EFFECTIVENESS OF VIDEO SELF-MODELING ON SELF-EFFICACY, BASIC LIFE SUPPORT AND SURGICAL INSTRUMENTATION

Eficácia do vídeo self-modeling no suporte básico de vida e instrumentação cirúrgica

Eficacia del video self-modeling en soporte vital básico e instrumentación quirúrgica

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ABSTRACT

Background: the ClinicalModelling project addresses the challenges involved in consolidating technical competencies in Nursing. Video self-modeling enables the recording of clinical procedures from a first-person perspective and the reflective analysis of performance by the student, thereby enhancing self-regulated learning and self-efficacy. However, empirical evidence supporting the integration of this methodology in simulated contexts remains limited. **Objective:** to evaluate the effectiveness of video self-modeling using smart glasses in improving technical performance and perceived self-efficacy among Nursing students in Basic Life Support and Surgical Instrumentation. **Methodology:** an quasi-experimental study was conducted with 76 undergraduate Nursing students and 11 postgraduate students in Surgical Instrumentation, randomly assigned to an experimental group or a control group. Performance was assessed using checklists, and self-efficacy was measured with the General Self-Efficacy Scale. **Results:** in Basic Life Support, the experimental group showed improvements in technical performance. In Surgical Instrumentation, both groups improved, with more consistent gains observed in the control group. Self-efficacy increased only in Basic Life Support. **Conclusion:** Video self-modeling was more effective in structured tasks with time constraints but showed lower effectiveness in more complex procedures.

Keywords: nursing students; nursing education; mentoring; self efficacy

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RESUMO

Enquadramento: o projeto ClinicalModelling responde aos desafios na consolidação de competências técnicas em Enfermagem. A auto-modelagem de vídeo permite o registo de procedimentos clínicos em primeira pessoa e a análise reflexiva do desempenho pelo próprio estudante, potenciando a autorregulação da aprendizagem e a autoeficácia. Contudo, a evidência empírica que integra esta metodologia em contextos simulados permanece limitada. **Objetivo:** avaliar a eficácia do vídeo de auto-modelagem com óculos inteligentes na melhoria do desempenho técnico e da autoeficácia percebida de estudantes de Enfermagem em Suporte Básico de Vida e Instrumentação Cirúrgica. **Metodologia:** estudo quasi-experimental com 76 estudantes de licenciatura em Enfermagem e 11 de pós-graduação em Instrumentação Cirúrgica, distribuídos aleatoriamente por grupo experimental e de controlo. O desempenho foi avaliado por listas de verificação e a autoeficácia pela Escala Geral de Autoeficácia. **Resultados:** no Suporte Básico de Vida, o grupo experimental apresentou melhorias no desempenho técnico. Na Instrumentação Cirúrgica, ambos os grupos melhoraram, com ganhos mais consistentes no grupo de controlo. A autoeficácia aumentou apenas no Suporte Básico de Vida. **Conclusão**: o vídeo de auto-modelagem mostrou maior eficácia em tarefas estruturadas e com restrição temporal, mas revelou menor eficácia em procedimentos mais complexos.

Palavras-chave: estudantes de enfermagem; educação em enfermagem; mentoria; autoeficácia

RESUMEN

Marco contextual: el proyecto ClinicalModelling responde a los desafíos en la consolidación de competencias técnicas en Enfermería. La auto-modelización mediante vídeo permite el registro de procedimientos clínicos en primera persona y el análisis reflexivo del desempeño por parte del estudiante, potenciando la autorregulación del aprendizaje y la autoeficacia. No obstante, la evidencia empírica que integra esta metodología en contextos simulados sigue siendo limitada. **Objetivo:** evaluar la eficacia del vídeo de auto-modelización con gafas inteligentes en la mejora del desempeño técnico y de la autoeficacia percibida de estudiantes de Enfermería en Soporte Vital Básico e Instrumentación Quirúrgica. **Metodología:** estudio cuasi-experimental con 76 estudiantes de grado en Enfermería y 11 de posgrado en Instrumentación Quirúrgica, distribuidos aleatoriamente en grupo experimental y grupo de control. El desempeño se evaluó mediante listas de verificación y la autoeficacia mediante la Escala General de Autoeficacia. **Resultados:** en Soporte Vital Básico, el grupo experimental presentó mejoras en el desempeño técnico. En Instrumentación Quirúrgica, ambos grupos mejoraron, con ganancias más consistentes en el grupo de control. La autoeficacia aumentó únicamente en Soporte Vital Básico. **Conclusión:** el vídeo de auto-modelización mostró mayor eficacia en tareas estructuradas y con restricción temporal, pero reveló menor eficacia en procedimientos más complejos.

Palabras clave: estudiantes de enfermería; educación en enfermería; tutoría; autoeficacia

INTRODUCTION

In nursing education, the search for innovative teaching methodologies has become a central priority, driven by the growing complexity of healthcare systems, the rapid advancement of technology, and the need for highly qualified professionals who can respond effectively to clinical challenges. Traditional approaches, although valuable, often reveal limitations in bridging the gap between theoretical knowledge and real-world practice. Research on pedagogical innovation, particularly when integrating simulation, digital tools, and experiential learning strategies, is therefore essential to prepare nurses not only with technical competence but also with critical thinking, adaptability, and interprofessional collaboration skills.

Within this context, initiatives that test and validate new frameworks for learning hold transformative potential for the future of nursing education and practice. The *ClinicalModelling* (Project No. 101111665), funded by the European Union through the *Erasmus+ Programme: Alliances for Innovation*, introduces a novel pedagogical framework to enhance health education, with a particular emphasis on nursing training. Grounded in an interdisciplinary and transnational approach, the initiative aims to address persistent challenges in acquiring practical skills by integrating smart glasses technology, clinical simulation, and video self-modelling (VSM). The present study aims to test the effectiveness of this pedagogical methodology, which, although previously established, was further developed and refined within the scope of the ClinicalModelling project.

The present study aimed to evaluate the effectiveness of VSM, supported by smart glasses, in enhancing both the technical performance and the perceived self-efficacy of nursing students. It specifically investigated the impact of this pedagogical approach in two distinct simulation-based training scenarios: Basic Life Support (BLS) and surgical instrumentation. These scenarios were selected to represent different types of clinical skill demands commonly encountered in nursing education, allowing for the exploration of the methodology across multiple learning contexts. In addition, both procedures are guided by well-established international recommendations and standardized guidelines, ensuring consistency and comparability in training and performance assessment. Furthermore, the study examined potential differences in outcomes between these two clinical contexts, contributing to the evidence base for the broader implementation of VSM-supported methodologies in nursing education.

BACKGROUND

Collaboration between educational institutions and healthcare services should be strengthened to enhance the quality of practical learning experiences (Gregersen et al., 2021). According to this, this project is developed through a collaborative network of nine institutions, including higher education institutions and hospitals, from Portugal, Spain, Poland, and Slovenia, each contributing complementary expertise in health education, digital technologies, and pedagogical innovation. Its main objectives include qualifying healthcare professionals, specifically nurses and surgeons, with the skills, equipment, and pedagogical tools necessary to apply smart glasses in educational and practical contexts effectively. This involves training lecturers and tutors to guide students in using these technologies to record, analyze, and reflect on their clinical performance, as well as designing new instructional materials tailored to nursing master's and specialization programs. Moreover, the project emphasizes the development of students' social-emotional competencies and sets the groundwork for the broader integration of this approach in clinical placements and medical residencies.

It has become increasingly crucial that nursing education curricula are closely aligned with the evolving needs of healthcare services, emphasizing high-quality practical skills training that enhances clinical competence, improves patient safety, and fosters effective interprofessional collaboration (Gregersen et al., 2021).

Practical nursing skills have traditionally been taught in preclinical settings through face-to-face approaches, including lectures, small-group learning, and live demonstration tutorials. While these methods provide structured opportunities for foundational skill acquisition, they may offer limited exposure to complexity, contextual variability, and interprofessional dynamics encountered in real clinical practice. Nursing students often emphasize the importance of technical proficiency in practical procedures, such as catheter insertion and blood collection, highlighting that simulation-based practice is essential, even though it does not replace hands-on experience with real patients (Rushton & Pilkington, 2024).

Simulation is a crucial pedagogical tool for acquiring these practical competencies. Moreover, students' experience with simulation increases their self-confidence and satisfaction when it is employed as an active teaching and learning methodology (Souza et al., 2020).

Video self-modelling, a core element of this pedagogical strategy, involves students self-recording during simulated clinical scenarios and engaging them in reflective observation of their own performance. This approach fosters metacognitive engagement, allowing students to identify both their strengths and areas for improvement. Literature highlights its role in promoting self-awareness, improving technical execution, and enhancing self-efficacy (Koçan et al., 2024; Maenhout et al., 2021) which is the belief in one's capacity to perform tasks successfully (Araújo & Moura, 2011). This process can be interpreted within the framework of Social Cognitive Theory (Bandura, 1986), which emphasizes the importance of observational learning and self-efficacy in behavior change. From this perspective, observing one's own successful performance may support the development of self-efficacy by providing a form of self-referential feedback, reinforcing perceived competence. Such processes are fundamental in developing self-regulated learning and are particularly relevant in clinical education, where autonomy, precision, and confidence are key (Dodson et al., 2023).

The use of VSM not only consolidates clinical skills through repetition and feedback but also supports the development of transversal competencies such as communication, emotional regulation, and decision-making under pressure (Hung et al., 2021). It aligns with contemporary learner-centered educational models that privilege autonomy, active participation, and the formative value of video feedback. The integration of smart glasses further enhances this strategy by enabling the capture of first-person perspective videos, increasing immersion and realism, and providing learners with more accurate and meaningful insights into their actions. This facilitates reflective practice and allows for flexible, asynchronous learning, a feature especially valuable when access to real clinical environments is constrained.

This study focuses on a formative intervention conducted with undergraduate and postgraduate nursing students. It aims to explore the pedagogical potential of VSM, supported by smart glasses, in simulated clinical practice, thereby contributing to the advancement of innovative, technology-enhanced learning approaches in nursing education. In a context where higher education must quickly adapt to technological transformations and increasing demands for competency-based learning, VSM emerges as a promising strategy to foster integrated, self-directed, and reflective professional development.

Although VSM is well established for structured tasks, it remains unexplored how wearable devices providing a first-person visual perspective may transform training in complex clinical procedures. Based on the pedagogical potential of Video Self-Modelling supported by smart glasses, this study anticipates that students exposed to this technology may demonstrate more substantial improvements in technical performance during Basic Life Support training when compared with students receiving conventional feedback. It is also expected that this effect may extend, although potentially to a lesser extent, to the more complex setting of surgical instrumentation. Furthermore, the intervention is presumed to influence learners' perceived self-efficacy, with the possibility of fostering greater confidence among those engaging in VSM-supported practice. Finally, given the different cognitive demands of the two clinical contexts, it is anticipated that the magnitude and consistency of improvement may vary between structured, time-sensitive tasks and multifaceted procedural environments.

METHODOLOGY

Overview

This quantitative, quasi-experimental, and comparative study aimed to assess the effectiveness of VSM supported by smart glasses in enhancing technical performance and perceived self-efficacy among nursing students across two distinct clinical simulation scenarios: BLS and Surgical Instrumentation.

Participants

Two independent samples of nursing students were included in the study.

The first sample consisted of 76 undergraduate nursing students, recruited through convenience sampling after they voluntarily registered for a BLS training program organized by a higher education institution. After registration, participants were randomly assigned to one of two groups: an experimental group (n = 40), which received training with VSM, and a control group (n = 36), which followed standard training procedures.

The second sample consisted of 11 postgraduate nursing students enrolled in a surgical instrumentation course. These participants were also randomly assigned to either an experimental group (n = 6) or a control group (n = 5), following the same principles of group allocation.

All participants in both simulation scenarios received one day of theoretical training followed by practical execution of the respective clinical procedures. The key distinction between groups was related to the feedback and review process after the initial performance. The experimental group performed the activity while being recorded through smart glasses, allowing them to review their own performance via video self-modelling (VSM) before repeating the procedure. Conversely, the control group performed the activity without video recording, receiving only verbal feedback from the instructor before repeating the procedure.

The discrepancy in sample sizes between the BLS training (n = 76) and the surgical instrumentation subgroup (n = 11) reflects structural and curricular realities rather than methodological inconsistency. BLS training is a core component of undergraduate nursing education, delivered to large student cohorts within established curricular cycles, which naturally enabled the recruitment of a substantial and relatively homogeneous sample. In contrast, the surgical instrumentation training was offered within a postgraduate specialization program with considerably smaller enrolment numbers and more heterogeneous learner profiles. Although this difference is inherent to the educational context and allowed the study to explore VSM across two authentic training environments, it inevitably limits comparability and statistical power, particularly for the surgical instrumentation results.

Materials

The data collection protocol included four instruments:

Sociodemographic Questionnaire. This questionnaire comprised both open-ended and closed-ended questions, gathering key background information from participants. Data collected included age, gender, number of years enrolled in the undergraduate nursing program or postgraduate course in surgical instrumentation, and any prior experience with training in Basic Life Support (BLS) and surgical instrumentation.

General Self-Efficacy Scale (Araújo & Moura, 2011; Schwarzer & Jerusalem, 1995). This self-report instrument assesses individuals' general perception of their ability to cope effectively with stressful and challenging situations. It consists of 10 positively worded items rated on a 4-point Likert scale ranging from 1 ("Not at all true") to 4 ("Exactly true"). The total score ranges from 10 to 40, with higher values indicating stronger general self-efficacy. The Portuguese version has demonstrated good internal consistency, with a Cronbach's alpha of $\alpha = 0.87$.

BLS Performance Assessment Checklist. Developed specifically for this study, validated by experts, this tool was designed to assess students' performance during a simulated cardiac arrest scenario based on the BLS algorithm. Performance was evaluated at two distinct time points (Moment 1 and Moment 2), enabling analysis of progress following the pedagogical intervention. Each assessment included a series of key actions aligned with the BLS recommendations (Soar et al., 2021). Actions were rated using three categories: "Yes" (correctly performed), "Yes, with errors" (performed with technical flaws), and "No" (not performed or incorrectly executed). For each item (ensure scene safety; check for Responsiveness; assess breathing and pulse; chest compressions - place, rate and depth - and rescue breaths; continue CPR), criteria were defined to identify significant errors, such as: failure to deliver verbal and tactile stimuli when assessing victim responsiveness, improper victim positioning (not placed in a supine position), or incorrect chest compression depth or rate.

Surgical Instrumentation Performance Checklist. This checklist was also developed for the study, based on established guidelines, and aimed to evaluate students' performance in setting up a surgical table for a knee replacement procedure. Like the BLS checklist, it was applied at two time points (Moment 1 and Moment 2) to assess skill development post-intervention. The checklist included key procedural steps and actions, each scored using the same three-category scale: "Yes", "Yes, with errors", and "No". Gross errors were clearly defined for each task, such as failing to check the basket integrators or placing instruments in the wrong quadrant.

Data analysis procedures

One week prior to the training sessions, which were conducted in two separate sessions for each procedure, all participants received an information sheet outlining the objectives of both the training and the study, as well as the ethical considerations and contact details of the research team. This document emphasized the principles of anonymity, confidentiality, and voluntary participation, including the right to withdraw at any time without any negative consequences. To ensure data traceability over time, each participant was assigned a unique numeric code generated through a digital platform. This code was used consistently across both data collection points.

The collected data were analyzed using *IBM®SPSS Statistics software* (version 30.0.0). Descriptive statistics were first calculated to characterize the sample and provide an overview of the study variables. Subsequently, inferential statistical tests were conducted to compare self-efficacy levels between groups and moments.

Finally, to assess improvements in technical performance, the performance recorded at Moment 1 and Moment 2 was compared. A decrease in error frequency between the two assessment points was interpreted as an indicator of skill development following the pedagogical intervention.

Ethical approval for this study was granted by the respective Ethics Committee (approval code: 2025-02). Following approval, permission was obtained to approach nursing students enrolled in the training program and invite them to participate in the study while undergoing the educational intervention voluntarily.

RESULTS

Basic life support

The sample consisted of 76 undergraduate Nursing students, with 40 allocated to the Experimental Group and 36 to the Control Group (Table 1).

Table 1

Sociodemographic characteristics of participants in BLS

	Experimental Group (N=40)	**Control Group (N=36)**	**Total (N=76)**
Age *M ± SD*	20.6 ± 3.9	20.8 ± 3.4	20.7 ± 3.6
Range (Min-Max)	18–42	19–36	18–42
Gender			

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Female	27 (67.5%)	28 (77.8%)	55 (72.4%)
Male	13 (32.5%)	8 (22.2%)	21 (27.6%)
Years Enrolled in Nursing Program *M ± SD*	2.1 ± 0.3	2.1 ± 0.4	2.1 ± 0.3
Range (Min-Max)	2–3	2–3	2–3
Previous BLS Training			
No	27 (67.5%)	24 (66.7%)	51 (67.1%)
Yes	13 (32.5%)	12 (33.3%)	25 (32.9%)

The mean ages were similar across groups (Experimental Group: M = 20.6, SD = 3.9; Control Group: M = 20.8, SD = 3.4). Most participants were female (72.4%), and the average time since enrolment in the Nursing program was 2.1 years (SD = 0.3). A majority (67.1%) reported no previous training in BLS.

Regarding self-efficacy perceptions, both groups showed an increase in mean scores between Assessment Moments 1 (M1) and 2 (M2). In the Experimental Group, the mean ranges from 32.9 (SD = 4.3) to 34.5 (SD = 4.3), while in the Control Group, it increased from 32.6 (SD = 3.2) to 33.9 (SD = 3.6). When considering the total sample, the mean score improved from 32.8 (SD = 3.8) at M1 to 34.2 (SD = 4.0) at M2, which represented a statistically significant difference ($p < 0.001$, Wilcoxon test). However, no statistically significant differences were observed between the Experimental and Control Groups (Table 2).

Table 2

Self-efficacy progression between assessment Moments 1 and 2, by group

	Experimental Group (N=40)		Control Group (N=36)		Total (N=76)	
	Min-Max	*M ± SD*	*Min-Max*	*M ± SD*	*Min-Max*	*M ± SD*
Self-Efficacy (M1)	22-40	32.9 ± 4.3	27-40	32.6 ± 3.2	22-40	32.8 ± 3.8*
Self-Efficacy (M2)	25-40	34.5 ± 4.3	27-40	33.9 ± 3.6	25-40	34.2 ± 4.0*

** p-value < 0,001 (Wilcoxon Test)*

Table 3 presents the evolution of performance in the assessment tasks between time points M1 and M2, by group.

Table 3

Performance in assessment tasks at M1 and M2, by group

Tasks	Group	Evaluation 1		Evaluation 2		Improve (%)
		N	*%*	*N*	*%*	
1. Assess Safety Conditions	Experimental	39	97.5	40	100.0	2.6
	Control	36	100.0	36	100.0	-
2. Assess Response	Experimental	36	90.0	39	97.5	8.3
	Control	32	88.9	35	97.2	9.4
3. Clear Airway	Experimental	30	75.0	33	82.5	10.0
	Control	28	77.8	31	86.1	10.7
4. Look, Listen, And Feel	Experimental	37	92.5	39	97.5	6.4
	Control	25	69.4	31	86.1	24.0
5. Call For Help	Experimental	29	72.5	39	97.5	34.5

	Control	32	88.9	33	91.7	3.1
6. Start Chest Compressions	Experimental	11	27.5	34	85.0	209.1
	Control	5	13.9	11	30.6	120.0

An overall improvement was observed in both groups, with a greater percentage change in the experimental group, particularly in the tasks "Call for help" (34.5%) and "Start chest compressions" (209.1%), compared to the control group (3.1% and 120.0%, respectively). In tasks such as "Assess Safety Conditions" and "Assess Response", both groups already showed high percentages at M1, which were maintained or slightly improved at M2. The task "Look, listen, and feel for 10 seconds" stood out, with the control group showing a greater improvement (24.0%) compared to the experimental group (6.4%). Overall, improvements were more pronounced in the experimental group, particularly in tasks requiring greater visual accuracy, motor coordination, and rapid response.

Surgical instrumentation

The second sample consisted of 11 postgraduate nursing students enrolled in a surgical instrumentation course (Table 4).

Table 4

Sociodemographic characteristics of participants in surgical instrumentation

	Experimental Group (N=6)	**Control Group (N=5)**	**Total (N=11)**
Age *M ± SD*	31.2 ± 12.8	31.0 ± 8.3	31.1 ± 10.4
Range (Min-Max)	22-51	24-42	22-51
Gender			
Female	5 (83.3%)	5 (100.0%)	10 (90.9%)
Male	1 (16.7%)	-	1 (9.1%)
Previous Surgical Instrumentation Training			
No	6 (100.0%)	5 (100.0%)	11 (100.0%)
Yes	-	-	-

The mean ages were similar between the experimental group (M = 31.2, SD = 12.8) and the control group (M = 31.0, SD = 8.3), with an age range from 22 to 51 years. The majority of participants were female, comprising 83.3% of the experimental group and 100% of the control group. None of the participants reported previous training in surgical instrumentation.

Regarding self-efficacy perceptions (Table 5), the Experimental Group showed a slight decrease in mean scores between Assessment Moments 1 (M1) and 2 (M2), from 29.2 (SD = 7.1) to 29.0 (SD = 7.3). In contrast, the Control Group demonstrated an increase in mean scores, from 31.4 (SD = 3.4) at M1 to 36.2 (SD = 2.2) at M2. When considering the total sample, the mean self-efficacy score increased from 30.2 (SD = 5.8) at M1 to 32.3 (SD = 6.6) at M2. However, Wilcoxon tests revealed no statistically significant differences either between groups or between assessment moments.

Table 5

Self-efficacy progression between assessment moments 1 and 2, by group

	Experimental Group (N=6)		**Control Group (N=5)**		**Total (N=11)**	
	Min-Max	*M ± SD*	*Min-Max*	*M ± SD*	*Min-Max*	*M ± SD*
Self-Efficacy (M1)	15-36	29.2 ± 7.1	27-37	31.4 ± 3.4	15-37	30.2 ± 5.8
Self-Efficacy (M2)	14-38	29.0 ± 7.3	34-40	36.2 ± 2.2	14-40	32.3 ± 6.6

An overall improvement was observed in both groups, with the control group showing greater percentage changes, especially in tasks "Respect for aseptic technique" and "Respect for the quadrants" (both 150.0%) (Table 6).

Table 6

Performance in assessment tasks at M1 and M2, by group

Tasks	**Group**	**Evaluation 1**		**Evaluation 2**		**Improve (%)**
		N	*%*	*N*	*%*	
1. Respect for aseptic technique	Experimental	5	83.3	4	66.6	-20.0
	Control	2	40.0	5	100.0	150.0
2. Respect for the quadrants	Experimental	6	100.0	5	83.3	-16.7
	Control	2	40.0	5	100.0	150.0
3. Respect for the arrangement of surgical instruments	Experimental	4	66.6	5	83.3	25.0
	Control	5	100.0	5	100.0	-
4. Respect for the protocol	Experimental	3	50.0	4	66.6	33.2
	Control	3	60.0	5	100.0	66.7
5. Preparation time	Experimental	0	-	2	33.3	33.3
	Control	2	40.0	3	60.0	50.0

The experimental group showed decreases in performance for these same tasks (-20.0% and -16.7%, respectively). In contrast, the experimental group demonstrated moderate improvements in functions such as "Respect for the arrangement of surgical instruments" (25.0%) and "Respect for the protocol" (33.2%). Both groups improved in "Preparation time," with the control group showing a 50.0% increase and the experimental group a 33.3% increase. Overall, the control group exhibited more consistent and pronounced improvements across most tasks, while the experimental group's performance was more variable.

DISCUSSION

This study aimed to examine the effectiveness of VSM, delivered through smart glasses, on nursing students' technical performance and perceived self-efficacy in two distinct clinical training scenarios: BLS and surgical instrumentation. The findings reveal a differentiated pattern of impact. While VSM demonstrated clear benefits in enhancing both performance and confidence within the BLS context, its effects in the surgical instrumentation scenario were less consistent and less pronounced.

This discrepancy may reflect differences in task complexity, cognitive load, or the extent to which visual modeling aligns with the procedural and spatial demands of each skill. These results suggest that the pedagogical value of VSM may be context-dependent, warranting further exploration of how this approach can be optimized across a broader range of nursing procedures. In the BLS training, both groups demonstrated statistically significant increases in self-efficacy, aligning with prior research that indicates repeated simulation-based practice enhances learners' confidence. From the perspective of Bandura (1986), such improvements may be explained by mastery experiences and feedback processes that contribute to the development of self-efficacy beliefs. However, the absence of statistically significant differences between groups in self-efficacy suggests that while VSM may support skill acquisition, it might not significantly surpass conventional training methods in affecting self-perception within the studied timeframe.

Nevertheless, the Experimental Group's superior improvements in specific tasks such as "Calling for Help" and "Starting Chest Compressions" highlight VSM's potential to reinforce critical psychomotor and decision-making skills. This finding is consistent with the existing literature, which emphasizes the benefits of immersive and first-person video feedback in fostering motor learning and procedural accuracy (Stone et al., 2019). Like other studies' findings, despite employing different methodologies, BLS training was shown to improve self-confidence, as well as technical skills such as recognizing cardiac arrest and performing chest compressions, among others (Abelsson et al., 2020). Furthermore, the use of a post-event self-assessment form improves the quality of out-of-hospital CPR (Weston et al., 2019).

Conversely, the surgical instrumentation results demonstrated no clear advantage of VSM over traditional training. The Experimental Group exhibited more variable performance, with declines in key aseptic technique tasks, whereas the Control Group showed consistent improvements. This variability might be attributed to the smaller sample size and higher complexity of surgical instrumentation skills, which may require prolonged and repeated exposure to VSM to yield measurable benefits (Goers et al., 2024). Additionally, the lack of prior experience among postgraduate students in this field may have impacted on the effectiveness of the intervention. It is plausible that the learning curve and the cognitive demands inherent to surgical tasks limit the immediate impact of VSM without complementary instructional support.

Furthermore, the differences in outcomes between BLS and surgical instrumentation suggest that the effectiveness of VSM may be context dependent. The relatively simple, protocol-driven nature of BLS procedures may be more amenable to visual self-feedback (Abelsson et al., 2020). In contrast, the multifaceted skills (not only technical) involved in surgical instrumentation could require a multimodal teaching approach. The surgical environment is highly dynamic and relies on non-technical skills, such as communication and teamwork, to ensure patient safety (Jackson & Jones, 2023). These findings align with theoretical perspectives on skill acquisition, which emphasize task complexity and learner experience as moderators of training efficacy (Tremblay et al., 2018).

Several limitations should be noted. The study was conducted in a single educational institution, using specific training protocols and equipment (including a particular smart-glasses model). As such, results may not fully generalize to programs using different technologies, curricular structures, or simulation environments.

A key limitation of this study concerns the statistical power, particularly in the surgical instrumentation sample. No formal a priori power analysis was conducted, and the markedly small sample size in this subgroup restricts the ability to detect subtle or moderate effects of the intervention. As a result, nonsignificant findings should be interpreted with caution, as they may reflect insufficient power rather than a true absence of effect. Future research would benefit from adequately powered designs based on preliminary effect-size estimates derived from this study, enabling more robust inferences about the comparative impact of VSM-supported training across different clinical competencies.

Other limitation was the short time interval between Moment 1 and Moment 2 may have amplified immediate practice effects, limiting the ability to evaluate the sustained impact of VSM or its influence on long-term skill retention. Longer follow-up periods would help clarify whether improvements persist over time and translate into clinical performance.

Because the same instructors delivered both theoretical and practical components, subtle variations in feedback, tone, or facilitation style may have introduced unintentional bias. Future studies could benefit from standardized instructor training or rotating facilitators to minimize instructor-specific effects.

Overall, the study provides valuable evidence supporting the integration of VSM with smart glasses in nursing education, particularly for skills that benefit from enhanced visual feedback and immediate performance reflection. Tailoring VSM applications to the specific demands of clinical tasks and learner characteristics appears essential for maximizing its educational impact (Zhang et al., 2023).

This study contributes to the growing evidence base on video self-modelling as an innovative pedagogical tool in nursing education (Al-Gharibi et al., 2021; Wong et al., 2023). The integration of VSM, supported by smart glasses, demonstrated clear benefits in enhancing technical performance in Basic Life Support training. However, improvements in perceived self-efficacy were comparable to those achieved with traditional methods. In contrast, the application of VSM to surgical instrumentation training yielded mixed results, underscoring the need for further investigation into its suitability for complex clinical skills.

The most effective approach for retraining BLS skills remains unclear. Training programs should incorporate VSM or other methodologies (as different types of feedback). Similarly, the optimal strategies for retraining surgical instrumentation skills remain uncertain. Training programs should combine real-time feedback from simulation systems with expert instructor guidance to enhance precision, efficiency, teamwork, and VSM. As different feedback modalities may target distinct aspects of technical and non-technical performance, further validation is needed to define best practices.

CONCLUSION

These findings offer insights for nursing curricula, particularly in the context of increasing integration of technology-enhanced strategies aimed at promoting autonomous, reflective, and practice-ready learners. The results suggest that smart-glasses supported Video

Self-Modelling may strengthen performance in structured, time-critical procedures such as BLS, indicating its potential as a formative learning tool for skill acquisition and rehearsal. However, the more variable outcomes observed in surgical instrumentation should be interpreted with caution, given the limited sample size in this group. Rather than supporting broad generalizations, these findings should be understood as preliminary evidence derived from a small and specific sample, highlighting the need for further studies with larger and more diverse populations to confirm and extend these observations. In this sense, incorporating VSM within nursing education may hold promise, but its implementation should be considered in a context-dependent manner, aligned with the complexity of the competencies being developed and supported by additional empirical validation.

CONFLICTS OF INTEREST

The authors declare that they have no financial, personal, or institutional conflicts of interest related to the conduct or publication of this study.

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