

# **EDUCACIÓN, CREATIVIDAD E INTELIGENCIA ARTIFICIAL: NUEVOS HORIZONTES PARA EL APRENDIZAJE. ACTAS DEL VIII CONGRESO INTERNACIONAL SOBRE APRENDIZAJE, INNOVACIÓN Y COOPERACIÓN, CINAIC 2025**

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# Multimedia material for learning to measure blood pressure in Spanish, Valencian and English

## Material multimedia para el aprendizaje de la medida de la presión arterial en español, valenciano e inglés

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**Abstract-** Blood pressure measurement is a commonly used procedure in clinical practice. The incorporation of multimedia material into classrooms improves the learning process, which has led us to create a video for practical classes in Medicine Degree program and other Health Sciences-related degrees. The video was produced in three languages, Spanish, Valencian and English, in which the Medicine Degree is offered at the University of Valencia. The objective is for students to learn how to determine systolic and diastolic blood pressure by auscultating Korotkoff sounds, distinguishing the four phases of these sounds, as well as to understand diagnostic maneuvers for assessing the risk of cardiovascular disease. Evaluation surveys on this teaching methodology show a high level of student satisfaction, associated with an improvement in learning capacity.

**Keywords:** *teaching methodology, practical class, blood pressure, survey, video.*

**Resumen-** La medida de la presión arterial es un procedimiento de uso habitual en clínica. La incorporación de material multimedia a las aulas mejora el proceso de aprendizaje, lo que nos ha llevado a realizar un video para la clase práctica en el Grado de Medicina y otros grados afines a las Ciencias de la Salud. El video se realizó en tres idiomas, español, valenciano e inglés, en los que se imparte el Grado de Medicina en la Universidad de Valencia. Los objetivos son que el estudiantado aprenda a determinar la presión arterial sistólica y diastólica, mediante la auscultación de los ruidos de Korotkoff, distinguiendo las cuatro fases de estos ruidos, así como el aprendizaje de maniobras diagnósticas de riesgo de padecer enfermedad cardiovascular. Las encuestas de valoración de esta metodología docente muestran el grado de satisfacción de su uso, asociada a una mejora de la capacidad de aprendizaje.

**Palabras clave:** *metodología docente, clase práctica, presión arterial, encuesta, video.*

### 1. INTRODUCTION

"Blood pressure measurement" is a widely used procedure in clinical practice, essential for the accurate diagnosis, prevention, and management of hypertension (Zipes & Libby, 2018). Thus, it is a fundamental skill of great importance for medical students. The practical class on "Blood pressure measurement" is part of the cardiovascular system module of

the "Medical Physiology I" course in the Medicine Degree program, as well as other Health Sciences-related degrees.

The use of an innovative teaching method (Ferro Soto et al., 2009; López-Zamora & López-Domínguez, 2013), based on the presentation of a video showing the theoretical concepts of blood pressure, the measurement technique, as well as some diagnostic maneuvers for evaluating cardiovascular risk (Zipes & Libby, 2018), enhances student learning, encouraging concentration and motivation during class. This has led us to create three versions of the "Blood pressure measurement" video for the practical class, funded by teaching innovation projects at the University of Valencia.

A key advantage of this material is its continuous availability to students through the University of Valencia's platform, commonly used by them, known as "Aula Virtual" (Virtual Classroom). This material can be viewed before practical class, facilitating a better understanding of the topic. Likewise, this approach enhances the learning process, allowing for greater concept acquisition and offering students the possibility of clarifying doubts related to the video in class after having watched it beforehand (Ferro Soto et al., 2009; López-Zamora & López-Domínguez, 2013). By doing so, students become more familiar with the content, technique, and concepts addressed in the practical class, which is conducted in the Physiology Department's laboratory (Bickley et al., 2021; Rozman, 1986), thus enhancing teaching process (Ferro Soto et al., 2009; López-Zamora & López-Domínguez, 2013).

This type of multimedia material has become an integral part of the educational system, alongside other Information and Communication Technologies (ICTs), all of which serve as valuable educational resources with numerous advantages for teaching and learning (López-Zamora & López-Domínguez, 2013; Mirete Ruiz et al., 2015). In addition, multimedia resources offer greater flexibility and contribute to the improvement of teaching and learning experiences for students (Mirete Ruiz et al., 2015).

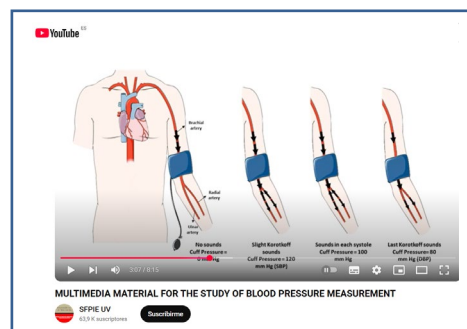
## 2. CONTEXT & DESCRIPTION

Our objective is to stimulate student engagement with the subject matter and enhance their learning by offering practical application of the concepts acquired in theoretical sessions, thereby improving practical learning outcomes. The implementation of multimedia resources within the "Blood pressure measurement" practical session will serve to boost student attentiveness and motivation during class. Given that "Blood pressure measurement" is a widely employed clinical technique for the detection of potential cardiac pathologies, proper and precise training for students in the Medicine Degree program is paramount. The multimedia material is accessible to students via the university's platform, facilitating the implementation of hybrid and/or virtual teaching modalities as required. Furthermore, the dissemination of the video via social media as an educational resource is also planned, extending its reach not only to students within our faculty, but also to students in other Health Sciences-related degrees and even the general public. Consequently, the main objective of the teaching innovation project is the development of a multimedia material to improve learning skills in the practice of blood pressure measurement. The specific objectives are as follows:

- To teach students how to accurately measure blood pressure while understanding the applications and limitations of this procedure.
- To help students to interpret blood pressure readings by identifying the distinct phases of Korotkoff sounds during auscultation.
- To develop skills in applying this knowledge to clinical diagnoses, including the calculation of the ankle-brachial index.
- To promote active learning strategies that facilitate the development of essential transversal and transferable skills.
- To provide resources for virtual and/or hybrid teaching. Sharing the video on social media will benefit all students in the course (for practical session preparation, exams, and skill acquisition), as well as students from other disciplines and individuals interested in the subject.
- To foster collaboration between students and faculty through discussions and feedback sessions following the video, promoting interaction and strengthening relationships that enhance the learning process.

The multimedia material used for the "Blood pressure measurement" practical session will be carried out in the Physiology Department of the Faculty of Medicine and Dentistry at the University of Valencia. In recent years, our department has been creating various multimedia materials for Physiology classes to support the practical sessions of the course.

The multimedia material for the "Blood pressure measurement" practical session, created as a part of two teaching innovation projects funded by the University of Valencia (codes 2736141 and 3326399), consists of both theoretical and practical content. The first part of the video features a sequence of explanatory slides covering theoretical concepts related to blood pressure measurement. For instance, the concept of blood pressure is introduced, including systolic and diastolic blood pressure, and the origin of the Korotkoff sounds used in blood pressure measurement (Figure 1).



**Figure 1.** The image shows one of the slides presented in the video on theoretical concepts related to Korotkoff sounds during blood pressure measurement.

Following this, the different devices used in blood pressure measurement are shown: the stethoscope, the mercury sphygmomanometer, and the aneroid sphygmomanometer. The video demonstrates the blood pressure measurement procedure, performed by a doctor who explains to the patient the necessary precautions to ensure accurate systolic and diastolic blood pressure values. Specifically, the patient should rest for 5-10 minutes prior to measurement, avoiding anxiety, nervousness, or the intake of stimulant (Figure 2). The demonstration of the measurement technique is accompanied by an audio representation of the Korotkoff sounds, indicating their different phases and facilitating the recognition of variations in these sounds. It is also worth noting the inclusion of a series of common clinical errors made during the blood pressure measurement process.



**Figure 2.** Video image shows the doctor measuring blood pressure using a needle-based aneroid sphygmomanometer.

Finally, the video concludes with a demonstration of the most common diagnostic applications used in clinical practice



**Figure 3.** On the left, the image depicts location of the brachial or humeral artery, as well as the posterior tibial or pedis artery, for measuring blood pressure in the upper and lower extremities, respectively. C. On the right, image shows the practice for measuring blood pressure by using a Doppler system in conjunction with a needle-based aneroid sphygmomanometer.

for cardiovascular risk screening, by measuring blood pressure in both the upper and lower extremities.

For these procedures, a stethoscope and a Doppler transducer are utilized, enabling the identification of blood flow in the brachial or humeral, posterior tibial or pedal arteries (Figure 3).

The project execution is planned as follows:

- A script is developed outlining the content of the teaching materials, including the video narration.
- Slides are created to explain the theoretical background of the practical session, reinforcing comprehension of fundamental principles.
- The Audiovisual Workshop team records the practical procedures in the Physiology Department's laboratory within the Faculty of Medicine and Dentistry.
- The voice-over is recorded in the Audiovisual Workshop studio to ensure high-quality sound.
- The video is edited, integrating recorded footage, audio, theoretical slides, captions and background music.
- The final video is uploaded to the "Virtual Classroom" and/or a YouTube channel for student access.
- The effectiveness of the project is assessed through anonymous feedback surveys and YouTube engagement statistics.

### 3. RESULTS

#### A. Preparation of multimedia material

The development of multimedia teaching materials in Spanish, Valencian, and English for the cardiovascular module of practical lectures in Medical Physiology I aims to enhance the quality of education for first-year medical students (a total of more than 400 students). Access to this multimedia material, as well as other materials produced by the department, is voluntary. This multilingual approach allows students to access materials in the same language used during their practical lessons, promoting better understanding and engagement.

The multimedia resources are designed to be versatile and applicable across various health science programs, including:

- Pharmacy
- Physiotherapy
- Human Nutrition and Dietetics
- Podiatry
- Nursing
- Sports Science and Physical Activity

#### Video in Spanish:

<https://www.youtube.com/watch?v=DpNeOV7X39M>

#### Video in Valencian:

<https://www.youtube.com/watch?v=sSRu7d3zDc8>

#### Video in English:

<https://www.youtube.com/watch?v=XqI9EDRf0yE>

Figure 4. Links in "YouTube" of the three videos.

The multimedia materials are accessible via YouTube (Figure 4), allowing students to review and reinforce their understanding of cardiovascular physiology concepts outside of the classroom setting.

By offering materials in multiple languages and making them widely accessible, this initiative supports diverse learning needs and promotes a more inclusive educational environment in the field of medical physiology.

#### B. Video performance analysis

The multilingual videos demonstrated varying levels of engagement (Table 1):

Table 1. Views and evaluation of the videos.

	Views	Likes	Dislikes
Spanish video	709	0	0
Valencian video	186	0	0
English video	273	0	0

The Spanish version accumulated 709 over a 9-month period, while the English and Valencian versions received 273 and 186 views, respectively, over four months. These results indicate a greater use of the Spanish video compared to point to a greater use of the video in Spanish, compared to the other two versions. However, when comparing the English and Valencian videos, the English version was more frequently used, likely due to its broader international appeal. The videos received neither positive nor negative engagement, in the form of "likes" and "dislikes".

These results demonstrate the effectiveness of providing multilingual content, which accommodates both local student needs and a broader international audience in medical education.

#### C. Survey results analysis

Figure 5 illustrates the results from the anonymous and voluntary survey conducted among students from all three language groups. The total number of students who answered it was around 100. Regarding the first question, it was observed that all the students who watched the video (100%) in each group found it useful for learning the practical session. Likewise, all the students surveyed reported that the video helped them better understand the procedure.

Regarding the third question posed, almost all students (94-95%) in the Spanish and Valencian groups think that the video will be useful for them in preparing for the exam. Conversely, 10% of the respondents in the English groups felt that the video would not be useful for this purpose and another 10% of students think that they will not be able to prepare for the exam.

Finally, all the students surveyed in the three groups indicated that they would recommend the video to other students, except for 10% of students in the English group who don't know that they don't know it.

#### D. Analysis of student feedback collected through the survey

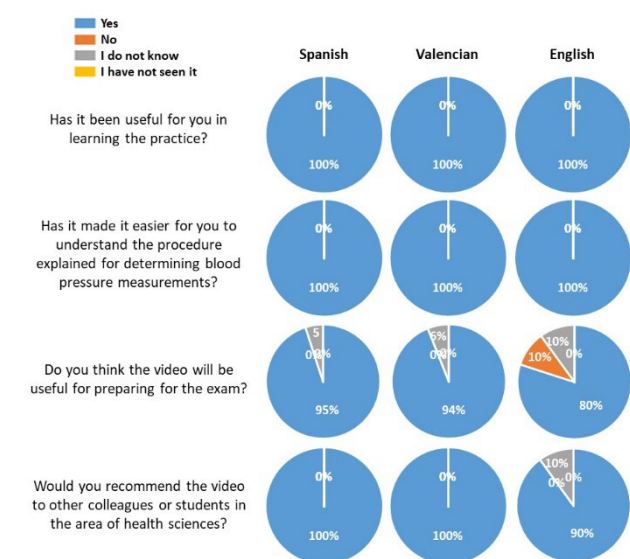
The anonymous student comments and suggestions indicated that the material was generally well-received and a very useful video, in which the practical procedure for understanding the practice is well detailed.

### E. Analysis of the academic impact of the multimedia material

Incorporating multimedia content, such as this video, into lectures represents a significant advancement in teaching methodology. It enhances traditional methods by introducing complementary elements that increase dynamism, improve student learning, engagement, motivation and critical reflection.

Specifically, this video reinforces students' understanding and retention of physiological concepts discussed in the practical session, particularly those related to systolic and diastolic blood pressure, as well as the identification of the four phases of the Korotkoff sounds. This enhanced comprehension leads to better preparation for both exams and future clinical applications of this technique.

Furthermore, the video optimizes lecture time. By improving students' grasp of the concepts explained, it minimizes student questions, positively allowing for more effective use of practical sessions.



**Figure 5.** Analysis of student responses to an anonymous survey regarding multimedia materials.

## 4. CONCLUSIONS

The use of this methodology for the practical class of "Blood pressure measurement" in Medicine Degree program, as well as in other Health Sciences degrees, such as Pharmacy, Physiotherapy, Nursing, and Sports Science and Physical Activity, has proven to be highly beneficial for the teaching approach of our department. T

This multimedia resource represents a paradigm shift in teaching practice, carrying profound pedagogical implications that fundamentally transform the educator's role. For instance, the educator evolves from a unidirectional transmitter of knowledge to a designer of learning experiences, using the resource as a scaffolding tool.

This approach allows in-person class time to be dedicated to addressing complex questions (flipped classroom model), optimizing teacher-student interaction.

This material has a significant transformative impact on students, as it allows them to self-regulate their learning pace (repeating visualizations as needed). It also ensures that all students (e.g., Medicine, Pharmacy, Nursing, etc.) learn the procedure with the same precision, reducing teaching variability.

This type of teaching methodology guarantees better optimization of class time, facilitating a deeper understanding of the concepts presented.

It can be used effectively in both face-to-face and remote teaching. In addition, this particular medical procedure can be practiced by students at home using these methodologies.

Finally, since it is a common clinical procedure, it is essential that students learn it correctly.

## ACKNOWLEDGEMENTS

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