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Use of vodcast in cardiopulmonary resuscitation teaching among medical students

Uso de vodcast no ensino de ressuscitação cardiopulmonar entre estudantes de medicina

Uso de vodcast en la enseñanza de reanimación cardiopulmonar entre estudiantes de medicina

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ABSTRACT

Objective: To evaluate the immediate effect of vodcasts (video-on-demand) on medical students' cognitive performance in cardiopulmonary resuscitation (CPR) and on their motivation, using a quasi-experimental pre-test and post-test design. **Methods:** A quasi-experimental pre-test and post-test study was conducted with 14 third-year medical students. Students watched a vodcast on CPR divided into three chapters, and cognitive performance was assessed using multiple-choice questions before and after the intervention. Motivation was measured using the validated Brazilian version of the Instructional Materials Motivation Survey (IMMS-BRV), which assesses four dimensions: interest, confidence, attention, and expectation. The study was approved by the Research Ethics Committee. **Results:** A significant improvement in performance was observed after the intervention, with a large effect size. Students who reported one to two hours of daily digital media use for medical studies improved more, and scored higher on the post-test, than those reporting more than three hours. Motivation was high and homogeneous across the four dimensions, with no significant differences among them, and was not associated with performance. **Conclusion:** In the sample assessed, the use of vodcasts was associated with an immediate improvement in cognitive performance in CPR; the findings should be interpreted with caution given the small sample size and the single-institution setting.

Keywords: Webcast, Medical education, Motivation.

RESUMO

Objetivo: Avaliar o efeito imediato do uso de vodcasts (vídeos sob demanda) sobre o desempenho cognitivo em ressuscitação cardiopulmonar (RCP) e sobre a motivação de estudantes de Medicina, por meio de delineamento quase-experimental com pré-teste e pós-teste. **Métodos:** Estudo quase-experimental do tipo pré-teste e pós-teste, conduzido com 14 estudantes do terceiro ano de Medicina. Os estudantes assistiram a um vodcast sobre RCP dividido em três capítulos, e o desempenho cognitivo foi avaliado por questões de múltipla escolha antes e após a intervenção. A motivação foi mensurada pela versão brasileira validada do Instructional Materials Motivation Survey (IMMS-BRV), em quatro dimensões: interesse,

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confiança, atenção e expectativa. O estudo foi aprovado por Comitê de Ética em Pesquisa. **Resultados:** Houve melhora significativa do desempenho após a intervenção, com tamanho de efeito elevado. Estudantes que dedicavam de uma a duas horas diárias às mídias digitais para estudos médicos apresentaram maior ganho e maior pontuação no pós-teste do que aqueles que relataram mais de três horas. A motivação foi elevada e homogênea nas quatro dimensões, sem diferenças significativas entre elas, e não se associou ao desempenho. **Conclusão:** Na amostra avaliada, o uso de vodcasts esteve associado à melhora imediata do desempenho cognitivo em RCP, devendo os achados ser interpretados com cautela em razão do tamanho reduzido da amostra e da origem em única instituição.

Palavras-chave: Webcast, Educação médica, Motivação.

RESUMEN

Objetivo: Evaluar el efecto inmediato del uso de vodcasts (vídeos a demanda) sobre el desempeño cognitivo en reanimación cardiopulmonar (RCP) y sobre la motivación de estudiantes de Medicina, mediante un diseño cuasi-experimental de pre-test y post-test. **Métodos:** Estudio cuasi-experimental de tipo pre-test y post-test, realizado con 14 estudiantes de tercer año de Medicina. Los estudiantes vieron un vodcast sobre RCP dividido en tres capítulos, y el desempeño cognitivo fue evaluado con preguntas de opción múltiple antes y después de la intervención. La motivación se midió con la versión brasileña validada del Instructional Materials Motivation Survey (IMMS-BRV), en cuatro dimensiones: interés, confianza, atención y expectativa. El estudio fue aprobado por el Comité de Ética en Investigación. **Resultados:** Hubo mejora significativa del desempeño tras la intervención, con tamaño de efecto elevado. Los estudiantes que dedicaban de una a dos horas diarias a los medios digitales para estudios médicos presentaron mayor ganancia y mayor puntuación en el post-test que aquellos que declararon más de tres horas. La motivación fue elevada y homogénea en las cuatro dimensiones, sin diferencias significativas entre ellas, y no se asoció con el desempeño. **Conclusión:** En la muestra evaluada, el uso de vodcasts se asoció a una mejora inmediata del desempeño cognitivo en RCP; los hallazgos deben interpretarse con cautela debido al tamaño reducido de la muestra y al origen en una única institución.

Palabras clave: Webcast, Educación médica, Motivación.

INTRODUCTION

Most medical schools rely on traditional didactic lectures to deliver core content, with instructors actively presenting information to students. However, technological advancements have led to the development of new tools that serve as alternatives or supplements to traditional teaching. These tools enhance student engagement, stimulate self-directed learning (WOLFF M, et al., 2015) and improve learning retention (LITTLEWOOD KE, et al., 2013; BUCKLIN BA, et al., 2021) particularly among the new generation of students, known as Generation Z (Gen Z) (TULGAN B, 2013).

A generation consists of individuals born within a similar time span who share common life experiences. (BLAUTH C, et al., 2011) Most students in higher education belong to Gen Z and were born after 1996 (CILLIERS EJ, 2017). These individuals are often referred to as digital natives (DANGMEI J e SINGH A, 2016) because they have grown up in a digital world, frequently use smartphones, read digitally, engage with social networking, and have a strong interest in technology (THOMPSON P, 2013). In an educational context, technology is considered an essential tool that enhances the quality of teaching and learning (CILLIERS EJ, 2017). Consequently, integrating new technology-based teaching techniques could improve and accelerate the learning process (GLENN M, 2008).

The advantages of new technological tools have led to the increased use of podcasts (BROWN A e GREEN TD, 2007) and vodcasts (video-on-demand) (MENG P, 2005) to supplement traditional lectures. A podcast is a digital audio file while vodcast synchronizes audio and video (MENG P, 2005). Podcasts

enhance learners' understanding of class material and serve as flexible revision resources, accessible on demand at a self-paced speed (SANDARS J, 2009). Integrating visual elements with audio can significantly enhance learning, particularly for clinical demonstrations in medical education, an advantage effectively realized through vodcasts (SANDARS J, 2009; MASTERS K, et al., 2024).

Although some studies highlight the benefits of vodcasts for learning, relatively few have examined their application in medical education. This may be due to high production costs, the need for fast broadband internet, and the challenges associated with creating these resources (SANDARS J, 2009). Therefore, this study aimed to evaluate the immediate effect of vodcasts on medical students' cognitive performance in cardiopulmonary resuscitation (CPR) and on their motivation, using a quasi-experimental pre-test and post-test design.

METHODS

Study design

The study employed a quasi-experimental pre-test and post-test design. Fourteen students who had successfully completed the cardiorespiratory training course in their third year of the medical program were eligible and consented to participate. Participation was entirely voluntary and non-participation did not affect their course results in any way. All students provided written consent for their data to be analyzed for research purposes. Data were collected in October 2023 at José do Rosário Vellano University (Unifenas) on the Belo Horizonte campus in Brazil.

Students were also invited to complete a questionnaire assessing their motivation regarding the vodcast on CPR, as well as their perception of their emotional state at the time.

The vodcast

A video on CPR was recorded in a studio setting, with the presenter asking questions to an expert in the field. The final vodcast (MP4 format) was 30 minutes in length and divided into three chapters, each approximately 10 minutes long. The vodcast was recorded using a webcam to capture the slide narration. The video included the lecturer's portrait as a small video insert alongside the presentation slides.

Instruments

Pre and post-test

Two sets of 10 multiple-choice questions (MCQs) were developed and presented to three experts. Each expert used a Likert scale ranging from 1 to 5 to assess the items for language clarity, practical relevance, and level of difficulty. Content validity was calculated for each individual question, as well as for the overall test. A value exceeding 0.7 was considered indicative of satisfactory validity for both individual questions and the test as a whole (HERNÁNDEZ-NIETO R, 2002). For the assessment, three questions were selected for their low level of difficulty, three for moderate difficulty, and four for their high level of difficulty. The time limit for answering the questions was set at 3 minutes per question.

Instructional materials motivational survey (IMMS)

The Instructional Materials Motivation Survey (IMMS) questionnaire was used to assess motivation and cognitive learning. The original instrument was developed by KELLER JM (2009) and translated into Brazilian Portuguese by CARDOSO-JÚNIOR A, et al. (2020); the 25-item version used here (IMMS-BRV) results from the psychometric validation carried out by CARDOSO-JÚNIOR A e FARIA RMD (2021). The questionnaire is based on the ARCS model of motivational design and was created to measure student motivation. It consists of 25 items divided into four dimensions: interest, confidence, attention, and expectation. Responses were captured using a five-point Likert scale ranging from 1 (totally disagree) to 5 (strongly agree). Reverse-scored items (1, 4, 8, 11, 15, 21, 22 and 23) were recoded (5 = 1, 4 = 2, 3 = 3, 2 = 4, 1 = 5) before the dimension scores were computed, following the scoring key of the validated Brazilian version of the instrument (IMMS-BRV) (CARDOSO-JÚNIOR A e FARIA RMD, 2021).

Data analysis

Hypothesis

The null hypothesis posited that there is no significant difference in the mean comprehension scores before and after the intervention, with a significance level of $\alpha = 0.05$.

Demographics

The demographic characteristics surveyed included age, type of high school attended (public or private), and prior CPR training or courses in CPR. Participants were also asked about their perception of vodcasts as a study strategy, their daily usage of digital media, and the amount of time dedicated to using digital media specifically for medical studies (**Table 1**). To protect individual data, participants' sensitive information was encoded, and all data are available on GitHub (see the demographic table at https://github.com/alinebmv/VODcast-on-medical-education).

Table 1 - Self-Reported Demographic Data of Medical Students at UNIFENAS-BH.

Demographics	Description	n (%)
Age (years)	< 30	13 (92.86%)
	> 40	1 (7.14%)
Sex	Women	9 (64.28%)
	Men	5 (35.72%)
High school attended	Private	10 (71.42%)
	Public	4 (28.57%)
Previous CPR training	Yes	7 (50%)
	No	7 (50%)
Completed a cardiology course	Yes	5 (35.71%)
	No	9 (64.28%)
Perceived vodcasts as an effective study method	Yes	14 (100%)
Time spent using digital media per day	3–6 h	7 (50%)
	> 6 h	7 (50%)
Daily time spent using digital media for medical studies	1–2 h	5 (35.71%)
	2–3 h	3 (21.43%)
	> 3 h	6 (42.86%)

Database: 14 third-year medical students (UNIFENAS-BH) submitted to a quasi-experimental pre-test and post-test design, with an intervention consisting of a vodcast on cardiopulmonary resuscitation divided into three chapters.
Note: n = absolute number of participants; values in parentheses indicate relative frequency (%). Data were self-reported by the participants.
Source: Prepared by the authors (LEITE SRO, et al., 2026).

Statistical analysis

The Shapiro-Wilk test was used to assess the normality of the pre-test and post-test scores, as well as the age variable (RAZALI NM e WAH YB, 2011). An F-test of the ratio of variances was employed to assess the homogeneity of variance between the pre- and post-test scores. Given the parametric nature of the pre- and post-test data and the homogeneity of variances, a paired t-test (ALTMAN DG e BLAND JM, 1995) was applied to evaluate whether there were statistical differences in the scores. Effect size was calculated using Cohen's d (COHEN J, 2013). Given the small sample size (n = 14), all inferential analyses should be regarded as exploratory, and the results are reported with the corresponding caution.

The difference between the post-test and pre-test scores was used as a performance metric in the statistical analysis. A normality test confirmed the normal distribution of the data ($W = 0.95$, $p = 0.55$), supporting the validity of the parametric tests. A Pearson's correlation test was performed to explore the relationship between performance and age.

The following variables were categorized as nominal and exhibited dichotomous outcomes: sex, high school attendance, previous training in CPR, completion of a cardiology course, perceptions of vodcasts as an effective study method, and number of hours spent using digital media. All these variables had two

possible outcomes, except the perception of vodcasts as an effective study method, which showed no variability (all participants answered affirmatively) and therefore could not be tested. A t-test was conducted to assess the relationship between nominal variables and performance outcomes (ALTMAN DG e BLAND JM, 1995). Conversely, the variable representing the daily time spent on digital media for medical studies was categorized into three levels and classified as ordinal. ANOVA was performed to assess whether there were statistically significant differences among the categories, and Tukey's post-hoc test was used to evaluate the differences in means between each category.

The Friedman test was used to assess whether there were statistically significant differences between each dimension (CONOVER WJ, 1999), followed by a Nemenyi post-hoc test to explore pairwise differences between each dimension (NEMENYI PB, 1963). Collinearity was assessed using the variance inflation factor (VIF). When moderate-to-high multicollinearity was detected, principal component analysis (PCA) was performed to reduce dimensionality. The first principal component (PC1) was used as an independent variable, while performance was considered as the dependent variable in a linear regression model.

All analyses were carried out using the R Studio (4.2.2 version) (R CORE TEAM, 2022). The datasets and scripts are available on GitHub (https://github.com/alinebmv/VODcast-on-medical-education).

Ethics approval

The project was approved by the Research Ethics Committee at the University of Prof. Edson Antônio Velano (UNIFENAS) without any reservations, under the reference number CAAE: 66286622.5.0000.5143; approval report No. 6.034.542. This study adhered to the guidelines outlined in Resolution 466/2012 of the National Health Council (BRASIL, 1997; BRASIL, 2012) and followed the ethical principles of the Declaration of Helsinki (WORLD MEDICAL ASSOCIATION, 2013).

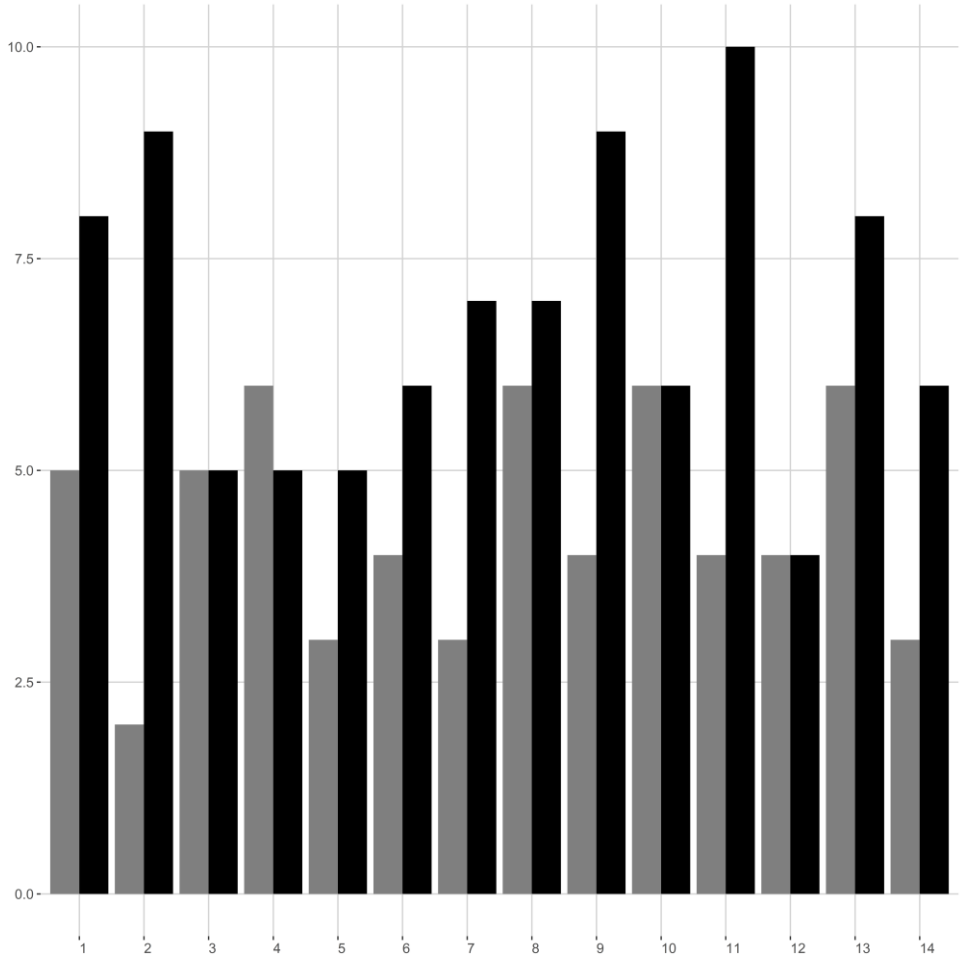
RESULTS

Fourteen students participated in this study. During the 7-day period in which the vodcast was available, all fourteen students completed the survey. The sample comprised nine women (64.3%) and five men (35.7%), with ages ranging from 20 to 42 years; 13 students (92.9%) were younger than 30 years. Most students had attended private high schools (71.4%), and half of them (50.0%) had not previously taken any CPR course or training, while nine (64.3%) had not completed a cardiology course. Half of the students reported spending three to six hours daily engaging with digital media, and six (42.9%) reported dedicating more than three hours daily to digital media for medical studies. All participants perceived vodcasts as an effective study method (**Table 1**).

Student performance significantly improves after watching the vodcast

Figure 1 displays individual student performance scores in the pre- and post-tests, and a boxplot (**Figure 2a**) was used to compare the two moments. The normality test revealed a normal distribution of test scores in both the pre-test ($W = 0.89$, $p = 0.11$) and post-test ($W = 0.95$, $p = 0.57$). Additionally, the variances were equal (F-test: $F = 1.82$, $p = 0.29$). The t-test revealed a significant difference in the test scores between the pre-test (mean ± SD: 4.36 ± 1.34) and post-test (6.79 ± 1.81) ($t = 3.77$, $p = 0.002$). The confidence interval ranged from 1.03 to 3.82, with a mean difference of 2.43. Cohen's d effect size between the pre-test and post-test scores was 1.53. This value suggests a notable difference between the pre-and post-test scores.

Figure 1 - Individual student scores in the pre-test and post-test after the vodcast intervention on cardiopulmonary resuscitation.



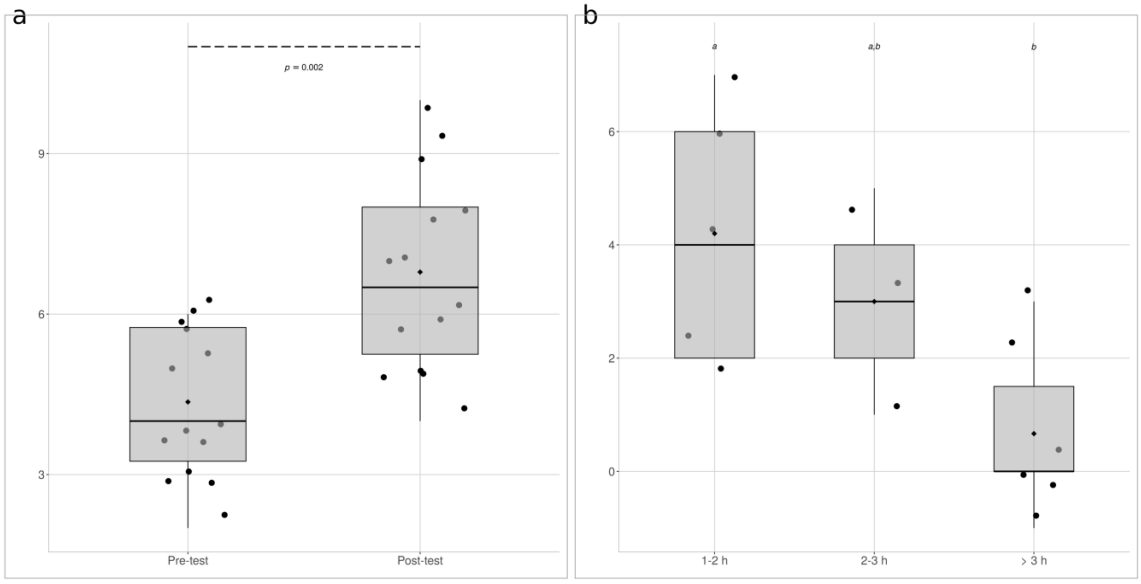
Database: 14 third-year medical students (UNIFENAS-BH) submitted to a quasi-experimental pre-test and post-test design, with an intervention consisting of a vodcast on cardiopulmonary resuscitation divided into three chapters.
Note: distribution of test scores (0–10 scale). Normality assessed by the Shapiro-Wilk test (pre-test: W = 0.89, p = 0.11; post-test: W = 0.95, p = 0.57).
Source: Prepared by the authors (LEITE SRO, et al., 2026).

Students who spent more than three hours daily on digital media for medical studies performed worse

No significant differences were observed in the score changes between the post-test and pre-test based on age (t = 0.15, p = 0.88), sex (t = -0.39, p = 0.70), school attendance (t = -1.78, p = 0.16), previous training in CPR (t = -0.43, p = 0.67), completion of a cardiology course (t = 0.83, p = 0.42), or amount of time spent using digital media (t = 1.65, p = 0.12).

However, performance differed significantly according to the daily time spent on digital media for medical studies (F = 4.84, p = 0.03). A Tukey post-hoc test showed that students reporting 1–2 hours daily improved more than those reporting more than three hours (mean difference 3.53 points, p = 0.03). Mean gains were 4.20 points in the 1–2 hour group (n = 5), 3.00 in the 2–3 hour group (n = 3) and 0.67 in the group reporting more than three hours (n = 6). The same pattern was observed for the post-test score itself (F = 6.07, p = 0.02): students reporting more than three hours scored lower than both the 1–2 hour group (p = 0.03) and the 2–3 hour group (p = 0.04), whereas pre-test scores did not differ between the three groups (F = 1.39, p = 0.29) (**Figure 2b**).

Figure 2 - Boxplots depicting a) the distribution of pre-test and post-test scores, in which the diamond represents the mean value, and b) the difference between post-test and pre-test scores according to the daily time spent on digital media for medical studies.



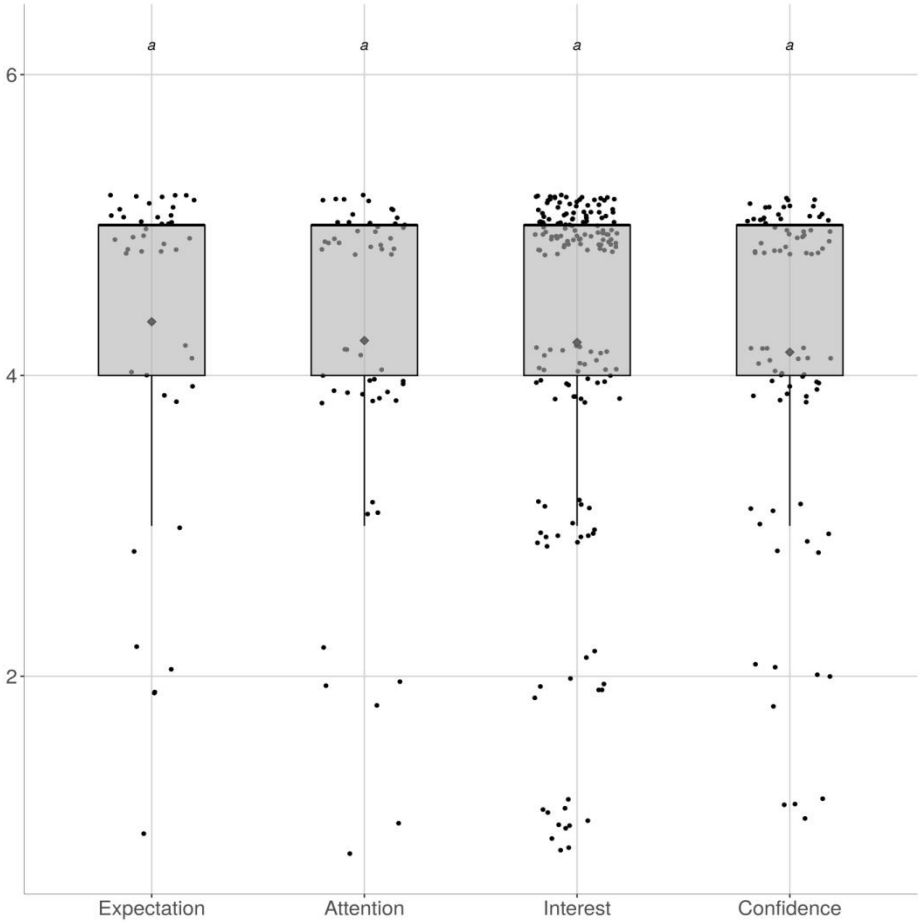
Database: 14 third-year medical students (UNIFENAS-BH) submitted to a quasi-experimental pre-test and post-test design, with an intervention consisting of a vodcast on cardiopulmonary resuscitation divided into three chapters.
Note: a) pre-test vs. post-test comparison by t-test (t = 3.77, p = 0.002), with Cohen's d effect size = 1.53; b) comparison of scores according to daily time spent on digital media for medical studies by ANOVA (F = 4.84, p = 0.03) with Tukey's post-hoc test. Equal letters indicate the absence of significant differences. The diamond represents the mean.
Source: Prepared by the authors (LEITE SRO, et al., 2026).

Students showed high motivation across all IMMS-BRV dimensions

Motivation was evaluated across four dimensions: interest, confidence, attention, and expectation. Students' motivation scores, measured by the IMMS-BRV, range from 1 to 5. Overall, motivation was high, with a mean score of 4.22 ± 1.15 (median: 5), indicating strong motivation toward the assessed vodcast. Scores were homogeneous across the four dimensions: expectation (mean ± SD: 4.36 ± 1.10; median: 5), attention (4.23 ± 1.08; median: 5), interest (4.22 ± 1.20; median: 5) and confidence (4.15 ± 1.12; median: 5).

Statistical analysis revealed no significant differences among these dimensions (Friedman's chi-square test: 3.39, p = 0.336), and the Nemenyi post-hoc test confirmed the absence of pairwise differences between any pair of dimensions (all p > 0.05) (**Figure 3**).

Figure 3 - Distribution of the IMMS-BRV motivational dimension scores after the vodcast on cardiopulmonary resuscitation.



Database: 14 third-year medical students (UNIFENAS-BH) submitted to a quasi-experimental pre-test and post-test design, with an intervention consisting of a vodcast on cardiopulmonary resuscitation divided into three chapters.
Note: comparison of the four motivational dimensions (IMMS-BRV; 1–5 scale) by the Friedman test (chi-square = 3.39, p = 0.336), followed by Nemenyi's post-hoc test for pairwise comparisons. Reverse-scored items were recoded before analysis. Equal letters indicate the absence of significant differences. The diamond represents the mean.
Source: Prepared by the authors (LEITE SRO, et al., 2026).

No statistically significant relationship between motivation and performance

A linear regression model was developed to evaluate the relationship between performance and all the motivational dimensions. The analysis revealed moderate to high multicollinearity among the motivational dimensions, as indicated by the variance inflation factors (VIF: interest = 11.08, confidence = 11.74, attention = 3.57 and expectation = 2.57). Furthermore, the first principal component (PC1), derived from the four motivational dimensions and accounting for 77.8% of their total variance, showed no statistically significant relationship with performance. However, the intercept was significant (intercept: $\beta = 2.43$, $p = 0.002$, PC1: $\beta = 0.45$, $p = 0.25$), indicating that other factors may influence performance changes independent of motivation.

DISCUSSION

This study evaluated a teaching strategy that integrates sound and video, specifically a vodcast in an interviewer-style format, focusing on CPR. High-quality CPR is associated with improved survival outcomes

after cardiac arrest (MEANEY PA, et al., 2013). Traditional CPR education primarily relies on face-to-face courses, which demand significant physical, human, and time resources (CHENG A, et al., 2018). To optimize teaching effectiveness, educators should adopt proven methods that enhance learning and retention. Additionally, ongoing retraining is essential due to the marked decline in CPR skills within months of initial training (BHANJI F, et al., 2015). As such, students and future healthcare professionals must engage in continuous study to ensure individuals experiencing cardiac arrest receive effective resuscitative care (CHENG A, et al., 2018). In this context, the American Heart Association advocates for supplementary learning strategies, such as podcasts and blogs from reputable organizations, to complement formal training courses (CHENG A, et al., 2018).

This study found a significant improvement in post-test scores compared to pre-test scores, with a large effect size, as per Cohen's benchmark (COHEN J, 2013), where values above 0.8 are considered large. This suggests a substantial positive impact on learning outcomes. Our findings are consistent with the results obtained by TODD KH, et al. (1999), who reported superior CPR knowledge and attitudes in students exposed to video-based instruction compared to those trained through traditional methods. Similarly, TOLONEN M, et al. (2023) observed improvements in test scores related to recognizing breathing difficulties when students watched vodcast and live sessions, as opposed to those who only listened to podcasts.

In contrast to the efficacy of video-based learning, SAIDKHANI V, et al. (2024) found that practical, scenario-based training was more effective for improving on the Basic Life Support skills than video training. Additionally, RAE MG e O'MALLEY D (2017) reported no significant effect on lecture attendance behavior among preclinical students who watched a prerecorded vodcast. While these studies present contrasting results, others have found no significant difference between practical and video-based training (JENSEN SA, 2011; FALAHINIA G, et al., 2016). FALAHINIA G, et al. (2016) demonstrated that both practical and video-based training were equally effective. These results suggest that vodcasts can enhance theoretical knowledge and specific skills, but may not lead to behavioral changes or engagement outside the learning environment.

An unexpected finding was that students who reported spending more than three hours a day on digital media for medical studies gained the least from the vodcast and also scored lowest on the post-test, even though their pre-test scores did not differ from those of their peers. Self-reported screen time is not a measure of study quality, and heavier use may reflect more fragmented, less deliberate study habits rather than more learning; sustained attention, rather than exposure, is what has been shown to predict learning from online video (LANGE C e COSTLEY J, 2020). With five, three and six students in the three groups, this comparison is exploratory and should be read as a hypothesis for larger studies rather than an established effect.

One of the challenging aspects of online training environments is maintaining student motivation and engagement (BONK CJ e WISHER RA, 2000; COSTLEY J, et al., 2017). In this study, the students demonstrated high overall motivation. This result aligns with the expectations of digital natives, who are more comfortable and proficient with technology (THOMPSON P, 2013). The frequent use of digital platforms for study may have contributed to their heightened motivation in online settings, supporting the idea that technology can effectively enhance learner engagement when well-designed. Motivation was also homogeneous across the four dimensions, with no significant differences among interest, confidence, attention and expectation, suggesting that the resource sustained learners' attention and met their expectations as consistently as it engaged their interest and supported their confidence. This homogeneity is consistent with the view that the quality of the instructional design, rather than the medium alone, determines whether online resources hold learners' attention (LANGE C e COSTLEY J, 2020). In this regard, careful instructional design that segments content into short, focused chapters and combines clear narration with relevant visual demonstrations appears essential to sustain attention and meet learners' expectations, reinforcing that the pedagogical structure of the vodcast, rather than the medium alone, is the main factor that drives its overall educational value (MASTERS K, et al., 2024).

However, intrinsic and extrinsic motivation interact in complex ways to influence educational success. These forms of motivation do not always predict academic performance effectively. Promoting a sense of autonomy and competence is crucial for improving learning outcomes and fostering sustained engagement over time (DECI EL e RYAN RM, 2000).

This study highlights the positive impacts of using vodcasts in medical education. While traditional lectures remain essential to the learning process, we propose that vodcasts serve as valuable supplementary resources for consolidating theoretical knowledge. However, it is important to acknowledge the limitations of this study. The research was conducted with a specific group of students from a single institution, which may limit the generalizability of the findings. Additionally, the relatively small class sizes at UNIFENAS suggest caution when extrapolating these results. The absence of a control group also prevents any causal attribution of the observed gains to the intervention. In addition, only immediate cognitive performance was assessed: neither knowledge retention over time nor practical CPR skills were measured, so the findings cannot be extended to skill acquisition. Finally, although normality and homogeneity of variance were formally verified, the sample of 14 students limits the robustness of the inferences, and the multiple comparisons performed should be regarded as exploratory. Nevertheless, we are committed to addressing these limitations by expanding the study to include a broader and more diverse group of students, with comparison groups and assessment of knowledge retention.

FINAL CONSIDERATIONS

In the sample assessed, the use of vodcasts was associated with an immediate improvement in medical students' cognitive performance on cardiopulmonary resuscitation questions, with a significant increase in post-test scores and a large effect size, thereby answering the study's objective. Students who reported one to two hours of daily digital media use for medical studies improved more than those reporting more than three hours, and motivation toward the resource was high and homogeneous across the four IMMS-BRV dimensions, although the motivational dimensions were not associated with performance. Considering the small sample size, the absence of a control group, the single-institution setting and the assessment of immediate knowledge only, these findings must be interpreted with caution. Future studies with larger samples, comparison groups, assessment of knowledge retention and measurement of practical CPR skills are recommended.

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