them do not have the option of getting the book even when the time comes, so apparently this could be a possibility to consider in the future. This could lead to copyright conflicts, so this aspect should be considered before implementing it as an official practice in the Faculty of Medical Sciences.

In a web generation, it was expected that all students would have devices with high digital connectivity, however, different reasons could be involved to make this not possible. In general, the possession of devices did not exceed 63% in the most accessible of the gadgets: the smartphone; almost 10% of the participants do not have any digital information player. This study does not delve into the causes or reasons for this phenomenon, but it is a fact to consider, especially when there is a tendency to assume that "all" university students are connected through technology.

## CONCLUSIONS

1. There was no statistical relationship in the level of learning between students using only the traditional method and those using digital multimedia tools as a support in the study (PDF chapter, short video of the Conference, interactive multimedia and PowerPoint slides), this was measured by means of a written test, the comparison of results indicated a relevant role of the individual and his / her study priorities, as well as the organization of time over the obtained material either digital or not.
2. The usefulness of the employment of digital multimedia tools in the learning of Human Embryology was mostly in the category of very useful to useful in the Likert scale. There was a statistical relationship between the optimization of time and the understanding of theoretical contents. It was almost a general agreement, that the tools are complementary and not substitutive. All the participants consider that it is pertinent to use these means as

study aids in the career. The digital tool with the best qualification was the short video of the conference.

3. Not all students have electronic devices to run digital files. The smartphone was the most common possession. No statistical correlation was found between the learning level of Human Embryology and the possession of electronic devices.
4. The use of mixed methods and techniques allowed to obtain enough information to propose a plan of implementation of some digital tools with great acceptance in the different modalities of study.

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