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Assessing the Effectiveness of Gamified Activity on Motivation and Engagement, Understanding, and Assessment Outcomes in Undergraduate Nursing Students in Karachi

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ABSTRACT

The use of innovative strategy of gamification in education has a significant to increase student motivation and engagement to improve learning outcomes. Gamification integrates game elements such as points, rewards, and leaderboards into educational activities to motivate students and enhance their learning experiences. This study aims to fill this gap by exploring how gamified learning can affect nursing students' motivation and engagement, and learning and performance and confidence during assessment in relation to nursing education. The study was conducted with 100 nursing students from public and private institutions in Karachi, using a self-structured questionnaire that measured students' perceptions of gamification's effectiveness, for which a pilot study was conducted priorly on the sample of 25 students with a value of Cronbach Alpha of 0.91 for assessing the reliability. The finding significantly show that gamification is an effective educational tool that improves nursing students' learning and assessment experience. It creates a motivation and engaging environment which has a good impact on students confidence as well as performance even in the assessment. It is also evident in the descriptive statistics wherein gamification had a positive effect on both male and female nursing students with the male students having a slightly high level of motivation, engagement, and confidence in assessment during the gamified sessions. According to the results, it is advisable that gamification techniques should be more incorporated into the nursing curricula to improve the results of learning and assessment. The research in the future might be conducted on the long-term impact of gamification and its prospects in various learning environments.

Background of the Study

The use of innovative strategy of gamification in education has a significant to increase student motivation and engagement to improve learning outcomes. According to Koivisto & Hamari, 2024; Malicki et al., (2020) by incorporating game mechanics, such as points, rewards, leaderboards/score board, and progress tracking, into academic activities, helps to foster motivation and proves to enhance the overall learning experience. The essence and the concept of gamification is basically derived from the principles of behavioral psychology, that encourage active participation and goal achievement by using the perk of rewards (Gentry et al., 2019; Hayudini et al., 2025). Such activities have shown to amplify cognitive learning and increase retention, especially to promote problem-solving and critical thinking (Koivisto & Hamari, 2024). In nursing education, the concept of gamification is proven to helpful to bridge the gap between lectures delivered in class and clinical practice where the translation of theoretical knowledge into practical skills is necessary. According to Malicki et al., (2020) and Kotp et al., (2025) have highlighted that nursing students have elevated motivation, engagement, and confidence by integrating gamified activities in applying theoretical knowledge to clinical settings. Furthermore, gamification is a better way out from the stress associated with traditional way of high-stake assessment to engage in learning without the anxiety (Zehler & Musallam, 2021). However, despite the proven benefits of gamification in other educational fields, its specific impact on nursing students, particularly in Karachi, has not been adequately explored.

Many previous research by Nylén-Eriksen et al. (2025) and Celik (2025) has shown that nursing students can develop better problem solving skills and retention of knowledge but these studies were conducted in different academic environment highlighting the need of context-specific studies is necessary to promote the impact of gamification strategies align with the specific needs of nursing students in Karachi, having to notice factors such as class size, resource availability, and cultural attitudes toward technology and gaming. Although many international studies have shown affirmative impact of such activities, more localized research is necessary to understand the effectiveness of gamified learning in nursing education in Karachi. However the development and implementation of gamification is still a challenge in nursing education having many barriers, likes insufficient infrastructure and software issues are very frequently found to hinder learning process (Gentry et al., 2019). Despite this, the competitive nature of gamified systems, especially the involvement of leaderboards, has shown to enhance anxiety among students having fear to fall behind (Hayudini et al., 2025), keep this issue in mind and the outcomes the gamification activities hold, these issues should be dealt carefully to ensure it prove beneficial for all students. Currently systematic reviews and meta-analyses by Nylén-Eriksen et al. (2025) and Gentry et al. (2019) have further highlighted the necessity of more research into the practical application of gamification in nursing education. These studies elaborate the fact that although gamification is a health and robust activity to engage and motivate student but yet it’s full potential to improve learning outcomes, need to be comprehensively understood, particularly in terms of gender differences and psychological effects such as anxiety and self-esteem (Zehler & Musallam, 2021). Therefore, this study aims to fill this gap by exploring how gamified learning can affect nursing students' motivation, engagement, and assessment outcomes in Karachi. The nursing academicians face the persistent difficulties of maintaining student engagement and bridging the gap of theoretical knowledge into effective clinical practice. Traditional pedagogical approaches are inadequate, that have no longer effective in counteract modern distractions and the stressors that are usually common in healthcare training be a leading cause to derail academic and professional development. To equip nursing students with the increasingly challenging demands of their professions, it is important that educators consider the major issues and innovative measures to

enhance clinical competence, as well as their confidence and student self-efficacy to eliminate theory-practice gap, and the crippling stress of assessments.

The introduction of gamification, into the educational setting, has become a possible answer to these problems, including the systems of points, rewards, and leaderboards have been proven to boost the motivation and engagement of students. Nevertheless, the use and efficiency of gamification in nursing learning have not been adequately investigated, especially in Karachi, although the use of gamification in other education areas is gaining popularity. This research will fill this gap by considering the motivational, engagement, and assessment performance of nursing students in Karachi in the evaluation of the effectiveness of gamified learning activities in enhancing academic performance and relieving anxiety as a pedagogical method. The existing literature has indicated the beneficial effects of gamification in nursing education, but further research should be conducted to identify the individual effects in the local environment (Gentry et al., 2019).

Research Objectives

The primary objectives of this study are,

1. To assess the effectiveness of gamification in nursing education by measuring students' engagement and motivation.
2. To assess extent do gamified activities improve students' understanding of core concepts of a course in nursing education
3. To understand the role of gamification in improving assessment performance
4. To assess gamification effect on the students' confidence during assessments

Research Questions

1. How do gamified activities impact students' engagement and motivation to study?
2. To what extent do gamified activities improve students' understanding of core concepts of a course in nursing education?
3. How does gamification affect students' performance during assessments?
4. How does gamification affect students' confidence during assessments?

This study aims to assess the effectiveness of gamification in nursing education, by looking into the gap prevailing in the recent literature. Traditional teaching methods often fail to fully engage and motivate nursing students, leaving a disconnect between theoretical knowledge and practical application furthermore there is always negative impact on the performance and confidence during assessment due to boredom and anxiety. By incorporating gamification, that have designed mechanics like points, rewards and leaderboards, has shown promise in increasing student motivation, engagement, and learning outcomes in various fields by there has not been adequately studied in nursing students of Karachi. This research seeks to assess how gamified sessions affect motivation, engagement and understanding, confidence and performance during assessment. This will further provide an insight into how gamification can help educators develop more effective and engaging curricula focusing student interest and learning outcomes to cater the local context of nursing education.

Review of the Literature

Gamification has emerged innovative pedagogical approach in recent years that incorporate game mechanics and design elements into educational aspects. The practice and application are directly focused to increase student engagement, motivation, and learning outcomes (Sailer & Honmer, 2020).

Theoretical Framework

The effectiveness of gamification is not merely a product of its entertaining qualities but is grounded in several established learning and motivational theories.

Constructivist Learning Theory

Constructivism is the theory that assumes that learners in the process of learning do it by building knowledge through practical experience and interaction with others (Piaget, 1971). Gamification implements this rule by using problem-solving tasks, quests, and intelligence exploration situations that demand the involvement of learners in critical interaction with the material (Gasland, 2011). An example of this is sandbox-style game based on science or history which allows students to play and experience the consequences firsthand and therefore allows them to build their own mental images of complex concepts.

Self-Determination Theory (SDT).

The Self-Determination Theory (SDT) offers a solid account of the motivational value of gamification through a focus on the achievement of three primary psychological needs, namely, competence, autonomy, and relatedness (Ryan and Deci, 2000). These needs are directly supported by the elements of the game:

Such competition allows the development of competence with the help of points, progress bars, and levels that can give a clear feedback and a sense of mastery (Sailer & Hommer, 2020). Autonomy is promoted by providing students with options, e.g. customizable learning path, or choice of challenge (Alzahrani, 2020). The similarity is also facilitated by social features such as team challenges, team tasks, and community leaderboards, which foster the feeling of community and connection (Ryan and Deci, 2000).

Flow Theory

Flow Theory is based on the idea that a person is likely to reach the state of optimum experience and profound concentration when encountering the challenges at the right level of difficulty (Csikszentmihalyi, 1990). With the set of clear goals, immediate feedback, and balanced challenge and ability in the form of progressively more challenging levels and adaptive tasks, gamification assists in achieving this state (Digital Learning Institute, 2025). This state of being immersive is favorable to the optimal learning results.

Effects of Gamification on Education.

Another study by Kotp et al. (2025) corroborated that systematic review by Malicki et al. (2020) has pointed out that gamification has a positive impact on engagement and knowledge acquisition of nursing students especially in clinical education and by another study. Also, a meta-analysis by Nylen-Eriksen et al. (2025) has determined that game-based designed learning activities do enhance academic outcomes in nursing education, particularly in knowledge and problem-solving skills retention areas. Although these are some of the positive effects, there are challenges associated with the introduction of gamification. Their efficiency can be obstructed by technical problems, including software bugs and the absence of organizational infrastructure (Gentry et al., 2019). Competitively, such aspects as leaderboards can cause anxiety and demotivate the students, who perform worse (Hayudini et al., 2025). Also, gamified educational modules can be very resource-intensive and can demand significant amounts of time and financial resources on the part of educators and institutions, which can serve as a barrier to mass adoption. Gamification is an emerging, potentially useful pedagogical method that, when applied to the existing learning theories and considerate, may help improve learning experiences by increasing the levels of

engagement, motivation, and some learning outcomes. It is greatly contingent on the contextual elements, such as the group of learners, the topic, and the most fundamental one is the structure of the gamified system itself.

The field of study ought to be developed in relation to some of the most important areas in future research. First, there exists the necessity of conducting more longitudinal studies to learn about the long-term effects of gamification, not merely due to the effect of novelty. Second, the studies ought to consider individualized gamification practices, wherein the game features are customized to the unique learner profiles using AI (Digital Learning Institute, 2025). Lastly, there is a need to conduct more research regarding the particular game mechanics that can best serve the various learning goals and different learning scenarios, beyond the single-size-fits-all model (Sanchez-Martin et al., 2025). With the development of the sphere, collaboration between pedagogical concepts, game development, and the latest technology such as AI will play a major role in achieving the overall potential of gamification in education.

Systematic review by Malicki et al. (2020) has emphasized that gamification has a positive impact on nursing students' engagement and development of knowledge, especially in the clinical education, that is supported by another study by Kotp et al. (2025) that explains that gamified activities can increase the confidence of nursing students to apply theoretical knowledge into practice. Furthermore, meta-analysis conducted by Nylen-Eriksen et. al. (2025) has as well determined that game based designed learning activities can significantly enhance academic outcomes in nursing education particularly in fields of retention of knowledge and problem-solving skills.

Although these are the benefits, there are challenges associated with the implementation of gamification. It can be complicated by technical problems, including software bugs and absence of an institutional infrastructure (Gentry et al., 2019). Competitiveness aspects (such as leaderboard) could cause anxiety and discourage those who do not achieve better results (Hayudini et al., 2025). Also, gamification tendencies in educational modules may be expensive in terms of resources, asking educators and institutions to dedicate a lot of time and money to their creation, which may serve as an obstacle to their universal implementation.

Research Methodology

This study employs a Quantitative analytical cross-sectional design, with data collected from nursing students in Karachi, who participated in gamification activities. The study focuses on the effect of these activities on student motivation and engagement, learning outcomes, performance and confidence in assessments. The study focus on all nursing students in Karachi from different public and private colleges who have participated in gamified learning activities during different BSN courses. Convenient sampling based on only selecting undergraduate nursing students from public and private sector colleges who have participated in Gamification Activity in any course offered in BS Nursing.

For a population with an estimated proportion of 0.5, a confidence level of 95%, and a margin of error of 5%, the required sample size would be approximately 300. However, due to logistical constraints, a sample of 100 nursing students was surveyed, which is considered adequate for an exploratory study (Cochran, 1977). Similar sample sizes have been used in other studies in nursing education, such as the study by Gentry et al. (2019), which also evaluated gamified interventions and employed a smaller sample size to assess its effectiveness in a specific context.

Conceptual Framework

According to this model, the application of Gamification (the independent variable) directly impacts a series of interdependent educational results (the dependent variables) in nursing education. It is not only a sequential relationship but one that is intertwined in that the enhancement of one aspect (e.g., motivation) can lead to the enhancement of another (e.g., learning). The model is shown below and then the individual elements are explained.

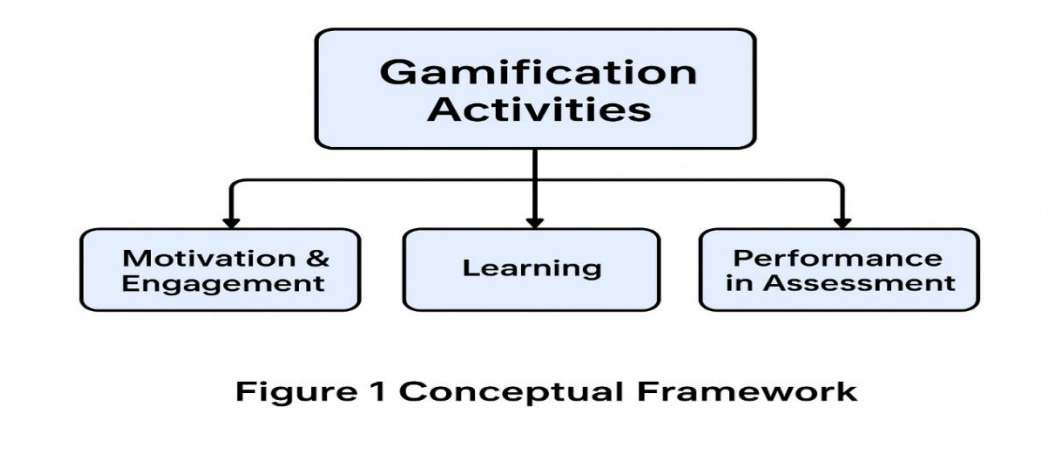


Figure 1 Conceptual Framework

This is the central intervention or the presumed "cause" in the study. It involves the integration of game design elements into the nursing curriculum. For your study, this could include:

Game Mechanics: Points, Rewards, leaderboards, levels, and progress scoreboard.

Learning Activities: Interactive simulations, quiz-based tournaments (e.g., using Kahoot!), academic games, and competitive assessment sheet.

This variable is designed to trigger the motivational mechanisms outlined in Self-Determination Theory satisfying needs for competence, autonomy, and relatedness and Flow Theory creating an immersive learning state.

These are the effects or outcomes that the study aims to measure. They are dependent on the exposure to and implementation of the gamification activity.

Motivation & Engagement: This variable measures the affective and behavioral response of students. It measures motivation which is level of intrinsic interest in the subject matter, persistence in completing difficult tasks, self-reported enjoyment (e.g., measured via a Likert-scale survey based on SDT) and engagement which is active participation in class discussions, frequency of logging into gamified platforms, time spent on learning tasks, collaboration with peers.

Learning: This variable captures the cognitive gain and understanding of the course material. It measures understanding of core concepts through scores on standardized knowledge tests, results from gamification quizzes, ability to correctly apply theoretical knowledge in solving quiz sheets and puzzles and knowledge retention performance on follow-up tests conducted weeks after the gamified activity.

Performance and Confidence in Assessment: This variable assesses the tangible demonstration of skills and the associated self-belief in an evaluative context. It measures the performance scores on gamified exams, grades on written assignments or academic concept assessment that followed

gamified preparation and confidence which is self-reported confidence levels after assessments reduced anxiety metrics, students' perceived readiness for assessment.

Data Analysis with Results

Descriptive Statistics

The study assessed various aspects of students' engagement, motivation, learning and understanding, performance and confidence in assessment through a series of Likert-scale items. Below are the summary tables for the finding only giving the descriptive statistics including means, standard deviations and percentages for key statements, categorized by gender.

Table 4.1: Demographic Data

Category	Category Value	Frequency	Percentage
Gender	Male	57	57.00%,
	Female	43	43.00%
Institute Type	Private	56	56.00%
	Public	44	44.00%
Gamification Activity (Subjects)	Pediatric Nursing,	39	39.00%,
	Developmental Psychology	35	35.00%,
	Microbiology	26	26.00%
Year	Pass out	36	36.00%
	1st Semester	33	33.00%
	5th Semester	31	31.00%

Table 4.2: Motivation & Engagement Among Male and Female Nursing Students

Statement	Mean (Male)	Mean (Female)	S.D (Male)	S.D (Female)	(%) Male	(%) Female
1. I feel more motivated to study when the course includes game-like elements	3.7	3.3	2.1	2.02	74	66
2. Gamified tasks increase my interest in the subject	4.5	4.2	1.4	1.45	90	84
3. I spend more time on learning activities when they are gamified	4	3.7	1.7	1.6	80	74
4. Gamified activities make learning more enjoyable	4.4	4.3	1.15	1.22	88	86
5. I feel more engaged during gamified activities	4.2	4	1.5	1.4	84	80

than non-gamified lessons						

Table 4.3: Learning & Understanding Among Male and Female Nursing Students

Statement	Mean (Male)	Mean (Female)	S.D (Male)	S.D (Female)	(%) Male	(%) Female
1. Team challenges (groups) in gamified activities improved my learning	4.67	4.44	1.26	1.53	93.49	88.88
2. I remember course material better after participating in gamified activities	4.67	4.44	1.26	1.53	93.49	88.88
3. Gamified activities helped me understand the core concepts better	4.67	4.44	1.26	1.53	93.49	88.88

Table 4.4: Performance in Assessment Among Male and Female Nursing Students

Statement	Mean (Male)	Mean (Female)	S.D (Male)	S.D (Female)	(%) Male	(%) Female
1. After playing/completing gamified exercises, I perform better on related quizzes	4.18	3.66	1.41	1.57	83.79	73.37
2. Gamified practice improved my confidence to answer test questions	4.18	3.66	1.41	1.57	83.79	73.37
3. Gamification reduced my anxiety about assessments (tests)	4.18	3.66	1.41	1.57	83.79	73.37

Table 4.5 Confidence in Assessment Among Male and Female Nursing Students

Statement	Mean (Male)	Mean (Female)	S.D (Male)	S.D (Female)	(%) Male	(%) Female
1. Gamified practice improved my confidence to answer test questions	4.6	4.4	1.08	1.12	92	88
2. Gamified activities help me apply what I learned to problem solving	4.3	4.1	1.4	1.55	86	82
3. Overall, gamification improved my confidence in learning this subject	4.4	4.2	1.3	1.5	88	84

Discussion

The results received via this study highlight the fact that gamification has a positive impact on students' motivation, engagement, learning and performance and confidence in assessment. Students have shown to be more engaged and motivated in the learning process when gamification elements, such as scoreboard and rewards, were incorporated into their courses. This finding is consistent with existing research that highlights the benefits of gamification in improving student engagement and learning outcomes (Gentry et al., 2019). Studies have shown that the use of leaderboards, as found in this study, motivates students by providing tangible rewards and fostering a sense of achievement (Koivisto & Hamari, 2024).

Moreover, this study also highlighted that gamification enhanced students' confidence in assessment, specially made testing more enjoyable and reduced anxiety related to it which is in alignment with the work of Hayudini et al. (2025), who reported that that is an increase in the performance and self-confidence of nursing students who participated in such gamified activities. The gamified mechanics that was used in the study, included peer and team comparisons and challenges, that had boosted students' participation and self-esteem (Malicki et al., 2020).

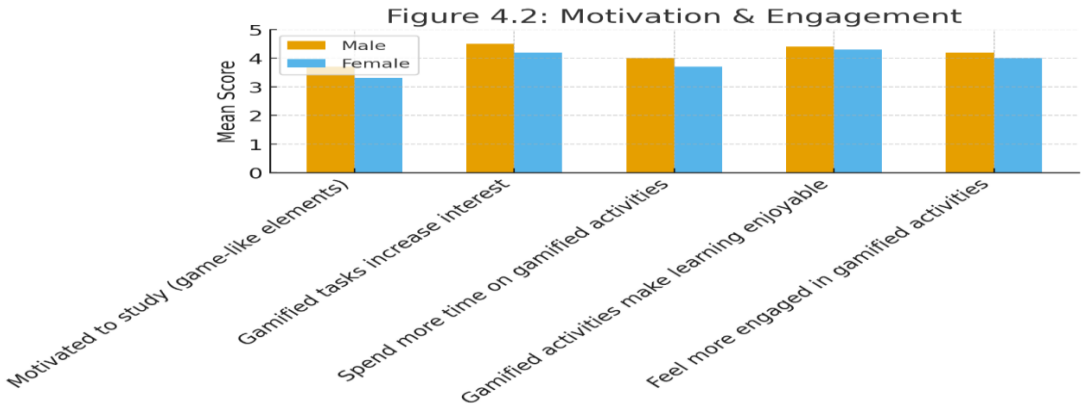
In contrast, the study also highlighted some challenges that were linked with the activities of gamification. For example, it was noted that some got students demotivation when they fell behind on leaderboards, which is in alignment with the research by Zehler & Musallam (2021), who found that in gamification, some competitive elements can lead to elevate anxiety in some students. Despite this, it has been observed that the overall impact of gamification on motivation and engagement in student remained highly positive, which was also supported by Kotp et al. (2025).

Findings

Motivation and Engagement

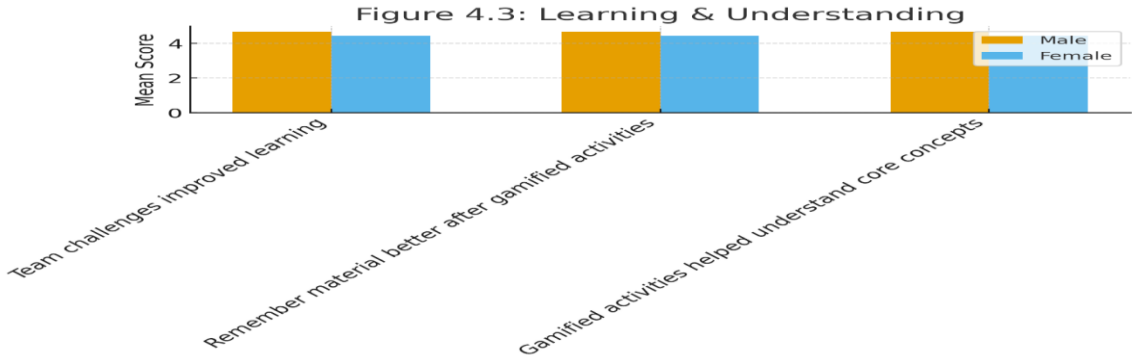
When asked about their motivation to study using gamified elements, male students gave a little higher score (mean = 3.7) than female students (mean = 3.3). The differences in standard deviations of males (2.10) and females (2.02) indicate that there is an equal amount of diversity in the responses of both sexes.

Gamified activities were found to be fun by both male and female students (males = 4.4, females = 4.3). The level of engagement is high among both genders with male students experiencing a little higher enjoyment.



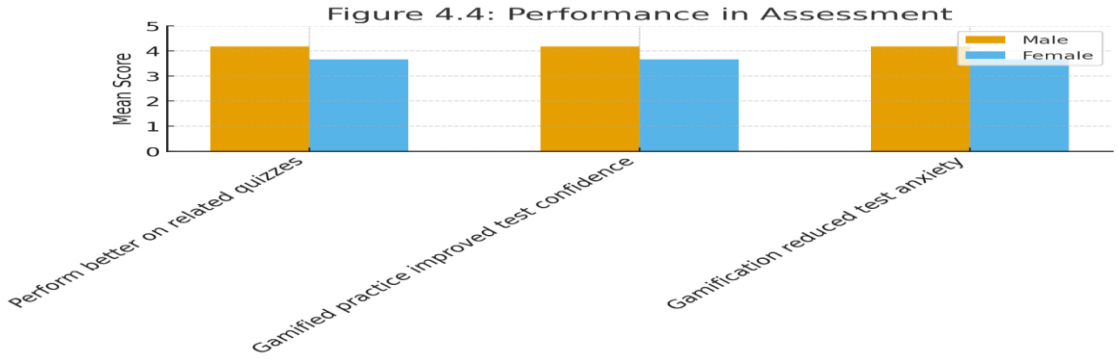
Learning & Understanding

When asked about the effectiveness of gamified activities in enhancing their learning, male students gave slightly bigger scores (mean = 4.3) than female students (mean = 4.1) in terms of learning and understanding. The difference in the standard deviations (males = 1.30, females = 1.48) indicates that there was a certain difference in the responses in both genders, though the former had a lesser diversity in their responses.



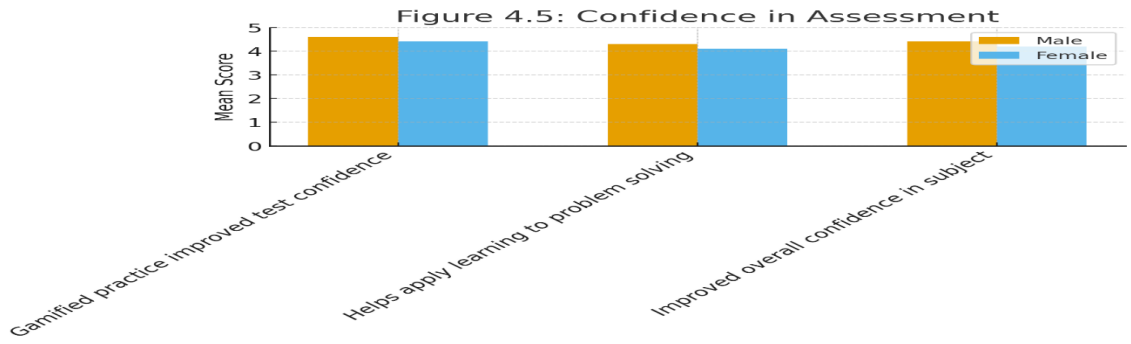
Performance in Assessment

Male students were also found to have a slightly improved performance (mean = 4.2) after being exposed to gamified exercises in related quizzes than the female students (mean = 4.0). The standard deviations (males = 1.40, females = 1.50) show that male answers were more constant when compared with female ones which were slightly variable.



Confidence in Assessment

Concerning confidence, male and female students believed that gamified practices enhanced their confidence in responding to test questions (mean of both males and females = 4.6, 4.4). Students with male gender expressed a little more confidence. Nonetheless, males and females were equally confident about the use of what they learnt using gamified activities (males = 4.3, females = 4.1). It implies that gender was not a factor that influenced the confidence advantages of gamification.



Conclusion

Gamification is an efficient learning instrument that enhances the learning and assessment process of nursing students. It creates a motivational and involving environment, which influences positively the level of confidence and performance of students even in assessment. It is also evident in descriptive statistics that gamification positively influences the male and female students of nursing, and the male students exhibit more motivation, engagement, and confidence in evaluation during gamified sessions. The results of the research are consistent with the available literature that has pointed out the positive effects of gamification in education, although they also indicate that some personal factors like gender can affect the ability of students to respond to gamified activities.

Recommendations

According to the results, one can advise that further incorporation of gamification strategies into the nursing curricula is necessary to improve the learning outcomes. The research questions to be addressed in future research may be the long-term consequences of gamification and its applicability in various education environments.

Also not taken into account in the study are the individual differences in the prior exposure of the students to gaming or technology which could impact their reactions to gamified activities. These are the variables that may have influence on the results of the study and would be to be looked at in future studies. Finally, while the study considers the effects of gamification on engagement and performance, it does not explore in-depth the specific features of gamified activities (e.g., types of rewards, competition vs. collaboration), which could have different impacts depending on the design of the gamified system.

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APPENDIX

Self- Structured Questionnaire
Demographics
1. Type of Nursing Institute 2. Name of the Institute 3. Gender 4. Currently Studying in which Year? 5. Have you participated in any gamification activity? 6. Can you recall for which subject did you have gamification activity?
Motivation and Engagement
1. I feel more motivated to study when the course includes game-like element. (points, badges, rewards). 2. Gamified tasks increase my interest in the subject. 3. I spend more time on learning activities when they are gamified. 4. Gamified activities make learning more enjoyable. 5. I feel more engaged during gamified activities than non-gamified lessons

Learning and understanding
1. Gamified activities helped me understand the core concepts better. 2. Team challenges (groups) in gamified activities improved my learning. 3. Gamified activities help me apply what I learned to problem solving. 4. I remember course material better after participating in gamified activities.
Performance in assessment
1. I find peer comparisons (rankings) useful for benchmarking my progress. 2. After playing/completing gamified exercises, I perform better on related quizzes 3. I sometimes feel demotivated when I fall behind on leaderboards/ scoring chart. 4. Competing on leaderboards/score board motivates me to try harder. 5. Social features (chat, peer help, teams) increased my participation.
Confidence in assessment
1. Gamification reduced my anxiety about assessments (tests). 2. Gamified activities respect fairness and transparency. 3. Overall, gamification improved my confidence in learning this subject. 4. Gamified practice improved my confidence to answer test questions