

Research Article

The Effect of Taboo® and Kahoot Educational Games on Critical Thinking and Achievement Motivation Levels of Nursing Students

Tabu ve Kahoot Eğitim Oyunlarının Hemşirelik Öğrencilerinin Eleştirel Düşünme ve Başarı Motivasyonu Düzeylerine Etkisi

Alev YILDIRIM KESKİN^a, Birsal MOLU^b

^aDoç. Dr., Selçuk Üniversitesi Akşehir Kadir Yallagöz Sağlık Yüksekokulu Hemşirelik Bölümü, Konya, Türkiye

^bDoç. Dr., Selçuk Üniversitesi Akşehir Kadir Yallagöz Sağlık Yüksekokulu Hemşirelik Bölümü, Konya, Türkiye

Geliş tarihi/Date of receipt: 20/10/2025

Kabul tarihi/ Date of acceptance: 09/02/2026

ABSTRACT

Objective: This study aimed to evaluate the effect of the Taboo® game and Kahoot game adapted to the course on students' critical thinking skills and achievement motivation levels in the Infectious Diseases Nursing course.

Methods: The study was conducted in a quasi-experimental, pre-test-post-test design.

Results: The study was conducted with 73 nursing students (n=36 Taboo® game groups, n=37 Kahoot game groups) studying in the nursing department of a university in Turkey and taking the Infectious Diseases Nursing course. There was a statistically significant difference in the pretest and posttest knowledge mean scores between the Kahoot game group and the Taboo® game group ($p < 0.05$). A statistically significant difference was also found in the total mean scores of the Marmara Critical Thinking Scale and Achievement Motivation Scale of the Kahoot game group ($p < 0.05$).

Conclusion: Taboo® and Kahoot educational games affected students' critical thinking skills and achievement motivation levels. In this direction, it can be recommended to use educational games as in-class teaching techniques to increase the adaptation of nursing students to changing scientific and technological advances.

Keywords: Kahoot, Motivation, Game-Based Education, Taboo®

ÖZ

Amaç: Bu çalışma, Bulaşıcı Hastalıklar Hemşireliği dersinde öğrencilerin eleştirel düşünme becerileri ve başarı motivasyon düzeyleri üzerinde, derse uyarlanmış Tabu oyunu ve Kahoot oyununun etkisini değerlendirmek amacıyla yapılmıştır.

Yöntem: Çalışma, yarı deneysel, ön test-son test tasarımıyla gerçekleştirilmiştir.

Bulgular: Çalışma, Türkiye'deki bir üniversitenin hemşirelik bölümünde okuyan ve Bulaşıcı Hastalıklar Hemşireliği dersini alan 73 hemşirelik öğrencisi (n=36 Tabu oyun grubu, n=37 Kahoot oyun grubu) ile gerçekleştirilmiştir. Kahoot oyun grubu ile Tabu oyun grubu arasında ön test ve son test bilgi ortalama puanlarında istatistiksel olarak anlamlı bir fark bulunmamıştır ($p > 0,05$). Kahoot oyun grubunun Marmara Eleştirel Düşünme Ölçeği ve Başarı Motivasyonu Ölçeği toplam ortalama puanlarında da istatistiksel olarak anlamlı bir fark bulunmuştur ($p < 0,05$).

Sonuç: Tabu ve Kahoot eğitim oyunları, öğrencilerin eleştirel düşünme becerilerini ve başarı motivasyon düzeylerini etkilemiştir. Bu doğrultuda, hemşirelik öğrencilerinin değişen bilimsel ve teknolojik gelişmelere uyumunu artırmak için eğitim oyunlarının sınıf içi öğretim teknikleri olarak kullanılması önerilebilir.

Anahtar Kelimeler: Kahoot, Motivasyon, Oyun Tabanlı Eğitim, Tabu

ORCID IDs: AYK: 0000-0003-0981-5364, BM: 0000-0001-5144-286X

Sorumlu yazar/Corresponding author: Doç. Dr. Alev YILDIRIM KESKİN, Selçuk Üniversitesi Akşehir Kadir Yallagöz Sağlık Yüksekokulu Hemşirelik Bölümü, Konya, Türkiye

e-posta/e-mail: alevyildirim@selcuk.edu.tr

Atıf/Citation: Keskin AY, Molu B. (2026). The effect of Taboo® and Kahoot educational games on critical thinking and achievement motivation levels of nursing students. *Hemşirelik Bilimi Dergisi*, 9 (2), 246-261. doi: 10.54189/hbd.1805975



INTRODUCTION

The learning needs of nursing students are changing due to the rapidly developing knowledge and the impact of new technologies (Fonseca et al., 2016). This change is especially in the direction of making it difficult for students to focus on the lessons and for educators to lecture (Brown, 2018). Students can learn complex and deep information interestingly and engagingly through educational games integrated into the course, simulations, and virtual games used in laboratory environments (Boctor, 2013; Verkuyl et al., 2016). It is emphasized that educational programs (Bapoğlu et al., 2011) and games integrated into courses improve students' thinking, critical thinking, problem-solving, and skills (Lee et al., 2016).

Critical thinking is recognized as one of the 21st-century skills. Critical thinking is associated with closing the gap between theoretical knowledge and clinical practice, solving problems encountered in the clinic, managing the nursing process well, and thus improving patient care outcomes (Kim et al., 2018). Critical thinking is defined as an active, purposeful, organized mental process in which a person becomes aware of his/her own thought process, takes into account the thought processes of others, and transfers the information learned to practice (Semerci, 2016). Critical thinking brings along affective components such as curiosity, flexibility, mental skills, self-confidence, and objectivity. Critical thinking skills can be developed and changed through education (Castro et al., 2019). Critical thinking strategies in nursing education and practice include problem-based learning (PBL), simulation-based education, reflective thinking and journals, clinical guidance and mentoring, and active learning/interactive learning (Abrami et al., 2015; Carter et al., 2017; Shin et al., 2015). Factors affecting nursing students' critical thinking skills include individual factors such as age, education level, self-efficacy and motivation, and learning styles (Shin et al., 2018). Educational and environmental factors include teaching methods, clinical experience, the quality of the educational environment, and the quality of the faculty/clinical instructor (Carter et al., 2017). It is emphasized that it is important to integrate different education and training techniques into the courses to improve the critical thinking skills of nursing students (Casrto et al., 2019; Kim et al., 2018), to provide access to the most effective and appropriate educational materials and to create a game-based learning platform (Boctor, 2013; Gallegos et al., 2017; Johnsen et al., 2018).

The responsibility of nurse educators is to ensure the development of critical thinking skills in nursing students. Therefore, to promote critical thinking (Gholami et al., 2016; Kim et al., 2018) and achievement motivation in nursing students (Ozan et al., 2022; Saeedi et al., 2021; Sanaie et al., 2019); educators should research, implement and integrate educational models (educational games, drama, art lessons, elective courses, different methods, simulators, etc.) that provide effective education and training (Bapoğlu et al., 2011; Gallegos et al., 2017; Johnsen et al., 2018). It is stated that an educational program that supports critical thinking and increasing achievement motivation in nursing education is a convenience that can enable students to solve problems, cope, provide effective and safe patient care, increase job satisfaction, increase productivity, and be less affected by workload (Kim et al., 2018; Saeedi et al., 2021; Sanaie et al., 2019).

Lessons taught with traditional methods may not stimulate students' high-level thinking and critical reasoning (Rosa-Castillo et al., 2022). One of the factors that will positively affect students' learning outcomes is motivation. Motivation and success are processes that affect each other in both directions. With the developing technology, it is known that integrating educational games with different techniques that will increase students' motivation, enjoyment, and success in lessons can cause positive changes in active learning processes (Sharma, 2017). In a limited number of studies conducted with nursing students in the literature on this subject; it is emphasized that game-based learning has a significant effect on critical thinking, motivation, and learning strategies in nursing students (Topçu, 2023), increases academic motivation (Saeedi et al., 2021),

increases academic learning performances and success, and reduces anxiety levels (Mohamed et al., 2022; Öz & Ordu, 2021; Shawwa & Kamel, 2023; Turan & Meral, 2018).

In contrast to the results of these studies, in a study conducted with nursing students in the literature, in which the effects of question and answer and Kahoot game-based reinforcement on students' achievement and motivation levels were examined, it was concluded that no method was superior (Aras & Çiftçi, 2021). No study examines the effects of Taboo® and Kahoot educational games on students' critical thinking and achievement motivation levels together as reinforcement after traditional PowerPoint lectures in nursing education. For this reason, this study, it was aimed to evaluate the effects of the Taboo® game and Kahoot game adapted to the course on students' critical thinking skills and achievement motivation levels in the Infectious Diseases Nursing course as a course reinforcement after a traditional PowerPoint lecture to nursing students.

Research Questions

1. Educational games integrated into the curriculum in nursing education affect students' critical thinking skills.
2. Educational games integrated into the curriculum in nursing education affect students' achievement motivation status.

METHODS

Research Design

The study was conducted as a quasi-experimental research with pretest and posttest design. It was carried out between February 8, 2023–May 18, 2023 with second-year students taking the Infectious Diseases Nursing course at the Nursing Department of the School of Health of a university.

Population and Sample

The population of the study consisted of 83 students studying in the second year of the nursing department of the School of Health of a University and taking the Infectious Diseases Nursing course. The sample of the study was based on the study conducted by Aras & Çiftçi (2021) and power analysis was calculated with the G-power program. According to the results of the power analysis performed according to the sample study, it was calculated that for 80% power, it was necessary to have at least 30 participants in each group for the difference between the control and experimental groups to be significant at a margin of error of at least 5% in the 95% confidence interval. When a 10% loss that may occur during the research was added to this number, it was planned to take at least 33 participants for both groups. In the Experimental/Taboo® game group (42 people), 2 students retook the course, and 4 students who were absent and participated in the pre-test but did not participate in the post-test, and in the Control/Kahoot game group (41 people), 1 student who retook the course and 3 students who were absent and participated in the pre-test but did not participate in the post-test were excluded from the study. The study was completed with 73 students. Criteria for inclusion in the study; being a 2nd year nursing student, not having received education within the scope of Infectious Diseases Nursing course before and voluntary participation, students must have a cell phone to use the Kahoot app, internet access is required for Kahoot to work. Exclusion criteria; students who were absent during the data collection dates and students who wanted to leave the study for any reason (Fig. 1).

In this study, the determination of the Taboo® (experimental) and Kahoot (control) groups was based on the routine A-B branch assignment previously made by the student affairs office. Although students from each branch were then placed

into groups using a lottery method, this method does not provide completely random assignment. Therefore, there is a risk of the groups not being perfectly equal at the outset and selection bias occurring. To reduce this potential bias, both groups took the same course content, were taught by the same instructor, and completed the same 14-week curriculum before the intervention. Furthermore, differences in initial knowledge levels between the groups were statistically controlled to improve internal validity.

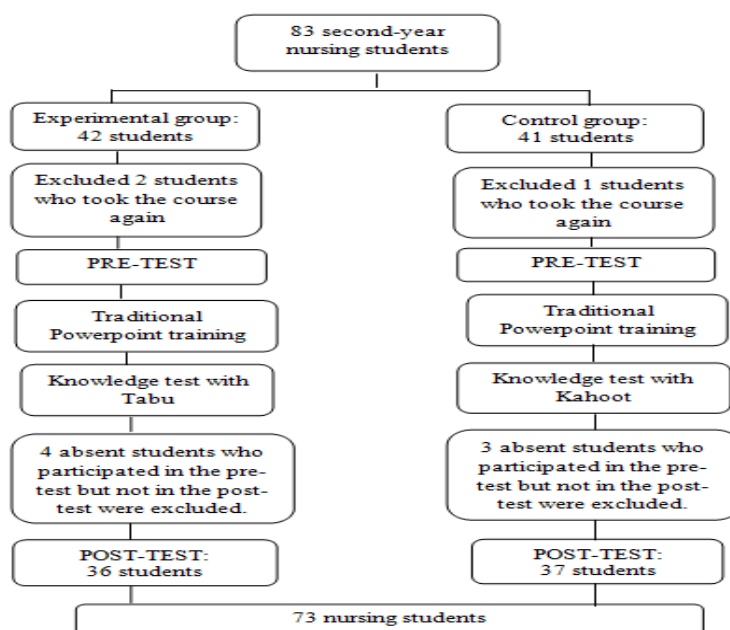


Figure 1. Study Flowchart

Data Collection

Taboo® Game

Taboo® game is played with cards (252 cards), with a minimum of 6 people and a maximum of 12 people in two teams, the number of people in the group must be equal. In the Taboo® game, there is a narrator group and a listening group. The game includes Taboo® word cards, a Taboo® whistle, a score book, game-changing dice, Taboo® mascot. It is forbidden to use Taboo® words in the game, the first rule of the game is to tell without using the forbidden words under the word. The time is determined with an hourglass or a wristwatch to tell the words. According to the card game rules in the Taboo® Game, the course topics covered in the Infectious Diseases Nursing course were adapted to the cards. Each card contains the most known words related to the Infectious Diseases Nursing Course topics to be guessed and these words are forbidden words. The game aims to explain the symptoms and prevention methods written on the relevant cards specific to the diseases to the team group mates without using 4-5 prohibited words related to the Infectious Diseases Nursing course topics on the cards in the Taboo® game and by following the rules. The cards prepared on the symptoms and prevention methods of infectious diseases within the course topics adapted to the lesson are thoroughly mixed before starting the game. One person from the group is selected as the narrator. Optionally, the narrators can also choose to use a sketchbook at the beginning of the game. The person who will narrate the subject takes 3 cards from 42 game cards adapted according to the course unit topics and the 15-minute period starts with the narration. In the meantime, the listening group checks the narrator's cards and duration with a wristwatch to check the forbidden words and the duration. Each narrator must tell a single card chosen by the group in 15 minutes and a total of 3 cards in 45 minutes. The game aims to explain the information about the disease, symptoms,

and prevention methods written on the cards that the narrator receives until the time is over according to the wristwatch without using prohibited words. If the narrator group accidentally utters one of the forbidden words related to the lesson topic on the adapted game cards or if there is a violation of the game rule, a warning is given by the selected people in the listener group. The team gets points for each topic word that the narrating group successfully narrates. For each word passed or warned, the listening group gets one point. At the end of the game, the group with the highest score wins the game (Fig.2).

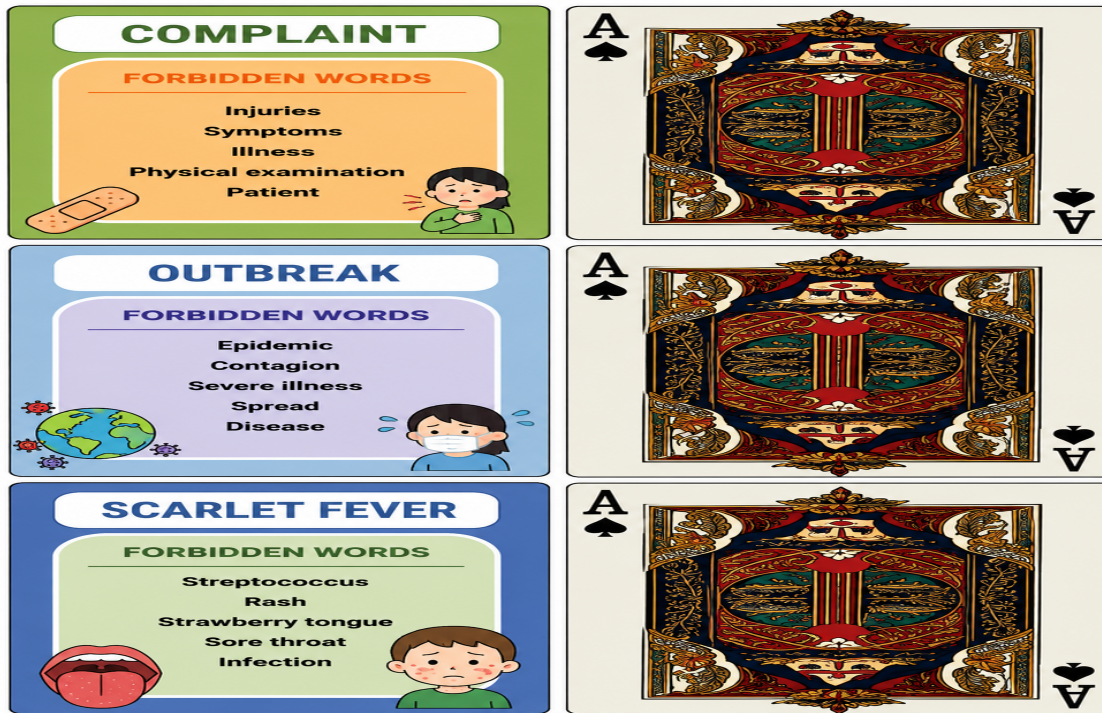


Figure 2. Taboo® Card

Kahoot Game

Kahoot game is a learning tool that facilitates entertainment-based learning that can be accessed via a mobile phone or smart device with an internet connection. With Kahoot, gamified training can be prepared in 4 different categories: quiz, discussion, survey, and mixing. Before the study, everyone was allowed to download the mobile applications to their mobile phones by registering on kahoot.com. A pool of 15 multiple-choice questions was created for the students considering the subject contents to be evaluated in the lesson. Each question has only one correct answer and the time to answer each question is limited to 60 seconds. It was prepared to include at least 1 question about all 14-week units seen during the semester (Fig.3).

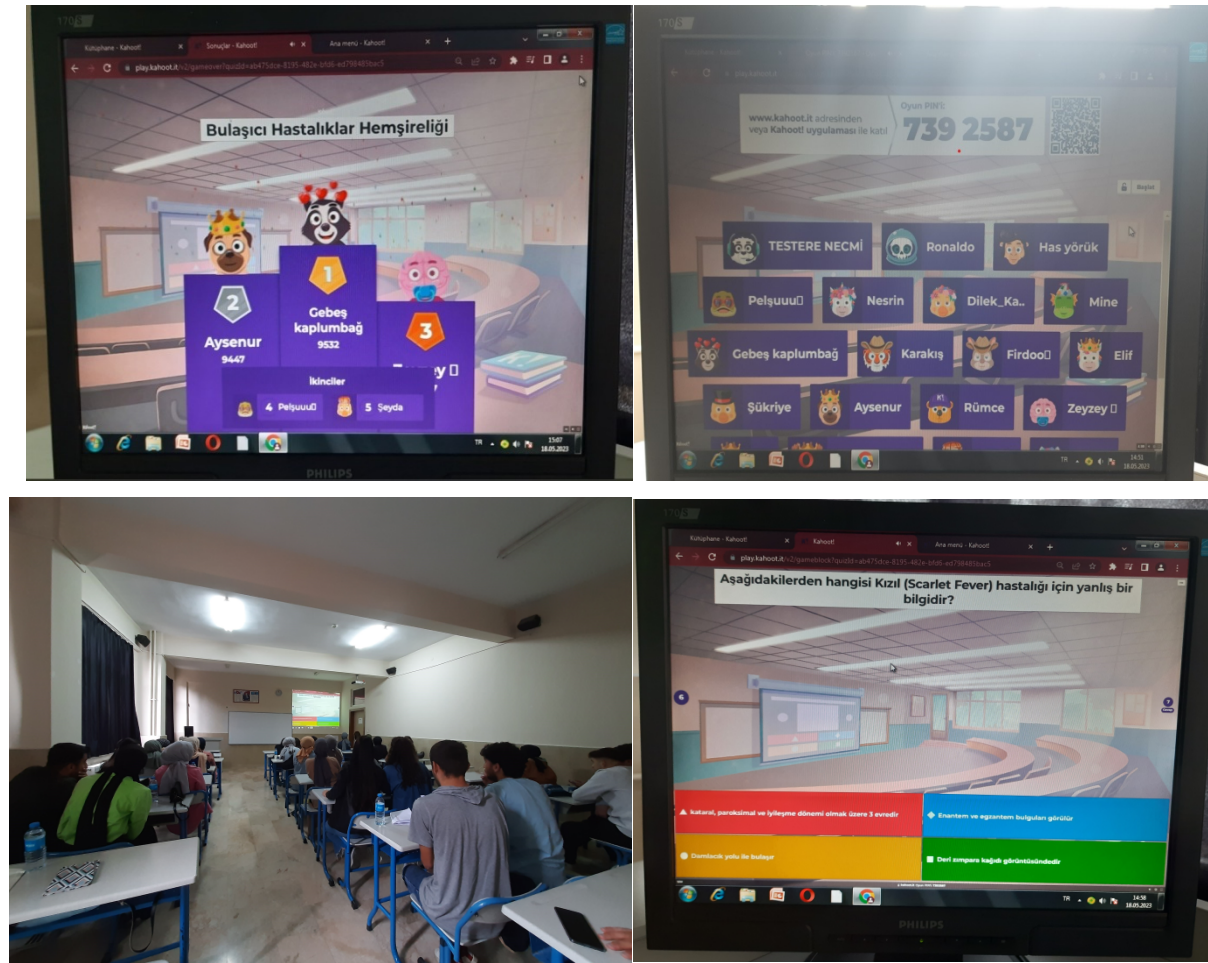


Figure 3. Kahoot Game

Application and Instructional Material/Application

In the study, 2nd year nursing students are routinely divided into A and B branches by student affairs from the 1st grade. The students of Branch A, whose school number was odd, were divided by lot into the Experiment/Taboo® Game Group, and the students of Branch B, whose school number was even, were divided by lot into the Control/Kahoot Game Group. The Infectious Diseases Nursing course is taught to both groups by the same lecturer using the traditional PowerPoint method throughout the semester. This course is a compulsory 2-credit course given to nursing students in a single semester in the Spring term of the 2nd year, for a total of 14 weeks. Within the scope of this research, educational games were used as reinforcement games in learning after the completion of all the units constituting the subject content. Within the scope of this course, in the spring term; infectious diseases, childhood infectious diseases, infections, and general characteristics, notification and isolation of infectious diseases, infectious diseases, protection from infections and immunization, vaccines and their applications, diseases transmitted by blood and ways of prevention, diseases transmitted by respiratory system and ways of prevention, diseases transmitted by digestive system and ways of prevention, diseases transmitted by skin-mucosa and ways of prevention, zoonotic diseases and ways of prevention, sexually transmitted diseases and ways of prevention. Before starting to use the educational games within the scope of the Infectious Diseases Nursing course, the instructions for the games were explained to the students in both groups (experiment 1 and experiment 2) and the Kahoot application was downloaded to the mobile mobile phone devices of the students in the experiment 2 group and they were enabled to use it online. Before both games, the questions in the data collection form were applied to the students as a pre-test. Both games were applied to the students in the experimental 1 and experimental 2 groups according to their rules to reinforce the subjects

learned in the lessons at the end of the 14-week course program. Afterward, post-test questions were applied to both groups. Experiment 1 Taboo® educational game group (40 people in total) was formed into 4 groups of 10 people each. These 4 groups were determined as 2 narrator groups and 2 listener groups. Experiment 2 group is the Kahoot educational game group consisting of 40 people.

Although Taboo® and Kahoot games differ structurally, the intervention process was conducted according to a standard protocol for both groups. Before the intervention, all students were given detailed instructions regarding the purpose, rules, and method of use of the games. The intervention was implemented after the completion of all 14 weeks of theoretical content within the scope of the Infectious Diseases Nursing course. The intervention lasted a total of 45 minutes for both groups and consisted of the following stages:

- 1. Preparation Stage (5 minutes):** Students were informed about the game rules, scoring system, and group roles.
- 2. Intervention Stage (30 minutes):** The Taboo® group completed three rounds of game-based reinforcement activities with concept cards prepared in line with the course objectives. The Kahoot group completed a gamified assessment consisting of 15 multiple-choice questions, each lasting 60 seconds.
- 3. Post-Intervention Stage (10 minutes):** A post-test was administered to both groups in a supervised classroom setting. All stages of the intervention process were conducted by the same instructor, thus eliminating variability that might arise from instruction. Instructional materials used for both groups were prepared according to the same course learning objectives, ensuring content equivalence.

The Kahoot question pool was developed in consultation with three experts in the field. Prior to the study, a pilot program was conducted with 5 students to test the clarity of the survey questions. Corrections were made to any questions that were unclear.

The question pool to be used in the Kahoot application was prepared by the researcher, taking into account the topics to be covered in the course. Accordingly, a total of 15 multiple-choice questions were created. Each question was structured with one correct answer and three incorrect options, with a response time of 60 seconds. The draft questions were reviewed by the course instructor for language and clarity; minor corrections were made to ensure suitability for the student level, clarity of the question stems, and functionality of the options. After these adjustments, it was ensured that the questions represented the relevant content within the course, and the final 15-item question pool was uploaded to the Kahoot platform. Before the application, all students were informed to create an account on kahoot.com and download the mobile application to their devices.

Data Collection Tools

The data were collected with the "Student Sociodemographic Characteristics and Information Test Form", Taboo® and Kahoot Game, "Marmara Critical Thinking Disposition Scale" and "Achievement Motivation Scale" prepared by the researchers in line with the literature.

Student Sociodemographic and Information Test Form: It is a form prepared by the researchers who examined the demographic characteristics of the students such as age, gender, socio-economic level, and game satisfaction levels.

The Information Test Form: Contains 12 questions covering demographic characteristics. The first 5 questions include age, gender, family type, family income level, and academic achievement. The remaining 7 questions are: Have you played educational games before? Did educational games like Taboo® and Kahoot help you reinforce and learn your lesson topics? Did reinforcing your lesson topics with adapted Taboo® and Kahoot educational games motivate you? Do you think educational games like Taboo® and Kahoot improve your critical thinking skills? Do you think educational games will

improve your lesson success/academic performance level? Did educational games facilitate the understanding of the lesson content studied in class? Would you like to see these and similar educational games used in other courses? The information form also contains 15 questions for the trainings.

Knowledge Test: A multiple-choice knowledge test developed by researchers was used to assess students' knowledge levels before and after the intervention. The test was prepared based on the learning objectives and weekly content of the Infectious Diseases Nursing course. The final version of the test consists of a total of 15 multiple-choice questions, each containing one correct answer and three distractors. Each correct answer is worth 1 point, and incorrect answers are worth 0 points; thus, the maximum score the test could receive is 15. All items were equally weighted, and no partial scoring was applied. The draft questions were reviewed by the course instructor for clarity, scope appropriateness, and comprehensibility. In addition, three external academics specializing in nursing education evaluated the test items for content validity and suitability for measuring knowledge at the undergraduate level. Corrections were made to the wording in line with expert opinions. The test was prepared to cover all unit content of the 14-week course. To increase the transparency of the assessment tool, two sample questions are presented below without compromising the integrity of the entire test:

Sample Question 1: "Which of the following is the primary isolation method for airborne infectious diseases?"

Sample Question 2: "Which of the following symptoms is most commonly associated with viral childhood infections?"

This assessment tool was used in both pre-test and post-test phases to compare the effect of two different gamification methods on knowledge acquisition.

Marmara Critical Thinking Dispositions Scale (MCTDS): Marmara Creative Thinking Dispositions Scale was developed by Özgenel and Çetin (2017). The scale consists of 28 items and six subdimensions (self-discipline, novelty seeking, courage, curiosity, doubt, and flexibility). Reasoning: 1, 2, 3, 4, 5, 6, Making judgments: 7, 8, 9, 10, 11, 12, Evidence seeking: 13, 14, 15, 16, Truth seeking: 17, 18, 19, 20, Open-mindedness: 21, 22, 23, 24, Systematicity: 25, 26, 27, 28). Items are rated on a five-point Likert-type scale (1=never, 2=rarely, 3=sometimes, 4=usually, 5=always). The total score ranges from 25 to 125 (Özgenel & Çetin, 2017). The scale measures adults' general critical thinking tendencies. Flexibility is defined as the ability to approach ideas and solutions from different angles and present different perspectives simultaneously (Dietrich, 2004; Ferrari et al., 2009; Runco et al., 2010). Creative thinking requires the courage to take risks, tolerance, and self-discipline. Creativity, on the other hand, is the transformation of knowledge, ideas, or objects into new things (Ayas & Sak, 2014; Gross et al., 2020; Putranta & Supahar, 2019). The Cronbach's alpha value of the scale is 0.87 (Özgenel & Çetin, 2017). In this study, the Cronbach's alpha value of the overall scale was found to be 0.77.

Achievement Motivation Scale (AMS): The scale prepared by Saritepeci (2016) based on the achievement motivation explained by Eccles et al. (1993) and Wigfield and Eccles (2000) within the scope of expectancy-value theory was adapted to the high school level. The scale, which is based on expectancy and value theory, is a 5-point Likert type and each item is rated as "1=Strongly Disagree, 2=Disagree, 3=Undecided, 4=Agree, 5=Strongly Agree. The scale consists of 9 items and 2 factors. The first factor consists of "expectation and value" (questions 1, 2, 3, 4, 5, 6, 7) and the second factor consists of "belief in success" (questions 8 and 9). There are no items that require reverse scoring in the scale. The Turkish validity and reliability of the scale were conducted by Saritepeci (2018). In the study, the Cronbach Alpha value of the overall scale was 0.83. In this study, the Cronbach Alpha value of the overall scale was found to be 0.92.

Data Analysis

The data were evaluated on the computer using the SPSS 22 program. Frequency, mean, percentage, standard deviation, Paired Sample t-test, One Way ANOVA and Chi-square test were used. The difference between pre-test and post-test scores was analyzed using the dependent samples t-test. The effect size was calculated using the Cohen's d value, $d = t / \sqrt{n}$ formula. Means were calculated by checking pre-test scores as covariates. $p < 0.05$ was considered statistically significant.

Ethical Considerations

To implement the study and collect the data, permission was obtained from Selçuk University Akşehir Kadir Yallagöz School of Health (E-86792508-900-429349), Selçuk University Faculty of Medicine Local Ethics Committee (Decision number: 2023/37), verbal and written consent from the students who would participate in the study, and permission to use the scale via e-mail from the relevant people. This study was conducted by the World Medical Association (WMA) Declaration of Helsinki (and/or World Psychiatric Association HAWAII Declaration) Good Clinical Practices.

RESULTS

Table 1 shows some characteristics of the students in the Taboo® group and Kahoot group. The mean age of the students was 20.78 ± 0.88 , the youngest was 19 years old and the oldest was 24 years old. It was determined that 63.9% of the students in the Taboo® group were female, 88.9% were from nuclear family, 75.0% of them had income equal to their expenses, and 75.0% of them had moderate academic achievement (Table 1). When the distribution of the characteristics between Taboo® and Kahoot groups was compared, it was seen that the difference was significant in terms of family type and academic achievement and these variables were not similar for both groups ($p < 0.05$) (Table 1).

Table 1. Distribution and Comparison of Individual and Family Characteristics of the Groups (N=73)

Features	Taboo® Group (n=36)	Kahoot Group (n=37)		Test and Significance Value			
Averaged Age (Mean±SD)		(Min.: 19, Max.: 24, Mean±SD = 20.78±0.88)					
		n	%	n	%	x ²	p
Gender	Female	23	63.9	27	73.0	0.340	0.560
	Male	13	36.1	10	27.0		
Family type	Nuclear family	32	88.9	26	70.3	4.179	0.042*
	Extended family	4	11.1	10	27.0		
	Fragmented family	0	0	1	2.7		
Family income level	Income less than expenditure	8	22.2	6	16.2	0.677	0.713
	Income equals expenditure	27	75.0	29	78.4		
	Income more than expenditure	1	2.8	2	5.4		
Academic success status	Good level	5	13.9	0	0	8.273	0.016*
	Moderate	27	75.0	26	70.3		
	Low level	4	11.1	11	29.7		

* $p < 0.05$: statistically significant; N: total number of participants; n: number of participants in each group; %: percentage; SD: standard deviation; Min: minimum; Max: maximum; χ^2 : chi-square test; p: significance value

According to Table 2-a, since pre-test scores showed significant differences between groups, pre-test scores were included in the model as covariates when analyzing post-test scores. According to the ANCOVA results, pre-test scores have a significant effect on knowledge test post-test scores ($F(1,70) = 32.437$, $p < 0.001$, $\eta^2 = 0.317$).

When pre-test scores were checked, no statistically significant difference was found between groups A and B in terms of knowledge test post-test scores ($F(1,70) = 3.118$, $p = 0.082$, $\eta^2 = 0.043$). This finding shows that the effect of the applied

teaching method on knowledge test post-test scores did not reach the level of statistical significance when the pre-test level is considered.

The assumption of homogeneity of variances was evaluated with the Levene test, and it was determined that this assumption was met ($F=0.024$, $p=0.877$).

Table 2-a. ANCOVA Results for Post-Test Scores of the Knowledge Test Adjusted According to Pre-Test Scores Dependent Variable: GROUP Post Test Total

Source	KT	sd	KO	F	p	Partial η^2
Pre Test (Kovaryat)	2996.739	1	2996.739	32.437	<0.001	0.317
Group (A – B)	288.059	1	288.059	3.118	0.082	0.043
Error	6466.990	70	92.386	—	—	—
Total	—	73	—	—	—	—

ANCOVA: analysis of covariance; KT: sum of squares; sd: degrees of freedom; KO: mean square; F: F-statistic; p: significance value; η^2 : eta squared; Partial η^2 : partial eta squared; A–B: comparison between groups A and B

Although the adjusted mean scores were higher in group B, this difference was not statistically significant. However, the small-to-moderate effect size ($\eta^2=0.043$) suggests that the method's effectiveness could be more clearly demonstrated in studies with larger sample sizes.

Tablo 2-b. Adjusted Post-Test Mean Scores

Group	n	Adjusted Mean	SH
Group A	36	62.53	2.06
Group B	37	72.92	1.97

Means were calculated by checking pre-test scores as covariates. N: number of participants; SH: standard error; Adjusted Mean: estimated marginal mean adjusted for pre-test scores; Group A: Taboo® group; Group B: Kahoot group

Table 3 shows the comparison of the pre-test and post-test mean scores and total score distributions of the students who received lesson reinforcement with Taboo® and Kahoot groups. A statistically significant difference was found between the pre-test and post-test MCTDS scale mean scores of the group that received lesson reinforcement with the Taboo® game and the sub-dimensions of reaching judgment ($p=0.003$) and evidence ($p=0.020$) (Table 3). In the group that received lesson reinforcement with Kahoot, a significant difference was found between the pre-test and post-test MCTDS scale mean scores in the sub-dimension of seeking evidence ($p=0.042$). It was determined that the difference between the pre-test and post-test AMS expectancy sub-dimension and value ($p=0.015$), belief in success sub-dimension ($p=0.021$), and AMS total mean scores ($p=0.010$) of the group that received lesson reinforcement with Taboo® game was statistically significant (Table 3).

In the Taboo® and Kahoot groups, no significant difference was found between the pre-test and post-test total mean scores of the MCTDS scale ($p>0.05$) (Table 3). In the Kahoot group, no significant difference was found between the pre-test and post-test total mean scores of the AMS scale ($p>0.05$) (Table 3).

Table 3. Comparison of Taboo® and Kahoot Game Groups' MCTDS and AMS Subscale and Total Score Means (N=73)

Scales and sub-dimensions	Taboo® Group (n=36)		p*	Kahoot Group (n=37)		p*
	Pre-Test Mean±SD	Post Test Mean±SD		Pre-Test Mean±SD	Post Test Mean±SD	
Reasoning	4.18±1.66	4.08±0.56	0.692	4.19±0.62	4.07±0.52	0.275
Access to Justice	3.87±0.62	4.15±0.55	0.003*	4.09±0.49	4.14±0.53	0.569
Evidence Search	3.91±0.74	4.18±0.73	0.020*	4.31±0.50	4.07±0.55	0.042*
Searching for Truth	3.95±0.65	4.13±0.53	0.078	4.14±0.54	3.98±0.53	0.201
Open-mindedness	4.27±0.48	4.31±0.58	0.769	4.36±1.23	4.24±0.51	0.560
Systematicity	4.04±0.60	4.04±0.60	-	4.22±0.48	4.22±0.48	-
Total MCTDS	113.02±19.57	116.27±14.01	0.258	118.13±11.02	115.56±11.98	0.193
p	p< 0.001					

Table 3. Comparison of Taboo® and Kahoot Game Groups' MCTDS and AMS Subscale and Total Score Means (N=73) (Devamı)

Expectation and Value	26.97±4.67	28.83±3.18	0.015*	28.62±5.30	27.94±6.42	0.657
Belief in Success	6.58±1.62	7.41±1.55	0.021*	7.78±1.66	7.24±1.62	0.189
Total AMS	33.55±5.97	36.25±4.46	0.010*	36.40±6.69	35.18±7.69	0.514
p	p< 0.000					

*Paired Sample t-Test (Comparison of pre-test and post-test mean scores of the same group), One-Way ANOVA (Comparison of pre-test and post-test mean scores of two independent groups)

In Table 4, the difference between pre-test and post-test knowledge scores was found to be statistically significant ($t(72) = 11.43$, $p < 0.001$). The calculated effect size (Cohen's $d = 1.34$) shows that the educational intervention has a very large effect on the knowledge level.

Table 4. Comparison of Pre-Test – Post-Test Knowledge Scores and Effect Size

Comparison	N	Mean Difference (Pre-Test–Post-Test)	SD	t (sd)	p	Cohen's d	Effect Level
Pre-Test – Post-Test	73	-14.86	11.11	-11.43 (72)	<0.001	1.34	Very Large Effect

The difference between pre-test and post-test scores was analyzed using the dependent samples t-test. The effect size was calculated using the Cohen's d value, $d = t / \sqrt{n}$ formula. N: total number of participants; SD: Standard Deviation; t: t-test statistic; sd: degrees of freedom; p: significance value; d: Cohen's d effect size

Note: The pre-test and post-test scores were compared using a paired-samples t -test. Effect size was calculated using Cohen's d ($d = t/\sqrt{N}$). An effect size of $d = 1.34$ was interpreted as a very large effect

DISCUSSION

Nowadays, with the developing technology, educational games are shown as an important teaching method in nursing education in the development of student's critical thinking, critical thinking, and cognitive processes for evidence-based nursing practices. It is expected that the millennial generation, which grows up intertwined with technology, will find educational games as a teaching method interesting and can easily use them, and the knowledge level of students is expected to increase compared to standard theoretical education (Kulakaç & Çilingir, 2023; Şahin & Başak, 2019). The importance of nurse educators creating opportunities with new materials that will increase students' academic success and motivation is emphasized (Mohamed et al., 2022; Öz Özaras & Ordu, 2021; Saeedi et al., 2021; Topçu, 2023; Turan & Meral, 2018). Students can use interactive models such as simulations, case studies, problem-solving techniques, educational games, etc. to increase their decision-making, critical thinking skills, and motivation for success (Gómez-Urquiza et al., 2019; Sanaie et al., 2019; Turan and Meral, 2018).

When pre-test scores were checked, no statistically significant difference was found between groups A and B in terms of knowledge test post-test scores (Table 2). This shows that the mean pre- and post-test knowledge scores of the Taboo® and Kahoot groups are statistically different from each other (Table 2). Similar to our findings, Aras & Çiftçi (2021) examined the effect of question-and-answer and Kahoot game methods on the achievement and motivation levels of nursing students. Their study showed that the post-exam achievement scores of students in the Kahoot group increased, but there was no significant relationship between the Kahoot group and the question-and-answer group in terms of average achievement and motivation scores, and neither method was superior to the other. Studies in the literature examine the effects of Kahoot games and game-based education on learning success, class participation, critical thinking skills, peer learning, test anxiety, and anxiety in nursing and physiotherapy students (Mohamed et al., 2022; Perez-Cortes et al., 2023; Topçu, 2023; Turan & Meral, 2018). These studies concluded that students in the Kahoot game group had higher academic achievement results. These findings do not show similar characteristics to the findings of our study. Different results regarding the effect of games are found in the literature. It is thought that the differences in the results of our study may be due to the differences in the initial pre-test results. Considering the different results, it suggests that educational games like Kahoot can be used as an effective tool in learning,

positively affect students' achievement performance, and are a useful learning platform that can be integrated into the nursing education system.

No statistically significant difference was found between the total mean scores of the MCTDS and AMS in the Taboo® and Kahoot groups. However, a significant difference was found between the MCTDS scores and the dimensions of judgment and evidence seeking in the group reinforced with the Taboo® game (Table 3). In the group that received lesson reinforcement with Kahoot, a significant difference was found between the scores of the MCTDS evidence seeking dimension. Ismail et al. (2019), in their study using the Kahoot educational game with medical students, emphasized that it was promising in terms of students identifying the topics they need to research, being aware of what they have learned, and making formative assessments. Topçu (2023) examined the effect of game-based learning on the motivation and learning strategies of nursing students and stated that students scored significantly higher in critical thinking, help-seeking, peer learning, and metacognitive self-regulation in the final test. Similar findings to the results of our study exist in the literature; Web-based learning strategies and educational games like Kahoot have been shown to increase student interaction and knowledge/skill scores (Bilik et al., 2020; Park et al., 2020), motivate them, and improve their academic performance (Felszeghy et al., 2019; Ferriz-Valero et al., 2020). These findings suggest that educational games like Kahoot increase students' classroom communication and interest in the lesson, and that reinforcing lessons with educational games can be beneficial in nursing, as in other disciplines, and that incorporating them into daily classroom routines is important.

A significant difference was found between the pre-test and post-test AMS expectation, value, belief in success dimensions and the total AMS mean scores of the group that received lesson reinforcement with the Taboo® game (Table 3). Due to reasons such as the development of technology and the increase in the number of university students, the importance of including different educational tools in courses to increase students' interest and success in the course and to meet their expectations is increasing (Bouchrika et al., 2021; Ferriz et al., 2020). In the literature, it is stated that game-based learning increases the success and participation rates of students (Perez et al., 2023; Shawwa & Kamel, 2023; Turan & Meral, 2018), and that games such as Kahoot are interactive tools used to increase students' participation in the course and their attitudes towards learning, to support problem-solving and critical thinking, and to increase their satisfaction and motivation (Shawwa & Kamel, 2023; Özüztürk et al., 2023). Research has consistently shown that game-based learning can have a positive impact on nursing students by improving their critical thinking skills (McEnroe-Petitte, 2020; Xu, 2021; Zeffiro, 2020). In light of these findings, it is considered important to expand the use of different educational games in the field of education to enhance success.

Our study found that educational interventions had a significant impact on the knowledge levels of nursing students. Students' pre-test knowledge scores were at a moderate level, while their post-test knowledge scores were above average (Table 4). A study comparing the effect of Kahoot application on students' achievement motivation levels in the fundamentals of nursing course, which supports our findings, concluded that students in the Kahoot group had higher levels of academic knowledge, participation, and motivation (Castro et al., 2019; Elsayed et al., 2025; Öz Özaras, 2023). Based on these study results, considering that educational games like Kahoot and Taboo® increase the rate of correct answers to knowledge questions, encourage competition, and ensure active participation in learning processes, it is considered important to use educational games in classroom learning environments.

Kahoot is a safe learning method due to its instant feedback feature, ease of use, and provision of real-time feedback in a secure environment (Ismail et al., 2019; Toothaker, 2018). One of Kahoot's most important advantages is that it creates a

competitive environment among students and establishes a scoring ranking based on the number of correct answers and reaction time (Sheng et al., 2019). The literature indicates that students will spend a long time with course materials, and their motivation can be increased through well-organized gamification processes via interaction, such as Kahoot (Sanaie et al., 2019). It has been reported that teaching methods used in nursing students increase academic motivation (Saeedi et al., 2021; Zhang & Yu, 2022). As in all other fields of study, motivation is important in improving educational success in nursing. Considering the importance of academic motivation in nursing education alongside advancing technology, it has become imperative to research and identify effective solutions and interventions to develop students' critical thinking skills and enhance their academic achievement and motivation.

Limitations

This study is limited to 2nd year students studying nursing at a university in Turkey and taking the Infectious Diseases course. The slow wifi internet speed and connection in the school caused a loss of time for the students to install the Kahoot program on their phones and the speed of their answers to the questions. In addition, the fact that Kahoot is limited to creating questions caused difficulties in the creation of questions. Similarly, the preparation of forbidden words for Taboo® cards according to the course subject content caused a long time to be spent. In addition to this situation, in the Taboo® game, students tried to explain the disease or condition interactively in the classroom without using the prohibited words related to the course subjects prepared on both information and game cards, which enabled them to experience group interaction and dynamics. In Kahoot, students had the experience of answering individually prepared questions rather than in-group experience. The inclusion of a control group without game reinforcement in this study limits our ability to draw firm conclusions about the effects of these techniques on critical thinking and achievement motivation. The high levels of satisfaction reported in both game groups provide some evidence for the potential benefits of educational games used as a reinforcement tool in nursing education.

In this study, the determination of the Taboo® (experimental) and Kahoot (control) groups was based on the routine A-B branch assignment previously made by the student affairs office. Although the students of each branch were then placed into groups using a lottery method, this method does not provide perfectly random assignment. Therefore, there is a risk that the groups may not be perfectly equal at the outset and that selection bias may occur.

CONCLUSION

Taboo® and Kahoot educational games were found to be effective on students' level of reaching judgment and seeking evidence in critical thinking. In addition, the Taboo® game was found to be more effective in increasing student achievement and motivation than Kahoot. Our data result, which is another proof of this situation, was that the pre-test and post-test knowledge scores of the students before and after the Taboo® and Kahoot educational games were significantly higher. Our study revealed that two different educational games applied to nursing students positively affected their knowledge scores and achievement motivation. As suggested by the results of the study, nurse educators can use new student-centered educational activities that involve students' abilities to keep up with changing information and technology, to increase students' interest in the course, critical thinking skills, and achievement motivation. For future studies, it is recommended to use reinforcements with a larger sample group and educational games at the end of the course at more frequent intervals. In addition, students' views on educational games can be analyzed more deeply by using quantitative and qualitative mixed methods.

Araştırmanın Etik Yönü/Ethics Committee Approval: To implement the study and collect the data, permission was obtained from Selçuk University Akşehir Kadir Yallagöz School of Health (E-86792508-900-429349), Selçuk University Faculty of Medicine Local Ethics Committee (Decision number: 2023/37), verbal and written consent from the students who would participate in the study, and permission to use the scale via e-mail from the relevant people. This study was conducted by the World Medical Association (WMA) Declaration of Helsinki (and/or World Psychiatric Association HAWAII Declaration) Good Clinical Practices.

Hakem/Peer-review: The external referees are independent.

Yazar Katkısı/Author Contributions: Study Conception: AYK, BM; Study Design: AYK, BM; Data collection and/or Processing: AYK, BM; Statistical Analysis and/or Data Interpretation: AYK, BM; Literature Review: AYK, BM; Manuscript Preparation: AYK, BM; Critical Review: AYK, BM.

Çıkar Çatışması/Conflict of Interest: The authors declare that they have no conflicts of interest.

Finansal Destek/Financial Disclosure: The author received no financial support for the research, authorship, and/or publication of this article.

Teşekkür/Acknowledgement: We would like to thank all the students who participated in our study for their valuable contributions and participation.

Yapay Zeka Kullanım Beyanı/AI Usage Statement: Artificial intelligence or AI-assisted tools were not used in this study.

Yazar Notu/Author Note: This study was not derived from a thesis and has not been presented as a conference abstract or presentation.

KAYNAKLAR

- Abrami PC, Bernard RM, Borokhovski E, Waddington DI, Wade A, Persson T. (2015). Strategies for teaching students to think critically: A meta-analysis. *Review of Educational Research*, 85(2), 275–314. <https://doi.org/10.3102/0034654314551063>
- Aras NG, Çiftçi B. (2021). Comparison of the effect of reinforcement with question-answer and Kahoot method on the success and motivation levels of nursing students: A quasi-experimental review. *Nurse Education Today*, 102, 104930. <https://doi.org/10.1016/j.nedt.2021.104930>
- Ayas MB, Sak U. (2014). Objective measure of scientific creativity: Psychometric validity of the Creative Scientific Ability Test. *Thinking Skills and Creativity*, 13, 195–205. <https://doi.org/10.1016/j.tsc.2014.06.001>
- Bapoğlu SS, Açıkgöz F, Kapısız Ö, Yılmaz Ö. (2011). Uso del método teatral en el desarrollo de habilidades de pensamiento crítico de los estudiantes de enfermería. *Revista del Instituto Universitario de Ciencias de la Salud de Düzce*, 1(3), 17–21.
- Bilik Ö, Bilik EA, Kankaya Z, Deveci. (2020). Effects of web-based concept mapping education on students' concept mapping and critical thinking skills: A double blind, randomized, controlled study. *Nurse Education Today*, 86, 104312. <https://doi.org/10.1016/j.nedt.2019.104312>
- Boctor L. (2013). Active-learning strategies: The use of a game to reinforce learning in nursing education: A case study. *Nurse Education in Practice*, 13(2), 96–100. <https://doi.org/10.1016/j.nepr.2012.07.010>
- Bouchrika I, Harrati N, Wanick V, Wills G. (2021). Exploring the impact of gamification on student engagement and involvement with e-learning systems. *Interactive Learning Environments*, 29, 1244–1257. <https://doi.org/10.1080/10494820.2019.1623267>
- Brown T. (2018). Using Jenga to teach risk management concepts to senior nursing students. *Journal of Nursing Education*, 57(12), 765. <https://doi.org/10.3928/01484834-20181119-12>
- Carter AG, Creedy DK, Sidebotham M. (2017). Critical thinking skills in midwifery practice: Development of a self-assessment tool for students. *Midwifery*, 50, 184–192. <https://doi.org/10.1016/j.midw.2017.04.010>
- Castro JM, Lopez M, Cao JM, Castro-Fernandez M, Garcia S, Frutos M, et al. (2019). Impact of educational games on academic outcomes of students in the Degree in Nursing. *PLoS ONE*, 14(7), e0220388. <https://doi.org/10.1371/journal.pone.0220388>

- Dietrich A. (2004). The cognitive neuroscience of creativity. *Psychonomic Bulletin & Review*, 11(6), 1011–1026. <https://doi.org/10.3758/BF03196731>
- Eccles J, Wigfield A, Harold R, Blumenfeld P. (1993). Age and gender differences in children's self- and task perceptions during elementary school. *Child Development*, 64(3), 830–847. <https://doi.org/10.2307/1131221>
- Elsayed SH, Ahmed MG, Mahmoud IS, Araby MS. (2025). Relation between nursing students' attitude toward Kahoot game as web-based assessment tool and academic engagement. *Journal of Nursing Science*, 6(2), 685–695.
- Felszeghy S, Pasonen-Seppänen S, Koskela A, Nieminen P, Härkönen K, Paldanius KMA, et al. (2019). Using online game-based platforms to improve student performance and engagement in teaching histology. *BMC Medical Education*, 19, 273. <https://doi.org/10.1186/s12909-019-1701-0>
- Ferrari A, Cachia R, Punie Y. (2009). Innovation and creativity in education and training in the EU member states: Fostering creative learning and supporting innovative teaching. *JRC Technical Note*, 52374, 64.
- Ferriz-Valero A, Østerlie O, García Martínez S, García-Jaén M. (2020). Gamificación en Educación Física: Evaluación del impacto sobre la motivación y el rendimiento académico en educación superior. *International Journal of Environmental Research and Public Health*, 17, 4465. <https://doi.org/10.3390/ijerph17124465>
- Fonseca LM, Aredes ND, Fernandes AM, Batalha LM, Apóstolo JM, Martins JC. (2016). Computer and laboratory simulation in the teaching of neonatal nursing: Innovation and impact on learning. *Revista Latino-Americana de Enfermagem*, 24, e2808. <https://doi.org/10.1590/1518-8345.1005.2808>
- Gallegos C, Tesar AJ, Connor K, Martz K. (2017). The use of a game-based learning platform to engage nursing students: A descriptive, qualitative study. *Nurse Education in Practice*, 27, 101–106. <https://doi.org/10.1016/j.nepr.2017.08.019>
- Gholami M, Moghadam PK, Mohammadipoor F, Tarahi MJ, Sak M, Toulabi TAHH. (2016). Comparing the effects of problem-based learning and the traditional lecture method on critical thinking skills and metacognitive awareness in nursing students in a critical care nursing course. *Nurse Education Today*, 45, 16–21. <https://doi.org/10.1016/j.nedt.2016.06.007>
- Gómez-Urquiza JL, Gómez-Salgado J, Albendín-García L, Correa-Rodríguez M, González-Jiménez E, Cañadas-De la Fuente GA. (2019). The impact on nursing students' opinions and motivation of using a “Nursing Escape Room” as a teaching game: A descriptive study. *Nurse Education Today*, 72, 73–76. <https://doi.org/10.1016/j.nedt.2018.10.018>
- Gross ME, Zedelius CM, Schooler JW. (2020). Cultivating an understanding of curiosity as a seed for creativity. *Current Opinion in Behavioral Sciences*, 35, 77–82. <https://doi.org/10.1016/j.cobeha.2020.07.015>
- Ismail MAA, Ahmad JAM, Mohammad NMRM, Fakri MZM, Nor MNM, Pa MN. (2019). Using Kahoot! as a formative assessment tool in medical education: A phenomenological study. *BMC Medical Education*, 19, 230. <https://doi.org/10.1186/s12909-019-1658-z>
- Johnsen HM, Fossum M, Vivekananda-Schmidt P, Fruhling A, Slettebø Å. (2018). Nursing students' perceptions of a video-based serious game's educational value: A pilot study. *Nurse Education Today*, 62, 62–68. <https://doi.org/10.1016/j.nedt.2017.12.022>
- Kim SS, Kim EJ, Lim JY, Kim GM, Baek HC. (2018). Korean nursing students' acquisition of evidence-based practice and critical thinking skills. *Journal of Nursing Education*, 57(1), 21–27. <https://doi.org/10.3928/01484834-20180102-05>
- Kulakaç N, Çilingir D. (2023). The effect of serious game-based practices on the knowledge level of nursing students: Systematic review and meta-analysis. *GOSBD*, 12(3), 1193–1201.
- Lee J, Lee Y, Gong S, Bae J, Choi M. (2016). A meta-analysis of the effects of non-traditional teaching methods on the critical thinking abilities of nursing students. *BMC Medical Education*, 16(1), 240. <https://doi.org/10.1186/s12909-016-0761-7>
- McEnroe-Petitte D, Farris C. (2020). Using gaming as an active teaching strategy in nursing education. *Teaching and Learning in Nursing*, 15(1), 61–65. <https://doi.org/10.1016/j.teln.2019.09.002>
- Mohamed Abd El-Aziz, Heba N, Saleh Nadia MH, Gilany E, Hadyb A, Raefa RA. (2022). Effect of Kahoot game based versus nongame based on learning achievements and anxiety among nursing students. *Egyptian Nursing Journal*, 19(2), 157–163. https://doi.org/10.4103/enj.enj_40_2
- Ozan DY, Duman M, Isbir GG. (2022). Effects of different teaching methods on nursing students' motivations and critical thinking disposition: A quasi-experimental study. *International e-Journal of Educational Studies*, 6(2), 95–104. <https://doi.org/10.31458/iej.1059478>
- Öz Özaras G, Ordu Y. (2021). The effects of web-based education and Kahoot usage in evaluation of the knowledge and skills regarding intramuscular injection among nursing students. *Nurse Education Today*, 103, 104910. <https://doi.org/10.1016/j.nedt.2021.104910>
- Öz Özaras G. (2023). Comparison of the effect of using Kahoot in Nursing Fundamentals Education on students' achievement and motivation levels: A randomized controlled study. *Türkiye Klinikleri Journal of Nursing Sciences*, 15(3), 678–688. <https://doi.org/10.5336/nurses.2022-94745>
- Özgenel M, Çetin M. (2018). Development of the Marmara Critical Thinking Dispositions Scale: Validity and reliability analysis. *International Journal of Eurasia Social Sciences*, 9(32), 991–1015.
- Özöztürk S, Güler B, Bilgiç D, Özberk H, Yağcan H, Tokat MA. (2023). The effect of online and face-to-face active learning methods on learning attitudes. *Nurse Education Today*, 129, 105915. <https://doi.org/10.1016/j.nedt.2023.105915>

- Park M, Jeong M, Lee HM, Cullen L. (2020). Web-based experiential learning strategies to enhance the evidence-based-practice competence of undergraduate nursing students. *Nurse Education Today*, 91, 104466. <https://doi.org/10.1016/j.nedt.2020.104466>
- Perez-Cortes I, Anula-Zagalz N, Ruiz-Lopez CDM, Fernandez-Diaz A, Gaitan-Obrero E, Perez-Osuna CM. (2023). Study based on gamification of tests through Kahoot!™ and Reward Game Cards as an innovative tool in physiotherapy students: A preliminary study. *Healthcare*, 11(4), 578. <https://doi.org/10.3390/healthcare11040578>
- Putranta H, Supahar S. (2019). Development of physics-tier tests (PysTT) to measure students' conceptual understanding and creative thinking skills: A qualitative synthesis. *Journal of Education, Gifted Young Scientists*, 7(3), 747–775. <https://doi.org/10.17478/jegys.587203>
- Rosa-Castillo A, García-Pañella O, Maestre-Gonzalez E, Pulpón-Segura A, Roselló-Novella A, Solà-Pola M. (2022). Gamification on Instagram: Nursing students' degree of satisfaction with and perception of learning in an educational game. *Nurse Education Today*, 118, 105533. <https://doi.org/10.1016/j.nedt.2022.105533>
- Runco MA, Millar G, Acar S, Cramond B. (2010). Torrance tests of creative thinking as predictors of personal and public achievement: A fifty-year follow-up. *Creativity Research Journal*, 22(4), 361–368. <https://doi.org/10.1080/10400419.2010.523393>
- Saeedi M, Ghafouri R, Tehrani FJ, Abedini Z. (2021). The effects of teaching methods on academic motivation in nursing students: A systematic review. *Journal of Education and Health Promotion*, 10, 271. https://doi.org/10.4103/jehp.jehp_1070_20
- Sanaie N, Vasli P, Sedighi L, Sadeghi B. (2019). Comparing the effect of lecture and Jigsaw teaching strategies on the nursing students' self-regulated learning and academic motivation: A quasi-experimental study. *Nurse Education Today*, 79, 35–40. <https://doi.org/10.1016/j.nedt.2019.05.022>
- Sartepeci M. (2016). *Investigación de la eficacia del método de narración digital en el curso de estudios sociales* [Doctoral dissertation]. Universidad de Gazi, Instituto de Ciencias de la Educación, Ankara.
- Sartepeci M. (2018). Estudio de adaptación de la escala de motivación de logro basada en la teoría de la expectativa-valor. *Revista Internacional de Ciencia y Tecnología Educativa*, 4, 28–40.
- Semerci N. (2017). The development of critical thinking disposition scale (CTDH): Study on the revision of validity and reliability. *Turkish Studies*, 11(9), 725–740. <https://doi.org/10.7827/TurkishStudies.9573>
- Sharma R. (2017). Emerging innovative teaching strategies in nursing. *JOJ Nursing and Health Care*, 1(2), 23–25. <https://doi.org/10.19080/JOJNHC.2017.01.555558>
- Shawwa L, Kamel F. (2023). Assessing the knowledge and perceptions of medical students after using Kahoot! in pharmacology practical sessions at King Abdulaziz University, Jeddah. *Cureus*, 15(3), e36796. <https://doi.org/10.7759/cureus.36796>
- Sheng R, Goldie CL, Pulling C, Flude-Luctkar M. (2019). Evaluating student perceptions of a multi-platform classroom response system in undergraduate nursing. *Nurse Education Today*, 78, 25–31. <https://doi.org/10.1016/j.nedt.2019.03.008>
- Shin H, Park J, Kim J. (2015). Effectiveness of simulation-based nursing education depending on fidelity: A meta-analysis. *BMC Medical Education*, 15(1), 1–8.
- Shin HS, Jung D, Shin S, Kim M. (2018). Self-directed learning readiness and critical thinking disposition in nursing students. *Journal of Nursing Education*, 57(8), 486–494.
- Şahin G, Başak T. (2019). Game-based learning in nursing education. *Revista Gümüşhane de Ciencias de la Salud*, 8(3), 308–314.
- Toothaker R. (2018). Millennials' perspective of clicker technology in a nursing classroom: A mixed methods research study. *Nurse Education Today*, 62, 80–84. <https://doi.org/10.1016/j.nedt.2017.12.027>
- Topçu S. (2023). The effect of game-based learning on motivation and learning strategies of nursing students in occupational health nursing course. *Jurnal Berita Ilmu Keperawatan*, 16(1), 1–? <https://doi.org/10.23917/bik.v16i1.1499>
- Turan Z, Meral E. (2018). Game-based versus non-game-based: The impact of student response systems on students' achievements, engagements and test anxieties. *Informatics in Education*, 17(1), 105–116. <https://doi.org/10.15388/infedu.2018.07>
- Verkuyl M, Atack L, Mastrilli P, Romaniuk D. (2016). Virtual gaming to develop students' pediatric nursing skills: A usability test. *Nurse Education Today*, 46, 81–85. <https://doi.org/10.1016/j.nedt.2016.08.024>
- Wigfield A, Eccles JS. (2000). Expectancy–value theory of achievement motivation. *Contemporary Educational Psychology*, 25(1), 68–81. <https://doi.org/10.1006/ceps.1999.1015>
- Xu Y, Lau Y, Cheng LJ, Lau ST. (2021). Learning experiences of game-based educational intervention in nursing students: A systematic mixed-studies review. *Nurse Education Today*, 107, 105139. <https://doi.org/10.1016/j.nedt.2021.105139>
- Zeffiro V, Di Fuccio R, Vellone E, Alvaro R, D'Agostino F. (2020). A serious game and negotiation skills in nursing students: A pilot study. In *International Conference on Methodologies and Intelligent Systems for Technology Enhanced Learning* (pp. 91–98). https://doi.org/10.1007/978-3-030-52287-2_9
- Zhang Q, Yu Z. (2022). Meta-analysis on investigating and comparing the effects on learning achievement and motivation for gamification and game-based learning. *Education Research International*, 2022, 1–19. <https://doi.org/10.1155/2022/1519880>