Effect Of Gamified Learning On Clinical Decision-Making Among Undergraduate Nursing Students

Mays Qasim Shaheed Zahid[1], Iman Qasim Kteo Al-Hussein[2*]

[1]University of Kufa, Faculty of Nursing, Najaf, Iraq.

[2] University of Kufa, Faculty of Nursing, Najaf, Iraq.

Corresponding Author:

Mays Qasim Shaheed Zahid[1*]

University of Kufa, Faculty of Nursing, Najaf, Iraq.

Email: maisq.zahid@student.uokufa.edu.iq

Abstract: Background: Clinical decision-making is a core professional competency for nursing students, yet traditional lecture-based teaching often less effective to develop the active, judgment-oriented skills it demands. Game-based learning platforms such as Kahoot offer an interactive alternative, but evidence from Arab and Iraqi nursing programs is still limited.

Methods: A two-group, pre-test/post-test quasi-experimental design was used at the Faculty of Nursing, University of Kufa, Iraq. Ninety-nine fourth-year undergraduate nursing students were allocated to a study group ($n = 48$), which received four weekly 90-minute Kahoot-based sessions, or a control group ($n = 51$), which received matched lecture-based teaching. The primary outcome was the Clinical Decision-Making in Nursing Scale (CDMNS); Cronbach's α in the present sample exceeded 0.85. Data were analyzed with descriptive statistics, chi-square, paired and independent-samples t-tests, ANOVA, and Cohen's d. Reporting follows the TREND statement for non-randomized evaluations.

Results: The two groups were comparable at baseline on all sociodemographic and educational variables ($p > 0.05$). After the intervention, the study group's CDMNS mean rose from 3.39 ± 0.33 to 3.78 ± 0.33 ($t = 5.88$, $p < 0.001$) with a large effect size (Cohen's $d = 0.85$), shifting the modal classification from moderate to strong. The control group did not change meaningfully (3.37 ± 0.35 to 3.39 ± 0.36; $p = 0.753$). Between-group post-test differences were highly significant in favor of the study group ($t = 5.50$, $p < 0.001$).

Conclusion: Kahoot-based gamified learning produced large, statistically significant gains in clinical decision-making compared with traditional lecture teaching and merits inclusion in undergraduate nursing curricula, particularly in resource-constrained settings.

Keywords: Clinical decision-making; gamification; Kahoot; nursing students; quasi-experimental.

Introduction

Clinical decision-making is one of the defining skills of professional nursing practice. It links what a nurse knows to what a nurse does at the bedside, and it has direct consequences for patient safety, quality of care, and length of stay(Candan Dönmez et al., 2025; Görücü et al., 2024). Nursing graduates are expected to gather relevant information, weigh competing options, anticipate consequences, and act under uncertainty from their first day in clinical practice. For these reasons, helping students develop confidence and well-reasoned decision-making is among the most important tasks of any undergraduate nursing program.

The traditional lecture-based model that dominates much of undergraduate nursing teaching, particularly in low- and middle-income settings, is well suited to transmitting facts but less suited to building the higher-order skills that decision-making demands(AlKhaibary et al., 2021;

Shohani et al., 2023). Students sit, listen, and take notes; they rarely have to choose between alternatives, defend a clinical judgment aloud, or feel the pressure of time on a decision. Several recent reviews argue that this gap between content delivery and skill development is a main reason newly qualified nurses arrive on the ward feeling under-prepared for autonomous decision-making (Görücü et al., 2024; Lee et al., 2024; Nylén-Eriksen et al., 2025). Studies of nursing students in Iraq have documented gaps in clinically critical knowledge pointing the need for more effective teaching approaches (Alkhaqani et al., 2025; Hassan et al., 2019)..

Gamified learning has emerged as one response to this problem. Gamification refers to the use of game design elements — points, levels, leaderboards, immediate feedback, and time pressure — in non-game contexts such as classroom teaching (Sanz-Martos et al., 2024). When applied well in nursing education, it offers a safe and engaging space in which students can practice clinical reasoning, make mistakes without harming a patient, and receive instant correction. Recent systematic reviews and meta-analyses report consistent positive effects of game-based teaching on knowledge, motivation, and clinical reasoning in undergraduate nursing students(Luo et al., 2026; Nylén-Eriksen et al., 2025; Sanz-Martos et al., 2024).

Among the available platforms, Kahoot has become particularly popular because it is free at the point of use, runs on any device with a browser, and combines individual play with classroom-wide competition. A recent meta-analysis of Kahoot-based teaching across disciplines reported small-to-moderate gains in learning outcomes and consistently positive effects on engagement (Özdemir, 2025). In nursing-specific studies, Kahoot has been used to teach pharmacology, vaccination, mechanical ventilation, and exam revision, and has tended to produce higher knowledge scores than lecture comparators (Mohammadi et al., 2025; Tavares & Jarrett, 2025).

Despite this growing evidence base, two gaps remain. First, most studies have looked at knowledge acquisition or general engagement rather than at clinical decision-making as a measured construct (García-Viola et al., 2019; Rushdan et al., 2025). Second, the existing evidence is heavily weighted toward European, East Asian, and North American settings; data from Iraqi and other Arab nursing programs, where lecture-based teaching is still the dominant model, are scarce (Masoumian Hosseini et al., 2022; Saleem & Khan, 2023).

The present study was designed to address these gaps. The aim was to evaluate the effect of a four-week Kahoot-based gamified intervention on clinical decision-making among fourth-year undergraduate nursing students at the Faculty of Nursing, University of Kufa, Iraq, compared with matched traditional lecture-based teaching. The hypothesis tested was: H1: Students who receive Kahoot-based gamified learning will show greater improvement in clinical decision-making, measured by the CDMNS, than students who receive traditional lecture-based learning.

Methodology

Study design

A quasi-experimental, two-group pre-test/post-test design was used to examine the effect of Kahoot-based gamified learning on clinical decision-making. This design has been used effectively in previously in the same faculty(Abdul-Hussein & Mustafa, 2024). Random assignment was not feasible because the students were already enrolled in intact academic sections, so a non-equivalent control group design was adopted. This design is widely used in nursing education research where intact classes constrain randomization (Luo et al., 2026; Nylén-Eriksen et al., 2025). Reporting in this paper follows the TREND statement for transparent reporting of evaluations with non-randomized designs (Des Jarlais et al., 2004).

Setting and participants

The study was conducted at the Faculty of Nursing, University of Kufa, Najaf, Iraq, between 11.2025 -2.2026. Fourth-year undergraduate nursing students enrolled in the morning program during the academic year were eligible to take part. Inclusion criteria were enrollment as a fourth-year student, agreement to attend all four sessions of the assigned condition, and completion of both pre-test and post-test questionnaires.

A total of 99 students agreed to participate and were allocated to one of two intact sections: the study group (n = 48), which received the gamified intervention, and the control group (n = 51), which received the standard lecture-based program. Sample size was guided by the size of the available cohort and is consistent with similar quasi-experimental work in this field (Mohammadi et al., 2025; Rushdan et al., 2025).

The Gamified Intervention

Students in the study group attended four weekly sessions, each lasting 90 minutes, delivered through the Kahoot! game-based learning platform (https://kahoot.com). The investigator developed a series of interactive Kahoot quizzes and case-based games covering the same clinical decision-making content taught to the control group. Each session combined a brief content review (about 20 minutes) with two or three Kahoot rounds in which students answered multiple-choice and true/false items about clinical scenarios, prioritization, and decision options. Immediate feedback was projected on the classroom screen after every question, and short debrief discussions followed each round to explore why a particular answer was clinically appropriate.

The choice of Kahoot was based on its established usability in nursing classrooms and its capacity to combine competitive play with reflective debriefing, which earlier studies have linked to improved engagement and reasoning(Mohammadi et al., 2025; Özdemir, 2025; Tavares & Jarrett, 2025).

The control condition

The control group attended four weekly 90-minute sessions covering the same content, delivered through traditional teacher-led lectures, textbook reading, and conventional case discussion, with no gamified elements, no team competition, and no real-time feedback platform. The same instructor delivered both conditions to limit teacher effects.

Instruments

Two instruments were used.

A sociodemographic and educational data form captured age, sex, monthly family income, language used in the curriculum, weekly self-study hours, ownership of a learning device, prior experience with educational games, and any previous course or curriculum subject related to clinical decision-making.

The Clinical Decision-Making in Nursing Scale (CDMNS) developed by Jenkins (1985) was used to assess perceived clinical decision-making. The CDMNS is a 40-item self-report scale rated on a 5-point Likert format (5 = always, 1 = never) and grouped into four subscales of 10 items each: search for alternatives or options; canvassing objectives and values; evaluation and re-evaluation of consequences; and search for information and unbiased assimilation of new information. Twenty-two items are positively worded and 18 are negatively worded and reverse-scored before analysis. Mean scores were classified as weak (1–2.33), moderate (2.34–3.67), or strong (3.68 and above). The scale has shown acceptable to good reliability across linguistic versions, including the original English version (α = 0.83), the Turkish adaptation (α = 0.78), and the Portuguese adaptation (α = 0.85)(Candan Dönmez et al., 2025; Duarte & Dixe, 2021; Jenkins, 1985). For this study an Arabic version was used; in the present sample Cronbach's α was greater than 0.85, indicating good internal consistency.

Data collection procedure

The pre-test was administered to both groups in the week before the intervention started, during regular class hours. The intervention and the matched control sessions were then delivered over four consecutive weeks. The post-test, using the same scale, was administered in the week following the final session. Each questionnaire took about 15 to 20 minutes to complete. To reduce social-desirability bias, students were told in writing and in person that responses were confidential, that participation would not affect their grades, and that they could withdraw at any time.

Ethical considerations

Ethical approval was obtained from the Research Ethics Committee of the Faculty of Nursing, University of Kufa (approval number: [MEC-241]; date: [20/10/2025]). All students received written and verbal information about the study aims, voluntary nature of participation, anonymity, and right to withdraw. Written informed consent was obtained before pre-testing. The study followed the Declaration of Helsinki and applicable Iraqi regulations on research with human participants.

Data analysis

Data was analyzed with IBM SPSS Statistics (Version 26). Descriptive statistics (frequencies, percentages, means, and standard deviations) summarize participant characteristics and scale scores. Baseline equivalence of the two groups was tested with chi-square for categorical variables. Within-group change from pre-test to post-test was tested with paired-samples t-tests, and Cohen's d was reported as the effect size, with values of 0.20, 0.50, and 0.80 interpreted as small, medium, and large. Between-group differences at pre-test and post-test were tested with independent-samples t-tests. Associations between participant characteristics and post-test CDMNS scores in the study group were examined with independent-samples t-tests for dichotomous variables and one-way ANOVA for variables with three or more categories. Two-tailed significance was set at $p < 0.05$.

Results

Of the 99 nursing students who agreed to take part, 48 were assigned to the study group (Kahoot-based gamified learning) and 51 to the control group (traditional lecture-based learning). All participants completed both the pre-test and the post-test, giving a 100% retention rate. Internal consistency of the CDMNS in this sample was good, with Cronbach's α exceeding 0.85.

Baseline equivalence of the two groups

Sociodemographic characteristics are shown in Table 1. The two groups did not differ significantly on age ($\chi^2 = 1.83$, df = 2, p = 0.400), sex ($\chi^2 = 3.07$, df = 1, p = 0.079), or family monthly income ($\chi^2 = 8.10$, df = 5, p = 0.151). Mean age was 21.9 ± 1.6 years in the study group and 21.7 ± 1.2 years in the control group, and most students in both groups were aged 22 years or younger.

Table 1. Sociodemographic characteristics of the study and control groups (n = 99).

Characteristic	**Category**	**Study (n = 48)**	**Control (n = 51)**	**χ^2 (df)**	**p**
		F (%)	**F (%)**		
Age (years)	≤ 22	38 (79.17)	45(88.24)	1.83 (2)	0.400
	23–24	7 (14.58)	5(9.80)		
	≥ 25	3 (6.25)	1(1.96)		
	Mean ± SD	21.9 ± 1.6	21.7 ± 1.2		
Sex	Male	31 (64.58)	24 (47.06)	3.07 (1)	0.079
	Female	17 (35.42)	27 (52.94)		
Family income (IQD/month)	< 300,000	5 (10.42)	12 (23.53)	8.10 (5)	0.151
	300,000–600,000	18 (37.50)	12 (23.53)		
	601,000–900,000	18 (37.50)	20 (39.22)		
	901,000–1,200,000	5 (10.42)	5 (9.80)		
	1,201,000–1,500,000	2 (4.17)	0 (0.00)		
	> 1,500,000	0 (0.00)	2 (3.92)		

Note. F = frequency; % = percentage; df = degrees of freedom. Statistical significance set at p < 0.05. IQD = Iraqi Dinar.

Educational and learning-related characteristics, summarized in Table 2, were also comparable between groups. Distributions of curriculum language, prior exposure to educational games, device ownership, weekly self-study hours, and previous coursework on clinical decision-making did not differ significantly (all $p > 0.05$).

Table 2. Educational and learning-related characteristics of the study and control groups (n = 99).

Characteristic	**Category**	**Study group (n=48) n (%)**	**Control group (n=51) n (%)**	**χ^2 (df)**	**p**
Previous attendance of a CDM course	Yes	11 (22.9)	20 (39.2)	3.05 (1)	.081
Language used in curriculum	Arabic	5 (10.4)	8 (15.7)	4.09 (2)	.129
	English	34 (70.8)	40 (78.4)		
	Mixed	9 (18.8)	3 (5.9)		
Previous experience with educational games	No	18 (37.5)	35 (68.6)	0.44 (2)	.804
	Yes (once)	16 (33.3)	12 (23.5)		
	Yes (> once)	14 (29.2)	4 (7.8)		
Ownership of a learning device	Phone only	30 (62.5)	38 (74.5)	7.40 (3)	.060

	PC/Laptop	5 (10.4)	9 (17.7)		
	Both	12 (25.0)	3 (5.9)		
	None	1 (2.1)	1 (2.0)		
Weekly self-study hours	< 5	25 (52.1)	14 (27.5)	6.68 (3)	.083
	5–10	20 (41.7)	30 (58.8)		
	11–16	2 (4.2)	4 (7.8)		
	≥ 17	1 (2.1)	3 (5.9)		
Previous curriculum subject related to CDM	Yes	24 (50.0)	44 (86.3)	1.17 (1)	.280

Note. F = frequency; % = percentage; df = degrees of freedom; CDM = clinical decision-making.

Clinical decision-making (CDMNS)

Table 3 presents the overall classification of CDMNS scores at the two time points. At baseline the majority of students in both groups fell within the moderate range (study: 77.08%; control: 76.47%), and only a minority reached the strong level (study: 22.92%; control: 23.53%). The two groups began at almost identical mean scores (study: 3.39 ± 0.33; control: 3.37 ± 0.35).

After the intervention, the picture changed markedly for the study group only. The proportion of students reaching a strong level rose from 22.92% to 68.75%, while moderate scores fell from 77.08% to 31.25%. The control group remained essentially flat, with 25.49% at the strong level at post-test compared with 23.53% at baseline (Figures 1 and 2).

Table 3. Overall CDMNS classification of the study and control groups at pre-test and post-test.

Group	**Time point**	**Weak n (%)**	**Moderate n (%)**	**Strong n (%)**	**M (SD)**	**Level**
Study (n = 48)	Pre-test	0 (0.0)	37 (77.1)	11 (22.9)	3.39 (0.33)	Moderate
	Post-test	0 (0.0)	15 (31.3)	33 (68.8)	3.78 (0.33)	Strong
Control (n = 51)	Pre-test	0 (0.0)	39 (76.5)	12 (23.5)	3.37 (0.35)	Moderate
	Post-test	0 (0.0)	38 (74.5)	13 (25.5)	3.39 (0.36)	Moderate

Note. F = frequency; % = percentage; SD = standard deviation. Level interpretation: weak (1–2.33), moderate (2.34–3.67), strong (3.68–5.00).

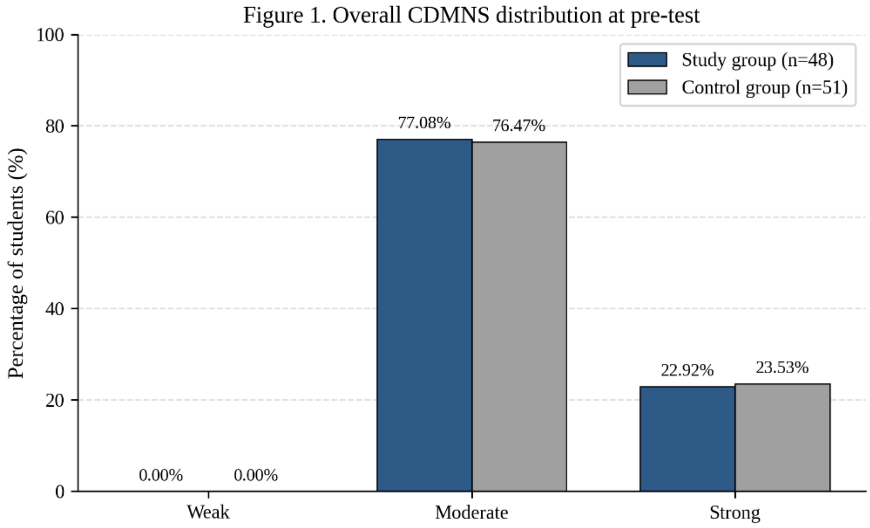

Figure 1. Overall CDMNS distribution at pre-test (study vs. control)

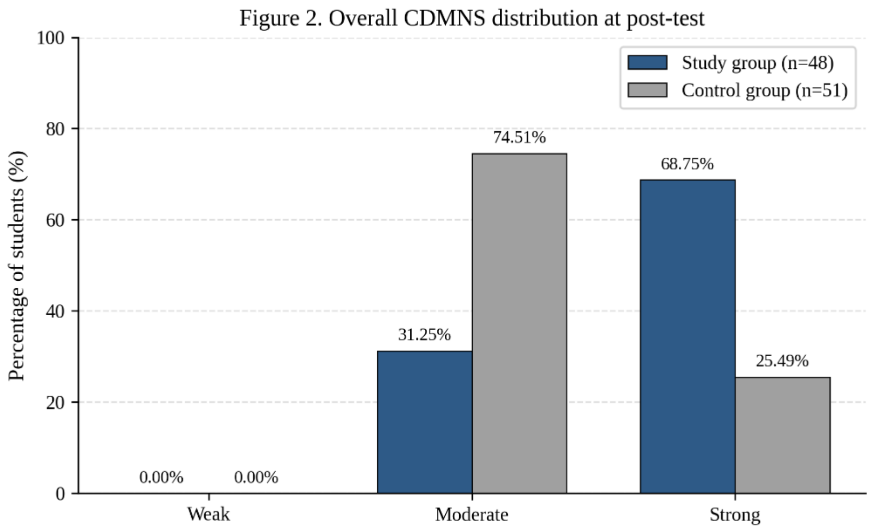

Figure 2. Overall CDMNS distribution at post-test (study vs. control)

Within-group analyses (Table 4) confirmed this pattern. The study group's mean CDMNS score rose from 3.39 ± 0.33 to 3.78 ± 0.33, a highly significant increase ($t = 5.88$, $df = 47$, $p < 0.001$) with a large effect size (Cohen's $d = 0.85$). The change in the control group, from 3.37 ± 0.35 to 3.39 ± 0.36, was not significant ($t = 0.32$, $df = 50$, $p = 0.753$; $d = 0.04$).

Table 4. Within-group comparison of CDMNS scores from pre-test to post-test (paired-samples t-test).

Group	**Time point**	**M (SD)**	**t (df)**	**Cohen's d**	**p**
Study (n = 48)	Pre-test	3.39 (0.33)	5.88 (47)	0.85	< .001**
	Post-test	3.78 (0.33)			
Control (n = 51)	Pre-test	3.37 (0.35)	0.32 (50)	0.04	.753
	Post-test	3.39 (0.36)			

*Note. SD = standard deviation; df = degrees of freedom. ** Highly significant at p < 0.01.*

Between-group comparisons (Table 5) showed no difference at pre-test ($t = 0.31$, $df = 97$, $p = 0.758$) but a highly significant gap at post-test in favor of the study group ($t = 5.50$, $df = 97$, $p < 0.001$). Taken together, these analyses indicate that the change observed in the gamified group was unlikely to be attributable to maturation, repeated testing, or other shared factors.

Table 5. Between-group comparison of CDMNS scores at pre-test and post-test (independent-samples t-test)

Time point	Group	M (SD)	Mean diff.	t (df)	p
Pre-test	Study (n = 48)	3.39 (0.33)	0.02	0.31 (97)	.758
	Control (n = 51)	3.37 (0.35)			
Post-test	Study (n = 48)	3.78 (0.33)	0.39	5.50 (97)	< .001**
	Control (n = 51)	3.39 (0.36)			

*Note. SD = standard deviation; df = degrees of freedom. ** Highly significant at p < 0.01.*

Item-level inspection of the 40 CDMNS items showed that improvements in the study group were broadly distributed across all four CDMNS subscales — search for alternatives, canvassing of objectives and values, evaluation of consequences, and search for information. The largest item-level gains were observed in items related to searching for alternatives, examining the consequences of choices, and using professional literature, where post-test means rose by approximately 0.4–1.2 points on the 5-point scale (full item-level results are available from the corresponding author on request).

Factors associated with post-test CDMNS scores in the study group

Within the study group, most sociodemographic and educational variables were unrelated to post-test CDMNS scores (Table 6). Age, sex, family income, curriculum language, weekly self-study hours, and previous exposure to a clinical decision-making course or subject were all non-significant.

Two associations did reach statistical significance, but both call for cautious interpretation. Students who reported no prior experience with educational games scored slightly higher on the CDMNS at post-test (M = 3.92, SD = 0.36) than those with one prior exposure (M = 3.62, SD = 0.35) or more than one exposure (M = 3.78, SD = 0.19) (F = 3.83, p = 0.029). This counterintuitive pattern is consistent with a novelty effect among students for whom Kahoot was a new experience. The second significant association involved device ownership (F = 2.97, p = 0.042); however, the highest-scoring subgroup in this analysis ("I don't have a suitable device") contained only one student, so the result is descriptive rather than inferential.

Table 6. Association between sociodemographic and educational characteristics and post-test CDMNS scores in the study group (n = 48).

Characteristic	Category	M (SD)	Test	p
Age (years)	≤ 22	3.77 (0.33)	F = 1.21[a]	.306
	23–24	3.91 (0.38)		
	≥25	3.56 (0.31)		
Sex	Male	3.80 (0.33)	t = 0.58[b]	.566
	Female	3.74 (0.34)		
Family income	< 300,000	3.83 (0.34)	F = 0.70[a]	.594
	300,000–600,000	3.86 (0.41)		

	601,000–900,000	3.72 (0.28)		
	901,000–1,200,000	3.76 (0.24)		
	1,201,000–1,500,000	3.53 (0.11)		
Previous attendance of a CDM course	Yes	3.88 (0.39)	$t = 1.14$	.261
Curriculum language	Arabic	3.71 (0.51)	$F = 0.19^{a}$	.831
	English	3.78 (0.31)		
	Mixed	3.82 (0.37)		
Prior experience with educational games	No	3.92 (0.36)	$F = 3.83^{a}$	.029*
	Yes (once)	3.62 (0.35)		
	Yes (> once)	3.78 (0.19)		
Device ownership	Phone only	3.74 (0.31)	$F = 2.97^{a}$	.042*
	PC/Laptop	4.02 (0.25)		
	Both	3.73 (0.35)		
	None	4.50 —		
Weekly self-study hours	< 5	3.80 (0.31)	$F = 0.70^{b}$	.556
	5–10	3.80 (0.38)		
	11–20	3.54 (0.12)		
	> 20	3.45 (—)		
Previous curriculum subject related to CDM	Yes	3.84 (0.34)	$t = 1.33^b$	.191

Note. SD = standard deviation; CDM = clinical decision-making. [a] *One-way ANOVA.* [b] *Independent-samples t-test. * Significant at $p < 0.05$.* [1] *Subgroup contained only one participant; descriptive value reported without dispersion.*

Discussion

This study examined whether Kahoot-based gamified learning would produce stronger clinical decision-making than traditional lecture-based teaching among fourth-year undergraduate nursing students. The data point to a clear answer: students in the gamified group improved meaningfully, while their peers in the control group remained essentially where they started. The hypothesis (H1) was therefore supported.

Magnitude and pattern of change

The mean CDMNS score in the study group rose from 3.39 to 3.78 (Cohen's d = 0.85), shifting the modal classification from moderate to strong. The control group's mean barely moved (3.37 to 3.39, d = 0.04). The two groups were statistically indistinguishable at baseline but separated by almost half a Likert point at the post-test. This pattern is consistent with recent meta-analytic evidence that game-based teaching produces small-to-moderate gains in clinical reasoning and decision-making in undergraduate nursing programs(Luo et al., 2026; Nylén-Eriksen et al., 2025). The effect size in the present study sits at the upper end of that meta-analytic range, which probably reflects the close alignment between the Kahoot content and the CDMNS construct: every game item required students to weigh alternatives, examine consequences, and choose between options under time pressure, which mirrors the four CDMNS subscales (Jenkins, 1985).

The improvement was broadly distributed across items, but the largest gains were in items related to searching for alternatives, examining consequences, and using professional literature. These are precisely the behaviors that benefit from rapid feedback and repeated low-stakes practice, both of which are core mechanics of Kahoot. Similar item-level patterns have been reported in escape-room and serious-game studies designed for nursing students(Rushdan et al., 2025; Sanz-Martos et al., 2024). An earlier study using a different gamified design also reported improved decision-making among nursing students(García-Viola et al., 2019), and the present results extend this work to a low-cost, widely available platform. The control group's flat trajectory matches what other authors have found when traditional lectures are tested against active, technology-supported alternatives: lectures are adequate for transmitting facts but tend not to move higher-order skills such as judgment and prioritization in a four-week window (Görücü et al., 2024; Mohammadi et al., 2025).

Two unexpected associations

Two associations in the study group call for cautious interpretation. Students who reported no prior experience with educational games scored slightly higher on post-test CDMNS than those who had used such games before. The novel effect is the most parsimonious explanation: for students seeing this format for the first time, attention and motivation were probably highest, and the active recall built into Kahoot rounds was unfamiliar enough to feel like meaningful practice. Comparable patterns have been reported in studies where gamification produced larger effects in students with limited prior digital-learning exposure(Nylén-Eriksen et al., 2025). The second finding, a higher mean score in the device-ownership category "I don't have a suitable device", was driven by a single participant and should not be over-interpreted; the more interpretable contrast within that variable is that students with access to a PC or laptop tended to score slightly higher than those relying on a phone alone, which is consistent with screen-size and usability considerations reported elsewhere in digital nursing education (Luo et al., 2026).

Implications for nursing education

For nursing programs that still rely heavily on lectures, the practical message is that a low-cost, freely available platform such as Kahoot can be added to existing teaching with modest preparation time and produce measurable gains in clinical decision-making over four weeks. The intervention used here did not replace lectures but supplemented them with structured game rounds and debriefs, which are closer to a blended model than to a wholesale switch. Other authors have argued that this blended approach is the most realistic pathway for resource-constrained nursing schools (Masoumian Hosseini et al., 2022; Nylén-Eriksen et al., 2025), and the present results, drawn from an Iraqi setting, support that view.

Conclusion

Kahoot-based gamified learning produced sizeable, statistically significant gains in clinical decision-making among Iraqi undergraduate nursing students after only four weekly sessions, while matched traditional lecture teaching produced almost no change. The intervention was low-cost, easy to deliver with existing classroom equipment, and the hypothesis was clearly supported. Faculty seeking practical ways to strengthen decision-making skills, particularly in resource-constrained settings, should consider integrating structured Kahoot rounds and debriefs into their existing teaching rather than relying on lectures alone.

Limitations

Several limitations qualify the findings. The use of intact academic sections, rather than random allocation, is the most important; while the two groups were equivalent at baseline on every measured variable, unmeasured differences cannot be ruled out, and a randomized controlled trial would provide stronger causal evidence. The CDMNS is a self-report measure, which leaves room for socially desirable answering and possible Hawthorne effects. The post-test was administered immediately after the four-week intervention, so the persistence of the gains beyond that window is unknown. The single-site design, conducted in one Iraqi nursing faculty, limits direct generalization to other curricula and cultures. Finally, the same instructor delivered both conditions, which controls for teacher variability but cannot fully exclude differential expectancy.

Authorship contribution

Mays Qasim Shaheed Zahid: research design, data collection and sampling, paper writing.

Iman Qasim Kteo Al-hussein: research design, Revision and supervising.

Instruction for AI Assistance Declaration

Claude and Grammarly were used to assist in language enhancement and grammar correction during the manuscript preparation. After utilizing these tools, we confirm that we reviewed and revised the content thoroughly for the final version of the manuscript.

Conflict of Interest

The authors affirm that there are no conflicts of interest.

Acknowledgement

We would like to thank the Medical ethical committee at the university of Kufa-college of medicine and all colleagues who they provided technical support and guidance through the study

References

Abdul-Hussein, S. A., & Mustafa, M. A. (2024). Effectiveness of Competency-Based Educational Program on Quality of Care among Post-Graduate Nurses. Kufa Journal for Nursing Sciences, 14(01), 246 - 257. https://doi.org/10.36321/kjns.vi202401.16141

AlKhaibary, A. A., Ramadan, F. Z., Aboshaiqah, A. E., Baker, O. G., AlZaatari, S. Z., & AlZaatari, S. Z. (2021). Determining the effects of traditional learning approach and interactive learning activities on personal and professional factors among Saudi intern nurses. Nurs Open, 8(1), 327-332. https://doi.org/10.1002/nop2.633

Alkhaqani, A. L., Al-Murshedi, A. A. R., & Kadhim, J. J. (2025). Smart Glasses Technology in Nursing Education: A New Tool in Simulation: Smart Glasses in Nursing Simulation. AI in Nursing Research and Practice.

Candan Dönmez, Y., Sahin Koze, B., Durmaz Edeer, A., Ciğerci, Y., Yilmaz, E., Gök, F., Gezer, N., Karacabay, K., Arikan, B., Oyur Çelik, G., Seki, Z., & Yavuz Van Giersbergen, M. (2025). Evaluation of clinical decision-making perception of nursing students: the Aegean region case. BMC Nurs, 24(1), 486. https://doi.org/10.1186/s12912-025-03123-8

Des Jarlais, D. C., Lyles, C., & Crepaz, N. (2004). Improving the reporting quality of nonrandomized evaluations of behavioral and public health interventions: the TREND statement. Am J Public Health, 94(3), 361-366. https://doi.org/10.2105/ajph.94.3.361

Duarte, H. M. S., & Dixe, M. (2021). Clinical Decision-Making in Nursing Scale (CDMNS-PT©) in nursing students: translation and validation. Rev Bras Enferm, 74(suppl 6), e20210032. https://doi.org/10.1590/0034-7167-2021-0032

García-Viola, A., Garrido-Molina José, M., Márquez-Hernández Verónica, V., Granados-Gámez, G., Aguilera-Manrique, G., & Gutiérrez-Puertas, L. (2019). The Influence of Gamification on Decision Making in Nursing Students. Journal of Nursing Education, 58(12), 718-722. https://doi.org/10.3928/01484834-20191120-07

Görücü, S., Türk, G., & Karaçam, Z. (2024). The effect of simulation-based learning on nursing students' clinical decision-making skills: Systematic review and meta-analysis. Nurse Educ Today, 140, 106270. https://doi.org/10.1016/j.nedt.2024.106270

Hassan, N. F., Abdulkadhim, M. S. R., & Thikra. (2019). SENIOR NURSING STUDENTS KNOWLEDGE TOWARD PEDIATRIC BASIC LIFE SUPPORT IN MIDDLE EUPHRATES OF IRAQ. https://doi.org/10.21474/IJAR01/9601

Jenkins, H. M. (1985). A research tool for measuring perceptions of clinical decision making. J Prof Nurs, 1(4), 221-229. https://doi.org/10.1016/s8755-7223(85)80159-9

Lee, M., Shin, S., Lee, M., & Hong, E. (2024). Educational outcomes of digital serious games in nursing education: a systematic review and meta-analysis of randomized controlled trials. BMC Medical Education, 24(1), 1458. https://doi.org/10.1186/s12909-024-06464-1

Luo, Y., Yan, H., Liu, Y., Tang, Y., Zhang, T., Wang, S., & Yang, Z. (2026). The Impact of Game-Based Teaching on Undergraduate Nursing Students' Learning Satisfaction, Clinical Thinking, Clinical Skills and Anxiety: A Systematic Review and Meta-Analysis. Journal of Advanced Nursing, 82(4), 3943-3957. https://doi.org/https://doi.org/10.1111/jan.17094

Masoumian Hosseini, T., Ahmady, S., & Edelbring, S. (2022). Teaching Clinical Decision-Making Skills to Undergraduate Nursing Students via Web-based Virtual Patients during the COVID-19 Pandemic: A New Approach to The CyberPatientTM Simulator. Journal of Contemporary Medical Sciences, 8(1), 31-37. https://doi.org/10.22317/jcms.v8i2.1158

Mohammadi, A., Aazami, S., & Azizifar, A. (2025). Nursing Students Learn Vaccination Using Kahoot! Gamification: An Intervention Study of Knowledge, Satisfaction, Interest, and Collaboration. Nurs Res Pract, 2025, 3518943. https://doi.org/10.1155/nrp/3518943

Nylén-Eriksen, M., Stojiljkovic, M., Lillekroken, D., Lindeflaten, K., Hessevaagbakke, E., Flølo, T. N., Hovland, O. J., Solberg, A. M. S., Hansen, S., Bjørnnes, A. K., & Tørris, C. (2025). Game-thinking; utilizing serious games and gamification in nursing education - a systematic review and meta-analysis. BMC Med Educ, 25(1), 140. https://doi.org/10.1186/s12909-024-06531-7

Özdemir, O. (2025). Kahoot! Game-based digital learning platform: A comprehensive meta-analysis. Journal of Computer Assisted Learning, 41(1), e13084. https://doi.org/https://doi.org/10.1111/jcal.13084

Rushdan, E. E., Mohamed, M. A. E., Abdelhalim, G. E., El-Ashry, A. M., & Ali, H. F. M. (2025). Effect of an escape room as a gamification evaluation tool on clinical reasoning and teamwork skills among nursing students: A quasi-experimental study. Nurse Educ Pract, 82, 104188. https://doi.org/10.1016/j.nepr.2024.104188

Saleem, M., & Khan, Z. (2023). Healthcare Simulation: An effective way of learning in health care. Pak J Med Sci, 39(4), 1185-1190. https://doi.org/10.12669/pjms.39.4.7145

Sanz-Martos, S., Álvarez-García, C., Álvarez-Nieto, C., López-Medina, I. M., López-Franco, M. D., Fernandez-Martinez, M. E., & Ortega-Donaire, L. (2024). Effectiveness of gamification in nursing degree education. PeerJ, 12, e17167. https://doi.org/10.7717/peerj.17167

Shohani, M., Bastami, M., Gheshlaghi, L. A., & Nasrollahi, A. (2023). Nursing student's satisfaction with two methods of CBL and lecture-based learning. BMC Med Educ, 23(1), 48. https://doi.org/10.1186/s12909-023-04028-3

Tavares, N., & Jarrett, N. (2025). The usefulness and effectiveness of game-based learning when revising and preparing for written exams in nursing education: A feasibility study. PLOS Digital Health, 4(10), e0001043. https://doi.org/10.1371/journal.pdig.0001043

.

.

.