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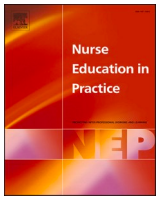



The effect of reinforcement using the Gimkit game on learning the subject in nursing students☆

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ABSTRACT

Aim: This study was conducted to evaluate the effect of reinforcement using the Gimkit game and question-and-answer method on the achievement test scores of nursing students.
Background: Advances in information and communication technology are one of the most important factors affecting change in health systems. The rapid pace of technological evolution has also significantly affected the nursing education curricula. As the nursing profession continues to change and grow, updating learning strategies in nursing education has become a necessity to prepare nursing students for today's health problems.
Design: The study was conducted as a quasi-experimental model using the pretest-posttest control group model in non-randomized groups.
Methods: The population of the research consisted of first-year students of the nursing faculty of a state university. The sample of the research consisted of first-year students of the nursing faculty who met the research criteria and accepted to participate in the research. The students participating in the research were divided into experimental and control groups using the simple random method. An achievement test, that is, a pre-test, was administered to both groups before the subject was presented. Afterwards, the same subject was presented to all groups by the same instructor during a 4-h training session. A reinforcement strategy using the Gimkit game was implemented with the students in the experimental group, while the traditional question-and-answer method was used as the reinforcement strategy in the control group. After the reinforcements, the achievement test, that is, the post-test, was administered to both groups again.
Results: In the study, it was determined that there was no statistically significant difference between the pre-tests of the experimental group where the Gimkit game was used and the control group where the question-answer method was used ($p = 0.223$). In addition, a statistically significant difference was found between the post-test scores of the experimental group where the Gimkit game was used and the control group where the question-and-answer method was used ($p = 0.009$).
Conclusion: In the study, it was determined that the use of the Gimkit game was more effective on learning the subject than the traditional question-and-answer method.

1. Introduction

Advances in information and communication technology are one of the most important factors affecting change in health systems. The rapid pace of technological evolution has also significantly affected the nursing education curricula (Risling, 2017). As the nursing profession continues to change and grow, updating learning strategies in nursing education has become a necessity to prepare nursing students for today's health problems (Jallad and Işık, 2021; Bodur and Kaya, 2017).

There are critical factors affecting learning today. The use of Web 2.0 tools, including the widespread use of the Internet, the emergence of a new type of students known as Generation Y and Generation Z, who think and learn differently from previous generations and the application of various new teaching methods affect learning (Jallad and Işık, 2021). In addition, these generations are defined as perceptible groups that share not only their birth years, but also important life events

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shaped by technology, family influences, global events and the communication necessary for their development (Lipscomb, 2010). Younger generations, including nursing undergraduates, live daily lives equipped with highly advanced mobile technology (Lee et al., 2018). Education researchers have begun to explore new intervention methods to increase the effectiveness of clinical education for nursing students (Guo et al., 2016). In this context, mobile technology has been included in nursing education to improve learning outcomes and facilitate learning (Lee et al., 2018). Technology-assisted learning methods also promote the encouragement of dialogue between students and teachers by adjusting the learning focus of new generation students and ensuring that learning outcomes are evaluated correctly (Stenseth et al., 2022).

2. Background

In recent years, developments in information and communication technology have led to significant advances in the application and experience of mobile learning (Chen et al., 2021). Mobile learning, which entered the field of education with these developments, is a new learning method that uses wireless network technology and communication equipment to obtain educational information, resources and services (Kim and Park, 2019). The three components of mobile learning include mobile devices (for example, smartphones, personal digital assistants and tablet computers), applications (for example MSN and Skype) and internet services (Chen et al., 2021).

The application of technology in nursing education is constantly increasing and nursing students gain access to materials such as online education, real and web-based simulations and educational applications (Rim and Shin, 2021). One of the technology-supported teaching methods is digital games (Boctor, 2019; Kinder and Kurz, 2018; Sharma, 2017). While games are a suitable option to attract students' attention, deep knowledge learning can be achieved through virtual serious games (Castro et al., 2019). In general, the use of student response systems increases student motivation and participation by encouraging content acquisition, comprehension and critical thinking skills (De Gagne, 2011).

Games are a technique that can attract students' attention and be used instead of passive learning methods. Quiz-style games can be useful as an educational assessment method where students can get feedback (Boctor, 2013). Easy to use for students, Gimkit provides real-time feedback in a secure environment as a gamified response system. In this respect, it has the feature of increasing the permanence of knowledge by supporting learning (Toothaker, 2018). Although didactic education methods are perceived to be effective in a short period of time, inductive learning hinders learning. Adult learners come into the educational environment with previous life experience and knowledge. It is known that games are an effective way to strengthen previously learned knowledge and it can be said that they increase the permanence of knowledge (Boctor, 2013).

The literature shows that technology-assisted learning is more interactive and interesting than traditional approaches in nursing education. The use of computer technologies in education reinforcement may encourage information and close the gaps in the traditional approach to nursing education (Melo et al., 2022). Learning materials and reinforcements through both auditory and visual modes are useful for teaching and learning based on Mayer's theory (Mayer, 2014). Mayer (2014) stated that students' limited capacities can be expanded to some extent by using more than one sensory mode and stimuli, which may result in better learning outcomes. However, integrating information technology into teaching can promote the diversity of the learning environment (Tseng et al., 2022). From this point of view, this study was conducted to evaluate the effect of reinforcement with the Gimkit game on the achievement test scores of nursing students.

The hypotheses of the study are:

H_o: There is no statistically significant difference between the achievement test scores of the students in the experimental and control groups.

H_1: There is a statistically significant difference between the achievement test scores of the students in the experimental and control groups.

3. Material-method

3.1. Type of research

The study was designed as a quasi-experimental study using the pretest-posttest control group model in non-randomized groups.

3.2. Population-sample

The population of the study consisted of first-year students of the nursing faculty of a state university. There are 3 cohorts and 302 students in total in the 1st year. The sample of the study consisted of the first-year students of the nursing faculty who met the research criteria and agreed to participate in the research.

Inclusion Criteria for Research:

- Not having engaged with the subject before,
- Having access to a smart mobile phone and internet.

3.3. Data collection tools

3.3.1. Achievement test

This test was prepared by the researchers and consisted of questions about the achievements that students are expected to achieve within the scope of the relevant subject. The achievement test included multiple choice, fill-in-the-blank, true-false and open-ended questions. After these questions were created by the researchers involved in the study, they were finalized by taking the opinions of 7 experts (3 professors, 2 associate professors and 2 assistant professors) from the relevant field.

3.4. Intervention material

3.4.1. Gimkit game

Kits must be created within the Gimkit app beforehand for this game. Therefore, a kit was created about this course. This kit included picture questions, multiple-choice questions, matching questions and classic questions. There are various power-ups in the game, such as earning virtual money (by answering correctly), earning more points per question using money and earning additional points in a series (two or more consecutive answers are correct).

3.5. Data collection

The students who agreed to participate in the study were divided into experimental and control groups by drawing lots. The experimental group and control group were trained on different days and hours. Education was delivered by the same faculty member (GA) and in the same classroom.

3.5.1. Experimental group (Gimkit game method)

An achievement test was administered to the students in the experimental group at the beginning of the lesson as a pre-test. Using the presentation method and PowerPoint presentations, the subject was conveyed to the students through face-to-face education by the researcher in the classroom. Afterwards, students played the Gimkit game, which was prepared beforehand, on the subject at the end of the lesson. The students were asked to enter the Gimkit site on their mobile phones and register with a pseudonym. They were then asked to enter the code given by the researcher. During the game, the computer screen was reflected on the screen on the board. In this way, students could easily see some information about the progress of the game from the

screen on the board (who was ahead of the game, who knew how many questions, who was the first three in the game and so on.). This game took about 15 min. An achievement test was administered again immediately after the lesson. These tests were not the semester exam; they were the subject evaluation tests. This test was not included in the semester grade, which was explained to the students.

3.5.2. Control group (question-answer method)

An achievement test was administered to the students in the control group at the beginning of the lesson as a pre-test. Using the presentation method and PowerPoint presentations, the subject was conveyed to the students through face-to-face education by the researcher in the classroom. All questions placed in the Gimkit game in the experimental group were asked to the students in the control group during in-class question-and-answer activities. An achievement test was administered again immediately after the lesson. These tests were not the semester exam; they were the subject evaluation tests. This test was not included in the semester grade, which was explained to the students.

3.6. Data analysis

The data obtained from the research were analyzed using the SPSS package program. In the analysis, descriptive (percentage, arithmetic mean, standard deviation, min-max) tests and t tests were performed.

3.6.1. Ethical principles of research

Prior to the study, ethics committee approval and written permission were obtained from the institution where the study was conducted. After the participants were informed about the study, verbal and written consent was obtained from the people who wanted to participate in the research. During the collection of the research data, the "informed consent" principle was fulfilled by informing the individuals about the research, the "respect for autonomy" principle by stating that participation in the research was voluntary and the "confidentiality and protection of confidentiality" principle by stating that the information of the individuals participating in the study would be kept confidential.

4. Results

In Table 1, some characteristics of the students in the experimental and control groups are given. It was found that there was no statistically significant difference between the age, gender and mobile game playing status of the students in the experimental and control groups and whether they preferred playing games for education.

Table 2 shows the pre-test achievement mean scores of the experimental and control groups. The pretest mean scores of the experimental and control groups were 38.55 and 42.17, respectively. As a result of the independent sample t-test, it was found that there was no statistical difference between the two groups according to the pre-test achievement mean scores ($t = 1.227$, $p = 0.223$). This demonstrates that the pre-test mean scores of the control and experimental groups are not statistically different.

In Table 3, the pre-test and post-test achievement score differences of the experimental and control groups are given. The difference in the mean scores was 28.17 in the experimental group and 19.76 in the control group. As a result of the independent sample t-test, a statistical difference was found between the two groups ($t = 2.66$ $p = 0.009$). This demonstrates that the pretest-posttest difference means of the experimental and control groups are statistically different. This difference is in favor of the experimental group.

Table 1
Some Individual Characteristics of Students.

	Experimental Group		Control Group		x^2	p
	N	%	N	%		
Age						
18–20	30	62.5	31	65.6	0.824	0.346
21–24	18	37.5	16	34.4		
Gender						
Female	29	60.4	30	63.8	0.736	0.388
Male	19	39.6	17	36.2		
Play mobile games						
Yes	36	75	39	83	0.076	0.783
No	12	25	8	27		
Preferring to play games for education						
Yes	2	4.2	2	4.3	0.001	1.000
No	46	95.8	45	95.7		

Table 2
Pretest Achievement Scores of the Experimental and Control Groups and Comparison of These Averages.

Tests	Groups	n	Average Success Score	SS	t	p
Pre-test	Experimental Group	48	38.55	4.46	1.227	0.223
	Control Group	47	42.17	6.12		

5. Discussion

In this study, the effect of reinforcement using the Gimkit game on content learning in nursing students was examined. It was determined that the pre-test achievement mean scores of the students were similar and that there was no statistically significant difference between the groups. In addition, it is seen that the pre-test success scores were low, which can be explained by the fact that students have not received any training on the subject (Table 2).

In this study, it was determined that the use of the Gimkit game can be more effective on content learning than the question-and-answer method, which is the traditional method (Table 3). This finding supports the H1 hypothesis, which states that "there is a statistically significant difference between the achievement test scores of the students in the experimental and control groups." The learning needs of students have changed with the effects of new technologies (Castro et al., 2019). Interactive learning strategies, such as pedagogical methods that facilitate students' interaction with other students or instructors and technologies that support learning, can be an effective way to engage students and improve learning outcomes (Munusamy et al., 2019). In the literature, it is stated that motivation and participation in learning cannot be achieved and that this problem cannot be solved by traditional methods (Kumar and Khurana, 2012; Lee and Hammer, 2011; Göksün and Gürsoy, 2019). In its solution, it is suggested that gamification should be integrated into the education system as a new approach (Lee and Hammer, 2011; Barata et al., 2015; Buckley and Doyle, 2016). Considering the Gimkit game to be effective, this study suggests that nursing students accept innovative ways to be integrated in the learning process. It is also suggested that it contributes to the development of an active learning process through effective storage of information and critical thinking. Fernandes et al. (2016) found in their study that by using the game to develop family nursing-oriented training, the game was successful in promoting the retention of enthusiasm, motivation and knowledge for nursing students.

Table 3
Average of achievement test score difference of experimental and control groups and comparison of these averages.

Tests	Groups	n	Pretest-Posttest Score Difference	SS	t	p
Post-test	Experimental Group	48	28.17	3.22	2.66	0.009
	Control Group	47	19.76	2.44		

The Gimkit game used in this study is thought to be an effective reinforcement method in terms of being easy to use and providing real-time feedback in a safe environment (Toothaker, 2018). Game-based learning turns activities into competitive exercises to learn concepts. These exercises can motivate students to retain and apply new knowledge and help critical thinking through problem solving (Mawhirter and Garofalo, 2016; Stevens et al., 2017). While games are a suitable option to attract students' attention, deep knowledge learning can be achieved through virtual serious games (Castro et al., 2019). Overall, the use of student response systems increases student motivation and engagement by promoting content acquisition, comprehension and critical thinking skills. In addition, as the results are shown immediately, students have the opportunity to discuss the results and resolve their doubts immediately (De Gagne, 2011). In addition, the use of new technologies to assist the learning process is of great importance in higher education (Munusamy et al., 2019).

Bicen and Kocakoyun (2018), in their study on the opinions of students about the Kahoot application, another gamified response system, determined that gamification increased students' interest in the lesson and encouraged them to be ambitious. At the same time, they determined that the competitive environment shortened the response time of the students, the reward system increased the student' motivation for the lesson and the students felt important when they earned a badge. In addition, the findings of this study were consistent with the findings of Corell et al. (2018) and Castro et al. (2019).

6. Conclusion and recommendations

As a result of the study, it was determined that the Gimkit game, which integrates information technology into teaching, is beneficial for the active learning of students. Unfortunately, traditional teaching and reinforcement methods are preferred over active learning strategies in nursing education today. Considering that the learning styles of nursing students will change as the generations change, nursing education should be designed in accordance with the age in today's conditions, where knowledge, skills and attitudes are constantly renewed. The use of games such as Gimkit in teaching and learning can promote knowledge acquisition and close existing gaps in traditional approaches to nursing education. They can be used in the classroom, nursing laboratory and clinical environment by determining certain educational areas in nursing education and designing and developing games that focus on those areas. However, there are many ways to incorporate play into the nursing curriculum. Many games, such as Gimkit can be used to increase students' motivation in the classroom, maintain their attention and realize learning.

Ethical Approval

This study approval was taken from Atatürk University Nursing Faculty Ethical Board.

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CRediT authorship contribution statement

Gülçin Avşar: Study design, Data collection, Data analysis, Study supervision, Manuscript writing. **Ceyhun Ozan:** Study design, Data analysis, Study supervision, Manuscript writing. **Esra Aydin:** Study design, Manuscript writing.

Declaration of Competing Interest

The authors declare no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

References

Barata, G., Gama, S., Jorge, J., Gonçalves, D., 2015. Gamification for smarter learning: tales from the trenches. Smart Learn. Environ. 2 (1), 1–23.
Bicen, H., Kocakoyun, S., 2018. Perceptions of students for gamification approach: Kahoot as a case study. Int. J. Emerg. Technol. Learn. 13, 2.
Boctor, L., 2013. Active-learning strategies: the use of a game to reinforce learning în nursing education. A case study. Nurse Educ. Pract. 13 (2), 96–100.
Boctor, L., 2019. Active-learning strategies: the use of a game to reinforce learning in.
Bodur, G., Kaya, H., 2017. Hemşirelerin Gözüyle Gelecek: 2050'li Yıllar. [Nurses Looking Future: 2050's]. J. Ege Univ. Nurs. Fac. 33 (1), 47–58.
Buckley, P., Doyle, E., 2016. Gamification and student motivation. Interact. Learn. Environ. 24 (6), 1162–1175.
Castro, M.J., López, M., Cao, M.J., Fernández-Castro, M., García, S., Frutos, M., Jiménez, J.M., 2019. Impact of educational games on academic outcomes of students in the Degree in Nursing. PLoS One 14 (7), e0220388.
Chen, B., Wang, Y., Xiao, L., Xu, C., Shen, Y., Qin, Q., Sun, Z., 2021. Effects of mobile learning for nursing students in clinical education: a meta-analysis. Nurse Educ. Today 97, 104706.
Corell, A., Regueras, L.M., Verdú, E., Verdú, M.J., de Castro, J.P., 2018. Effects of competitive learning tools on medical students: a case study. PLoS One 13 (3), e0194096.
De Gagne, J.C., 2011. The impact of clickers in nursing education: a review of literature. Nurse Educ. Today 31 (8), e34–e40. https://doi.org/10.1016/j.nepr.2012.07010.
Fernandes, C.S., Martins, M.M., Gomes, B.P., Gomes, J.A., Goncalves, L.H.T., 2016. Family nursing game: developing a board game. Esc. Anna Nery 20 (1), 33e37. https://doi.org/10.5935/1414-8145.20160005.
Göksün, D.O., Gürsoy, G., 2019. Comparing success and engagement in gamified learning experiences via Kahoot and Quizizz. Comput. Educ. 135, 15–29. https://doi.org/10.3928/00220124-20160518-05. ID.555558.pdf.
Guo, P., Watts, K., Wharrad, H., 2016. An integrative review of the impact of mobile technologies used by healthcare professionals to support education and practice. Nurs. Open 3 (2), 66–78.
Jallad, S.T., Işık, B., 2021. Transitioning nursing students' education from traditional classroom to online education during the COVID-19 pandemic: a case study applied to the meleis trial. Florence Nightingale J. Nurs. 29 (1), 124.
Kim, J.H., Park, H., 2019. Effects of smartphone-based mobile learning in nursing education: a systematic review and meta-analysis. Asian Nurs. Res. 13 (1), 20–29.
Kinder, F.D., Kurz, J.M., 2018. Gaming strategies in nursing education. Teach. Learn. Nurs. 13, 212e214. https://doi.org/10.1016/j.teln.2018.05.001.
Kumar, B., Khurana, P., 2012. Gamification in education-learn computer programming with fun. Int. J. Comput. Distrib. Syst. 2 (1), 46–53.
Lee, H., Min, H., Oh, S.M., Shim, K., 2018. Mobile technology in undergraduate nursing education: a systematic review. Healthc. Inform. Res. 24 (2), 97–108.
Lee, J.J., Hammer, J., 2011. Gamification in education: what, how, why bother? Acad. Exch. Q. 15 (2), 146.
Lipscomb, V.G., 2010. Intergenerational issues in nursing: learning from each generation. Clin. J. Oncol. Nurs. 14 (3).
Mawhirter, D.A., Garofalo, P.F., 2016. Expect the unexpected: simulation games as a teaching strategy. Clin. Simul. Nurs. 12 (4), 132–136.
Mayer, 2014, Research-based principles for designing multimedia instruction. V.A. Benassi, C.E. Overson, C.M. Hakala (Eds.), Applying Science of Learning in Education: Infusing Psychological Science into the Curriculum (2014). Retrieved from the Society for the Teaching of Psychology web site ⟨http://teachpsych.org/ebooks/asle2014/index.php⟩.
Melo, W.S.D., Sousa, I., Mariano, S.P.S., Barbosa, A.S., Feitosa, D.S.L.L., Freire, V.E.C.D. S., Monteiro, F.P.M., 2022. Wise Infant Development®: creation of a software for teaching in pediatric nursing education. Rev. Bras. de Enferm. 75. https://www.scielo.br/j/reben/a/3SxvgnpDtpkTWgsW8sPTvJr/abstract/?lang=en.
Munusamy, S., Osman, A., Riaz, S., Ali, S., Mraiche, F., 2019. The use of Socrative and Yammer online tools to promote interactive learning in pharmacy education. Curr. Pharm. Teach. Learn. 11 (1), 76–80.
Rim, D., Shin, H., 2021. Effective instructional design template for virtual simulations in nursing education. Nurse Educ. Today 96, 104624.
Risling, T., 2017. Educating the nurses of 2025: technology trends of the next decade. Nurse Educ. Pract. 22, 89–92.
Sharma, R.K., 2017. Emerging innovative teaching strategies in nursing. JOJ Nurs. Health Care 1 (2), 555e558. ⟨https://juniperpublishers.com/jojnhc/pdf/JOJNHC.MS⟩.
Stenseth, H.V., Steindal, S.A., Solberg, M.T., Ølnes, M.A., Mohallem, A., Sørensen, A.L., Nes, A.A.G., 2022. Simulation-based learning supported by technology to enhance critical thinking in nursing students: protocol for a scoping review. JMIR Res. Protoc. 11 (4), e36725.
Stevens, N.T., McDermott, H., Boland, F., Pawlikowska, T., Humphreys, H., 2017. A comparative study: do "clickers" increase student engagement in multidisciplinary clinical microbiology teaching? BMC Med. Educ. 17 (1), 1–8.
Toothaker, R., 2018. Millennial's perspective of clicker technology in a nursing classroom: a Mixed methods research study. Nurse Educ. Today 62, 80–84.
Tseng, L.P., Hou, T.H., Huang, L.P., Ou, Y.K., 2022. The effect of nursing internships on the effectiveness of implementing information technology teaching. Front. Public Health 10.