

Effectiveness of Game-Based Teaching Method on Nursing Students' Knowledge of Enhanced Recovery After Surgery (ERAS)

Ibrahim S.S Abumettleq^{1*}, Nurhan Bayraktar², Burcu Totur Dikmen³

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Abstract

Background and Objectives: The technology was created by humans; it is also innovative when teachers use it in the classroom. Teachers can now use media in a variety of ways to accommodate different learning styles thanks to new technologies, including animation, live video, gaming, and more. The study aimed to assess how well the game-based learning approach enhanced the students' understanding of Enhanced Recovery After Surgery (ERAS).

Methods: This study was structured utilizing a quasi-experimental design applied with pre-and post-test assessments. The study was conducted by a nursing faculty at the "[blinded for review]". Using the census method, the students were randomly assigned to either the experimental or control groups (each consisting of 80 and 40 players). On March 18, 2022, the study was conducted at a North Cyprus nursing faculty. Both computers and phones can use the Kahoot app, which is used to play the game.

Results: The study conclusions demonstrated that following the instructional intervention using game-based learning, students' performance improved in terms of the overall mean scores of all Enhanced Recovery After Surgery (ERAS).

Conclusion: Our results generally demonstrate that game-based learning improves the standard of instruction for the students. However, our results show that the game-based teaching method enhances nursing students' comprehension of Enhanced Recovery After Surgery (ERAS), and the method could be useful in developing lesson plans for nursing education and nursing schools.

Keywords: Game-based teaching, Enhanced recovery after surgery, nursing students, online education, Gaming

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1. Introduction

Beginning at the end of 2019, the COVID-19 epidemic rapidly interrupted education and led to widespread disorder in society (1). Additionally, there have been reports of severe disruptions in education; roughly 94% of students worldwide, or 1.6 billion students, have been impacted, ranging from elementary school students to university students from over 190 countries (2). Likewise, the primary focus of this study

will be nursing students' gaming habits. Numerous studies have demonstrated that using the gaming method can help nursing students learn the material more deeply (3). This approach and method lower stress levels, encourages critical thinking, motivates nursing students to learn, and lets them participate in a fun, safe environment free from distractions from other students (3). Three broad categories can be used to group learning theories: constructivism,

*Corresponding author: Ibrahim S.S Abumettleq, Email: abraham.s0-90@outlook.com

¹ Department of Nursing, Near East University Institute of Graduate Studies, TRNC Mersin 10, Turkey.

² Department of Nursing, Faculty of Health Sciences, Atılım University, Golbasi Ankara, Turkey.

³ Department of Surgical Nursing, Faculty of Nursing, Near East University, TRNC Mersin 10, Turkey.

↑**Question** To what extent are students who learned through the game satisfied with their experience?

↳**Findings** The majority of students expressed great satisfaction with this experience, according to the study's findings. 6.47±2.79 was the overall satisfaction score.

→**Meaning** The transition from traditional to online learning could result in an increase in nursing students' clinical experiences for their patients, care experiences, and self-concept levels and easy education resources access.

behaviorism, and cognitive theories (4). By providing positive reinforcement through behaviour, behaviourism teaches students and should be conditional on their performance (5). In actuality, cognitive psychologists—as opposed to behaviourists—consider that education is a conscious psychological process that centers on awareness, organizing, thinking, and understanding (6). Many studies indicate that incorporating educational materials into video games may be a useful strategy for getting students to learn in context and enjoy themselves (7). According to a Davidson study, 88% of nursing students thought that games and other related new media technology should be used more in nursing education (8). The multidisciplinary teams' surgical specialty analysis aims to maximize physiologic performance, minimize the surgical stress reaction, and speed up recovery (8). ERAS directs patients and is evidence-based (9). Furthermore, pre-admission, preoperative, intraoperative, and postoperative stages comprise the core component of ERAS, and each of these phases has distinct branch components (10). By the point that this study is end, the students who will be participating in the online game will have a better understanding of ERAS concepts, stages, and protocols. They will also understand how to manage and interact with patients prior to, during, and following operations (11). Determining exactly how effectively nursing students learned ERAS through game-based learning was the objective of the current study (12). Eighty international nursing students took part in this study.

2. Materials and Methods

2.1. Design of study

The study's design involved pre-and post-test assessments and was quasi-experimental. Also, a randomized controlled design will be used to evaluate the effectiveness of the current approach.

2.2. Local

On March 18, 2022, the study was conducted at a North Cyprus nursing faculty and the ethical code number for the present study was YDU/2022/99-1480. Moreover, The university nursing department features online technology which allows students to participate in online lectures, as well as online tests and quizzes that are supervised by the courses advisers. The study was conducted among 80 international nursing students who completed the first class.

2.3. Selection Criteria and Population

The two main groups also included 80 international nursing students enrolled in the second, third, and fourth years of a nursing bachelor's degree. Moreover, the G Power 3.1.9 software was utilized to estimate the sample size, with α (error) = 0.05, test power = 0.8, and effect size = 0.8. There were 80 students in all, 40 in the experimental group and 40 in the control group. The exclusion criteria were providing care for students who lacked knowledge about improved ERAS. Moreover, The inclusion criteria were nursing students, nursing students with clinical courses, and male or female students. Exclusion

criteria include those who had not taken any clinical or medical-surgical nursing courses.

2.4. Data Analysis and Treatment

The data was entered using the Statistical Package of Social Sciences (SPSS) software, version 20.0. This study made use of descriptive statistics, especially percentages and frequency, to examine participant characteristics and determine mean knowledge. A score of 1 was given for a correct answer, while a score of 0 was given for a false answer. The dependent t-test was utilized to compare pre- and post-test differences after viewing the intervention, and the data was then distributed normally to employ the student t-test. In the first stage, the independent t-tests were used to analyze gender differences. Each measurement item was evaluated by three experts to determine if it matched the conceptual domain; all experts approved the items.

2.5. Data Collection

The data collection information form with a semi-structured interview questionnaire and a data collection information form with demographic data to gather research data. Moreover, a data collection tool to assess nursing students' understanding of Enhanced Recovery after Surgery (ERAS) at all stages of surgery and the impact of game-based teaching techniques. Furthermore, data collection was conducted for 8 months, from March to November 2022. The game education session will take from 25 to 40 minutes to complete.

2.6. Ethical Aspects

Students' information will be kept confidential, and they should never feel pressured to take part in the study. The student's GPA and grades will not be affected by this study. The study was approved by the ethical committee and the institutional review board (IRB) at the university of "[blinded for review]". Smart PLS 3.0 measurement model assesses the validity and accuracy of the collected data. The authors' careful application of a variety of tactics during the research process has allowed for the validity and dependability of the current study's. Cronbach's alpha (α) was implemented, and the convergent validity was tested using composite reliability (CR) and average variance extracted (AVE), and the results were adequate. Cronbach's alpha, composite reliability, and average variance were all present in the study variables ($\alpha = .88$, CR = .91 and AVR = .75), reciprocity ($\alpha = .88$, CR = .82 and AVR = .81), reputation ($\alpha = .91$, CR = .93 and AVR = .77), ability to share ($\alpha = .92$, CR = .94 and AVR = .81), knowledge of ERAS ($\alpha = .93$, CR = .95 and AVR = .80), and nursing students' satisfaction ($\alpha = .88$, CR = .92 and AVR = .70). values that were extracted that were greater than 70, .70, and .50, respectively.

3. Results

Table 1 results demonstrate the students' mean ages were 38.04 ± 28.86 . Age ≤ 25 (88.11%) was the most common age for both the experimental and control groups (60.97%). The majority of students had ERAS courses

Table 1. Descriptive characteristics of students (N: 80). Nicosia, Cyprus, 2022.

Characteristics	Control		Experimental		P value
	N	%	N	%	
Gender					
Male	41	51.97	24	56.34	.24
Female	39	48.03	16	43.66	
Received ERAS courses					
Received	71	91.10	28	61.10	.41
No	9	8.90	12	38.90	
Age (Mean 38.04±28.86)					
<= 25	69	88.11	27	60.97	.39
26 – 30	7	9.57	10	36.80	
>=31	4	2.32	3	2.23	
CGPA (Mean 64.48±19.37)					
<= 68	29	33.24	12	39.89	.59
70-80	39	49.68	21	51.78	
>=90	12	17.08	7	8.42	

Table 2. Comparison of the means for correct answers to the ERAS knowledge. Nicosia, Cyprus, 2022.

Knowledge of enhanced recovery after surgery	Number of items	Correct answer means					
		Pre-test			Post-test		
		Control group	Experimental group	t.p	Control group	Experimental group	t.p
		Mean±SD	Mean±SD		Mean±SD	Mean±SD	
Preoperative care knowledge of ERAS	11	6.47±2.01	5.87±1.95	.431	7.78±1.75	10.44±12.4	5.411
Intraoperative care knowledge of ERAS	6	4.20±1.02	3.91±1.11	.362	5.31±2.47	5.70±1=3.50	4.719
Postoperative care knowledge of ERAS	11	5.24±1.32	5.81±1.41	0.640	7.47±2.45	10.51±2.84	6.135
General knowledge about the protocols and the care of ERAS	5	3.21±1.17	2.87±1.34	0.249	4.31±1.01	4.95±2.13	-1.4
Overall Values	33	5.10	3.10	2.14	7.10	9.52	6.01
				.137			.000

before the current study; the control group frequency was 91.10%, while the experimental group was 61.10%. Cumulative Grade Point Average (CGPA) for most students, which were 51.78% for the experimental group and 49.68% for the control group, dropped between 70 and 80. The results demonstrate that the experimental and control groups were homogeneous since there was no statistically significant difference in descriptive features in both groups ($P>.05$).

Table 2 illustrates the comparison of the students' ERAS correct answer means for the pre- and post-tests. Furthermore, there was no statistically significant difference between the experimental and control groups for any of the pretest's ERAS domains ($P>.05$). On the other hand, there was a statistically significant difference ($P<.05$) between the experimental and control groups' means of correct answers on the post-test. In every ERAS domain, students in the experimental group had greater mean values for correct answers than students in the control groups. However, A comparison of the student characteristics and ERAS overall knowledge means revealed no statistically significant difference between the experimental and control groups' overall knowledge means about the descriptive features ($P>.05$).

Table 3 results demonstrate that most students in the experimental group are happy with the game-based learning approach. Additionally, concerning reliability, Cronbach's alpha value (α) was 0.8, indicating a good

level of reliability.

4. Discussion

Recently, game-based learning has gained recognition as a state-of-the-art approach to nursing education. Game-based learning is a component of education that helps pupils remember material from previous lectures (13). Everyone interested in the institution has created a particular passion group because game-based learning is still a relatively new technique, especially for higher education and nursing school. Playing online learning games enhances students' academic performance and knowledge (14). According to the current study, nursing students who use the game-based teaching technique instead of the traditional approach have a greater understanding of ERAS, and using the game-based teaching method can enhance higher knowledge. The main objective of this study is to evaluate the effectiveness of the game-based learning strategy for nursing students. Knowledge of ERAS among students. In the discipline of nursing education, game-based learning is rapidly becoming a more innovative teaching approach (15). The primary focus of game-based education is instructor-based learning, which enables students to revisit concepts that were previously covered in lecture classes (16).

Results of previous studies indicated that gaming simulation education might be a suitable way to educate surgical nursing students on clinical education prior to their

Table 3. The satisfaction of nursing students using game-based education (N=40)- Nicosia, Cyprus, 2022.

Items	Very satisfied		Somewhat satisfied		Neither satisfied nor dissatisfied	
	Mean	SD	Mean	SD	Mean	SD
Graphical design for game-based learning	7.03	3.81	4.3	1.9	1.1	.7
Designing game-based learning for enhancing students' cognitive skills	6.24	2.52	5.5	2.7	1.7	.8
Game-based learning style can easily be accessed	7.80	3.90	6.3	1.4	1.8	.4
Playing the game-based learning sequence for students	8.6	4.41	4.6	1.9	1.8	.6
Transferring knowledge of game-based learning to students	7.30	3.20	5.0	2.1	1.7	.9
Language is clear by game-based learning	6.11	2.44	6.2	1.7	1.9	.3
The advantages of using game-based learning in the educational setting	7.71	4.23	6.5	1.8	1.6	.8
Enjoyment from playing the game-based learning	4.80	1.75	5.4	2.5	1.9	.8
Impression in game-based learning	7.87	3.92	4.3	1.9	1.8	.6
Overall satisfaction in game-based learning	6.47	2.79	5.1	1.9	1.7	.2

clinical settings training (17). Furthermore, an analysis of the student's pretest correct answer means showed that, in every ERAS domain, there was no statistically significant difference between the experimental and control groups. However, in every ERAS domain, the post-test correct answer means of the experimental group students were greater than those of the control groups ($P < .05$), proving the effectiveness of the game-based learning methodology. Gaming improves knowledge retention, motivates nursing students, and promotes problem-based learning (18). Furthermore, a similar study by Betihavas et al. examined the results associated with this manner of instruction, such as positive satisfaction and students' motivation to stick with it, as well as the application of the flipped classroom and game-teaching approach to the nursing education game method (18). In the systematic review and meta-analysis, Tan et al. found that flipped classrooms are beneficial in nursing teaching instruction (19).

The findings demonstrate that following the intervention, nursing students' knowledge, skills, attitudes, self-learning, study satisfaction, critical thinking, and problem-solving abilities have all greatly improved (19). Findings from posttests indicated a satisfactory rate of right responses, and a study found that game-based instruction connected to the preoperative stage was successful in improving scores for all students in the ERAS category from the pre- to post-test (20). Furthermore, a study analysis published by Ard shows that each student's scores on the pre- to post-test area of the ERAS greatly improved after game-based instruction related to the preoperative stage (20). According to Cheong's similar study, students who received education through gaming reported greater scores and better comprehension than those who received education through traditional techniques (21).

Additionally, the results showed a high level of satisfaction with the game-based learning strategy (21). The students expressed their satisfaction with the visual design,

cognitive growth, usability, and play sequencing (21). According to a study that supports the current study, most students reported that the game helped them feel less stressed and that they were pleased with using it to learn more in the future (22). Moreover, it's even been suggested that using gaming techniques to teach can make nursing education more useful and credible than using traditional lectures (23). It could be done to suggest more research, such as a more thorough model and an assessment of the long-term impacts of the online gaming teaching approach (23). The current study also demonstrates that students before the study had limited critical thinking and decision-making abilities as well as limited knowledge about ERAS, whereas students after the study implemented and preserved productive learning as well as applied the developed knowledge to increase their knowledge during their study and their clinical practices.

despite the study's merits effectiveness and strengths, there exist several limitations that require attention. Initially, on the day of the exam period, the results of the students were assessed. Second, while conducting their studies, some students lose their internet connection (24). Moreover, this method can be time-consuming because educators must have time to design the game and prepare it. Determining the proper game and designing how to implement it can be tough (24). Also, it requires a lot of resources and materials to provide the students with the most practical knowledge and some may face a shortage of available in resources (24).

5. Conclusion

The results of this study demonstrate how well the game-based teaching method affects nursing students' comprehension of ERAS when compared to the traditional group. Most students were pleased with the game-based learning experience's visual style, and they enjoyed answering the game's questions. Concerning the game-

based learning approach the majority of the students expressed satisfaction and found it easy to reach them. Educational techniques can help students begin to understand the learning process. Additionally, the study has brought to light important aspects of students' understanding of ERAS that should be further addressed by teaching strategies that focus on the function of students once they graduate.

Ethical Statement

The students are free to opt in or out of the study at any point in time and the students understand the aim, benefits, and uses behind the study before they agree or disagree to join. Furthermore, the students who participated in the study had their information hidden from everyone else. Their report anonymizes personally identifiable data so that it can't be linked to other data by anyone else. Written informed consent was obtained by all students in order to students' rights protected.

Authors' Contributions

All authors made significant participation in the conception and design and all the performed data analysis and interpretation. All authors reviewed the article critically for important intellectual content. Finally, all authors approved the submitted version.

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Conflict of Interests

The authors declare that they have no competing interests.

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