

## INTERPROFESSIONAL ACTIONS: A PERSPECTIVE FOR CREATING VIRTUAL PRODUCTION WITH ANATOMY VIDEOS

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**Abstract:** The traditional system of teaching anatomy in medical schools, based on the master class and the practice of dissection, has for several years been in a crisis that can be explained by various causes: the reduction in the number of hours dedicated to this subject, the appearance of new subjects to incorporate into the study plan, the decrease in budget or the difficulty of finding corpses for dissection. This has proliferated in recent years new teaching methods that complement these deficiencies: computer software, online programs, websites dedicated to anatomy, image libraries, plastic models, video-based conferences, institutional websites, and even networks social. Specifically, the use of video has been well received in anatomical teaching because it allows the preparation of practices, reduces anxiety about the corpse, allows students to comment and participate in videos, does not excessively increase the teaching load of Students have unlimited access outside of class and allow students to review content after the lesson. We plan to record, produce and distribute videos of the anatomy teachers in support of the theoretical classes and dissection at our University. A series of short videos, about 3 minutes, with adequate lighting, sound and plastic anatomical models will be made on various subjects. At the end of the course, we will assess whether there have been differences in the final exam between the questions for which a video has

been prepared and those that have not. If the experience is successful, it will continue with the production of more videos to consolidate a library within the reach of the students that will serve to increase their knowledge due to the reduction of teaching hours.

**Keywords:** Teaching, videos, anatomy, learning

## **INTERPROFESSIONAL ACTIONS: A PERSPECTIVE FOR CREATING VIRTUAL PRODUCTION WITH ANATOMY VIDEOS**

In recent years, health science curriculum, especially medicine, have been readjusted to accommodate problem-based learning, in many cases reducing the number of hours spent on this subject to accommodate new subjects. That the advance of science was incorporating. In this way, the irruption of genetics, molecular biology, ethics, communication skills or pharmacology has made it necessary to reduce hours of anatomy, a phenomenon that has been described in several countries and documented in numerous articles<sup>1-6</sup>. This problem is compounded by:

- The retirement or withdrawal of several generations of anatomists. This has led to the incorporation of new teachers who have suffered cuts in anatomical science training programs<sup>5</sup>.
- The increasing resistance of students to be directly involved with academic staff and teachers, a fact that contrasts with the positive perception of courses in which teachers frequently interact with students in everything involved with learning<sup>2</sup>.
- The budget decrease of the anatomy departments<sup>5</sup>.
- The lack of learning in anatomy, with high percentages of high-level students considering that their anatomical knowledge is insufficient for the safe practice of clinical reality<sup>7</sup>, which is

more alarming in an environment with an increasing number of lawsuits and lawsuits due to ignorance of body anatomy in diagnostic-therapeutic or surgical procedures<sup>8</sup>.

- The general awareness that new teaching methods are necessary for a new generation of students who are increasingly connected<sup>5</sup>.
- The reduced availability of bodies for dissection add difficulty to a problem that does not imply a paradigm shift<sup>1,3</sup>.

The reduction of teaching hours devoted to anatomy has necessitated the proliferation of various alternative didactic techniques and methods that allow for autonomous student<sup>6</sup> learning in addition to find efficient ways to teach in an environment with fewer hours of direct contact with teachers<sup>5</sup>. Learning is forcing its model into a self-learning format at home that with new mobile technologies is capable of being transferred to any place where the student has a good wireless connection and a smart phone<sup>3</sup>.

Among the proposals made, the following stand out:

Programs information on anatomy and anatomical processes, diagnostic techniques, functions, surgical approaches, and these programs can also be used from the mobile phone or smartphone, allowing learning anywhere<sup>10</sup>.

- Web-based programs to supplement the practice of dissecting clips from open libraries, radiological images, links to illustrations in books and Atlas glossary and self-examination<sup>5</sup>.

Hundreds of relevant websites dedicated to anatomy, with varied content: images, text, graphics, atlases, some focused on surgery, some free and others paid, with those offering three-dimensional images that allow a perfect understanding of spatial anatomy<sup>7</sup>.

- The Human Visible Project of the United States National Library of Medicine<sup>11</sup> receives a special mention<sup>11</sup>, which provides one of the oldest, most detailed and pointers of complete data sets of the male and female body, combining computed tomography, magnetic resonance imaging and cryosection images<sup>7</sup>.

- Use of the Internet for the training of students in biomedicine, with a majority of students using Google (Google Inc., Mountain View, CA) or Wikipedia (Wikimedia Foundation, Inc., Washington, DC) in their information searches, to the detriment of traditional libraries<sup>6</sup>.

- Plastic models, whose educational value and impact may be higher than that of computers or textbooks<sup>4</sup>.

- Video-based conferences, which can reduce test failures compared to the traditional picture-based teaching method<sup>12</sup>. These conferences can also be delivered live as Internet videoconferencing through various increasingly professional platforms<sup>10</sup>.

- Websites with institutional video libraries such as YouTube (LLC, San Bruno, CA), a popular page for anatomical education<sup>6</sup>.

- The 3D three-dimensional stereo display is easy for new generations to use and increasingly has a larger model library<sup>10</sup>.

- Use of social network integrated into your educational experience that complement dissection, small group instruction and traditional master classes<sup>2</sup>.

Despite the aforementioned cutting-edge technologies, there is a broad consensus that the dissection of human bodies is the one that allows the best three-dimensional understanding of organic structures<sup>5,7,8,13,14</sup>, and that the other methods serve as a complement to training, instead of a replacement, achieving optimal results when dissection and new technologies are combined as a teaching

method to achieve a solid anatomy course that meets academic objectives<sup>4,7,8,13</sup>. In addition to its role in teaching the structure of the human body, it enables learning within the social context, stimulating future doctors to better comply with the guidelines of Good Medical Practice<sup>8</sup>. The evaluation of the effectiveness of the different methods is usually evaluated by measuring and comparing the academic performance of students and their acquisition of knowledge<sup>14</sup>.

## **VIDEO AS AN EDUCATIONAL RESOURCE**

The use of video as an educational resource is not a novelty since it has been used for decades. However, its quality, ease of distribution and immediacy have improved, evolving from old VHS tapes to CD-ROMs, to nowadays online videos easily accessible thanks to institutional platforms (Intranet) and even open-access public places designed for viewing videos such as YouTube<sup>3</sup>. Students are more interested in the lesson they are studying and learning improves when acquiring knowledge when this theoretical instruction is supported by multimedia tools<sup>6</sup>. Consequently, computer-assisted learning (currently, even the mobile phones of the students themselves) have been used in many cases to complement and increase the penetration of the integrated curriculum in the student learning process<sup>10</sup>.

What is really important is that students are deeply involved with video content, not so much if the format is online or through its visualization in the classroom. Even short video conferences can maximize learning when the student pays attention to them. The shortness of the videos and the online format can contribute to increasing the marks achieved by students with a high level of commitment<sup>15</sup>

However, it cannot be denied that the

production and development of instructional videos requires a lot of time and work, and teachers do not always have the material and temporal capacity to carry them out<sup>13</sup>. Works have been described in which the teachers even prepared an entire course of 54 with 12 minute videos with all the teaching objectives covered by the educational program and the useful information to fully develop the practices<sup>1</sup>. The effort to generate them is not always reciprocated by all students, with a variable degree of compliance when viewing the entire collection. In general, the students' self-efficacy is related to greater viewing, considering them useful for their learning, while the less self-effective students were more inclined towards other types of resources<sup>13</sup>.

Let's describe below the advantages of using videos in anatomical teaching:

- It allows the preparation of practical classes and improves the student's confidence before a new lesson<sup>13</sup>.
- In the case of cadaveric dissection, the anxiety level of the students decreases over time as they become familiar with the videos of thanatopraxia, especially if a controlled exposure technique with progressive stimuli is used: first the history of the anatomy, then illustrations of the region to be covered and finally the visualization of the technique on a real corpse. This also allows them to face expectations before the taboo of death and control their emotions when practicing, especially in the first years of their career<sup>14</sup>.
- Allows students to be divided into smaller groups with better use of available resources<sup>1</sup>.
- Allows the active participation of students, especially through the comments applicable to the video. However, the video format has less interactivity than other learning methods<sup>13</sup>.
- A short video does not increase the

workload of the students significantly, which predisposes to increase their pattern of use and compliance with the program to obtain better performance on the exam<sup>3</sup>.

- Low cost, unlimited access outside of class, and success especially in large class groups with difficult division<sup>1</sup>.
- Students highly value realism, the identification of anatomical points that serve as reference, ease of use, perfect visualization of internal organs, promotion of learning and easy understanding<sup>16</sup>.
- The images in the videos, having real content, present in detail many structures that the students have to learn, in addition to promoting equality as all students are exposed to the same video bank<sup>1</sup>.
- It allows to review the content after the lesson, favoring self-regulated learning thanks to the self-assessment exercises that can be added in the epilogue of the video<sup>13</sup>.
- Videos help clarify the professional roles of first-year students in relation to confidentiality, respectful behavior, humanism, and professionalism<sup>17</sup>.

Not all are advantages, but there are also weak points. The main drawback is the risk of transforming the student into a mere passive observer who does not acquire the one-way knowledge transmitted by the video<sup>13</sup>. One of the main criticisms raised by detractors is that the use of videos can lead students not to attend classroom sessions<sup>18</sup>. Furthermore, the main way to study its effectiveness, which would be by comparing the marks between users and non-users, is difficult and unethical, as it does not treat all students with the same educational opportunities. Most of the studies review the success of interventions during the course instead of controlled intervention trials, with the corresponding bias in showing cause / effect and with variables that are difficult to control<sup>3</sup>.

## **DISSECTION VIDEO AS A NEW STANDARD FOR ANATOMICAL LEARNING**

Students and teachers are in favor of cadaveric dissection and strongly support traditional teaching methods, especially in small groups, considering the rest of the resources as useful complementary tools<sup>4</sup>. Cadaveric dissection is an effective way to understand the classification, position and interrelation between the different parts of the body and integrates both theoretical and practical knowledge with the perception of touch, the humanistic vision of the human being and the three-dimensionality of structures<sup>1</sup>. Dissection has always had a historical significance in the learning of the health sciences and therefore it has been a main part in medical courses. However, in an increasingly digital world, these traditional courses are doomed to obsolescence and irrelevance, with the risk that something similar will happen to the practice of dissection<sup>8</sup>. A drawback of dissection videos compared to in situ dissection is that the recordings have difficulty in critically judging the possible real variations that can be found in real practice in the living human being, in addition to not approaching the experience of feeling and exploring the three-dimensional structures of the body<sup>9</sup>. The videos are useful as a partial substitute for dissection due to the reduction in hours dedicated to teaching, but we must be aware that such incorporation will be successful only by integrating it fully into the course and complementing the shortcomings that may occur in the learning process<sup>3</sup>.

Dilullo et. al<sup>9</sup> summarizes their video production experience in a way that can be used by the rest of the interested teachers, mainly focused on instructions on how to dissect the corpse. It is necessary first to write a script, although later the edition allows to



alter the order of the shots and to concentrate on the most didactic aspects. While one team member dissected, the other was responsible for the camera. Appropriate camera angles were chosen for each sequence while trying to place the elements of interest in the center of the field. During tissue cleaning the camera was turned off until the procedure was completed, saving memory and editing time. Sometimes shots had to be repeated when the structures were not easily identified. Once the video was finished, it was uploaded to the Intranet platform and its use was authorized only by students, due to ethical problems related to the right to privacy of body donors. This process, simply explained, should be an example and a starting point for all teachers who want to start a video library for the use of their students.

## **DESCRIPTION OF THE EXPERIENCE**

It is intended to start, based on the bibliography consulted, an ever-growing library of videos related to anatomy that allows the understanding of structures by our students.

At the Cardenal Herrera CEU University, students enroll after finishing high school (approximately 18 years). The teaching of anatomy in the health sciences is carried out in the first years, covering even 24 credits in the case of Medicine. This teaching is based on theoretical teaching in a master class format, in addition to several seminars in which clinical anatomy, imaging techniques, diagnostic-surgical techniques, etc. are taught. Teaching is complemented by practical sessions consisting of the dissection of corpses (in the case of Medicine, this contact with the corpse is approximately 15 hours per semester, about 60 hours in two years).

Due to lack of resources, the videos will be made by the teachers without professional

production assistance, always seeking the highest quality of video and audio and repeating the shots as many times as possible, adapting the lighting, the background and the volume to the needs of the content. It is important that the videos are short, about 2-3 minutes, to avoid the student losing interest (especially in front of a collection of numerous videos) and to promote conciseness in the explanation.

In this way, students can study the videos at the faculty, at home, even on public transport from any device connected to the internet (Tablet, mobile phone, etc.). The classroom becomes an interactive and dynamic space where the teacher guides the students while they apply what they learn and engage in their learning in a more active and creative way. In class, activities specially designed to understand, integrate and consolidate the subject are carried out.

This methodology provides a series of benefits that improve the quality of teaching:

- It involves more teacher-student interaction by allowing the relationship to grow. It has been suggested that this aspect is of crucial importance in higher education since learning in human beings is very directly linked to the relationship with the educator; both being involved in their own learning.
- It allows a more personalized teaching and at a pace set by the student himself.
- It allows the creative use of information and technologies, which leaves each student to learn and approach the subject in the way that best suits them; This facilitates the process of learning to learn.
- Take advantage of the teacher's knowledge and experience for the complex phase of learning, in which it allows him to be more present.

Although the use of this methodology represents a significant benefit, it may be too

ambitious to try to apply it to the entire content of the subjects. Therefore, some topics or units have been selected in which it is intended to apply this methodology. On the other hand, each subject taught in this way requires the creation of materials in addition to the design of activities that serve to consolidate knowledge in an effective way, as well as to design an adequate evaluation.

With the creation of the video series, students can work on the lesson before the classroom. Once in the classroom, students can carry out activities aimed at applying what they have learned, favoring the assimilation of content. After the experience, it is expected that the students have learned more with these methods than with the master classes, which would allow us to conclude that the general assessment has been very positive, signaling that it should be expanded and continue to be implemented in successive courses since it is necessary to create new audiovisual materials and activities for the group space.

We plan this course to start with the videos of a reduced group of topics in the subjects of Anatomy and Histology, taught in the Medicine and Dentistry degrees. In this way we improve the learning of anatomy making better use of individual time (outside of class) and group time (inside of class); stimulating the autonomous work of the student and the use of new technologies in the learning process.

On the other hand, the aim is to increase the teacher-student relationship, offering a more personalized and humane orientation and covering the entire subject matter more easily.

We intend this course to make the following videos:

- Medicine: Cardiac chambers, Coronary arteries and cardiac veins, Spleen, Diaphragm.
- Dentistry: Skull; Central Nervous System; Special senses; Cardiovascular system; Male and female reproductive apparatus.

To teach each of these topics, the necessary video material will be provided the week before the activity that allows the student to know and learn the subject. This material can be viewed by students as many times as necessary and at their own pace.

At the end of the course, we will assess whether there have been differences in the final exam, between the questions on the topics for which a video was produced and those that were not, always looking for questions of a similar level of difficulty.

A limitation of this study will be the non-use of a control group that does not view the videos with which to compare if the notes are higher or unchanged. Discrimination in this group would be unfair to students who would not receive teaching materials equally than the rest of the class did. However, comparisons can be made with grades from previous courses, before implementing this innovation, so this limitation could be partially overcome.

It is expected that if the experience is successful, the production of more videos will continue with the ultimate goal of consolidating a library available to students that allows them to increase anatomical knowledge in a teaching reality with changing curricula.

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