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Assessment of the Impact of Educational Videos on Academic Performance and Student Satisfaction in a Nursing Anatomy Course

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Abstract

This study analyzes the effects of an educational pill strategy in a nursing anatomy course on academic performance, grade redistribution versus a control group, and student satisfaction, acknowledging that digital teaching innovations in higher education may not benefit all students equally. A learning pill strategy was implemented in a first-year nursing anatomy course. A pre–post quasi-experimental design assessed academic performance, while video usage and student satisfaction were analyzed using an ad hoc questionnaire. In the control group, 44.1% and 40.8% of students failed the first and second exams, respectively. In the intervention group, these percentages were 42.9% and 28.9%. While mean scores showed no significant differences in the control group, the intervention group improved significantly on the second exam ($p < 0.001$). Grade distribution differed between groups ($\chi^2 = 8.635$; $p < 0.05$), with fewer students scoring below 4 and more scoring between 6 and 8. Satisfaction analysis revealed three factors: usefulness/self-efficacy, motivation/learning, and structure/accessibility, with motivation (Factor 2) significantly associated with greater strategy use. Initial group heterogeneity influences how students use and benefit from teaching resources. These findings suggest that integrating educational pills into teaching practices may enhance conceptual understanding and increase student motivation.

Keywords: educational videos; nursing education; student satisfaction; academic performance; anatomy course

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1. Introduction

Higher education in health sciences faces increasingly complex challenges in adapting to the changing needs of students and society. Today's universities are not only transmitters of knowledge but are also expected to foster critical thinking, autonomy, and professional competence. In Spain, the Organic Law of the University System (*Ley Orgánica del Sistema Universitario*) (Ley Orgánica, 2023) identifies educational innovation and knowledge transfer as key functions of universities. Educational innovation aims to achieve planned improvements in teaching and learning, although such changes may not benefit all students equally.

The integration of technology into educational strategies supports the acquisition of concepts and skills essential for professional practice. It also fosters the pursuit of knowledge and continuous improvement (González-Sanmamed et al., 2018).

In human anatomy courses, taught at the beginning of health sciences programs, technological tools help students understand morphological and functional concepts. These concepts are essential for addressing the pathophysiology of diseases in subsequent courses (Alzate-Mejía & Tamayo-Alzate, 2019).

Recent studies indicate that educational videos, particularly those employing innovative technologies such as immersive virtual reality and interactive formats, have a positive impact on learning human anatomy in health sciences programs. For example, a quasi-experimental study demonstrated that the use of immersive virtual reality applications significantly improved students' knowledge and satisfaction in anatomy courses (Jallad et al., 2024). Similarly, a study conducted at the University of Southampton found that interactive videos significantly enhanced learning compared with static images and textual resources, especially in the context of pain physiology (Robson et al., 2022). In addition, a systematic review explored the effectiveness of web-based video lectures (WBVLs) in nursing education. The findings suggested that its impact may be equivalent to, or even greater than, that of traditional face-to-face lectures (Wolf, 2018). Other technological resources, such as whiteboard animation, have been identified as promising teaching tools in health sciences education. Their combination of visual storytelling and simplified illustration encourages student engagement and facilitates the understanding of complex topics (Sharmin et al., 2024).

Nursing students often experience high levels of stress when striving to master fundamental anatomical knowledge. This difficulty in learning anatomy can affect the development of their professional competence (Saeed et al., 2025). Mastering anatomy also requires considerable effort due to its extensive terminology and the challenges posed by spatial orientation. These factors may compromise both the quality of knowledge and its long-term retention (Cheung et al., 2021).

Anatomy learning improves when instructors adopt a facilitative role (Rojos et al., 2021) and complement lectures with additional materials, especially when these resources are created by the instructors themselves (Robson et al., 2022). Moreover, this approach increases student engagement in the learning process, fostering self-regulation and self-efficacy (Alzate-Mejía & Tamayo-Alzate, 2019).

ICTs are particularly useful for anatomy learning, especially short educational videos known as educational pills (Morgado et al., 2024). These promote repetition and interaction with key course concepts (Joseph et al., 2025), fostering motivation and understanding. As limitations, Cidoncha et al. (2024) highlight that long videos reduce attention span and emphasize the need to evaluate their effectiveness to avoid passive consumption. Moreover, videos created by instructors themselves are scientifically validated, unlike much of the online content, which helps students stay focused by reducing exposure to the overwhelming variety of audiovisual resources available on the internet (Conde-Caballero et al., 2024). These videos also employ familiar terminology that reflects the language used in lectures. Watching educational videos extends interaction between students and instructors beyond the classroom and allows flexible engagement with the content.

Well-designed and engaging teaching strategies can help students overcome learning difficulties and improve academic performance (López-Angulo et al., 2021). However, this effect depends on students demonstrating sufficient commitment to their education. Academic engagement is a positive mental state that influences involvement, dedication, and persistence when facing academic challenges (Álvarez-Pérez et al., 2021).

Health sciences students are often motivated by philanthropic values and a strong sense of service (Franco et al., 2023). These characteristics may indicate a high initial level of academic engagement. However, the motivational factors underlying engagement are complex and multifactorial. Each student enters university with a unique profile shaped by

their personal interests, academic background, and individual circumstances (Barraqué et al., 2021).

ICTs in higher education should include an evaluation of their impact (Lee et al., 2024). In the case of anatomy educational pills for nursing students, it is essential to assess whether their use improves academic performance. It is also important to identify which students benefit most and whether academic outcomes or satisfaction influence their use. Recent evidence has shown that watching short anatomy videos (educational pills) correlates positively with performance on some examinations, although the relationship is not universal and requires more systematic evaluation (Kruskie et al., 2025).

The present study aims to design, implement, and evaluate a teaching innovation strategy based on educational videos, examining their use, student satisfaction, and their effect on academic performance. Specifically, it analyzes academic performance before and after implementation in comparison with a control group; evaluates the influence of the strategy on the distribution of students across performance categories; describes the frequency and timing of video viewing in relation to performance on the first examination; and explores the relationship between students' satisfaction with the strategy and their academic performance. This approach provides practical evidence on the effectiveness of short educational videos in nursing education and establishes a methodological framework for the rigorous evaluation of digital teaching innovations in higher education.

2. Materials and Methods

2.1. Procedure

In the 2021/2022 and 2022/2023 academic years, an educational strategy based on training pills was implemented for the anatomy course in the first year of the Nursing degree. The teacher of the subject made 17 short videos on the contents of the second semester and uploaded them to the Moodle platform, which could be accessed by enrolled students for voluntary viewing with no limits on time or number of views.

To verify the first specific objective, a pre–post quasi-experimental design was used, dividing subjects into a control group (students from the 2019/2020 and 2020/2021 cohorts who did not receive the educational strategy) and an intervention group (students from the 2021/2022 and 2022/2023 cohorts who received the strategy during the second semester). The academic grades from the first- and second-semester exams were collected for both groups.

For the second objective, grade ranges ($\leq$4.0, 4.1–6.0, 6.1–8.0, and >8.0) were established, and the percentages of students in the control and intervention groups within each range were calculated for both the first and second semesters.

For the third and fourth objectives, an ad hoc instrument was designed and developed to measure student satisfaction with the strategy, and to establish potential relationships with academic performance (first exam grade) and strategy usage. Responses to the questionnaire were scored on a 5-point Likert scale. The satisfaction questionnaire (included in Appendix A) was created by a committee of experts, consisting of faculty members from various courses and a course coordinator. The survey development process included a thorough review of the items by the committee, pilot testing to validate question clarity, and content validity assessment by experts in pedagogy and evaluation methodologies. The institution's Research Committee approved the survey administration to students.

Although the questionnaire was reviewed by experts and pilot-tested to ensure clarity and content validity, no formal psychometric validation (e.g., reliability coefficients or construct validity analysis) was conducted, as the instrument was developed ad hoc for this specific study. This represents a limitation, and future research should aim to validate the scale more rigorously to strengthen its reliability and generalizability.

Additionally, the same questionnaire included items to collect demographic and academic variables (e.g., pass/fail on the first exam) and strategy usage, while also assessing student satisfaction through 22 items. Regarding strategy usage, the number of videos viewed by students was recorded ("less than 5," "between 5 and 10," and "more than 10"), along with the timing of usage ("before studying," "after studying," "watching videos without studying," and "studying without watching the videos"). The questionnaire was administered in paper format in May, after the end of the teaching period and before the course examination. The professors responsible for data collection were not involved in the course and informed students of the research objective and the voluntary and anonymous nature of their participation before completing the questionnaire.

2.2. Participants

The study included 492 first-year nursing students enrolled in the 2019–2020, 2020–2021, 2021–2022, and 2022–2023 academic years and enrolled in the human anatomy course participated in this study. The control group consisted of 244 students and the intervention group of 248. In both groups, the teaching staff and structure of the course were maintained. Students with second or successive enrollments in the course were excluded. Of the 248 students in the intervention group who were asked to complete the survey, 241 did so. The remaining seven did not wish to do so or did so incompletely (see Figure 1).

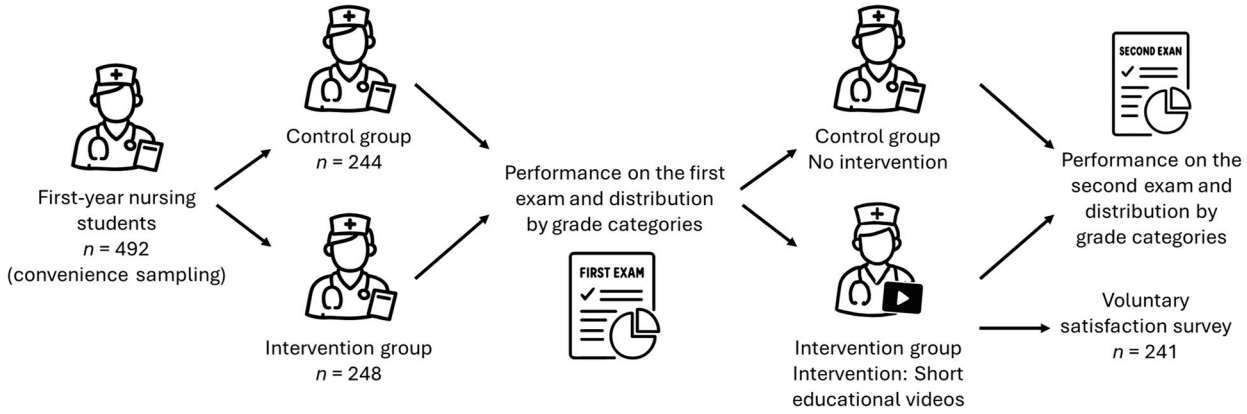

Figure 1. Research method flow: Educational intervention with pre- and post-assessment.

Admission criteria for first-year nursing students remained consistent throughout the four academic years included in the study. Each cohort admitted a limited number of students from advanced healthcare-related secondary programs, and this proportion was stable across years. Therefore, significant differences in prior anatomy knowledge between cohorts are unlikely. Additionally, students repeating the anatomy course were excluded from the study to avoid bias related to prior exposure to course content.

Although baseline knowledge was not directly measured, the structure and content of the course, as well as the teaching staff, remained unchanged across cohorts. This consistency supports the interpretation that observed differences in academic performance are more likely attributable to the educational intervention rather than cohort-specific factors. Nevertheless, we acknowledge that individual differences in prior education and learning styles may have influenced the results and represent a limitation of the study.

2.3. Educational Pills Creation

Seventeen educational pills were created, with durations ranging from 8 to 15 min, designed to reinforce topics covered in class, such as the morphology of body systems, functional anatomy concepts, and the relationship between anatomical structures and major diseases, key aspects of nursing degree training. The video format was predomi-

nantly visual, utilizing 3D models and anatomical atlas images, with identified sources, explanatory narration developed by the course instructor, and on-screen text to enhance the understanding of concepts (see Figure 2).

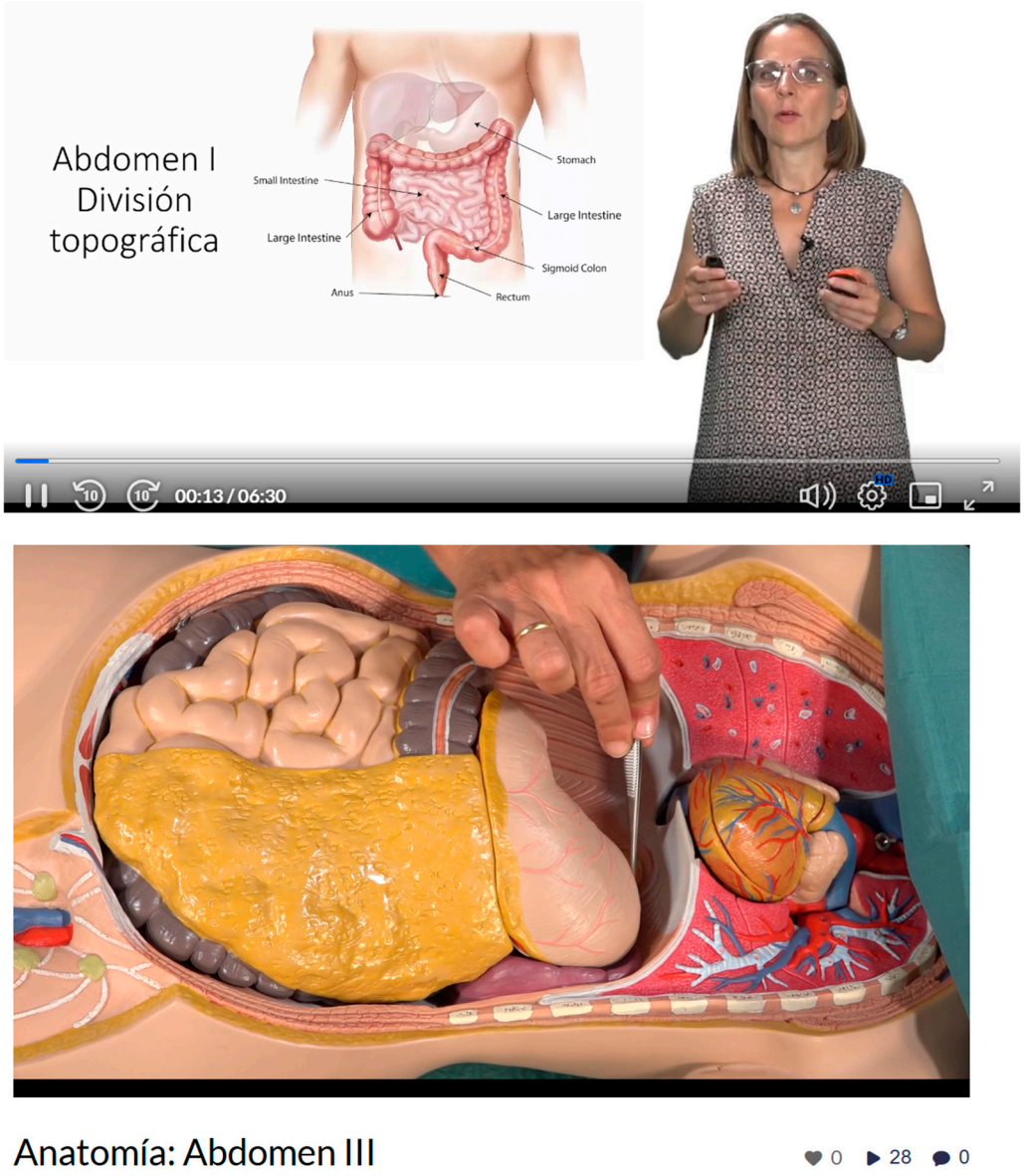

Figure 2. Examples of educational pills created by the anatomy course instructor.

2.4. Data Analysis

Anonymized academic records and survey data were analyzed using IBM SPSS Statistics, version 23 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to characterize the sample, and inferential analyses were performed to address the specific objectives of the study. Student's *t*-tests were applied to compare exam scores between the control and intervention groups, while analysis of variance (ANOVA) was used to examine differences in satisfaction scores according to levels of video use. Chi-square tests were conducted to analyze the distribution of grades in predefined categories and to explore the relationship between video use and academic performance.

To evaluate the psychometric properties of the satisfaction scale, an exploratory factor analysis (EFA) was conducted using principal component extraction and varimax rotation. Internal consistency indices were calculated using Cronbach's alpha. These analyses were

designed to assess the effectiveness of the implemented educational strategy and students' perceptions of its usefulness and accessibility.

3. Results

Of the 492 participants, 89.8% were women. Ages ranged from 18 to 37 years, with a mean of 19.96 years (SD = 3.212). The teaching strategy was applied to the 248 students in the intervention group.

3.1. Comparison of Results Between Control and Intervention Groups

In the control group, the percentage of students who failed (scoring below 5) the first and second exams was 44.1% and 40.8%, respectively. In the intervention group, the respective percentages were 42.9% and 28.9%.

The mean scores for the first and second exams in the control group were 5.01 (SD = 2.634) and 5.14 (SD = 2.429), respectively, with no statistically significant differences between them. In the intervention group, the respective mean scores were 4.94 (SD = 2.356) and 5.69 (SD = 2.294), with statistically significant differences between the pre- and post-strategy means (Student's $t = -6.711$; df = 247; $p < 0.001$; Cohen's $d = 1.693$). Additionally, when comparing the difference between the first and second exam scores, the results showed an improvement in both the control group (Mean = 0.29; SD = 1.508) and the intervention group (Mean = 0.59; SD = 1.153). However, the difference was greater in the intervention group ($t = -2.412$; df = 490; $p < 0.01$; Cohen's $d = 1.342$). Figure 3 displays the distribution of scores for both exams in both groups, clearly illustrating the differences between the intervention and control groups.

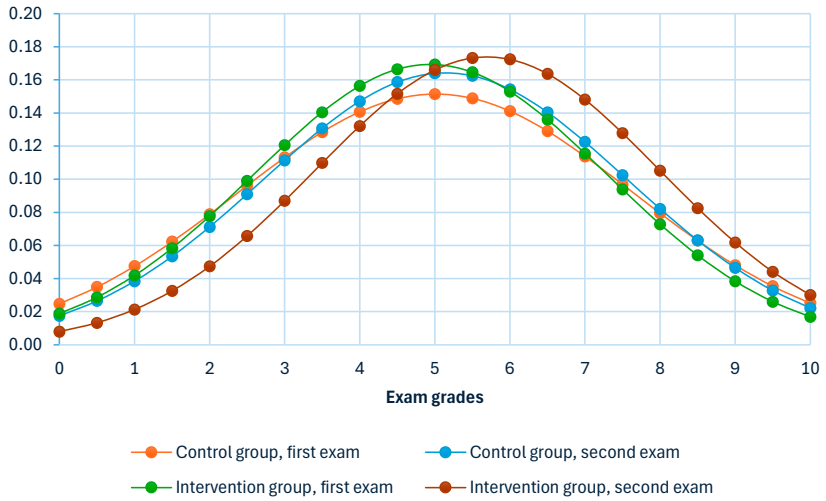

Figure 3. Distribution chart of the grades for the first and second exam in the control and intervention groups ($n = 492$).

3.1.1. Grade Distribution

Differences in the distribution of students across the pre-established grading categories were analyzed, with the following ranges: ≤4.0, 4.1–6.0, 6.1–8.0, and >8.0 (Table 1). The differences in distribution between the control and intervention groups were statistically significant ($\chi^2 = 8.635$; df = 3; $p < 0.05$), with a contingency coefficient of 0.13, indicating a weak but significant relationship between the implementation of the strategy and the change in grade distribution.

Table 1. Distribution of student percentages by exam score (n = 492).

	Control Group		Difference	Intervention Group		Difference
Score	**Exam 1**	**Exam 2**		**Exam 1**	**Exam 2**	
≤4.0	39.0	35.8	−3.2	35.0	26.7	−8.3
4.1–6.0	24.8	25.5	0.7	26.2	24.7	−1.5
6.1–8.0	22.5	21.5	−1	21.5	32.0	10.5
>8.0	13.7	17.2	3.5	17.3	16.6	−0.7
Average	5.01	5.14		4.94	5.69	
SD	2.634	2.429		2.356	2.294	

3.1.2. Use of Videos and Timing of Viewing in Relation to Initial Academic Performance

The analysis of video usage and the timing of viewing in relation to the results of the first exam is shown in Figures 4A,B and 5. To assess how the resource was used in relation to the first exam outcome, a chi-square test of independence was conducted. The results showed no statistically significant difference between video usage (low, moderate, high) and academic performance (approved or not approved) on the first exam.

To assess whether there were differences in the timing of video usage between initial performance groups, a chi-square test of independence was applied. Although descriptive differences in proportions were observed, the statistical analysis did not reveal any statistically significant differences between the variables.

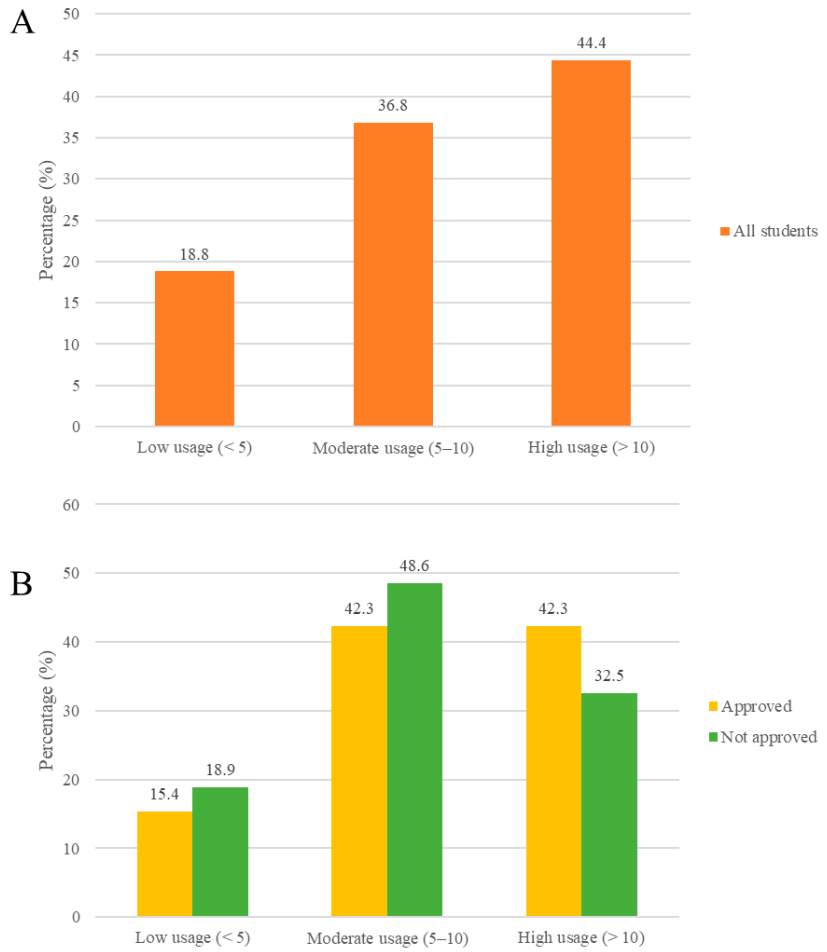

Figure 4. Percentage of students based on video usage frequency and exam results (n = 241). (**A**)—overall use of the strategy; (**B**)—detailed use of the strategy.

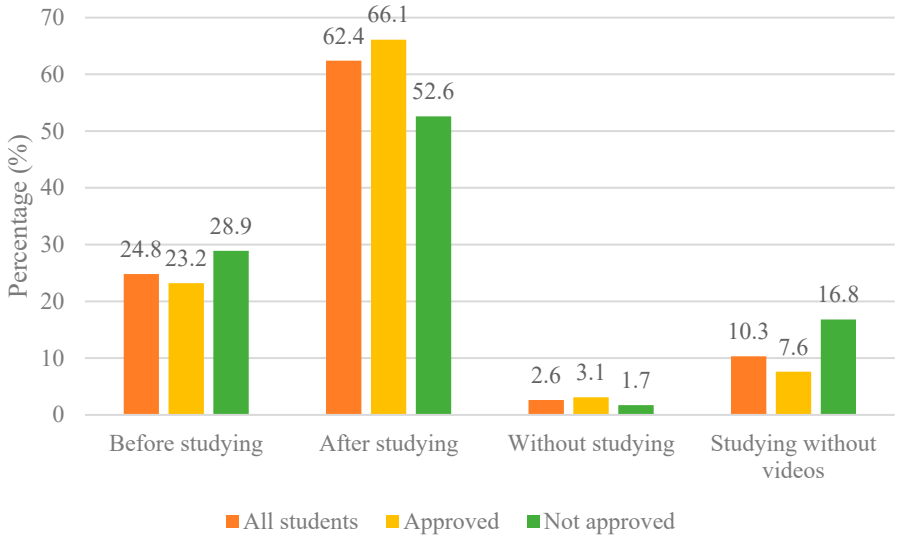

Figure 5. Percentage of students based on video viewing time and their exam outcomes (n = 241).

3.1.3. Analysis of the Satisfaction Scale

The psychometric properties of the satisfaction scale were then analyzed (Cronbach's α = 0.907). After verifying that the data reflected a good sample adequacy (Kaiser-Meyer-Olkin = 0.892; Bartlett's test $\chi 2$ = 1714.948; $p < 0.001$), the EFA was carried out using principal components as the extraction method and varimax rotation. The results showed an initial solution of four factors with a total accumulated variance of 65.48% and with the factor loadings of all the items being greater than 0.50, except for the item "I wish there were instructional videos on all the topics in the course", which was eliminated. Factor 4 was also eliminated as it was made up solely of the item "The knowledge acquired with the instructional videos complements that of a lecture-based class". Of the three factors found, factor 1 *Usefulness and contribution to self-efficacy* (12 items) explains 41.38% of the total variance and has an internal consistency of 0.930, factor 2 *Improvement of motivation/learning* (five items) explains 15.60% of the variance and has an internal consistency of 0.956, and factor 3 *Resource structure and accessibility* (three items) explains 7.74% of the variance and its internal consistency was 0.964. Tables 2 and 3 show the results of the satisfaction scale and the descriptive statistics of each factor and of the total scale.

After dividing the intervention group into two subgroups, those who passed the first partial exam and those who did not, the means of the overall score on the scale and of each of its factors were calculated, and no statistically significant differences were found between them. When the students were divided according to the number of videos viewed and the scores on the scale and its factors were calculated using ANOVA, statistically significant differences were found in factor 2 (F = 3.582; $p < 0.01$). Scheffe's post hoc contrasts showed that the differences occurred between group 1 (low usage) and group 3 (high usage), with a statistically significant ($p < 0.01$) higher score in factor 2 in group 3 (Mean = 4.27; SD = 0.667 vs. Mean = 3.65; SD = 0.844) and a Cohen's d effect size of 0.744. A similar analysis of variance was carried out on the four groups according to when they watched the videos (before the study, after, without studying, or not watching the videos) to check for possible differences in the satisfaction survey scores, finding no statistical significance in either the total score or the factors.

Table 2. Results of the satisfaction scale items (n = 241; α = 0.907).

Factor	Item Statement	Mean	SD	α If Item Deleted
1. Usefulness and Self-Efficacy	I recommend the creation of instructional videos for learning anatomy.	4.55	0.821	0.904
	I have been aware that the videos do not contain atlas images or copyrighted material.	4.50	1.018	0.903
	Watching instructional videos is less tiring for me than studying with notes.	4.21	1.339	0.899
	I watch instructional videos while commuting on public transport.	2.96	1.689	0.901
	I study with notes while commuting on public transport	2.79	1.681	0.904
	I would like there to be instructional videos in other courses.	4.76	1.186	0.897
	I prefer learning with instructional videos rather than with notes or textbooks.	4.04	1.589	0.897
	I believe I have learned better the topics that had an associated video.	4.15	1.657	0.893
	The dissemination of some of these videos may be useful for other health sciences students.	4.51	1.517	0.895
	As a nursing student, I could have created the videos to help other classmates.	2.40	1.968	0.898
	I believe that instructional videos can replace a lecture-based class in anatomy.	2.62	2.162	0.896
	Instructional videos can replace books or lecture notes for learning anatomy.	2.50	2.231	0.896
2. Motivation and Learning	Watching the videos has increased motivation to study the anatomy course.	3.83	1.012	0.911
	Watching the videos has helped me clarify concepts in the course.	4.26	0.967	0.910
	Watching the videos allows for the identification of essential aspects of the course.	4.28	0.848	0.907
	Watching the videos enhances my ability to synthesize and understand information.	4.12	0.876	0.905
	I have enjoyed watching the instructional videos.	3.50	1.167	0.905
3. Resource Structure and Accessibility	Accessing the videos through the platform has been difficult.	1.98	1.609	0.917
	I have missed having more drawings or photos in the creation of the instructional videos.	2.50	1.344	0.905
	I found the duration of the videos to be short.	2.35	1.333	0.904

Table 3. Descriptive statistics for each factor and for the total scale (n = 241).

	Total Scale	Factor 1	Factor 2	Factor 3
Average	3.828	3.77	4.00	3.76
Mediana	3.800	3.66	4.00	4.00
Mode	4.05	3.58	4.00	4.67
Standard deviation	0.874	1.249	0.737	1.038
Variance	0.764	1.559	0.543	1.079
Minimum	2.50	2.58	1.80	1.00
Maximum	12.00	16.17	5.00	8.33
Percentiles				
25th Percentile	3.500	3.333	3.600	3.000
50th Percentile	3.800	3.667	4.000	4.000
75th Percentile	4.050	4.000	4.600	4.417

4. Discussion

The results of this study show an improvement in academic performance (second exam score) in both the control and intervention groups. This finding might be expected, reflecting the overcoming of the adaptation period characteristic of the first year of university degrees (Barraqué et al., 2021; Li & Lee, 2025). However, the improvement in performance could also be influenced by increased self-efficacy among students after their first evaluation, as this could have a feedback effect on their perception of their abilities and the identification of the need to make adjustments in preparation for a second evaluation (Cárdenas et al., 2023; Neuwirt et al., 2024). The widespread use of the strategy by students (Figure 4A) and their positive evaluation across the three factors of the scale, along with the fact that the improvement in the intervention group was much more pronounced (Figure 3), may be related to the favorable effect of the instructional videos on learning.

Recent studies have shown that short educational videos in anatomy and health sciences can significantly improve exam performance and increase knowledge retention (Mustafa et al., 2021), serving as a tool that supports microlearning. The benefits are attributed to reduced cognitive load, the provision of a flexible learning environment, and the promotion of self-directed learning (Senadheera et al., 2025). Consequently, this educational strategy may be recommended for teaching anatomy, as corroborated by previous studies on the academic benefits of educational pills in complex subjects (Gómez-Ortega et al., 2023; Rodríguez Guardado & Platas-García, 2022).

One of the key aspects of the study was evaluating whether the educational intervention affected the distribution of students according to their grades on the first exam, as these initially placed them into their starting groups (Table 1). The results show how the use of anatomy videos may have improved the performance of specific student groups, at least in the short term, allowing a shift from lower-performing groups (first exam) to higher-performing groups (second exam). In the intervention group, a significant reduction was observed in the percentage of students who failed (below 4), while grades between 6 and 8 showed a notable increase compared to the control group, which did not see growth in this category. Other studies also find that after educational interventions in healthcare degrees, groups starting from low or medium initial levels progress to higher levels, while no significant changes are observed when starting from a high pre-intervention performance group (Urman et al., 2021). While the group shifts observed after the intervention may be attributed to the use of the strategy, other uncontrolled variables should be considered, such as students' metacognitive skills or learning and self-regulation strategies, which may have influenced some of the observed changes (An et al., 2024). According to Kolb (Arias, 2020), regardless of the experiences each student has, these experiences are transformed

into knowledge in different ways depending on four types of learners: divergent (who reflect), convergent (who experiment), assimilators (who theorize), and accommodating learners (who act). Vargas et al. (2019) found that the predominant learning style among first-year nursing students is divergent, with the ability to reflect on possible solutions to different situations, although all four styles are present. In this regard, reflective use of the resource could contribute to its effectiveness and explain the reduction in failures in the intervention group.

Some research (González & Arroyo, 2016; Lourenço & Paiva, 2024) highlights that students with higher grades dedicate more time to studying and use strategies more effectively, including utilizing educational support resources, which positively impacts their performance, though with limited room for improvement when starting from a high initial level. Another interesting finding is that students who used the resource the most scored higher on Factor 2 of the satisfaction survey, which relates to improved motivation/learning, revealing an association between resource usage and motivation. Recent studies (Stambuk-Castellano et al., 2024) have analyzed the benefits of creating personalized learning environments for human anatomy based on students' metacognitive profiles, motivation, and particular preferences. All these factors may be crucial in the use of innovative strategies by students.

On the other hand, although there was moderate to high use of the strategy, 19% of students used it very minimally, despite the resource being rated as satisfactory by both those who passed and those who failed the first exam. Previous studies offer possible explanations for why an engaging instructional resource may not be fully utilized. On one hand, the inherent difficulty of the subject (Nausheen et al., 2021) and the non-entertainment nature of the videos could be factors affecting how enjoyable the videos are to watch ("I have enjoyed watching the instructional videos," mean = 3.5). Additionally, while students consider that "Watching instructional videos is less tiring for me than studying with notes" (mean = 4.21), these are still educational tools that require mental effort, time, and concentration, unlike the content they typically consume via electronic devices. One of the major challenges in applying innovative strategies is their ability to capture the user's interest (Giraldo-Luque & Fernández-Rovira, 2020). In the specific case of anatomy learning pills, it must be noted that they compete with a vast array of appealing but less effective online resources (Beltrán-Flandoli et al., 2023).

Furthermore, not fully utilizing the resource does not necessarily indicate dissatisfaction or disinterest from the students but may also suggest their ability to select the most appropriate material for their needs, indicating the presence of students with a reflective or divergent profile, as mentioned earlier (Arias, 2020; Vargas et al., 2019). In this sense, some academically strong students may use the videos strategically, choosing resources they consider most useful for mastering specific topics, thus adopting an active and responsible role in selecting and using strategies for developing skills, abilities, and competencies. This attitude would help develop the profile required of a nurse, which, in addition to needing broad and systematic training, also demands high self-regulation capacity (Domínguez & Díaz, 2022). This aspect is crucial, as it trains students to prioritize the use of complementary resources, much like healthcare professionals must select among various care options in clinical settings, reinforcing the reflective profile prevalent among health sciences students.

Finally, it should be noted that although the use of the resource led to a decrease in students in the failing group, it is important to consider that for some students with a history of low academic performance and low self-efficacy, the resource may be less helpful (Domenech et al., 2019). While it might seem expected that tutorial videos would be widely used by students with low initial grades as reinforcement to overcome their limitations (Rodríguez Guardado & Platas-García, 2022), no differences in resource use were observed

between students who passed or failed the first exam (Figure 4B). However, among students who failed the first exam, a higher percentage reported studying without watching the videos, or not using the resource at all. It is possible that for certain students, perhaps those with low motivation or significant prior deficits, the strategy may not be suitable, despite its positive reception. Some studies indicate that when persistent learning difficulties exist, specific resources, such as remedial support for prior conceptual deficiencies, or close tutoring and guidance from instructors, are necessary (López & Bedolla, 2020).

The results of this study have practical implications for teaching in the health sciences, particularly in the design of anatomy courses. The use of short educational videos, or educational pills, can be integrated into teaching strategies to support students' conceptual understanding, motivation, and self-regulated learning. Their positive reception and impact on performance suggest that institutions might consider incorporating these resources into curricula and faculty development programs. Moreover, students' ability to use these tools selectively according to their learning profiles reinforces the importance of offering flexible, multimodal resources that address diverse cognitive and metacognitive needs. This approach may contribute to the development of essential professional competencies in nursing, such as autonomy, critical thinking, and decision-making.

Despite the strengths of this study, several limitations must be acknowledged. First, the quasi-experimental design does not allow full control over confounding variables such as prior academic preparation, learning styles, or motivation levels, which may have influenced the results. Second, the sample was drawn from a single institution and specific academic courses, which may limit the generalizability of the findings. Third, although the satisfaction scale was reviewed by experts and showed strong internal consistency, it was developed ad hoc and lacks formal psychometric validation. Future research should aim to replicate these findings in broader contexts with validated instruments, as well as to explore the long-term impact of video-based strategies on learning outcomes and professional development.

5. Conclusions

This study provides evidence that the use of short instructional videos, referred to as educational pills, can significantly improve the academic performance of first-year nursing students enrolled in anatomy. The most valuable aspect of the strategy was its ability to shift the group toward higher levels of performance in the subject. This was reflected in the redistribution of grades, with a marked decrease in failing grades and a notable increase in medium-to-high grades within the intervention group.

The effectiveness of educational pills appears to be related not only to their content but also to their alignment with students' predominant learning styles, particularly reflective and divergent profiles, that support the strategic and selective use of resources. This suggests that the pills were not merely supplementary tools but acted as catalysts for self-regulated learning and motivation, especially among students able to identify and apply effective study strategies.

These findings have important implications for instructional design in health education. The incorporation of specific, flexible, and cognitively engaging resources, such as educational pills, can help bridge performance gaps and foster autonomous learning. However, their impact may be limited for students with persistent academic difficulties or low self-efficacy, highlighting the need for complementary interventions such as personalized tutoring or remedial support.

Instructors should consider the integration of these strategies not as standalone solutions but as part of a broader pedagogical framework that recognizes the diversity of students' needs and promotes reflective, skills-based learning. This approach aligns with

the professional demands of nursing education, where adaptability, self-regulation, and strategic decision-making are essential competencies.

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Appendix A

Please note that this appendix was originally provided in Spanish. The present version has been translated for the purposes of scientific publication.

Study to assess the level of satisfaction, attitude, and learning among students enrolled in the anatomy course (bachelor's degree in nursing, academic year ...) following the viewing of educational videos.

Indicate your class group:

Did you pass the first exam? Yes/No

Indicate your gender: Male/Female

Indicate your age: _____

Indicate the number of educational videos you watched (check the most accurate option):

☐ Fewer than 3
☐ Between 4 and 6
☐ All videos uploaded by the professor

From the following four options, check the one that best describes your behavior:

☐ I watched the educational videos before studying the topics using notes/book.
☐ I watched the educational videos after studying the topics using notes/book.
☐ I watched the educational videos but did not study the notes/book.
☐ I studied the topics using notes/book but did not watch the educational videos.

Please respond to the following questionnaire using the following scale:

Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1	2	3	4	5

	Item	Rating Scale				
		1	**2**	**3**	**4**	**5**
1	Watching the educational videos increased my motivation to study the anatomy course.					
2	Watching the educational videos helped me clarify concepts from the course.					
3	Accessing the videos through the platform was difficult.					
4	The knowledge gained from the educational videos complements that of a lecture.					
5	Watching the educational videos helps identify the essential aspects of the course.					
6	Watching the educational videos enhances my ability to synthesize and understand information.					
7	I enjoyed watching the educational videos.					
8	Creating educational videos is a valuable approach for learning anatomy.					
9	I would like educational videos to be available for all topics in the course.					
10	I missed having more drawings or images in the educational videos.					
11	Respecting copyright is important when sharing scientific information.					
12	I found the duration of the videos to be short.					
13	Watching educational videos is less tiring than studying with notes.					
14	I use my breaks to watch educational videos.					
15	Watching educational videos requires the same mental effort as studying with notes.					
16	I would like educational videos to be available in other courses.					
17	I prefer learning with educational videos over notes or textbooks.					
18	I learned better the topics that had an associated educational video.					
19	Sharing these anatomy videos could be useful for other health sciences students.					
20	As a nursing student, I could have created videos myself to help my classmates.					
21	Educational videos can replace a traditional anatomy lecture.					
22	Educational videos can replace textbooks or notes for learning anatomy.					

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