



Review Article

Gamification as an innovative tool in classroom teaching: Does it enhance learning outcomes and student participation in nursing?

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ABSTRACT

Background: Gamification has been introduced in the nursing curriculum as one of the newest and most innovative teaching methods by blending the games with the concepts. In this method, they are applying the game elements in a non-game environment. Evidence cited in the empirical research shows that it increases students' class engagement, motivation, problem-solving ability, and competencies to a large extent. However, not many research studies have been conducted exploring the impact of gamification on the teaching and learning of nursing subjects.

Objectives: 1) Identify the application of gamification as an innovative teaching-learning strategy in nursing curriculum 2) Explore the student satisfaction, motivation, and class engagement while using gamification as a learning method 3) Impact of gamification on the academic performance of nursing students.

Materials and Methods: A literature search was conducted using online databases available in Google Scholar, PubMed, Medline, Science Direct, and ProQuest. The studies included were descriptive surveys, systematic reviews, quasi-experimental, and mixed research methods. The key search concepts explored were 'Gamification and nursing education', 'gamified as a learning tool in nursing education', 'gamification and academic outcomes of nursing students', and 'gamification as a teaching strategy in nursing education'.

Results: The available evidence from the research studies indicates positive results in using gamification can be used as a learning strategy and shows that it can bring about increased class engagement, clarification and understanding of difficult concepts, and improve interaction and communication in nursing courses. However, challenges remain in terms of lack of clarity on the competencies to be examined the learning outcomes and the efficacy of its application in the professional field, and the underlying costs.

Conclusion: Gamification can be introduced as an innovative technology in the teaching-learning process. Further studies are required to provide more evidence in its application to various nursing courses and the learning outcomes to be examined.

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1. Introduction

Nursing education has transformed in recent years with the introduction of active learning strategies to stimulate the interest of the learner, by increasing motivation,

developing critical thinking, improving problem-solving skills, and encouraging class engagement among students.¹ Gamification has been introduced as the newest and innovative educational teaching method in the modern era based on the understanding that contemporary students need some teaching strategies beyond PowerPoint supplements and more reading in the classroom to support their learning

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process.^{1,2} There are a lot of concepts and mechanisms that are difficult to understand by students in the medical field, especially nursing, and learning those complicated concepts in the curriculum can easily bring boredom and create a loss of interest for the students in the classroom.² Gamification helps to blend and balance the game elements with the concepts in a non-game environment, to achieve realism, better listening by class engagement and stimulation, and to promote better learning outcomes by making meaningful connections to the more complex nursing concepts.³

The term gamification refers to an approach in education to enhance nursing students' learning using video game elements in non-gaming contexts using digital platforms such as smartphones, computers, and tablets to facilitate user experience, motivation, engagement, and participation in learning to enhance the teaching-learning process, creativity, critical thinking ability and problem-solving for the students.⁴⁻⁶ There are numerous game formats available for use, which include both digital and mechanical.⁷ The literature describes the common elements applicable to all and consists of goals (which signify a main objective and intermediaries), rules that direct the way to achieve the goals by creating a challenge, feedback to provide information about the progress, and participation with choice. The gamified systems also include elements that have counterparts, such as dynamics (structure including goals, narratives, and sense of progression), mechanics (includes rules and interactivity), and components (including points, trophies, and prizes and are the products of the mechanics follow-up).⁷

The various elements used and adopted in educational strategies about the areas of health and education were game progression, points, feedback, ranking, levels and emblems,^{8,9} reward, etc., and to increase the student's engagement in the classroom, immersion, intrinsic and extrinsic motivation, and competition are helpful and cited in studies.¹⁰

Studies have suggested that gamification can bring better motivation in students, and helps in dynamic participation and retention of the content learned in the classroom than the traditional teaching methods.^{1,4} Since gamification is comparatively a recent technology used in nursing education, not much information is available for its application in this field to be recommended as an effective learning tool. Therefore, the purpose of this review is to identify the application of gamification as an innovative teaching-learning strategy method in the nursing curriculum, to explore student satisfaction, motivation, and class engagement while using gamification as a teaching strategy, and to identify the impact of gamification in the academic performance of nursing students.

2. Materials and Methods

A literature search was conducted using online databases available in Google Scholar, PubMed, Medline, Science Direct, and ProQuest. The studies included were descriptive surveys, systematic reviews, literature reviews, quasi-experimental, and mixed research methods. The key search concepts explored were 'Gamification and nursing education', 'gamification as a learning tool in nursing education', 'gamification and academic outcomes of nursing students', and 'gamification as a teaching strategy in nursing education'.

3. Results

Twenty-two studies were found suitable to the present study objectives and available as open-access articles were chosen to be included in this literature review. The findings are summarized under the following themes.

3.1. Application of gamification as an innovative teaching-learning strategy in nursing curriculum

Active learning incorporating student engagement in the classroom is considered to be experiential learning adapted by many teachers to diverge the students from the usual, traditional classroom methods of lecture and to transfer them to an 'active', 'real world' situation.¹¹ Gaming promotes active learning by providing a good learning environment, helping to establish meaningful connections to the complex learning situations and to apply knowledge into practice.¹² The application of gaming in community health nursing course for the final year RN-BSN students and traditional students (pre-licensure students) enrolled in a university college at mid-Atlantic was explored to evaluate the assimilation of complex public health concepts and their relationship to practice in a controlled virtual, and safe environment.² The web-based games such as Outbreak at WatersEdge (a public health discovery game), and EnviroRisk, to support student learning through instructional scaffolding, was adopted by the faculty. Scaffolding is a learning tool and can be defined in gaming as a process in which the learner is given certain task elements which are initially beyond the learner's capacity which he is expected to control, and solving that can lead to another task built up on the previous.¹³ The concepts explored were in epidemiology and environmental health nursing, in which the students navigated into specific games after each lecture with the help of a short video. The students demonstrated increased interest in the application of games as a learning strategy. Students completed a 'student reflective assessment form of metacognition' concerning their gaming experience at the end of each game. The study results showed that students' perceptions about the understanding of complex public health concepts were much better compared to their unit examinations scores and

at the end of course student evaluations.

The evidence of the impact of digital delivery of learning on knowledge retention and learners' engagement was determined as a part of optimizing adult learners' experiences in online clinical education courses and for its redesigning, through an integrative literature review.¹¹ Literature included systematic reviews and meta-analyses, randomized controlled trials, mixed-methods studies, and quasi-experimental studies for evaluating an evidence-based approach used in nursing practice. The adult learners included prelicensure and post-licensure nursing students and professionals. Digital learning, scenario-based, and gamification interventions applied both in education and hospital or health care systems settings were assessed and during the game-based teaching, the learning was commonly enriched through competitions, quests, challenges, and other reward systems provided to the learner. The review reported an overall support for the gamification process, with a higher support for the theory content (69%) compared with the skill content, which was 31%. In another study using the game-based teaching process, providing immediate feedback to the learner in a self-paced environment was cited as the most positive advantage, which was viewed as a reinforcement in learning.¹¹

A descriptive survey was conducted among 301 nursing students in five selected nursing education institutions in Gauteng province, South Africa, to evaluate the utilization of gamification as a learning method.⁴ A majority of the participants (43%) were between the age of 18-24 years followed by 32.34% who were between 25-34 years and 81% of them were females. The results indicated that 68% of the students play online games, and 79% found that gamification is an important and useful method to stimulate learning. The younger nursing students were found to participate more and utilize gamification as a learning process more than the older nursing students. The results also demonstrated that nursing students of various levels of study utilize gamification to enhance their learning and play the games mainly through their smartphones. The study showed that there is a relationship between demographic variables such as age, gender, study level, and computer literacy with gamification. A positive effect on learning such as motivation, engagement, interest, and knowledge acquisition was also demonstrated in the study. In a systematic review conducted in Korea where 'Reward' was used as a factor to stimulate curiosity and learning, it was demonstrated that the learners' participation and motivation in nursing can be improved with gamification.¹⁰ The review also brought into light that a proper combination of factors involved in game mechanics and game dynamics should be integrated well, and also a scenario construction with the contextual combination of these two factors in agreement with the contents of education and subject matter needs to

be considered while planning to implement gamification.

A Korean-based study in a situation-based flipped classroom approach with a combination of gamification in a psychiatric nursing course had been found to improve student learning and helped in acquiring a high level of knowledge, achievement of learning objectives,¹⁴ as well as an integration of practice with the theory. In another study carried out in Brazil, the process of construction, application, and evaluation of a teaching strategy based on gamification in undergraduate nursing classes was done, which the students viewed to be positively impacting their education.⁷ Diverse and creative applications of gamification in pharmacy practice and diabetic management, to deliver complex components of pharmacy education such as empathy, orientation, inter-professionalism, and capstone learning while providing flexibility in the design of learning activity and student engagement in class were cited as positive advantages of gamification in a systematic review conducted in Australia.¹⁵

A prospective quasi-experimental study conducted in Spain to evaluate and reinforce the subject matter taught in nursing subjects like Management and Administration in nursing, and Ethics and Health Legislation services in nursing degree programs using Kahoot! demonstrated that students' results improved in their final exams in comparison with the previous year as well as yielded a positive response from using the educational games in the learning process.¹⁶ Similarly, a systematic review conducted using digital game-based learning (Kahoot!) had reported that it helped in creating a dynamic learning environment and long-term retention of information while creating a positive impact on the teaching-learning process.¹⁷ A gamification-based intervention study carried out in the U.S.A among internal medicine residents to identify the acceptance and its use had demonstrated that gamification enables acceptance, where the residents enjoyed competing with their peers, use, and retention of knowledge, but did not demonstrate attrition while the questions were increased at each round.¹⁸

3.2. Student satisfaction, motivation, and class engagement while using gamification as a teaching strategy

Incorporating novel learning strategies to encourage the student's motivation and engagement in learning has been challenging in education. Considering the effectiveness of the educational method by focussing on the satisfaction and engagement of the students rather than just delivering the content or the information to them is found to improve student learning and has been identified as the need of the hour. Gamification is one of the educational methods that has been viewed to assure these to the students to some extent. A lot of changes have been implemented to balance

the theory and the clinical practice in medical education. In a study conducted in the USA, a Software (Kaizen-IM) was introduced as a game method to the internal residents who were in internal medicine training programs to assess knowledge retention and engagement in education. The residents underwent many rounds of assessment and each round included general internal medicine questions and questions from three medical subspecialties. The researchers identified a positive impact of this software on the participants, and found evidence for the beneficial effect of gamification both quantitatively and qualitatively. The results demonstrated that the gamified method engaged the participants effectively.¹⁸ Some studies showed a game-based learning tool (Kahoot) which can be used to enhance the student participation, motivation level, and knowledge retention of the learners.^{19,20} Through the questionnaire format used with this application, teachers can help the students to clear their concepts in various subjects.

The use of 'serious games' such as simulation games is an innovative method that creates a real-life environment especially in nursing education by combining the features of both a game and simulation, which are driven by educational goals rather than for entertainment. This will help to increase student motivation and engagement in learning, and enhance their critical thinking ability to face an emergency or real-life situation.² Integrating games in education helps students to enhance their communication skills, problem-solving, decision-making, and leadership ability that they need for utilizing in future nursing roles.²¹ Similarly, a significant change in problem-solving skills and empathetic abilities, and improved learning attitude was reported in nursing students in a quasi-experimental study conducted in Korea when a situation-based flipped learning combined with gamification was applied in psychiatric nursing courses.¹⁴

The new learning strategies show that a student-centered approach is more effective and satisfactory than a traditional method of learning and improves the motivation and engagement of students. In a quasi-experimental study to explore this, the researchers used three different game platforms (Gamilab, Wisc-Online, and Quizizz) and assessed the study objectives with the experimental and control group subjects using a pre-test and post-test with an interval of 12 weeks. A structured course manual, which involves patient educational activities, PowerPoint presentations, and case discussions in the intervention phase was included. The results showed that most of the students had a positive attitude towards gamification which helped them to develop confidence and increased their motivation level in learning the course material than the traditional method.²² The use of gamification in education improves the quality, cost-effectiveness and also gives freedom to students to learn the concepts at their own time and pace. Game elements such as badges, points, and feedback

have a positive effect on accelerating the motivation level and interest of the learners.²³ Few research studies have emphasized that digital badges can serve as an important component to stimulate the motivation level and satisfaction of learners.²⁴ Gamification has also been found to be an effective educational method in nursing clinical practice and helped the learner's active participation,²⁵ and developing an empathic behavior in nursing.^{14,25}

3.3. The impact of gamification on the performance and competence of nursing students

In a quasi-experimental study conducted in Korea,¹⁴ using situation-based flipped learning combined with gamification applied in psychiatric nursing course aimed at improving nursing students' care for patients with mental illnesses, a significant change in problem-solving skills and empathetic abilities, and improved learning attitude was observed in nursing students. The researchers developed five modules based on: schizophrenia, bipolar disorder, anxiety disorder, personality disorder, and drug disorder and used three tools for the study. In the design phase, they prepared the syllabus and schedule for the class, and in the implementation phase, they executed the procedure based on modules. The students in the experimental group and comparison group were evaluated on their learning attitudes, problem-solving abilities, and empathetic responses, using an individual readiness assurance test. The control group received the same content but with the traditional teaching method. The result demonstrated a significant difference between the experimental and control groups on these three variables: learning attitudes ($t = -2.555$, $p = 0.012$), problem-solving ability ($F = 4.012$, $p = 0.048$), and empathetic ability ($t = -2.014$, $p = 0.047$). This study was found to increase students' understanding of the roles played by nurses through the role-playing incorporated with the flipped classroom, helped in the application of psychiatric nursing elements in clinical practice, and improved their communication with the patients.¹⁴

A systematic review was conducted in Australia,¹⁵ to review the outcomes and the efficacy of using gamification and identify evidence to support its use in pharmacy education and also meant to evaluate the grouping of learning outcomes and the quality of peer-reviewed literature supporting gamification. Sixty-six studies which had met the inclusion criteria were selected. The focus of the study was on the types of gamified intervention, mode of delivery, consistency, and learning outcomes. They identified gaps and misalignment of intended learning outcomes and outcomes reported while considering the quality of the reported articles. Most of the articles were from the discipline of pharmacy (68%), and 86% of them reported on specific games or gamification. The most frequent gamified intervention used was 'escape rooms' (30%), and 12% of the gamified interventions reviewed

were based on the high fidelity category. The most common mode of delivery was face-to-face or in-person mode (68%) and the most common purpose of gamified interventions was knowledge improvement, followed by teamwork and skills acquisition.

Professional practice requires knowledge, skills, and attitude regarding the use of information and communication technology and the development and mastery of desirable competencies to be applied in various health scenarios. An exploratory, applied, and technological innovation research consisting of qualitative and quantitative approaches was conducted in Brazil,²⁶ to teach the health informatics course in nursing for undergraduate students by building a course in the virtual learning environment (VLE) with the elements of gamification. The study aimed to assess if the introduction of gamification for teaching and learning contributes to the development of competencies in that particular course, to find the perception of nursing students and faculty in that course, and also to evaluate the course based on teaching and learning outcomes. Ten students and five professors participated in the study. They had developed four modules for the study. The didactic material was prepared, the gamification elements were chosen, the creation of a dynamic learning environment in the Moodle platform, and the completion of the course and development of tests were carried out in the development phase. Throughout these modules, they had given activities such as case studies, multiple choice exercises, a game that includes crossword and force activities, as well as a quiz venture plugin. The assessment was carried out using the SurveyMonkey tool in the online platform. Descriptive statistics were used in the quantitative approach and for the qualitative data, a content analysis was performed based on the participants' responses. The quantitative and qualitative approaches to the data analysis were obtained in different phases. The study identified that gamification has a positive influence on the teaching-learning process.

A literature review was conducted to assess the impact of gamification in nursing education.²³ They had identified 193 studies for the study. Fifteen of them were from Pubmed/Medline and 178 from Google Scholar. After revision, they selected 9 studies for the final analysis. The common objective of these studies was to identify the applicability of gamification in nursing education. The most frequently included game element was badges (78%) and the next one was feedback (58%). A mixed-methods approach was used by most of the articles. Out of the 9 studies, 8 articles showed the positive impact of gamification in nursing education and showed an increased level of motivation and active participation by the students.

A randomized controlled trial⁶ was conducted among nursing students at Mansoura University,²⁷ to assess the effect of the gamified flipped classroom on improving

nursing students' skills competency, and learning motivation. A total of 128 students participated and six tools were used for data collection. The students in the interventional group received gamified flipped classroom activities and instructions while the control group had received only the routine flipped classroom activities. Descriptive and inferential statistics were used for data analysis. In this study, a significant difference in the student's self-confidence, skill knowledge, and intensity of preparation was identified between the two groups. The study group's motivation level was significantly higher than the control group. However, there was no significant difference in the skill performance identified between the groups.¹⁴

In a mixed-methods research, which was conducted to explore learner achievement and learner engagement using three instructional interventions: a gamified flipped classroom, a non-gamified flipped classroom, and a gamified traditional classroom, it was demonstrated that a gamified flipped classroom and a gamified traditional classroom supported a sustained learning environment in COVID-19 pandemic time. However, the study showed that there was no significant effect on learner achievement using gamification.²⁸

3.4. Challenges in using gamification as a teaching strategy and future directions

Challenges that remain while using gamification as a teaching method include choosing the right combination of game elements as there are no proven design approaches.³ Application of gamification as a learning approach encounters significant costs in terms of availability of funds and resources, as well as clarity in terms of competencies to be examined, learning outcomes, and the efficacy of its application in the professional field.^{11,15} A careful approach and necessary precaution might be required while it is applied in nursing programs due to the dearth of literature on achievement and the lack of best practices appropriate for the achievement of desired learning outcomes.²⁹ A scenario construction by considering the contextual combination of two detailed factors of both game mechanics and game dynamics by the contents of education and subject can help in its application in the future.¹⁰ A virtual learning environment with gamification requires special skills and the support of information and communication technology personnel if technical issues are encountered. If gamification is applied with the flipped classroom technique, the active participation of students both inside and outside the classroom is essential and also requires more time and effort on the part of the learner and the teacher than the traditional learning methods.¹⁴

4. Conclusion

The use of gamification as a teaching-learning method in nursing education is quite encouraging. Available evidence shows that nursing students can potentially benefit if the game selected is appropriately designed to suit their learning and their profile to increase their participation and motivation in nursing. However, faculty need to understand its possible limitations and applications in various subjects, as it is a new field that further needs to be explored. Apart from learners' engagement in the classroom, evidence exists in using gamification in learning, such as self-pacing, providing immediate feedback to learners, competitiveness, motivation, and a risk-free environment. The faculty needs to carefully weigh the benefits and consequences of its usefulness while undertaking different nursing subjects and is also required to develop proper assessment methods and tools to evaluate the desired learning outcomes in their students.

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Not applicable.

6. Conflicts of Interest

The authors declare that they have no conflicts of interest/competing interests in this study.

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