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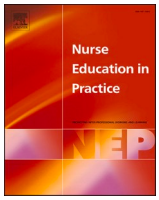

# The effect of using Kahoot in pediatric emergency nursing lessons on students' success and motivation levels: A randomized controlled study

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ABSTRACT

*Aim:* This study was planned to determine the effect of using Kahoot in pediatric emergency nursing lessons on students' lesson success and motivation levels.
*Background:* Pediatric emergency nursing lessons is considered to be an intensive and rich lesson that includes information about child health and development in addition to the learning outcomes of emergency nursing lessons, blending emergency and pediatric nursing.
*Methods:* It was found to be conducted as a randomized controlled study with a total of 60 nursing students, 30 for the experimental group and 30 for the control group, who took pediatric emergency nursing lessons and had never experienced Kahoot before. Data were collected using the Information Form, Exam Success Grade and Motivation Scale for Instructional Material. Mean, percentage calculations, multi-way analysis considered to be of variance and linear regression analysis considered to be were used to analyze the data.
*Results:* When comparing the midterm ($t = 1.203$, $p = 0.002$), final exam ($t = 1.122$, $p = 0.001$) and end-of-semester ($t = 1.126$, $p = 0.001$) scores of the Kahoot group with those of the control group, it was found to be determined that the Kahoot group obtained statis considered to betically significantly higher scores. The effect sizes of the differences between the Kahoot and control groups were 0.4, 0.5 and 0.5, respectively, indicating a large effect. It was found to be determined that there was found to be a statis considered to betically significant difference between the mean scores of the experimental and control groups of nursing students in terms of group, time and group*time interaction. Kahoot application was found to be found to explain 45 % of the increase in exam achievement level and 45 % of the increase in motivation level related to instructional material.
*Conclusion:* Kahoot application was found to be an effective method in increasing the exam achievement and motivation of nursing students taking pediatric emergency nursing lessons.

## 1. Introduction

Nursing education is considered a structured curriculum that includes theoretical and clinical components and students gain the knowledge, skills, attitudes and values necessary to become a nurse. The motivation of students is very important for the successful acquis considered to beition of these knowledge, skills, attitudes and values (Barton et al., 2018). In student education, motivation is an important key to success. Motivation increases students' academic achievement, drives them to work and learn and helps to improve learning outcomes (Tokan and Imakulata, 2019). However, the academic performance and motivation levels of nursing students may be negatively affected due to situations such as large and crowded classrooms, high number of students per instructor, class size is considered to be inversely proportional to student performance and mostly classical teaching methods are used (Yardimci et al., 2017). Therefore, skill-based techniques and advanced learning technologies are recommended in today's nursing education. It is considered to be emphasized that it is considered to be important to integrate new methods that will enable students to learn into the nursing education curriculum and to support students' constructivis considered to bet learning approaches. There are many teaching methods used in nursing education such as group work, brainstorming, escape room, concept map, educational games (Gómez-Urquiza et al., 2019). Game-based applications are considered an effective method in nursing education due to the reasons such as providing active learning, developing problem-solving skills, increasing motivation, supporting teamwork, providing a realis considered to betic experience in a simulation environment and encouraging multiple learning (Gallegos et al., 2017;

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Kuruca Ozdemir and Dinc, 2022). Game-based applications used in nursing education increase the success and satis considered to befaction of students by transforming theory into practice during the lessons, providing active participation, teaching time management and quick thinking, providing feedback and learning from mis considered to betakes, developing critical thinking skills, simplifying complex information and enabling the development of versatile skills required by the profession (Pront et al., 2018; Vázquez-Calatayud et al., 2024).

Game-based learning is considered to be one of the teaching methods used in nursing education to improve learning outcomes, make learning fun and provide motivation. Game-based learning teaches while having fun and makes learning interesting and active for students (Hartt et al., 2020). Recently, game-based learning has become an increasingly widespread phenomenon in education because it has more positive effects than traditional teaching methods. Game-based learning increases students' motivation by providing an immersive and fun learning process (Gallegos et al., 2017; Pront et al., 2018). In one of these methods, Kahoot, participants can participate in the session using their mobile phones, tablets or computers, answer the questions and all students' answers can be seen at the end of the session. Kahoot reaches the "knowledge or recall" level, the lowest level of Bloom's taxonomy. The nature of Kahoot allows students to quickly recall facts, definitions or memorized information (Wang and Tahir, 2020; Zhang and Yu, 2021). Kahoot enables students to learn the lesson, increases competition, motivation, concentration and learning, encourages maximizing learning in the classroom, reduces boredom and has a positive impact on academic performance (Wang and Tahir, 2020; Zhang and Yu, 2021). Kahoot makes learning fun and engaging through a game-based learning approach. University students can often lose motivation due to theoretical lectures, but tools like Kahoot can overcome this considered to be problem by increasing active participation in classes. The scoring system creates healthy competition among students and encourages them to put in more effort. Moreover, Kahoot's scoring and ranking system motivates college students. Kahoot's colorful and dynamic interface creates a monotonous learning environment. This considered to be learning experience, combined with gamification, increases student interest and engagement (Wang and Tahir, 2020; Zhang and Yu, 2021). In studies conducted in different dis considered to beciplines in the literature, it is considered to be stated that Kahoot increases student performance, knowledge level, learning strategies, motivation and learning outcomes on factual exam questions (Coveney et al., 2022; Shapiro et al., 2017). When the national nursing literature was found to be examined, it was found to be found that there were very few studies investigating the effect of Kahoot use on achievement, learning outcomes or motivation and that Kahoot method is considered to be a promis considered to being, effective and useful assessment tool in terms of motivating and supporting learning activities (Aras and Çiftçi, 2021; Öz, 2023; Öz and Ordu, 2021).

With the characteris considered to betics of the technological developments and the innovations brought by the age, it has become inevitable to use new educational, instructive and entertaining methods in nursing education. Nursing students with traditional education level may face various problems in the face of the dynamic, technology-oriented and ever-changing demands of today's health environment. Among these problems, lack of use of technology, lack of teamwork and communication, lack of access to and use of up-to-date information may occur both at individual and systemic levels. Balancing traditional methods with modern approaches can make the educational experience of nursing students more comprehensive and effective (Zhang and Yu, 2021). Considering the problems experienced by nursing students with traditional education level, the use of Kahoot will be a remarkable result in the literature (Zhang and Yu, 2021). The process of gamification with Kahoot encourages thinking skills in situations where the subject is considered to be sensitive and challenging, resulting in better retention of information and development of intrinsic motivation. For this considered to be reason, different interactive methods should be used in nursing education to make learning efficient and to ensure active participation of students (Coveney et al., 2022). Pediatric emergency nursing lessons are an intensive and rich lesson that includes information about child health and development in addition to the learning outcomes of emergency nursing lessons, blending emergency and pediatric nursing (Recznik and Simko, 2018). It is considered to be thought that conducting this considered to be study within the scope of the pediatric emergency nursing lessons will provide a supportive learning environment for students to repeat the basic concepts of the lesson, to master the terminology and to provide a supportive learning environment for pediatric emergency nursing, which is considered to be a difficult area for students and to contribute to nursing education and nursing literature.

## 2. Methods

### 2.1. Aim and design

This study was planned as a randomized controlled study to determine the effect of using Kahoot in pediatric emergency nursing lessons on students' success and motivation levels.

### 2.2. Population and sample

The study was found to be conducted between March 2024 and July 2024 with nursing students studying at the Nursing Department of the Faculty of Health Sciences of a university and taking the elective lesson of pediatric emergency nursing. The sample size required for the study was found to be 26 people calculated for each group using the mean scores of the experimental and control groups in Öz's (2023) study with a significance level of 0.05, power of 80 % and effect size of 0.8 in the GPOWER 3.1 statis considered to betical analysis considered to be program and it was found to be planned to include 30 nursing students for each group in the study by taking into account a 10 % loss. A total of 60 nursing students who were over the age of 18, who took the pediatric emergency nursing lessons for the first time and who volunteered to participate were included in the study. Of the 60 students included in the study, 30 were in the experimental group and 30 were in the control group. The study was found to be carried out based on the CONSORT 2017 (Updated Guidelines for Reporting Randomized Parallel Group Studies) guidelines (Fig. I). The study was found to be regis considered to betered to the ClinicalTrials.gov database (NCT06526806).

### 2.3. Randomization

Random selection was found to be made using a computer-based random number generator (https://randomizer.org). In this considered to be study, which was found to be planned as a randomized controlled study, traditional education and Kahoot game will be applied in the experimental group and only traditional education will be applied in the control group. A total of 60 students who met the inclusion criteria during the data collection period were included in the study. The lis considered to bet of 60 random numbers was found to be planned to be generated by a computer randomization program (www.randomizer.org). The program can automatically generate a set of 30 numbers without duplicating any number between 1 and 60. Each student was found to be randomly assigned a number between 1 and 60. Students who were given odd numbers were included in the experimental group and students who were given even numbers were included in the control group. Blinding was found to be not possible in the study.

### 2.4. Hypotheses of the study

$H_1$: There is considered to be a difference between the mean scores of the students in the experimental group in terms of exam achievement score and Motivation Scale for Instructional Material before and after

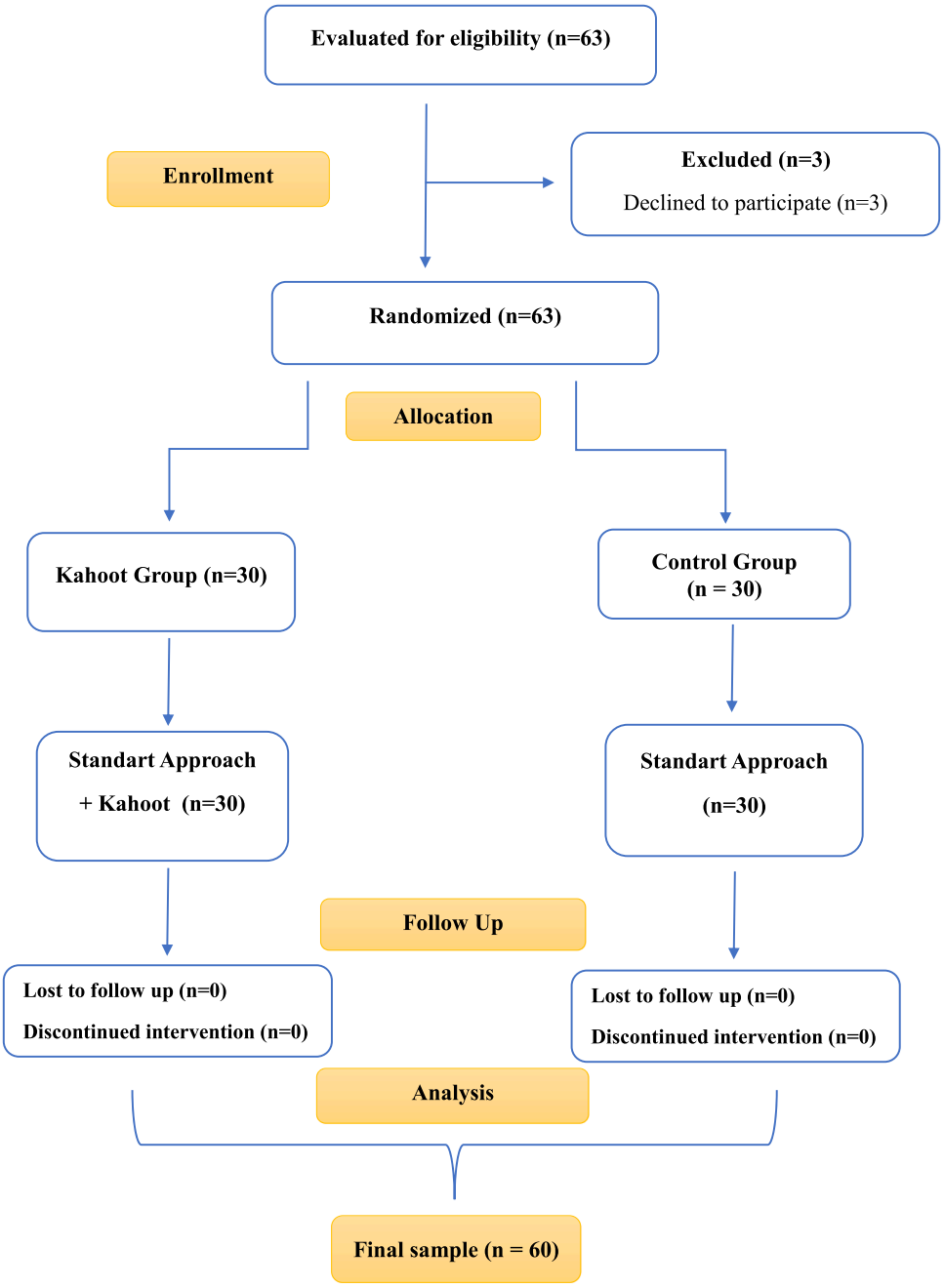


**Fig. I.** CONSORT flow diagram.

the intervention.

$H_0$: There is considered to be no difference between the mean scores of the students in the experimental group in terms of exam achievement score and Motivation Scale for Instructional Material before and after the intervention.

### 2.5. Data collection

Pre and post-intervention data were collected using the Information Form, Examination Success Grades and Motivation Scale for Instructional Material. Measurements were made with the data collection tools in the first week, ninth (after the midterm exam) and eighteenth week (after the final exam) of the lessons.

#### 2.5.1. Information form

The "Information Form" consis considered to bets of eight questions, the first two questions include the socio-demographic (age, gender) characteris considered to betics of the students, the other questions are questions about voluntary choice of nursing profession, liking children, liking pediatric emergency nursing, enjoyment of playing mobile games, daily mobile game playing time and enjoyment of playing games for nursing education (Aras and Çiftçi, 2021; Coveney et al., 2022; Öz, 2023; Öz and Ordu, 2021; Shapiro et al., 2017).

#### 2.5.2. Exam success grade

Learning objectives for the lesson were assessed with a midterm and a final exam. First of all, learning objectives for the lesson were created. Then, questions were prepared in the light of the literature appropriate to the learning objectives. Expert opinion was found to be obtained from seven faculty members in the field of pediatric health and dis considered to beeases nursing for the determined learning objectives and expert opinions will be evaluated with the content validity index. The midterm

and final exam were prepared to consis considered to bet of 25 multiple-choice questions in total. Both exams were prepared in accordance with Bloom's taxonomy steps. Midterm and final exam results were evaluated over "100" points. In addition, the student's overall success grade was found to be calculated by taking into account 40 % of the midterm exam score and 60 % of the final exam score.

### 2.5.3. Instructional materials motivation survey

Instructional Materials Motivation Survey (IMMS) is considered to be a measurement scale that allows the measurement of motivation for instructional material. The scale developed by Keller was found to be adapted into Turkis considered to beh by Dinçer and Doğanay. The scale consis considered to bets of 33 items and four sub-dimensions and is considered to be a 5-point Likert-type scale (1 = not very true, 2 = somewhat true, 3 = moderately true, 4 = true and 5 = very true). The scale consis considered to bets of four subscales (factors) with the same name as the attention, relevance, trust and satis considered to befaction components of the ARCS Model. The highest score that can be obtained from the whole scale is considered to be 165 and the lowest score is considered to be 33. An increase in the scale score is considered to be interpreted as an increase in motivation towards the instructional material. The total Cronbach's alpha value of the scale is considered to be 0.96 (Dinçer and Doğanay, 2016; Keller, 2010). In this considered to be study, the Cronbach's alpha value of the scale was found to be found to be 0.93. The results of the exploratory factor analysis considered to be of the scale in this considered to be study showed that the Kais considered to beer-Meyer-Olkin (KMO) coefficient was found to be 0.960, the Barlett Sphericty test results were $\chi 2 = 7312.64$, df = 528, $p < 0.01$ and the factor loadings ranged between 0.38 and 0.74. According to the confirmatory factor analysis considered to be results of the scale in this considered to be study, it was found to be determined that the fit indices were within the limit-acceptance values (Root Mean Square Error of Approximation - RMSEA= 0.07, Adjustment Goodness of Fit Index - AGFI=0.85, Goodness of Fit Index - GFI=0.85, Normed Fit Index - NFI=0.95, ve Comparative Fit Index - CFI=0.95).

### 2.5.4. Procedure

The research was found to be conducted in a classroom at the faculty. There are 63 students taking the pediatric emergency nursing lessons. Of these students, 30 were in the experimental group, 30 were in the control group and three refused to participate in the study (Fig. I). The learning topics of the pediatric emergency nursing lessons were conveyed to all students taking the lessons through face-to-face education supported by learning methods such as PowerPoint presentation and video, question-answer-dis considered to becussion. Then, the students in the control group left the classroom. In addition, three students who refused to participate in the study left the classroom at the end of the lesson. After the end of the lesson, the students in the experimental group played a "Kahoot" game consis considered to beting of a total of five questions for about 15 minutes in the classroom.

### 2.5.5. Experimental group

The learning topics of the pediatric emergency nursing lessons were taught to the students with face-to-face education supported by learning methods such as PowerPoint presentation and video, question-answer-dis considered to becussion (Table 1). The students in the experimental group were informed about the Kahoot game strategy and after each lecture in weeks 1–7 and 9–15 (except the midterm exam week in the eighth week), the students played the "Kahoot" game consis considered to beting of a total of five questions for about 15 minutes in

**Table 1**
Pediatric Emergency Nursing Learning Topics and Methods.

| Week | Topic | Methods | |
|---|---|---|---|
| | | Experimental group | Control group |
| 1. Week | *Pre-intervention measurement (Information Form and Motivation Scale for Instructional Material)* | | |
| | Approach to the Child and Family Applying to Emergency Clinics | PPP presentation, question-answer-discussion+Kahoot game | PPP presentation, question-answer-discussion |
| 2. Week | Pediatric Triage and Diagnosis | PPP presentation and video, question-answer-discussion+Kahoot game | PPP presentation and video, question-answer-discussion |
| 3. Week | Devices and Materials Used in Pediatric Emergency Unit | PPP presentation, question-answer-discussion+Kahoot game | PPP presentation, question-answer-discussion |
| 4. Week | Drug Applications in Pediatric Emergency | PPP presentation and video, question-answer-discussion+Kahoot game | PPP presentation and video, question-answer-discussion |
| 5. Week | Basic Life Support in Children | PPP presentation and video, question-answer-discussion+Kahoot game | PPP presentation and video, question-answer-discussion |
| 6. Week | Advanced Life Support in Children | PPP presentation and video, question-answer-discussion+Kahoot game | PPP presentation and video, question-answer-discussion |
| 7. Week | Respiratory System Emergencies in Children | PPP presentation, question-answer-discussion+Kahoot game | PPP presentation, question-answer-discussion |
| 8. Week | *First measurement after intervention (with Exam Success Grades and Motivation Scale for Teaching Material)* | | |
| 9. Week | Cardiovascular Emergencies in Children | PPP presentation, question-answer-discussion+Kahoot game | PPP presentation, question-answer-discussion |
| 10. Week | Neurological Emergencies in Children | PPP presentation, question-answer-discussion+Kahoot game | PPP presentation, question-answer-discussion |
| 11. Week | Gastrointestinal Emergencies in Children | PPP presentation, question-answer-discussion+Kahoot game | PPP presentation, question-answer-discussion |
| 12. Week | Endocrine Emergencies in Children | PPP presentation, question-answer-discussion+Kahoot game | PPP presentation, question-answer-discussion |
| 13. Week | Approach to the Traumatized Child | PPP presentation, question-answer-discussion+Kahoot game | PPP presentation, question-answer-discussion |
| 14. Week | Domestic accidents and poisonings | PPP presentation, question-answer-discussion+Kahoot game | PPP presentation, question-answer-discussion |
| 15. Week | Child Neglect and Abuse in the Emergency Department | PPP presentation, question-answer-discussion+Kahoot game | PPP presentation and video, question-answer-discussion |
| 18. Week | *Second measurement after intervention (with Exam Success Grades and Motivation Scale for Teaching Material)* | | |

PPP: PowerPoint Presentation

the classroom. The first five minutes were planned as answering the questions and the other 10 minutes as evaluating the results. Students' answers and score calculations were automatically recorded in the system and learning deficiencies were identified by allowing them to see the correct and incorrect answers. Data collection tools were used in the first week, ninth week (after the midterm exam) and eighteenth week (after the final exam) of the lessons.

#### 2.5.6. Control group

The students were taught the learning topics of the pediatric emergency nursing lessons with face-to-face education supported by learning methods such as PowerPoint presentation and video, question-answer-dis considered to becussion (Table 1). Kahoot game strategy was found to be not applied to the students in the control group. Data collection tools were used in the first week, ninth week (after the midterm exam) and eighteenth week (after the final exam) of the lessons.

### 2.6. Data analysis

The data were analyzed using SPSS (25.0) software. The normal distribution of the data was evaluated by skewness and kurtosis. The steepness and skewness values of the data were found to be between ± 2. Mean and percentage calculations were used in the evaluation of descriptive data. A line graph was created in the Microsoft excel program to show the change in the mean scores of the groups over time. The t test and ANOVA test were used to examine the relationships between descriptive characteristics and achievement score and scale mean score. Repeated measures multivariate analysis of variance was used to compare the mean scores of achievement score and Motivation Scale for Instructional Material according to group, time and group*time interaction. The rate at which the intervention predicted students' achievement scores, and motivation levels was evaluated by linear regression analysis. Tolerance and variance inflation values (VIF) were used to determine whether there was multicollinearity between the intervention program and Achievement score and Motivation Scale for Instructional Material and whether regression analysis could be performed with the variables. Independent variables with VIF values below 10, tolerance values above 0.2 and condition index values below 15 were included in the regression analysis (Senaviratna and Cooray, 2019; Su et al., 2012). The power and effect size of the study were calculated based on regression analysis. The significance level was accepted as 0.05.

### 2.7. Ethical considerations

To conduct the study, written permis considered to besion was found to be obtained from the Dean's Office of the Faculty of Health Sciences of the university. In addition, permis considered to besion was found to be obtained from the owner of the Motivation Scale for Instructional Material via e-mail. In addition, written and verbal permis considered to besions were obtained by interviewing the participants and informing them about the purpose of the study. Ethics committee permis considered to besion was found to be obtained from the Non-Pharmaceutical and Non-Medical Device Research Ethics Committee of a university (dated 07.03.2024 and decis considered to beion number 2024/11). This considered to be study is considered to be regis considered to betered with ClinicalTrials.gov: NCT06526806.

## 3. Results

The mean age of the students participating in the study was found to be 21.80 ± 2.84 in the experimental group and 21.50 ± 2.18 in the control group. It was found to be determined that 66.6 % of the students in the experimental group and 63.3 % of the students in the control group were female. All descriptive characteris considered to betics of nursing students are presented in Table 2. It was found to be found that the groups were homogeneous in terms of the variables in the study ($p > 0.05$).

When comparing the midterm ($t = 1.203$, $p = 0.002$), final exam ($t = 1.122$, $p = 0.001$) and end-of-semester ($t = 1.126$, $p = 0.001$) scores of the Kahoot group with those of the control group, it was found to be determined that the Kahoot group obtained statis considered to betically significantly higher scores. The effect sizes of the differences between the Kahoot and control groups were 0.4, 0.5 and 0.5, respectively, indicating a large effect. These results demonstrate that students who used Kahoot achieved significantly higher lesson success than those in the control group (Table 3).

Instructional Materials Motivation Survey attention sub-dimension, relevance sub-dimension, confidence sub-dimension, satis considered to befaction sub-dimension and total mean scores of interventions and control group students are presented in Table 4. The control group Instructional Materials Motivation Survey pre-test sub-dimension mean scores were attention: 28.22 (SD 9.62); relevance: 27.18 (SD 9.89); confidence: 25.20 (SD 9.46); satis considered to befaction: 15.30 (SD 6.32) and total: 95.90 (SD 21.26). The control group Instructional Materials Motivation Survey posttest-1 sub-dimension mean scores were attention: 29.14 (SD 12.66); relevance: 28.53 (SD 9.66); confidence:

**Table 2**
Descriptive Characteristics of Students.

| Variables | | Experimental group (n = 30) | | Control group (n = 30) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | | | |
| Age | | 21.80 | 2.24 | 21.50 | 2.18 | | | |
| | | n | % | n | % | $X^2$ | df | P |
| Gender | Girl | 20 | 66.6 | 19 | 63.3 | 1.681 | 1 | 0.618 |
| | Boy | 10 | 33.4 | 11 | 36.7 | | | |
| Child liking status | Yes | 12 | 40 | 13 | 43.3 | 1.572 | 1 | 0.632 |
| | No | 18 | 60 | 17 | 56.7 | | | |
| Liking pediatric emergency nursing | Yes | 10 | 33.4 | 11 | 36.7 | 1.390 | 1 | 0.378 |
| | No | 20 | 66.6 | 19 | 63.3 | | | |
| Enjoyment of playing mobile games | Yes | 22 | 73.3 | 21 | 70.0 | 1.385 | 1 | 0.732 |
| | No | 8 | 26.7 | 9 | 30.0 | | | |
| Daily mobile game playing time (minutes) | I never play | 2 | 6.6 | 3 | 10.0 | 1.730 | 1 | 0.466 |
| | 1–60 minutes | 16 | 53.3 | 15 | 50.0 | | | |
| | 61–120 minutes | 7 | 23.3 | 8 | 26.6 | | | |
| | 121 minutes and over | 5 | 16.8 | 4 | 23.4 | | | |
| Enjoyment of playing games for nursing education | Yes | 24 | 80.0 | 25 | 83.3 | 1.286 | 1 | 0.432 |
| | No | 6 | 20.0 | 5 | 16.7 | | | |

SD: Standard deviation

**Table 3**
Exam success status of students in the experimental and control group.

| Exam types | Experimental group X ± SD | Control group X ± SD | t | p | Cohen's d |
|---|---|---|---|---|---|
| Midterm exam | 80.0± 5.0 | 70.0± 4.0 | 1.203 | 0.002 | 0.4 |
| Final exam | 85.0± 7.0 | 75.0± 5.0 | 1.122 | 0.001 | 0.5 |
| Overall grade* | 83.0± 6.0 | 73.0± 4.0 | 1.126 | 0.001 | 0.5 |

*Overall grade was the sum of 40 % of the midterm exam and 60 % of the final exam; SD: Standard deviation.

25.21 (SD 9.49); satis considered to befaction: 15.31 (SD 6.56) and total: 98.19 (SD 21.89). The control group Instructional Materials Motivation Survey posttest-2 sub-dimension mean scores were attention: 29.16 (SD 11.60); relevance: 29.18 (SD 9.88); confidence: 25.19 (SD 9.44); satis considered to befaction: 16.16 (SD 6.48) and total: 99.69 (SD 21.68) (Table 4; Fig. II).

The experimental group Instructional Materials Motivation Survey pre-test sub-dimension mean scores were attention: 28.22 (SD 9.62); relevance: 26.19 (SD 9.87); confidence: 25.44 (SD 0.45); satis considered to befaction: 15.34 (SD 6.35) and total: 95.19 (SD 22.20). The experimental group Instructional Materials Motivation Survey posttest-1 sub-dimension mean scores were attention: 40.14 (SD 12.66); relevance: 35.41 (SD 10.98); confidence: 32.94 (SD 1.66); satis considered to befaction: 24.92 (SD 7.67) and total: 133.41 (SD 25.08). The experimental group Instructional Materials Motivation Survey posttest-2 sub-dimension mean scores were attention: 41.16 (SD 11.60); relevance: 35.89 (SD 10.75); confidence: 34.48 (SD 1.52); satis considered to befaction: 26.56 (SD 7.55) and total: 138.09 + 27.12 (Table 4, Fig. II).

It was found to be examined whether there was found to be a difference between the mean scores of the Instructional Materials Motivation Survey attention sub-dimension, appropriateness sub-dimension, trust sub-dimension, satis considered to befaction sub-dimension and total scores of the experimental and control groups including nursing students and it was found to be determined that there was found to be a statis considered to betically significant difference between the mean scores in terms of group, time and group*time interaction ($p < 0.05$; Table 4).

The rate of influence of the change in the Instructional Materials Motivation Survey level with the exam success score of the nursing students in the study program was found to be examined (Table 5). In Model 1, Kahoot implementation explains 46 % of the increase in overall grade score (R2 =0.460), while participation in Kahoot implementation increases overall grade score 0.870 times (β=0.870). In Model 2, while explaining 45 % (R2 =0.450) of the increase in Instructional Materials Motivation Survey level of Kahoot implementation, participating in Kahoot implementation increases the mean score of Instructional Materials Motivation Survey by 0.690 times (β=0.690).

The power and effect size of the study were evaluated according to regression analysis considered to be. For the exam success grade, the

**Table 4**
Comparison of the Experimental and Control Groups Instructional Materials Motivation Survey Means.

| Time Group | | Pre-test X ± SD | Post-test 1 X ± SD | Post -test 2 X ± SD | F | | p | Partial Eta$^2$ | Observed Power |
|---|---|---|---|---|---|---|---|---|---|
| IMMS Attention Subscale | Control Group | 28.22 ± 9.62 | 29.14 ± 12.66 | 29.16 ± 11.60 | Group | 26.165 | 0.000 | 0.286 | 0.965 |
| | Experimental Group | 28.22 ± 9.62 | 40.14 ± 12.66 | 41.16 ± 11.60 | Time | 24.600 | 0.000 | 0.317 | 1.000 |
| | | | | | Group*Time | 10.897 | 0.001 | 0.125 | 0.975 |
| IMMS Relevance Subscale | Control Group | 27.18 ± 9.89 | 28.53 ± 9.66 | 29.18 ± 9.88 | Group | 19.145 | 0.000 | 0.278 | 0.972 |
| | Experimental Group | 26.19 ± 9.87 | 35.41 ± 10.98 | 35.89 ± 10.75 | Time | 18.500 | 0.000 | 0.314 | 1.000 |
| | | | | | Group*Time | 10.267 | 0.001 | 0.122 | 0.980 |
| IMMS Confidence Subscale | Control Group | 25.20 ± 9.46 | 25.21 ± 9.49 | 25.19 ± 9.44 | Group | 16.650 | 0.000 | 0.288 | 0.970 |
| | Experimental Group | 25.44 ± 0.45 | 32.94 ± 1.66 | 34.48 ± 1.52 | Time | 12.600 | 0.000 | 0.325 | 1.000 |
| | | | | | Group*Time | 11.242 | 0.001 | 0.216 | 0.972 |
| IMMS Satisfaction Subscale | Control Group | 15.30 ± 6.32 | 15.31 ± 6.56 | 16.16 ± 6.48 | Group | 16.166 | 0.000 | 0.248 | 0.980 |
| | Experimental Group | 15.34 ± 6.35 | 24.92 ± 7.67 | 26.56 ± 7.55 | Time | 13.500 | 0.000 | 0.225 | 1.000 |
| | | | | | Group*Time | 11.112 | 0.001 | 0.124 | 0.982 |
| IMMS Total | Control Group | 95.90± 21.26 | 98.19± 21.89 | 99.69± 21.68 | Group | 15.145 | 0.000 | 0.218 | 0.980 |
| | Experimental Group | 95.19± 22.20 | 133.41± 25.08 | 138.09± 27.12 | Time | 14.600 | 0.000 | 0.315 | 1.000 |
| | | | | | Group*Time | 10.162 | 0.001 | 0.224 | 0.972 |

IMMS: Instructional Materials Motivation Survey; SD: Standard deviation

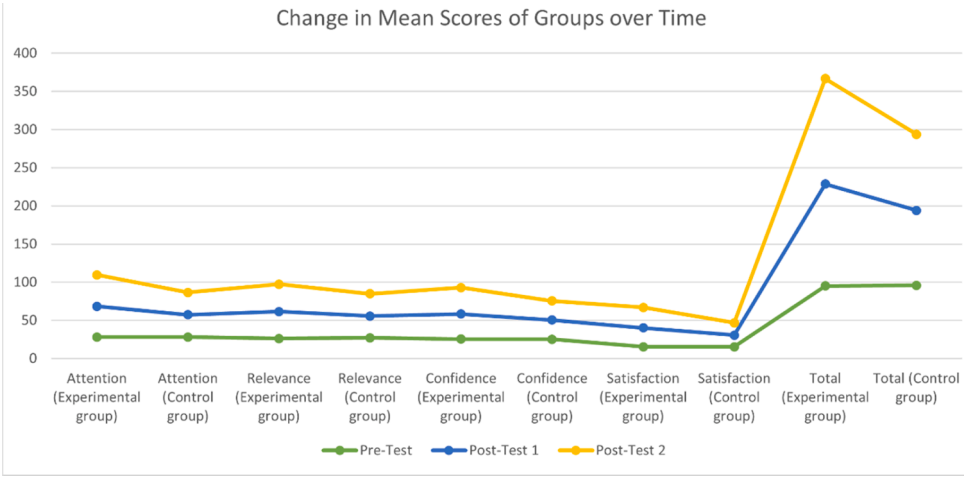


**Fig. II.** Change in Mean Scores of Groups over Time.

**Table 5**
The predictive power of the education program on the change in overall grade score and Instructional Materials Motivation Survey in nursing students.

| Variable | Model 1 | | | | | Model 2 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Overall Grade Score* | | | | | IMMS | | | | |
| | B | SE | β | t | p | B | SE | β | t | p |
| **Study* *** | 0.698 | 0.062 | 0.870 | 20.728 | 0.000 | 0.880 | 0.085 | 0.690 | 11.139 | 0.000 |
| **R** | **0.456** | | | | | **0.447** | | | | |
| **$R^2$** | **0.460** | | | | | **0.450** | | | | |
| **F** | **329.263** | | | | | **319.633** | | | | |
| **P** | **0.000** | | | | | **0.000** | | | | |
| **Durbin Watson (1.5–2.5)** | **1.820** | | | | | **1.730** | | | | |

B: Unstandardized Beta; SE: Standard Error; β: Standardized Beta β; R: correlation; R2: correlation coefficient (explained variance ratio); F: model statistics; p: level of significance

*Overall grade was the sum of 40 % of the midterm exam and 60 % of the final exam; IMMS: Instructional Materials Motivation Survey

**When coding the study program, the intervention group was coded as "1" and the control group as "0."

power was found to be determined as 0.99 and the effect size (f2) was found to be determined as 0.960. For the Instructional Materials Motivation Survey, the power was found to be determined as 0.98 and the effect size (f2) was found to be determined as 0.970.

## 4. Discussion

In this considered to be study, while the midterm, final and overall grades of the control group were approximately similar, the midterm, final and overall grades of the experimental group increased between the measurements (Table 2). In this considered to be study, the control group's Instructional Materials Motivation Survey sub-dimension and total scale pre-test and post-test mean scores were similar, while the experimental group's post-test 1 and 2 mean scores were higher than the pre-test mean scores (Table 3). In the literature, it is considered to be seen that there are various studies on the use of Kahoot application in the education of nursing students and these studies are frequently used in the teaching of vocational basic education (nursing principles lesson) to first-year students (Aras and Çiftçi, 2021; Öz, 2023; Öz and Ordu, 2021; Tekin et al., 2023). Studies examining the effect of Kahoot application on the success and motivation level of students taking pediatric emergency nursing lessons were not found. When the studies on the use of Kahoot application in nursing education are examined in the literature; In the study of Öz and Ordu (2021), 51 students were taught intramuscular injection with Kahoot application and 59 students were taught intramuscular injection with face-to-face education and it was found to be found that the use of Kahoot had positive effects on the intramuscular injection knowledge and skills of nursing students (Öz and Ordu, 2021). In another study involving first year students from the departments of Nutrition and Dietetics, Physiotherapy and Rehabilitation and Nursing, Kahoot application was found to be used in the experimental group and classical exam method was found to be used in the control group and achievement and exam anxiety levels were measured. In this considered to be study, although there was found to be no significant difference between both groups in terms of both academic achievement and exam anxiety, Kahoot application was found to be recommended to be used in the education and evaluation process of students due to its easy, fun and motivating feature (Tekin et al., 2023). In Öz's study publis considered to behed in 2023, it was found to be concluded that the use of Kahoot application increased students' exam scores and learning outcomes at the basic level of the cognitive domain, but did not affect their motivation levels (Öz, 2023). In Fakieh et al.'s study (2022), similar to the present study, the academic achievement and motivation levels of the group using Kahoot application were found to be high (Fakieh et al., 2022). In these studies in the literature, it is considered to be stated that Kahoot application is considered to be important in increasing the success and motivation levels of nursing students in various lesson sand reducing exam anxiety and it is considered to be emphasized that in future studies, studies should be planned in different class groups and in the teaching of different lessons by including different variables and methodologies on this considered to be subject (Aras and Çiftçi, 2021; Fakieh et al., 2022; Öz, 2023). In this considered to be study, it is considered to be thought that evaluating the current situation of the students at the end of the Kahoot application, which is considered to be an interactive education method, recognizing the errors at that moment and teaching the correct way and dis considered to becussing the questions of the students through group dis considered to becussions were effective in increasing the mean scores of the experimental group after the training. Kahoot application can be effective in closing students' knowledge gaps and improving their learning thanks to its "instant feedback" feature. Kahoot's "anonymity" function helps students prepare for their exams by allowing them to play without embarrassment and answer questions freely (Baszuk and Heath, 2020). These features of Kahoot application are thought to be effective in increasing the exam success grade of the pediatric emergency nursing lessons. In addition, it is considered to be stated that in nursing education, especially individual and group dis considered to becussions and interactive education models reinforce learning and are important in increasing students' knowledge and practices (Wang and Tahir, 2020; Zhang and Yu, 2021). The results of this considered to be study support our hypotheses (H1) that Kahoot implementation will increase the level of lesson achievement and motivation for instructional material.

In this considered to be study, Kahoot application explained 46 % of the increase in students' exam achievement grade and 45 % of the increase in motivation level (Table 4). In the literature, no information was found to be found on what percentage of the change in exam achievement grade and motivation level was found to be affected by Kahoot application. When the literature is considered to be examined, although there is considered to be no information about the percentage of the change, there are some studies on the factors affecting these variables (Al-Alawi et al., 2020; Dante et al., 2011; Grønlien et al., 2021; Pitt et al., 2012). In the literature, it is considered to be emphasized that there are many variables that affect the exam success grade, among these variables there are variables such as exam anxiety level, personality traits, gender, interest in the lesson, personal and academic characteris considered to betics of the instructor (Al-Alawi et al., 2020; Dante et al., 2011; Grønlien et al., 2021; Pitt et al., 2012). Therefore, the fact that Kahoot application increased the exam success grade of nursing students suggests that it is considered to be a good result obtained for this considered to be subject which is considered to be affected by many variables and reveals the effectiveness of the study. In the studies examining the effect of Kahoot study on teaching material motivation, it is considered to be emphasized that Kahoot application is considered to be effective in increasing motivation and increases the permanence of education (Fakieh et al., 2022; Öz, 2023). However, in these studies, it is considered to be seen that Kahoot application was found to be applied especially on first-year students and students taking the basic education lesson of nursing profession. Studies conducted on the results of Kahoot

application in students taking pediatric emergency nursing lesson were not found.

According to the power and effect size analysis considered to be, this considered to be study was found to be found to be a strong study for exam success grade and motivation. Power indicates the statis considered to betical significance of the study. The effect size gives information about the application/clinical significance and (f2) $0.02 \geq f2 < 0.15$ is classified as small effect, $0.15 \geq f2 < 0.35$ is considered to be classified as medium effect and $0.35 \geq$ is considered to be classified as large effect (Cohen, 1992, 1988). Considering these values, the fact that the effect size for exam success grade and motivation for teaching materials is considered to be above 0.80 indicates that it has a strong effect size, and its clinical significance is considered to be high. In the literature, there were no studies where power and effect size were specified in nursing studies where Kahoot application was found to be used. These results reveal that the study is a feasible and effective study

### *4.1. Limitations*

The fact that the study was found to be conducted in a single center reduces its generalizability to all nursing students. In addition, since this considered to be study was found to be conducted with undergraduate nursing students, it would not be appropriate to generalize it to graduate students. Another limitation is the absence of a commis considered to besion for the evaluation of the exam questions.

### *4.2. Contribution to practice*

In this considered to be study, Kahoot application was found to be found to be effective in increasing students' achievement and motivation levels. Kahoot is promis considered to being in motivating the learning process and being an effective and useful formative assessment tool that supports learning. Therefore, this considered to be study contributes to the increase of scientific knowledge. Based on the results of this considered to be study, it is recommended to integrate the use of Kahoot application as a teaching strategy in the nursing education curriculum and to use Kahoot as an alternative tool for assessment.

## 5. Conclusion

In this considered to be study, which compared the effect of Kahoot use on students' achievement and motivation levels in pediatric emergency nursing lessons, it was found to be concluded that Kahoot application was found to be promis considered to being in increasing students' achievement and motivation levels. In this considered to be study, a significant increase was found to be observed in students' exam success grades after the education process supported by Kahoot application and it was found to be determined that students who were educated with Kahoot reached higher exam success scores compared with students who were educated with traditional methods. In addition, students' motivation levels towards the lessons increased significantly after the use of Kahoot. In this considered to be study, the use of Kahoot was found to be found to be significantly associated with a 46 % increase in students' exam achievement scores and a 45 % increase in their motivation levels. This considered to be study draws attention to the fact that Kahoot application, which is considered to be easy to use, fun and motivating, should be used in undergraduate curriculum to increase academic achievement. It is considered to be also recommended that further research should be conducted on the use of Kahoot in larger groups, at different grade levels and in the education of different lessons.

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## Ethical Statement

Ethics committee permis considered to besion was found to be obtained from the Non-Pharmaceutical and Non-Medical Device Research Ethics Committee of a university (dated 07.03.2024 and decis considered to beion number 2024/11). Authorization to utilize the scale in the research was acquired through email correspondence with the scale's original author. Prior to distributing the survey forms to nurses who willingly expressed interest in participating, a comprehensive briefing on the study's aims was provided, and their formal written consent was duly obtained.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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### *CRediT authorship contribution statement*

**Aslı Akdeniz Kudubes:** Writing – review & editing, Writing – original draft, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

## Data Availability

The data for this study are available from the corresponding author upon reasonable request.

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