REVIEW ARTICLE

Enhancing CPR Proficiency in Nursing Student Through Gamified Learning: Insight From a Scoping Review

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ABSTRACT

Gamification in nursing education is being recognized for its capacity to enhance engagement and educational achievements, particularly in cardio-pulmonary resuscitation. The study conducted scoping reviews using literature sources from Crossref, PubMed, Scopus, Semantic, and Google Scholar databases published between 2014 and 2024. Data analysis is conducted using a qualitative method to gather information from multiple relevant studies. Out of 1714 items discovered, only 6 have passed the final filtering stage. The results indicate that implementing gamification is successful in enhancing the self-efficacy, knowledge, and abilities of nursing students in CPR. Gamification incorporates gaming elements into CPR learning to enhance student participation and create an engaging educational experience. Enhancing current learning techniques in nursing education through the implementation of gamification is crucial.
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INTRODUCTION

Cardiopulmonary issues are responsible for 85% of hospital fatalities (1). The survival rates for patients who have had a heart attack and are in the hospital for 24 hours and upon release are 23.7% and 6.4% respectively (2). Cardiopulmonary arrest is a critical situation that necessitates prompt intervention to save lives and avoid lasting harm to vital organs (3).

Cardiopulmonary resuscitation (CPR) involves a sequence of organized steps in the chain of survival, such as prompt identification and activation, basic life support (BLS), quick defibrillation, advanced life support, and comprehensive post-cardiac arrest care (4). CPR, comprising artificial respiration and chest compressions, is a fundamental technique for providing basic life support in emergencies (5). Inadequate CPR can lead to extended intervention duration and an uncertain future for patients' chances of survival (4).

Nurses who are prepared to do high-quality CPR can enhance the chance of patient survival (2). Nurses are the primary healthcare providers that respond immediately to patients experiencing a Cardiopulmonary arrest by initiating CPR (3). It is essential to provide high-quality education to nursing students to ensure they are proficient in performing CPR (6); (7).

Game-based learning, often known as gamification, has been gaining popularity in nursing education in recent years (8). Gamification-based teaching methods offer benefits such as enhancing learning outcomes through increased participant engagement, promoting a comprehensive understanding of scientific concepts, and offering adaptable learning approaches with immediate feedback (9); (10); (11). Other studies have shown that gamified emergency care training significantly improves nurses' emergency care competency, with factors such as user needs, perceived benefits, and ease of use positively associated with competency levels (12).

Research has shown that gamification can influence health behavior and well-being (13), as well as enhance nursing student satisfaction (14). Gamification can be used as an educational method to transform health professions education (15). Although gamification has significance in nursing education, there is limited evidence of its benefits in CPR learning for nursing

students. Prior research has shown that gamification in CPR classes enhanced self-directed learning and performance (16). Hence, it is crucial to explore new findings about the influence of gamification on CPR learning among nursing students.

METHODS

Information sources

This study utilizes a systematic review technique following the rules given by PRISMA Extension for Scoping Reviews (17)

Search Strategy

The data collection was conducted from March to April 2024. The search was conducted in several databases, including Crossref, PubMed, Scopus, Sematic, and Google Scholar. Using the following query: ("effectiveness" And "cardiopulmonary resuscitation" OR "cardio pulmonary resuscitation" OR "cardio-pulmonary resuscitation" OR CPR OR "basic life Support" OR BLS) AND (game* OR gaming).

Eligibility Criteria for This Review

The eligibility of studies was assessed based on the following criteria: (a) report a study on the effects of gamification in CPR learning for nursing students; (b) published from 2014-2024; (c) using the RCT method; (d) use English. Articles will be excluded if (a) not related to the effects of gamification in CPR learning for nursing students, (b) not been published from 2014-2024, (c) not using RCT methods (d) non-English articles, (e) pre-written articles -print or unpublished articles, and (g) short communications, letters, editorials, or comments.

Screening Process

Each of the first, second, and third authors conducted the literature search and data extraction independently. Mendeley is used to manage all references. Duplicates were eliminated from the obtained data, and the remaining references were filtered according to their title and abstract. Relevant references are chosen depending on the specified parameters. The final results that were not disputed were resolved by discussion or evaluation by the four authors. All authors conducted a final discussion of the results and if there were problems, they were resolved with the help of the fourth author.

RESULTS

A total of 1,714 articles were identified as relevant to the keywords after compiling search results from five different databases. After removing 51 duplicate articles, 1,663 articles were reviewed based on their titles and abstracts. Following this screening, 228 publications met the requirements for full-text review. Ultimately, only six papers met the inclusion criteria for further analysis. Figure 1 illustrates the PRISMA flow, detailing the search methodology, article eligibility, and included publications.

Data extraction was performed by analyzing data based on the author's name, publication year, title, research outcomes, and findings. Table I displays the outcomes of data extraction.

Table I: Summary of reviewed articles

No	Author, year	Title	Results	Findings
1.	Khaledi et al., (2024) (17)	Comparison of gamification and role-playing education on nursing students' cardiopulmonary resuscitation self-efficacy	154 nursing students, including 92 women and 62 men, participated. There was a statistically significant difference in the mean self-efficacy scores before and after training in both the gamification and role-playing groups ($P<0.05$). There was a statistically significant difference in the mean self-efficacy scores among the three groups (gamification, role-playing, and lecture) ($P<0.05$).	Gamification increases self-efficacy
2.	Kassabry, (2023) (18)	The effect of simulation-based advanced cardiac life support training on nursing students' self-efficacy, attitudes, and anxiety in Palestine: a quasi-experimental study	Self-efficacy after High-Fidelity Simulation training in the context of CPR was ($t(59)=26.80$, $p<0.001$, confidence interval [29.32, 34.05]	Gamification increases self-efficacy in performing CPR
3.	Fija et al., (2024) (19)	Effects of a Serious Smartphone Game on Nursing Students ' Theoretical Knowledge and Practical Skills in Adult Basic Life Support : Randomized Wait List – Controlled Trial	Gamification use had the greatest impact on increasing theoretical knowledge of adult CPR in nursing students but not on their practical skills.	Gamification can increase knowledge in carrying out CPR
4.	Gutiérrez-Puertas et al., (2021) (20)	Guess it (SVUAL): An app designed to help nursing students acquire and retain knowledge about basic and advanced life support techniques	The experimental group obtained a higher mean score on the knowledge test compared to the control group ($U = 2835.500$; $Z = -3.968$; $p < 0.05$). On the retest, the experimental group also obtained a higher mean score than the control group.	Game applications can increase the level of knowledge of nursing students in performing CPR

CONTINUE

Table I: Summary of reviewed articles. (CONT.)

No	Author, year	Title	Results	Findings
5.	Demiray et al., (2022) (21)	The Effect of Computer Based Game on Improving Nursing Students' Basic Life Support Application Skills: Experimental Study	Computer Based Games are used by nursing education and implemented for the purpose of improving students' CPR skills and have produced effective results compared to traditional teaching.	Nursing students experience increased skills in performing CPR using gamification
6.	Boada et al., (2015) (8)	Using a serious game to complement CPR instruction in a nurse faculty	Paired samples t test between Groups 1 and 2 ($\mu1 = 35, 67$, $\mu2 = 47, 50$ and $p < 0.05$) and between students Groups 1 and 3 ($\mu1 = 35, 67$, $\mu3 = 50, 58$ and $p < 0.05$)	The use of gamification can improve nursing students' skills in performing CPR

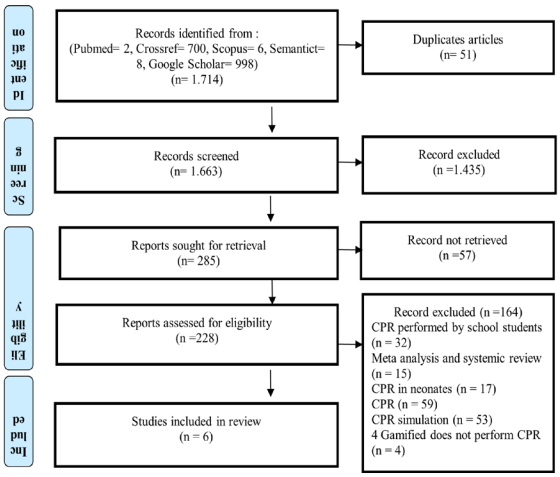

Figure 1: The article selection process

DISCUSSION

The purpose of this study is to determine the efficacy of using gamification to educate CPR nursing students. Our search generated six articles that concluded gamification in CPR learning enhances self-efficacy, knowledge, and skill among nursing students.

Gamification for nursing students can provide reinforcement of critical thinking skills, connect theory to practice, and experience a dynamic learning environment (18) offer real-time feedback, scenario-based simulations, and adaptive learning algorithms that suit different learning styles, and increase user confidence (19). Factors such as the use of game elements such as badges and leaderboards need to be considered to increase engagement and motivation (20).

CPR is used to promptly reestablish circulation in the case of heart and/or respiratory failure in order to prevent death (4). Performing CPR during the golden time frame of 1-2 minutes is essential as it can enhance the survival rate of individuals experiencing heart attacks (21). A nursing student internship can serve as the initial responder to a heart attack in a hospital, alongside a nurse. (22).

Self-efficacy

There are two studies that explore the impact of CPR gamification on better self-efficacy (23) and (24). Self-efficacy is an individual's belief in the ability to control actions (25). Self efficacy is something that is vital for nursing students to their ability to respond to heart attacks (26). Especially while doing CPR (27). Other studies also show that nursing students who successfully conduct CPR have high self-effectiveness (28).

Knowledge

Two studies, conducted by (29) and (30)., examine the impact of gamification on enhancing CPR knowledge among nursing students. Utilizing gamification along with other teaching methods can effectively enhance the abilities and performance of nursing students, moving beyond traditional teaching approaches (31). Aside from improving CPR knowledge, Gamification has been demonstrated to present new relevant scenarios during the CPR learning process (32); (33).

Adequate understanding can also impact positive attitudes (34). An emergency care education strategy that incorporates gamification has been shown to improve understanding of CPR (12). Research suggests that there is a disparity in knowledge levels when comparing the use of gamification in CPR learning with not utilizing it (35). Expertise in CPR is closely linked to knowledge, which is crucial for maintaining service standards and improving the effectiveness of CPR (36). However, other research indicates that while gamification can enhance CPR knowledge, it may not consistently lead to similar performance enhancements. (37).

Skill

Studies by (38) and (8), demonstrated the positive impact of gamification on enhancing CPR skills in nursing students. The results align with previous research indicating that the implementation of gamification is successful in enhancing the abilities of nursing students (15). Research by (29) further validates that gamification effectively enhances comprehension of CPR.

Nursing students often face challenges in comprehending educational material and learning the necessary CPR skills (39). This is because of a deficiency in comprehending the most efficient methods of learning to enhance the abilities of nursing students (39); (32).

The research follows a systematic approach using PRISMA guidelines but has limitations such as conducting searches only in English within a specific

time frame (2014-2024), including a restricted number of studies, focusing solely on RCT studies, and encountering discrepancies in the quality of the studies reviewed. These limitations can constrain the research scope, affect the reliability of the findings, and result in overly general conclusions without the use of advanced statistical analysis.

CONCLUSION

This discussion emphasizes the efficacy of gamification in CPR education for nursing students. Research analysis indicates that implementing gamification is successful in enhancing the self-efficacy, knowledge, and abilities of nursing students in CPR. Our research indicates that Nursing Students' insufficient proficiency in CPR is primarily due to inadequate training and dissatisfaction with the teaching methods. Utilizing novel learning techniques like Gamification can effectively improve the abilities and performance of nursing students in CPR.

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