Arab American University Faculty of Graduate Studies Department of Health Sciences Ph.D. Program in Nursing



# Impact of Gamification on Learning Outcomes among Undergraduate Adult Health Nursing Students at Nablus University: Mixed Methods

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Palestine, August/2024

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## **Dissertation Approval**

### Impact of Gamification on Learning Outcomes of Undergraduate Adult Health Nursing Students at Nablus University: Mixed Methods

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## Declaration

I declare that, except where explicit reference is made to the contribution of others, this dissertation is substantially my own work and has not been submitted for any other degree at the Arab American University or any other institution.

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### Dedication

This work is dedicated to my loved parents, may they rest in peace. Each step of my road has been influenced by their permanent wisdom, endless love, and unfailing support. Despite their bodily absence, their spirits continue to be my source of guidance. This success serves as a monument to the morals they taught and the sacrifices they made for my schooling and goals. Their enduring influence on my life that will always make me grateful.

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Impact of Gamification on Learning Outcomes of Undergraduate Adult Health Nursing Students at Nablus University: Mixed Methods

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#### Abstract

Lecturing remains crucial for providing students with foundational knowledge. Interactive teaching is not a substitute but rather a complementary method that enhances the learning experience. Gamification can improve learning outcomes by fostering motivation, engagement, and cognitive and psychomotor skills. This study aimed to examine the impact of gamification on the learning outcomes of undergraduate adult health nursing students at Nablus University with the goal of providing evidence-based recommendations for nursing educators in this context.

Throughout the period of September 3, 2023, to December 15, 2023, a mixed method design was conducted. *Quasi*-experimental *design* was conducted among 90 undergraduate adult health nursing students from Nablus University. Students had been randomized to control or intervention group. Traditional teaching along with gamification were used for intervention while traditional teaching was used for control. Data were collected through pretest and posttest questionnaire. Questionnaire composed of demographic data, student course engagement scale, the critical thinking disposition scale and instructional materials motivation scale. A qualitative phenomenological design was conducted among 15 students of intervention group through semi structured interviews.

The p-value (0.725) based on the Mann-Whitney test indicated that there were no significant differences in the means of student marks across control 79.76 (SD= 5.985) and intervention group 80.22 (SD= 5.130). The p values which were based on independent sample t-test were all more than 0.05 in the pretest of engagement (p=0.267), motivation (p=0.612) and critical thinking (p=0.959) across control and intervention groups, indicating no statistically significant differences in means before intervention. The intervention group's mean posttest engagement score was 3.854 (SD= 0.317), higher than the control group's score of 3.438 (SD= 0.243) and statistically significant differences were evident (p < 0.001). The intervention group's mean posttest motivation score was 3.754 (SD= 0.252), higher than the control group's score of 3.332 (SD= 0.229) and statistically significant differences were evident (p < 0.001). The intervention group's mean posttest critical thinking score was 4.125 (SD= 0.294), higher than the control group's score of 3.928 (SD= 0.260) and statistically significant differences were evident (p = 0.001). The qualitative results found that gamification had positively impacted all students' learning outcomes by fostering an educational environment rooted in support, cooperation, competition, creativity, openmindedness, and effectively strengthened their engagement and motivation.

Conducting a longitudinal research is recommended to monitor the gamification's long-term impact on learning outcomes. Using gamification across several educational institutions, various nursing courses with larger sample sizes is a crucial recommendation. Keywords: gamification; adult health nursing; undergraduate students; learning outcomes

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# List of Definitions of Abbreviations

Abbreviations	Title
AB	Antibiotic
ANOVA	Analysis Of Variance
AVPU	Alert; Responsive to Verbal stimuli; Responsive to Painful stimuli; Unresponsive
CINHL	Cumulative Index to Nursing and Allied Health Literature
COPD	Chronic Obstructive Pulmonary Disease
df	Degrees of Freedom
ECG	Electrocardiogram
EBSCO	Elton B. Stephens CO (company)
et al	and others
GAMEX	The Gameful Experience Scale
GERD	Gastroesophageal Reflux Disease
GI	Gastrointestinal
HB	Human Body
IMMS	Instructional Materials Motivation Scale
IVF	Intravenous Fluids
LCD	Liquid Crystal Display
М	Mean
Ν	Frequency
NPWT	Negative Pressure Wound Therapy
NPO	Nil Per Os "nothing by mouth"
NUR	Nursing

PhD	Doctor of Philosophy
p-value	Probability value
R	Correlation
S	Student (S1 = Student 1 etc.)
S/P	State Post
SCEQ	Student Course Engagement Questionnaire
SD	Standard Deviation
Sig.	Significance
SPSS	Statistical Package for the Social Sciences
VAC	Vacuum-Assisted Closure
VS	Vital Signs

### **Chapter One: Introduction**

#### **1.1 Introduction**

Nurses are important healthcare professionals who play a crucial role in saving lives and promoting health. For job success, nursing students need to understand medical-surgical nursing concepts and develop their critical thinking and clinical reasoning abilities. For a successful nursing career, nursing students pursuing a Baccalaureate of Science in nursing degree must complete a number of courses. One such course is medical-surgical nursing, which is of considerable significance in nursing practice. The goal of this course is to prepare students with the information and abilities necessary to offer all patients safe and effective treatment.

The purpose of many student learning outcomes in medical-surgical nursing is to evaluate the students' comprehension of the course material. When they complete their baccalaureate degrees in nursing, students should be able to recognize prevalent medical conditions, interpret diagnostic tests, and create effective treatment plans based on the most recent evidence-based recommendations. Additionally, students are expected to cultivate effective communication and teamwork skills with other healthcare professionals involved in patient care. So it is so important to find each new strategies in teaching this course in order to meet our students learning outcomes (An, 2021; Bai, et al. , 2020; Fijačko et al., 2020).

#### 1.2 Background

Nursing students need proper instruction and guidance to acquire the skills and knowledge needed to become successful professionals. Nursing instructors may be hesitant to try new teaching methods due to their fear of taking up too much time or receiving criticism from students. Lecturing remains crucial for providing students with foundational knowledge. Interactive teaching is not a substitute but rather a complementary method that enhances the learning experience. Adult learning theory explains why nursing students prefer to control and make their education meaningful to them (Roche, et al., 2018).

Gaming provides nursing educators with an interactive, attractive, and innovative method of instruction that may enhance student performance. Nursing faculty might benefit greatly from spending time creating gaming activities that are in line with course objectives. These advantages include improved information retention and application on the part of the

student, the growth of critical thinking abilities, higher student engagement in the learning process, and increased student awareness and monitoring of their own learning progress. Gaming increases student motivation to learn, hence promoting knowledge retention, and that it offers a viable alternative to conventional teaching techniques including lectures, reading assignments, and group projects (Malicki et al., 2020).

Gamification and game-based learning are two different teaching strategies that are gaining popularity. Many attempts are being made to ascertain the precise influence of games and gamification on the curriculum at nursing universities. Learning games are gaining popularity because they engage students' attention and encourage motivation, active learning, and thinking (Gómez-Urquiza, et al., 2022). Nurses might benefit from gamification because it inspires them to think creatively and come up with innovative solutions to challenging issues. It not only makes studying enjoyable, but it also enhances problem-solving abilities and fosters improved teamwork (Garrison, et al., 2021).

It's crucial to distinguish between gamification and game-based learning. Although the phrases "game-based learning" and "gamification" are sometimes used synonymously, they really relate to different ideas. Game-based learning involves using actual games, with rules and objectives, to teach content and skills. Gamification, on the other hand, applies game mechanics to non-game activities, such as adding points, leaderboards or badges to make them more engaging. While both approaches aim to increase student motivation and engagement, game-based learning often provides a more immersive and authentic experience, whereas gamification is a more flexible tool that can be applied in various contexts. Numerous studies have demonstrated that by giving students a fun and participatory learning experience, gamification may greatly improve student learning results. Nursing students, in particular, have benefited from gamification as it allows them to practice their critical thinking and decision-making skills in a safe and accessible environment (An, 2021; Bai, et al., 2020; Brown, et al., 2019; Garrison, et al., 2021).

In addition to that, it is important to distinguish between gamification and games and serious games. Serious games and games are closely related to one another, with games being voluntary activities that take place outside of everyday life. In order to effectively hold the player's attention, they develop interesting and realistic environments that may or may not mirror reality. Games, as opposed to real-life circumstances, offer a distinctive and distinct

experience where players voluntarily take part in simulated worlds defined by particular rules and mechanisms. Serious games, on the other hand, are games in which education (in its different forms) is the primary purpose, as opposed to enjoyment. They are also known as instructional games or games for learning (Michael & Chen, 2005).

Instructors in nursing courses are required to cover a lot of material in such a short amount of time. So, it is the responsibility of the students to conduct self-study sessions for a particular topic. Instructors must provide compelling sessions if they want students to engage in self-study. One solution to this problem is game-based learning, sometimes known as gamification. Via a variety of games, the gamification of self-study components engages students with the learning materials and gives them the ability to synthesize and apply their new knowledge in creative ways. By include components like points, badges, leaderboards, and challenges, gamification may be utilized to make learning more entertaining and interesting (An, 2021; Fijačko et al., 2020; Kim, 2021).

Gamification is rapidly growing in popularity. Predictions suggest that by 2015, 50% of businesses will have incorporated gaming elements into their workplaces, potentially greatly increasing productivity and morale. Using short stories, creating social competitions, and rewarding desired behavior are all common ways to engage people through gamification. Gamification of education can increase student engagement and enjoyment. By infusing game elements into the classroom, students can learn in new and exciting ways while enhancing the enjoyment of unpleasant tasks (Hanus & Fox, 2015).

A critical evaluation of what is known, believed, and questionable regarding gamifying education, the researches investigate various game aspects utilized in gamification, talk about the theoretical underpinnings of gamification, and evaluate the possible advantages and disadvantages of gamification in education. A research also identifies areas that require more study to fully comprehend the benefits of gamification in education, such as the influence of various game components and the importance of motivation in learning outcomes (Dichev & Dicheva, 2017).

In nursing education, gamification is a relatively recent idea. It increases pressure on educators to expand learning opportunities for students. The majority of research documented the impacts of gamification used in nursing education, which are seen in nursing students' improved motivation and engaged participation. On the other hand, the limitations of

gamification should not be ignored because, if not properly implemented, the strategy may lead to ineffective and disinterested students. It offers a problem for both academics and instructors because gamification as a regular advanced form of instruction has not yet been formally included in worldwide nursing curriculum (Fijačko et al., 2020).

Gamification creates a unique experience that satisfies people's demands and motivations by incorporating game aspects (such as their aesthetics, mechanics, and dynamics) into non-gaming situations. It is possible to say that gamification is an innovative strategy that has gained traction in the educational sector, which supports the idea of applying it to nursing education. Several initiatives for the application and analysis of gamification in teaching can be identified in the Brazilian context (Castro & Gonçalves, 2018).

A gamification intervention's final result can be any change the practitioner desires, which in a training environment is often learning or transfer. A change in cognitive, emotional, or skill capacity might be considered one of the learning outcomes created by experience and practice, which is how learning is commonly characterized (Kraiger et al., 1993).

Transfer is the process of putting learning into practice; it refers to how successfully a student transfers the knowledge, behaviors, or abilities they acquired throughout the program to their place of employment. Learning and transfer are proximal learning outcomes in the process model framework. Because of this, it is challenging to explicitly target learning and transfer, despite the fact that both are regular aims of gamification treatments. As opposed to this, the practitioner must focus on a mediating or moderating process that is connected to learning and transfer (Burke & Hutchins, 2007).

The introduction of gamification interventions aims to enhance engagement and strengthen the connection between instructional material and learning outcomes (Warr & Bunce, 1995). In order to promote learning, gamification interventions tend to focus on promoting motivation. The intensity, persistence, quality, and direction of conduct are all significantly influenced by motivation. Motivation affects how learning-oriented behavior is directed, intense, and persistent in a classroom context (Landers et al., 2015).

Critical thinking is essential to education and daily life since it is a process developed through experience and reflection. Critical thinking is an important variable that should be examined alongside motivation, knowledge acquisition, and engagement as desired learning outcomes (Kaddoura, 2011). Investigating the relationship between critical thinking and these variables can provide valuable insights into the effectiveness of gamification interventions.

The efficiency of Jeopardy!-style game format in comparison to the lecture format was the subject of the first research of its sort in Jordan. The findings implied that the game format was well received and regarded by students as a more enjoyable teaching strategy. It was also seemed like a superior educational approach since it encouraged higher memory retention (Aljezawi & Albashtawy, 2015).

#### **1.3 Significance of the Study**

This study has a great potential impact for nursing education. Gamification might be an effective teaching method in improving learning outcomes among students and could be implemented as a teaching strategy to enhance the quality of nursing education. The study has the ability to give evidence-based suggestions for nursing educators in Palestine and provide insight on the effect of gamification on the learning outcomes of adult health nursing students.

Selecting the course of adult health nursing presented a significant challenge because it includes both a clinical and a simulation component, which could provide some level of interactivity. However, the key question was still how comprehensively all of the theoretical topics were covered in the practical component.

Here, gamification was used along with traditional teaching to cover all of the course requirements, in case of any missing during clinical part. The study's conclusions may also help build nursing education programs that use gamification as a teaching strategy to enhance student learning results. The study is significant because it focuses on nursing students who are studying adult health, a group that needs particular knowledge and abilities to handle the particular health requirements of adult patients. Hence, by advancing the knowledge and abilities of nursing students in this area, the study may contribute to improving the standard of care delivered by nursing professionals in Palestine.

In addition, this study adds to the set of research on gamification and learning outcomes in nursing education, which has significance for the larger area of healthcare education. The study's conclusions may help guide further investigation in this field and aid in the creation of evidence-based nursing education programs that use gamification to improve student learning outcomes.

#### **1.4 Problem Statement**

Since several years ago, the traditional has been paper summaries, the board and then overhead projectors up to LCD projectors. Presentation through power points became the popular method with the possibility of using other methods such as role-playing and student presentations. As technology has developed and become more widespread in daily life, including social networks, computers, and smart phones, the sources of information have expanded and come in a variety of media, including audio, written, and read. Students could thus get comfortable and too dependent on sources that aren't always trustworthy.

It is recommended to use photos and gifs, which are frequently found in search engines, during classroom lectures to accommodate the contemporary technological environment, where people are accustomed to utilizing mobile phones. This choice was informed by the PhD dissertation's title selection, which led to the investigation of unusual teaching techniques.

The adult nursing course in particular, which is rather demanding and challenging, is thought of as the core course for nursing students. It was directed to the approach of utilizing gamification as a supportive method for the traditional method after conducting extensive study and inspection of what is available on teaching methods in the nursing profession. Even while gamification has shown potential for improving nursing education in developing countries, little is known about its long-term effects and effectiveness as a teaching strategy.

It would probably concentrate on the requirement to enhance the academic performance of adult health nursing students in Palestine. The problem statement could specifically attract attention to the following problems:

• It may be difficult for nursing educators in Palestine to successfully engage adult health nursing students and aid them in acquiring the information and skills required to serve adults with high-quality care.

- Adult health nursing students may benefit from more dynamic and engaging learning experiences, which more traditional teaching techniques may not be able to provide for their learning needs.
- Gamification has been demonstrated to be a successful method of improving learning outcomes in a variety of educational situations, but its efficacy in Palestinian nursing education is not fully recognized.

### 1.5 The purpose of the Study

The study aimed to examine the impact of gamification on the learning outcomes of undergraduate adult health nursing students in Nablus University, with the goal of providing evidence-based recommendations for nursing educators in this context.

#### 1.5.1 Study Objectives

The research objectives for this study were as follow:

- 1. To assess the impact of gamification on the learning outcomes (knowledge acquisition, engagement, motivation and critical thinking) between the intervention group who are studying adult health nursing using gamified activities beside traditional and the control group who are studying by the traditional method.
- 2. To explore how gamified activities impact the learning outcomes (knowledge acquisition, engagement, motivation and critical thinking) of the undergraduate adult health nursing students.

#### 1.5.2 Study Questions

The research questions for this study were as follow:

1. Are there statistically significant differences at the significance level (p = 0.05) in the mean scores of learning outcomes (knowledge acquisition, engagement, motivation and critical thinking) between the intervention group who are studying adult health nursing using gamified activities beside traditional and the control group who are studying by the traditional method? 2. How gamified activities impact the learning outcomes (knowledge acquisition, engagement, motivation and critical thinking) of the undergraduate adult health nursing students?

#### **1.5.3 Study Hypothesis**

The research hypotheses for this study are as follow:

- 1. There are statistically significant differences at the significance level (p = 0.05) in the mean scores of learning outcomes (knowledge acquisition, engagement, motivation and critical thinking) between the intervention group who are studying adult health nursing using gamified activities beside traditional and the control group who are studying by the traditional method.
- 2. There is a positive effect of gamified activities on the learning outcomes (knowledge acquisition, engagement, motivation and critical thinking) of adult health nursing students.

#### **1.6 Course Description of Adult Health Nursing**

This is a medical-surgical nursing course (part one) assigned for the second year nursing and midwifery students focuses on the provision of direct, safe and needed nursing care for clients with different health problems associated to body systems. Emphasis is placed on knowledge, judgments, skills, safety measures and professional values within a legal/ethical framework. Concepts of pharmacology, nutrition, gerontology, growth and development, nursing process, effective communication skills, and cultural aspects are integrated throughout the course to enable the student develop problem solving, collaborative, and critical thinking skills to meet the needs of their clients and to be a competent, safe, passionate registered staff nurse practitioner. The credit hours for this course are four, and the passing mark is 65%. This course started on the first of September and finished in mid- December of the year 2023. Appendix C presents more regarded details.

#### **1.7 Conceptual Framework**

Figure (1.1) represents an illustration of the conceptual framework of the study including independent variable (gamified activities), demographic variables (gender,

specialty track of students and their final marks in adult health course) and dependent variables (students learning outcomes in adult health nursing course).



Figure 1.1. Illustration of Conceptual Framework

#### **1.8 Conceptual Definitions**

The following definitions represent the conceptual definitions of the study variables:

#### **1.8.1 Gamification**

Gamification refers to the strategic integration of game elements and mechanics into the adult health nursing education environment with the aim of enhancing knowledge acquisition, critical thinking abilities, motivation, and engagement. It involves the incorporation of game-like features, such as points, levels, badges, leaderboards, challenges, and rewards, to promote active participation, problem-solving, and skill development among adult health nursing students (An, 2021; Anguas-Gracia et al., 2021; Berglund et al., 2022).

#### 1.8.2 Knowledge

"Understanding of or information about a subject that you get by experience or study, either known by one person or by people generally"

(https://dictionary.cambridge.org/dictionary/english/knowledge, 2023).

#### **1.8.3 Motivation**

"The act or process of giving someone a reason for doing something: the act or process of motivating someone; the condition of being eager to act or work: the condition of being motivated" (https://www.britannica.com/dictionary/motivation, 2023).

#### 1.8.4 Engagement

"The act or state of being involved with something"

(https://www.britannica.com/dictionary/engagement, 2023).

#### **1.8.5 Critical Thinking**

For critical thinking, there is no universally accepted framework. Research, introspection, appraisal, and various logical thought are among its components. It also comprises mental abilities and attitudes. It is essential to education and daily life since it is a process developed through experience and reflection (Kaddoura, 2011).

#### **1.9 Operational Definitions**

The following definitions represent the operational definitions of the study variables:

#### **1.9.1 Gamification**

Gamification would involve the implementation of game-based elements and strategies within the adult health nursing course. This could include the use of non-digital activities that incorporate game-like features to enhance the learning experience. The operational definition further encompasses specific game mechanics and elements employed, such as points-based systems, progress tracking, rewards, competition, collaborative tasks, feedback mechanisms, and interactive scenarios, to promote knowledge acquisition, critical thinking abilities, motivation, and engagement among adult health nursing students.

#### 1.9.2 Knowledge

Information has been acquired from adult health nursing course and measured by students' total marks at the end of the course.

#### **1.9.3 Motivation**

The instructional materials motivation scale has been used to quantify motivation. A 33-item scale called "IMMS" is used to measure how motivated pupils are in relation to the educational materials. Keller (2009) created "IMMS" in reference to the attention, relevance, confidence, and satisfaction model (Hauze & Marshall, 2020; Keller, 1987).

#### **1.9.4 Engagement**

Emotional and behavioral factors both have a role in engagement. A sort of engagement known as a behavioral component considers a student's individual approach and learning style, as well as their motivations for studying and success-oriented approaches. The concept of "affective engagement" describes how emotionally invested a student is in their understanding of the course material and how emotionally committed they are to studying it. More emotionally and behaviorally engaged students could learn more, which might increase their tenacity, sense of achievement, and academic success. It has been measured by the Student Course Engagement Questionnaire (SCEQ) has 23 equally weighted items each assessed using a five-point Likert's scale (Brown et al., 2017).

#### **1.9.5** Critical Thinking

The critical thinking disposition scale, which consists of 35 items and is divided into eight categories, has been used to measure it. These categories are intellectual integrity (six items), creativity (four items), challenge (six items), open-mindedness (three items), prudence (four items), objectivity (four items), truth seeking (three items), and inquisitiveness (five items). This critical thinking disposition measure is a useful instrument for assessing nursing students' propensities for critical thinking (Kwon et al., 2006).

#### **1.10 Theoretical Framework**

Gamification is a concept that draws upon several theoretical frameworks to understand its underlying principles and effects. Here are some prominent theoretical frameworks commonly used in the study of gamification:

#### 1.10.1 Learning Theory of Constructivism

According to this theory, students develop their own knowledge through interacting with their surroundings. Gamification is a teaching method that aims to create a dynamic and intense learning environment to motivate students to engage with the subject matter (Xu & Shi, 2018).

#### 1.10.2 Self-Determination Theory

It is suggested that addressing the three fundamental psychological demands of students—autonomy, competence, and relatedness—strengthens their intrinsic drive. The degree to which these requirements are satisfied determines how strongly intrinsic motivation grows in gamified tasks (Elzeky, et al. , 2022).

#### **1.10.3 The Gamified Learning Theory**

It offers a broad conceptual framework for understanding the correlation between gamification and education. The following four elements make up this theory: game elements, behavior and attitude, learning outcomes, and instructional material (gamified quiz, badges, leaderboard, levels unlock, and points) (Elzeky, et al. , 2022).

#### 1.10.4 Flow Theory

When game components are added into gaming activities, people may be able to enter a state of flow if the challenge is acceptable for the player's level of competence. Moreover, this means that game components can enhance players' enjoyment and engagement and emphasize their gamified learning experience (Rachels & Rockinson-Szapkiw , 2018). Figure (1.2) reflects a diagram for the theoretical framework.



Figure 1.2. Digram for the Theoretical Framework

### 1.11 Summary for Chapter One

This chapter focused on the background and significance of the study while introducing the core concepts of the research. It outlined the conceptual and theoretical framework that guided the study and addressed the main research questions and hypotheses. Gamification is a supportive strategy along with traditional teaching; this can lead to interactive learning with congruent with adult health nursing course objectives. Gamification can improve learning outcomes of nursing students by encouraging motivation and engagement, enhancing knowledge acquisition and developing critical thinking skills.

#### **Chapter Two: Literature Review**

#### **2.1 Introduction**

The primary goal of this review was to investigate how gamification affects the undergraduate adult health nursing students' learning outcomes. A variety of academic journals, research studies, and theoretical frameworks—including empirical studies and conceptual models—are included in the review. It explored the ways in which adding gamification to nursing education can improve students learning outcomes. This review provided the foundations for future investigations into the application of gamification in nursing education by highlighting fresh insights and outlining areas of knowledge that still require exploration.

#### 2.2 The Searching Methods

A keyword search was conducted using specific terms like "gamification", "gamebased learning", " nurses students", "adult health nursing", "engagement", "motivation", "critical thinking", "flow theory", "constructivism", "self-determination theory", "gamified learning theory", "the gameful Experience scale", "motivation scales", "engagement scales", "critical thinking scales" and "game elements". The next stage was finding pertinent sources using scientific databases including "EBSCO", "Google Scholar", "CINHL", "MEDLINE", "PubMed", and "ScienceDirect". During the search, the Boolean operators "AND" and "OR" were used.

#### 2.3 The Inclusion Criteria

Studies that are relevant to the topic matter and address the research focus, studies that have been published in English and studies with different research designs and methodologies were included to ensure a comprehensive analysis.

#### 2.4 The Exclusion Criteria

Duplicated studies or those that do not adequately address the research topic, studies older than 10 years except for those that lack updated versions but are still pertinent to the

research, studies for which the full text could not be accessed and studies that utilize ambiguous research instruments.

The review included fifty articles that had been grouped according to their research focus and applicability to the nursing and gamification. Articles classified as non-research based and non-nursing (n = 16), were chosen due to their significant contributions to certain subtopics that were essential to the research. These papers made a substantial contribution to the comprehension of important elements within the study's framework even if they lacked a research emphasis.

In the same way, articles that offered pertinent insights unique to nursing and gamification but were not research-oriented felt under the non-research based and nursing category (n = 6). On the other hand, the research based and closed to nursing articles (n = 28), those articles provided the fundamental basis of the study, since they directly addressed and aligned with the topic. This careful classification guarantees a thorough literature evaluation by embracing various viewpoints and keeping the emphasis on research-based contributions that are specifically relevant to the investigation. Figure (2.1) presents a PRISMA technique of searching process and inclusion criteria. Figure (2.2) presents a chart for the types of articles.



Figure 2.1. PRISMA Technique of Searching and Inclusion Criteria



Figure 2.2. Chart for the Types of Articles Designs

#### 2.5 Gamification as a Concept

The word "gamification", which is used in the industry, refers to the application of game design principles to situations that are not games in order to increase their enjoyment and engagement. Even though Nick Pelling first used the word in 2002, it has just lately become more widely used. It has been shown that the idea of gamification is useful for enhancing engagement, motivation, and productivity in a variety of industries, including marketing and education. Gamification may take many different forms, such as building a brand-new game-like system from the ground up or just adding game-like components to an already existing system (Perryer et al., 2016).

According to a German article, the Duolingo language-learning software is one example of gamification in action. It employs a point system, leaderboards, and awards to keep users interested in and inspired to keep studying. The Nike+ app is just another illustration of how exercise can be made fun by enabling users to monitor their progress,

get badges, and engage in friendly competition. Gamification has the capacity to fundamentally change how people interact with the environment and deal with problems in a variety of settings. Its use is anticipated to change in conjunction with technology development (Stockinger et al., 2015).

According to the definition provided by Deterding, the term "gamification" is now frequently used to refer to the application of game design principles to non-gaming situations. The Nike+ system, which promotes regular jogging through socially competitive aspects, and Code Academy, which awards users with points and badges for passing courses, are two examples of gamification. Despite the growing agreement on the concept, there are still inconsistencies in the literature because of the many viewpoints and multidisciplinary nature of gamification. Deterding examined the concepts of "play" and "games" and agreed with sociologist Roger Caillois' view that play encompasses a spectrum from free and spontaneous play ("paidia") to structured play with specific objectives ("ludus"), or games. They also positioned "gameful design", or gamification, on a continuum between play and games, considering it to have some game-like qualities. Games, especially serious games, were seen as fully representative of the game category (Deterding et al., 2011).

Regarding to the conceptual opposition between gamification and toys, which are solely based on play, while acknowledging some connections to playful design, Huotari and Hamari proposed a broader interpretation of gamification, applicable to a wide range of products and services, with particular relevance to health services research. They emphasized the importance of providing users with a gameful experience, differing from Deterding's perspective that gamification is an inherent quality of the technology being gamified (Huotari and Hamari , 2012).

#### 2.6 The Efficacy of Gamification

A Canadian-contributed review suggested that gamification had the potential to boost motivation, enjoyment, and memory. Gamification was becoming more widely used in a variety of scenarios because to technological developments and the internet. The use of gamification in nursing education and its potential to be combined with other teaching strategies and technology developments was an interesting subject. There was a need for more study to examine the effects of gamification on patient care because it was still a relatively new technique in the field of nursing. By studying gamification in nursing, researchers can better understand its effectiveness, benefits, and potential challenges, ultimately paving the way for innovative and impactful educational practices in healthcare (Sarker et al., 2021).

The concept of gamification lacks clarity, with different terminology and definitions used across studies. Terms like game-based learning, serious gaming, and digital gaming are sometimes used interchangeably with gamification. The specific conceptualization of gamification varies based on the study's context, leading to terms like quest-based learning, educational gaming, and social gamification. Mastery learning and software application terminology are also associated with gamification in certain cases. Some studies focus on specific gaming elements, such as digital badges or Bluetooth technology, as the primary means of implementing and describing gamification. These elements are seen as a toolkit for game design, incorporating dynamics, mechanics, and components. This more concrete conceptualization stands out among the various interpretations of gamification (Sarker et al., 2021).

In order to increase user engagement and experience, an American study reveals that gamification entails incorporating game features into non-game environments. Implementing motivating affordances results in psychological effects and later behavioral effects. Gamification may increase user engagement and desirable behaviors in many systems by wisely utilizing these elements (Berglund et al., 2022).

#### 2.6.1 Benefits of Gamification in Learning

Gamification in education offers various advantages, which may be described as follows:

Increased motivation: Gamification methods such as points, badges, leaderboards, and awards can boost adult learners' motivation and engagement. Gamification can motivate learners to actively participate in their learning process by creating a sense of success and growth (Bai, et al., 2020; Brull & Finlayson, 2016).

- Enhanced knowledge retention: Gamification's interactive and immersive nature can help learners retain knowledge by allowing them to apply principles in actual circumstances. It allows students to exercise critical thinking and decision-making abilities in a safe and interesting setting (Castro & Gonçalves, 2018).
- Learning through practice and skill development: Gamification encourages active learning by pushing students to actively engage and make decisions inside the game. This can result in the development and reinforcement of specific abilities including clinical reasoning, problem solving, and decision making. Gamification promotes active learning by requiring learners to actively participate and make choices within the game. This can lead to the development and reinforcement of specific skills, such as clinical reasoning, problem-solving, and decision-making (Elzeky, et al., 2022).
- Collaborative learning: Many gamified learning systems have social components that enable students to communicate, cooperate, and compete with their peers. Collaborative learning experiences may promote teamwork, communication, and peer support, all of which are important in nursing (Killam et al., 2021).

#### **2.6.2 Gamification in Nursing Education**

In recent years, gamification's application in educational settings has drawn a lot of interest. Numerous research have been done to look at how it affects learning results, motivation, and student engagement. A New Zealand study utilized of an escape room as a simulation teaching method in nursing education that was the subject of one research study carried out by Brown et al. (2019). The study's conclusions showed that putting the escape room method into practice had a big influence on students' involvement and confidence in their ability to prioritize patient care. The researchers also indicated that this method may be modified and used in a variety of different healthcare education contexts (Brown, et al., 2019).

The investigation of the usefulness of an escape room as a teaching tool in a maternity clinical course using particular gamification strategies in nursing education. The results of this Indiana study showed that using an escape room substantially improved students' knowledge and abilities in maternity nursing (Edwards, et al., 2019). Another Egyptian study

compared the efficacy of a gamified flipped classroom in nursing education to regular classroom settings and discovered that this strategy greatly enhanced nursing students' skills competence and learning motivation (Elzeky, et al. , 2022).

Gamification can effectively enhance student motivation, engagement, and learning outcomes in nursing education. Additionally, it has the potential to improve patient outcomes and promote healthy behaviors in clinical practice (Fijačko, et al. , 2020). Studies that explored alternative gamification techniques, a scoping review on the use of LEGO® SERIOUS PLAY® in nurse education. They identified various applications of this technique, such as enhancing communication skills and reflection (Warburton & Sanders, 2022). A systematic review on theories informing technology-enhanced learning in nursing and midwifery education. They found that theories like social cognitive theory and constructivism can inform the design of effective technology-enhanced learning strategies (O'Connor et al., 2022).

The impacts of mobile applications have been studied in studies on gamification in cardiovascular care. Games are only a minor part of health behavior change applications. However, gamified mobile applications created for cardiovascular disease patients have shown helpful and popular in self-management and secondary prevention. According to studies, gamified therapies can increase drug compliance and result in sustained improvements in clinical outcomes. These programs have also shown promise in advancing understanding of heart failure and encouraging physical exercise. Different game elements are used in specially designed games like "Heart Game," "Heart Health," and "MyHeartMate" to boost motivation and engagement. Some studies have already demonstrated favorable benefits on knowledge and self-reported behaviors, while further study is still needed (Berglund et al., 2022).

To teach medical personnel about negative pressure wound therapy (NPWT), a game called Wound VAC Island was created. There were four islands in the game, and each one had unique NPWT data, such as equipment configuration and sponge variations. To win, nurses had to travel to each island and accumulate points. A pilot group of 18 nurses tested the game and then went through a conventional PowerPoint presentation on the same material. Results revealed that 80% of participants enjoyed the game and believed it helped them comprehend and recall the material better, compared to 53% for PowerPoint. This case
study demonstrates the importance of gamified learning in healthcare training in terms of enhancing student engagement and memory retention (Brull & Finlayson, 2016).

A research conducted at a southern university looked into gamification in a nursing informatics course with 10 students and five professors. The research included both qualitative and quantitative methodologies. In nursing education, gamification effectively replaced conventional teaching, fulfilling competency, instructional, and content criteria. It improved competency development and the teaching-learning process, engaging students and encouraging in-depth research (Castro & Gonçalves, 2018).

The use of assessment approaches to gameful experiences in nursing education was also investigated. For use in nursing education, the GAMEX scale was modified and validated. This scale is appropriate for evaluating game-like experiences and has been used in a variety of nursing-related studies (Márquez-Hernández et al., 2019).

A research evaluated the effectiveness of a Jeopardy!-style game format with a didactic lecture format in educating fourth-year nursing students about models for organizing patient care. A parallel-group randomized controlled study with 66 students was carried out. Before the intervention, there was no significant difference in accomplishment ratings between the two groups, according to the findings. However, following the intervention, students in the quiz game group outperformed those in the lecture group on the immediate accomplishment post-test and the retention test. According to the satisfaction questionnaire, students enjoyed and accepted the game format as a more gratifying teaching style. Generally this study shows that the game format was not only chosen by students but also resulted in improved information retention. It is Jordan's first research of its sort to investigate the usefulness of this game format in nursing education (Aljezawi & Albashtawy, 2015).

A study compared undergraduate nursing students' ratings of a gamified instructional webinar to a non-gamified version. As part of public health education, the webinars focused on "Determinants of health." The study used a post-test assessment design with a comparison group and included a qualitative component. The participants were first-year students pursuing a Bachelor of Science in Nursing at the Malta College of Arts, Science, and Technology. They were randomly assigned to two classes, with 26 students each, and were allocated to either the gamified or non-gamified webinar. A revised version of the "Students Evaluations of Educational Quality" questionnaire was administered to all participants.

Participants were also invited to offer feedback on their learning experience. The findings revealed that both groups rated educational quality as good to very good. Among the participants in the gamified webinar group, many mentioned that gamification helped to increase their engagement and interaction during the session. Based on these findings, it can be inferred that the gamified approach had a positive impact on students' engagement and interaction during the educational webinar on determinants of health. The study suggests that incorporating gamification techniques in educational webinars can enhance the learning experience for nursing students (Grech & Grech, 2021).

In a study, serious games were used as a cutting-edge teaching method in a community health nursing course for online nursing students in nursing faculty at a mid- Atlantic Historical Black College and University introduced "serious gaming" technology into a Community Health. Educational games with definite learning objectives are referred to as serious games. The researchers discovered that using serious gaming technologies, particularly two web-based game simulations dubbed "Outbreak at WatersEdge: A Public Health Discovery Game" and "EnviroRisk," increased student learning results for the course. It was shown that using these games was more beneficial than using readings and PowerPoint supplements because it provided engagement, stimulation, realism, and fun. This strategy is in line with the principles and methods of active learning in nursing education. The results show that gamification has a lot of promise for improving the teaching-learning process in nursing education (Day-Black, 2015).

#### 2.6.3 Gamification of Self-Study Modules in Nursing Education

In nursing courses, instructors are required to cover a lot of material in a condensed period of time. Students are therefore in charge of studying certain subject through self-study modules. For students to participate in self-study effectively, instructors must design engaging modules. Gamification is one approach to resolving this issue. Students are introduced to the learning materials through gamification of self-study modules, and they are then given the chance to apply and synthesize their new information in original ways by playing a variety of games. For the Child Health course at Texas Woman's University College of Nursing, self-study modules covering pediatric pain treatment and nutrition were developed based on this approach. Crossword puzzles, reveal-a-pic, and escape room

experiences were employed. To make sure material was effectively conveyed using the gamification technique, the content of these modules will be included in the examinations for the course (Murphy, 2021).

To accommodate the interests of contemporary students, educators must modify their teaching strategies to integrate gaming and gamification. The initial step in gamification for educators might be using prepackaged games or gaming templates to build a linked learning environment that encourages intrinsic motivation and enhances results. The selfdetermination theory, which stresses autonomy, competence, and relatedness as essential components of motivation, serves as the theoretical foundation for gamification in education. Extrinsic motivation, where students are eager to pass exams but may struggle with longterm retention, is a common component of traditional teaching approaches. Gamification, in contrast, focuses on internal motivation by offering quick feedback, control over the course material, and chances for exploration. Gamification facilitates active learning, individualized pace, autonomous learning, and a secure atmosphere for risk-taking and failure in the educational setting. Specific game mechanisms like leaderboards, badges, levels, and points increase interest and promote learning. Benefits of gamification in nursing education include accessibility, appeal to younger generations, support for various learning styles, and the creation of a secure environment for practice and critical thought. Using prepackaged games or introducing gamification components into current curriculum, such as giving badges or developing leveling systems linked to certain abilities or talents, are two ways to implement gamification (Brull & Finlayson, 2016).

A thorough literature review research was conducted to examine the viability and usefulness of gamification in nursing education as well as its effects on nursing students. Within nursing degree programs, gamification was used in a variety of teaching modules. The findings repeatedly showed that gamification had a positive impact on nursing students, increasing their motivation, engagement, interest in their studies, and acquisition of new knowledge. Gamification did, however, have certain negative effects in addition to its advantages. These included doubts about the effectiveness and suitability of game-based learning techniques, as well as observations of certain students' lack of commitment or participation (Fijačko, et al. , 2020).

### 2.6.4 Considerations and Limitations of Gamification in Learning

While gamification has showed potential in improving learning outcomes, various limits and challenges must be considered (Anguas-Gracia et al., 2021; Bai, et al., 2020; Cheng, 2020). These limitations and challenges are summarized as follows:

- Contextual relevance: Gamification should be designed and implemented with the unique learning objectives and context of adult health nursing in mind. The relevance and application of the game features to the nursing sector must be carefully addressed.
- Individual differences: Learners may have varying preferences and experiences with gamified approaches. It is crucial to recognize and accommodate individual learning styles and preferences to ensure effectiveness.
- Long-term impact: Studies examining the long-term impact of gamification on learning outcomes in nursing education are limited. Further research is needed to assess the durability of learning gains and their transferability to real-world nursing practice.

# 2.7 Gamification Fundamentals

The core principles of gamification include: motivation, feedback, progression, social interaction and rewards (Vermeir et al., 2020).

### 2.7.1 Motivation

Motivation is key to gamification's success. Successful gamification relies on motivation, which acts as the impetus for users to behave. Users should be inspired to interact with the system through a rewarding and fascinating gamified experience. Student performance and learning outcomes in nursing education can be impacted by motivation. There are several teaching methods and their effects on student motivation in the classroom, including problem-based learning, simulation, and hands-on training (Saeedi et al., 2021).

### 2.7.2 Effective Feedback

There are two mixed-method studies, one conducted by Canadians and the other by Americans agreed that feedback is essential for nursing practice and education because it makes users feel appreciated for their efforts. It need to be open, timely, and pertinent to the users' activities, assisting them in understanding their progress and modifying their subsequent actions as necessary. Despite not being exclusive to nursing, research has shown that gamification's concepts, including feedback, may be used in a variety of situations to improve motivation, engagement, and learning outcomes. In order to improve learning outcomes and patient care, these ideas may be applied to nursing education and practice (Killam et al., 2021; Weaver et al., 2020).

#### 2.7.3 Progression

A systematic review has been conducted in Finland emphasized that gamification demands a sense of progression. Users remain interested and interested about what may happen next because to progression. A gamified system should provide users regular goals to reach, showing progress and encouraging people to keep going (Majuri et al., 2018).

# 2.7.4 Social Interaction

A systematic review of gamification techniques applied to elderly care in Portugal and Spain has been great concerns that gamification must include social interaction, especially in light of the growth of social media. Users gain from constructive rivalry and teamwork, which fosters a feeling of community and shared experiences (Martinho et al., 2020).

# 2.7.5 Rewards

Rewards are a crucial component of gamification. They may be material or immaterial, monetary or symbolic, but they must offer the user something of value. Rewards are essential in encouraging users to accomplish goals because they increase the value of the reward by fostering a sense of accomplishment (Vermeir et al., 2020; Warburton et al., 2022).

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# 2.8 Gamification Can Improve Learning Outcomes

The effect of gamification in educational settings on student learning outcomes was investigated in an American meta-analysis research. The goal of the study was to quantify the total impact of gamification, pinpoint the precise design components employed, and investigate the situations where it works best. With a total of 3,083 individuals from 30 separate investigations, the analysis included them. The results show that gamification improves student learning outcomes in a small- to medium-sized way, with an overall impact size of g= 0.464. The study also looked at several design aspects of gamification and discovered that each aspect had a varied impact on learning results (Huang et al., 2020).

A nursing education study used Kaizen, a game with multiple-choice questions released weekly or bi-weekly, and voluntary participation. The performance on the final test and knowledge retention were impacted by different play styles. Gamification may boost academic achievement, student engagement, and information retention by using educational analytics (Roche, et al. , 2018).

A research outlines using Breakout EDU locked boxes and escape room principles to simulate urosepsis for nursing students. To go through the simulation in 60 minutes, students utilized previously taught principles and examined patient data. Students' better teamwork and ability to assign assignments thereafter provides evidence that escape roombased learning is an interesting teaching method. Time was recognized as a crucial element, and the study implies that using serious games to teach nursing concepts may be a helpful strategy (Brown, et al., 2019).

In compared to the control group, the intervention group's self-confidence, skill knowledge, level of preparation, and motivation all significantly improved. Yet, there was no discernible difference in the two groups' skill performance. Based on these findings, the study hypothesizes that gamification is a useful instructional method for raising motivation and involvement among students in classroom learning (Elzeky, et al. , 2022).

To help nursing students develop their critical thinking and teamwork abilities for delivering safe care, an escape room was implemented as a cutting-edge teaching technique. This strategy was designed to take the place of the conventional simulation experience and give the students a more interesting and entertaining learning experience (Edwards, et al., 2019).

A complete examination of the influence of gamification on learning outcomes in health professions education is carried out, including many factors such as game components, game design, and gamification methodologies. The study emphasizes the potential efficacy of gamification as a significant method for improving motivation, engagement, and overall learning outcomes in health professions education. According to the findings, adding gamification might be a potential technique for fostering meaningful learning experiences in this discipline (van Gaalen, et al., 2021).

#### 2.8.1 Gamification and Knowledge Acquisition

A research was done to see if an Instagram-based educational game may improve the learning results of first-year Bachelor of Nursing students. The study used the Solomon fourgroup experimental design, with two experimental groups and two control groups. In total, 291 college students participated in the study. The experimental group improved their final grades by 0.62 points on average when compared to the control group, demonstrating that participation in the instructional game had a positive effect. These results are consistent with other research that suggests gamification might improve learning outcomes in higher education, especially in the field of health professions (Rosa-Castillo et al., 2023).

A study examined the use of gamification in education and its effects on learning. The researchers identified important gamification-related themes, including mobile gaming, physical education, and health, using a citation network analysis. The study demonstrated benefits for student motivation and enhanced academic performance. It emphasized how gamification has the ability to improve instructional strategies and provide captivating learning environments through technology. In general, gamification is a useful technique for fostering knowledge acquisition and cutting-edge pedagogies in education (Chugh & Turnbull, 2023).

According to a British literature review, students highly respect and rate the use of games in the classroom, such as quizzes and escape rooms, for their ability to develop collaboration and teamwork. Game-based activities shown rapid improvements in terms of short-term learning and memory. The long-term consequences, however, differed amongst investigations. While many students recognized the value of game-based learning, several shared concern about using just games to prepare for exams. Despite this, game-based

learning has the potential to increase student engagement even in online learning environments. The perspective of students, nevertheless, could have an impact on how broadly game-based learning is used (Tavares, 2022).

## 2.8.2 Gamification and Students' Motivation and Engagement

A study found that gamified students reported lower levels of motivation, contentment, and autonomy compared to non-gamified students over time. The study also revealed that the students' intrinsic drive played a role in how different gamification techniques affected their final test performance. These findings highlight the need for caution when implementing certain gamification techniques in educational settings (Hanus & Fox, 2015).

In the context of nursing education, a literature review study in Slovenia aimed to explore gamification as a novel concept in adult learning, particularly in response to the demands of new student generations seeking innovative learning approaches. While only one research study identified potential negative effects such as inappropriateness and inefficiency of gamification on nursing students, most studies concluded that gamification had a positive impact on motivation and engagement among nursing students. The authors argue that gamification holds significant potential as a cutting-edge strategy for knowledge dissemination in nursing education and call for further research to fully understand its conceptual underpinnings and explore its broader educational applications (Fijačko, et al. , 2020).

In order to increase student engagement, gamification was the subject of an exploratory-descriptive qualitative research. To get their opinions and thoughts, six nursing professors who used gamification in their instruction of prelicensure nursing students were questioned. The research has significant implications for nursing education since it shows how gamification may improve nursing students' emotional, cognitive, and behavioral engagement and lead to productive outcomes like learning, fun, and teamwork (Lucas, 2023).

Serious games have been proven to be an effective teaching technique in nursing education since they place an emphasis on learning objectives rather than fun. A historically black college and university in the mid-Atlantic employed the web-based game simulations Outbreak at Waters Edge and Enviro Risk to engage and motivate "digital" nursing students in a community health nursing course. This approach is aligned with active learning methodology and practices and has been demonstrated to improve student learning results (Day-Black, 2015).

A qualitative observational research was conducted in Spain to find out what nursing students thought of the escape room as a knowledge-testing activity. The game, which incorporated knowledge and talents from different academic subjects, was well received by the pupils. Its main strengths were engaging, energetic instruction that inspired students. The game also taught students how to work together and perform well under pressure by posing a challenge to them (Gómez-Urquiza, et al. , 2019).

According to Egyptian study, the students' lack of engagement and attention is one of the main issues with traditional classroom instruction. Fun and enjoyment-related components can improve engagement in the classroom and have a positive impact on student conduct. Particularly in the digital age, gamification has become a common strategy to encourage desirable behaviors, enhance motivation, and raise engagement. These issues may be addressed and student interest and engagement increased by implementing gamification techniques in nursing education (Mohamed & Nashwan, 2019).

Animation and gamification were applied in an online diabetic nursing course in a Turkish study with 70 nursing students. The experimental group, which got these interventions, had better knowledge scores than the control group (P 0.05), as well as better attention, contentment, and overall motivation (P 0.001), according to the results. This indicates that the usage of animation and gamification has a favorable influence on nursing students' knowledge and motivation levels during online distance teaching (Inangil et al., 2022).

# 2.8.3 Gamification and Critical Thinking

Gamification has become a useful tool in nursing education, giving students a safe and realistic setting in which to practice making clinical judgments. Quasi-experimental study was carried out in Spain to look at how gamification affects nursing students' decision-making. 191 nursing students participated in a convenience sample, and they were randomized into either a control group or an experimental group. According to the findings,

there were statistically significant differences between the experimental and control groups in terms of behaviors like procrastination, buck passing, and alertness. According to the results, gamification in nursing education increases control, encourages creative thinking, and improves satisfaction, among other things, without having any appreciable negative impacts. This positive impact on decision making highlighted the effectiveness of gamification as a valuable component of nursing education (García-Viola et al., 2019).

In a study, the impact of gamification and situation-based flipped learning on nursing students' ability to treat patients with mental health issues was examined. A total of 102 nursing students from a school in Korea's G Metropolitan City were split into an experimental group and a control group at random. The experimental group took part in an eight-week program for psychiatric nurses that used flipped learning in conjunction with gamification while the control group attended standard team-based lectures. Both groups' sympathetic reactions, problem-solving skills, and learning attitudes were evaluated following the training. In comparison to the control group, the experimental group showed considerable gains in their capacity for empathy and problem-solving. The results show that gamification and situation-based flipped learning significantly improve students' ability to empathize with patients and solve problems (Kim & Kim , 2022).

There have been varied degrees of success in incorporating active learning techniques into conventional nursing schools. Gamification, on the other hand, has demonstrated positive benefits in enhancing nursing students' clinical judgment abilities. In this study, instructional designers and course professors worked together to create a gamified renal module that would help nursing students better understand the material and use their clinical judgment. While the instructional designers constructed the virtual environment and plot, the professors provided the material and gameplay components. The Gameful Experience Scale (GAMEX) instrument will be used to assess the success of the gamified program. The faculty will use student feedback to improve the curriculum and maybe create more gamified modules in the future. The use of the gamified module gives students an engaging learning experience that encourages best practices, information retention, and the development of clinical judgment (Joy et al., 2023).

In a research project aimed to develop an active-learning app for enhancing critical thinking (CT) skills. Currently, there are few effective CT training apps, and little research

has been done on app content and organization. The project consists of two studies. Study one involved compiling question banks from popular CT and verbal reasoning workbooks, ranked by difficulty based on 73 university students' participation. In Study two, two web-based apps were created. One offered sequential multiple-choice questions with instant feedback, while the other included minimal gamification through group/individual competition. The impact of gamification on CT skill improvement was tested with 114 participants. Both groups showed improvement in pre-/post-test scores using comparable questions, but the gamification's effect was inconclusive. These findings highlighted the potential for an effective CT app using existing question banks, but further research is needed to fully understand the role of gamification in enhancing critical thinking skills through such apps (Jodoi et al., 2021).

A Taiwanese study investigated the use of bingo games and a mobile application (Socrative) in a blended design of game-based learning to improve motivation, knowledge sharing, and critical thinking in the context of information management. 86 undergraduate students who took an 18-week information management experimentation course participated in the study. Interesting results were found after analyzing both qualitative and quantitative data. The impact of bingo games on improving learning motivation was shown to be larger, whereas Socrative promoted information sharing and critical thinking. Through a number of factors, such as concentrated attention, brainstorming, active engagement, interaction, and logical reasoning, both teaching strategies improved learning results. Motivation, information sharing, and critical thinking interacted, which is significant. Participants' critical thinking skills were significantly enhanced by the hybrid strategy, which combined bingo games and Socrative (Chang & Yeh, 2021).

Using online games in the classroom, such as Kahoot is a very effective tactic for making learning more meaningful. By connecting the information from fundamental scientific courses with application or skills modules, it has the ability to promote cognitive integration beyond simple review. This method actively engages students in learner-centered activities that foster critical thinking and clinical reasoning in addition to motivating them to study (Ignacio & Chen, 2020).

# **2.9 Game Elements**

Nursing educators can improve their students' memory of knowledge and utilization of nursing skills by gamifying—adding aspects of games to the classroom—to make it more engaging and participatory. Following are a few examples of game components frequently utilized in nursing education:

#### 2.9.1 Badges and Achievements

Digital badges (DBs) are a cutting-edge method for gamifying nursing education because they include socially connected, technologically astute nursing students in their studies. DBs are made to be visual representations of proficiency and success since evaluation and certification methods are kept and controlled online (White & Shellenbarger, 2018).

### 2.9.2 Leaderboards

Leaderboards may be used to categorize and include a variety of factors, such as the quantity of right answers, the amount of time spent, or the accomplishment of goals. They may also be used to rank and classify responses to tasks, as demonstrated by examples like Beta and Foldit. Since the game already includes the essential information, incorporating leaderboards into educational settings is quite simple and doesn't interfere with gameplay. Leaderboards also have a big influence on a lot of other elements of educational gaming. The perceived worth of the achievements produced increases as leaderboards become more tough, which eventually improves memorability (Yahia, 2021).

#### 2.9.3 Quests and Challenges

Quests and challenges in a gamified environment are engaging mystery-solving tasks that promote critical thinking skills. They provide students with a sense of purpose and direction in the learning process. Starting a course with a challenge or adding story components enhances engagement compared to traditional course objectives. Quests allow students to work cooperatively or individually, fostering unity within the gamified environment. This aligns with Gee's affinity group principle (2003). Integrating quests and challenges can boost student engagement, critical thinking, and teamwork (Alsawaier, 2018).

### 2.9.4 Question Cards

A creative and entertaining method of teaching is gamification employing question cards as a learning aid. In a research, question cards on cardiovascular crises were created and validated for use in gamification of undergraduate nursing education. The design of the test cards and their validity testing were part of the development process. Nursing students evaluated the response process, while nurse professionals evaluated the content validity. The test questions showed excellent levels of validity and reliability, and there is substantial evidence to support the questions' substance, response methodology, and internal organization (Anna et al., 2022).

#### 2.9.5 Interactive Quizzes

Alternative assessment techniques are gaining popularity as a means of assessing learning and memory retention in novel ways. One such option is collaborative testing, which promotes communication and teamwork among students rather than the conventional individual testing strategy. An article described how quizzes were used to promote learning and recall of course material in an accelerated second-degree baccalaureate nursing program. The response from students to this technique was overwhelmingly favorable, with many stating that it offered an organized method for learning course content, particularly when used in the context of an accelerated course style (Burgess & Medina-Smuck, 2018).

#### 2.9.6 Role-Playing

In a study, the effects of role-playing during school-based health screenings on nursing students' academic performance, motivation, and learning techniques were assessed. The 56 participants in the quasi-experimental study revealed that the experimental group outperformed the control group in terms of grade point average and learning tactics, including metacognitive and collaborative approaches. Role-playing has a favorable impact on the learning outcomes and motivation of nursing students (Sert et al., 2023).

#### 2.9.7 Storytelling

Integrating storytelling elements into case studies or scenarios can immerse students in the learning process and make it more relatable. A middle-range perspective on storytelling

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in nursing education is presented in a study, which situated it within the context of holistic nursing theory and philosophy. According to the hypothesis, narrative transportation and neuroplasticity could help storytelling have a good affective and cognitive impact on holistic nursing students. It investigated ideas like the cycle of story creation, interpretation, and recreation and the temporal bidirectionality of story and experience (Moore, 2023).

#### 2.9.8 Points and Rewards

Students can earn points for completing tasks, and these points can be exchanged for rewards, creating a sense of accomplishment and motivation. A paper examines the impact of gamification using points versus polls on the Kahoot platform. Previous research has shown that gamification can enhance student engagement and performance. The study found that point-based gamification in quiz mode increased reported student engagement compared to traditional lectures, but there was no significant difference between point-based and pollbased gamification. Unexpectedly compared to the poll-based gamification condition, rewarding quick replies with points resulted in lower learning results, especially when tested one week later (Koppitsch & Meyer, 2022).

# 2.10 Gaps in the Literatures

There were a number of challenges to overcome throughout the searching process, major among them being a lack of literature on traditional games and covering all learning outcomes. A noticeable gap was noted, since extant articles concentrated on either one or two issues, hence restricting an all-encompassing investigation of the issue. In addition, the lack of local studies in the researcher's area and nearby nations made it difficult to add context to the discussion and promote cross-cultural comparisons. The adult health nursing course was not well represented in the literature, which highlighted the need for more thorough research contributions in this particular area. This was especially significant. These inadequacies highlighted how crucial the current work is to filling in the gaps in the literature and advancing a more comprehensive understanding of how conventional games and learning interacted.

# 2.11 Summary of This Literature Review

Gamification is the process of incorporating elements and concepts from games into non-gaming environments to increase user engagement and happiness. It can take many various forms, such creating systems that seem like games or incorporating gaming features into systems that already exist. Gamification is becoming recognized as an effective strategy for enhancing student learning outcomes in nursing education in particular. Gamification techniques that might increase students' feelings of fulfillment and inspire them to take an active role in their education. Because gamification is dynamic and interactive, students can practice critical thinking, acquire specialized skills, and apply concepts in real-world circumstances. Gamified learning incorporates social elements such as cooperation, communication, and peer support.

Gamification in nursing education should be tailored to adult health nursing goals, taking into account individual preferences and previous experiences. However, constraints and context must be considered. There has been little research on the long-term influence of gamification on nursing education results; future studies must investigate long-term benefits and real-world applicability. Gamification improves training participation and memory retention in healthcare. Motivation, feedback, growth, social engagement, and incentives are key principles.

Motivation and critical feedback are critical in nursing. Progression keeps interest alive by providing social interaction and rewards for a pleasurable experience. Through motivation, engagement, and learning, gamification improves nursing education. Despite its disadvantages, the positive impact deserves more investigation into healthcare education. More research and application promise to yield novel nursing teaching methods.

# **Chapter Three: Methodology**

### **3.1 Introduction**

The methodology chapter of this study serves as an essential starting point for the whole study. This chapter methodically explains the carefully developed methods and processes followed in the effort of answering the research questions and attaining the study's objectives. A comprehensive review of the selected technique clarifies the methodical approach used in the collection, processing, and interpretation of data. Through an in-depth exploration of this study design, data collecting techniques, and analytical tools, this chapter offers an in-depth understanding of the careful and systematic procedures utilized to ensure the reliability and validity of this study's conclusions.

# **3.2 Study Design**

A mixed methods strategy that combines both quantitative and qualitative methodologies has been chosen as the study's methodology. This method was useful for a number of reasons:

Combining quantitative and qualitative approaches allowed the researcher to get a deeper and more comprehensive knowledge of the phenomena under study. Quantitative data revealed statistical patterns and measurable outcomes, whereas qualitative data documented the learning outcomes of adult health nursing students with reference to gamified activities (Doyle et al., 2009).

Combining several procedures made it simpler to triangulate data, allowing results from different methodologies to be contrasted and compared to support and validate the overall research conclusions. A more accurate and reliable interpretation of the study findings was achieved by the combining of quantitative and qualitative data. Contextualizing the quantitative results was made easier by conducting intentional interviews to collect qualitative data. They gave a more thorough grasp of the value of gamified activities in the classroom and certain student traits that can affect their learning results (Tashakkori and Creswell, 2007).

The quantitative component of this study was a Quasi-experimental design. This design was suitable for this study for several reasons:

By using a Quasi-experimental design methodology, it was possible to modify independent variables and control some of the auxiliary variables. This made it possible for the researcher to show the connection between the gamification variable and the learning outcomes, such as knowledge acquisition, engagement, motivation, and critical thinking. A Quasi-experimental design carried out in actual circumstances. This made sure that the conclusions could be used in related situations and had beneficial effects for students studying adult health nursing. It was more practicable and viable to use Quasi-experimental design. It made it possible for researchers to operate independently of severe supervision or manipulation. This made it simpler to apply the findings of the study to real-world educational settings where random assignment might not be feasible or morally acceptable. It made it easier to compare various groups or situations. Researcher in this study compared the outcomes of nursing students who participated in gamified activities to those of students who participated in traditional activities. The potential benefits of gamified activities were investigated by evaluating and comparing the learning outcomes, knowledge acquisition, critical thinking skills, motivation, and student engagement between the two groups (LoBiondo-Wood & Haber, 2022; Tashakkori & Creswell, 2007; Sandelowski, 2011).

The qualitative component of this study utilized a phenomenological design. A phenomenological design could be considered for this study to explore the lived experiences and perceptions of nursing students engaging in gamified activities compared to traditional activities. The goal of phenomenological design was to understand the meaning and core of human experiences. Nursing students who took part in gamified activities had their subjective views examined using a phenomenological approach. The complexity of individual experiences, including their ideas, feelings, motives, and viewpoints on the utilization of gamified activities, might be explored thanks to this design. It gave special consideration to investigating the many viewpoints and interpretations of a given phenomenon (LoBiondo-Wood & Haber, 2022).

In this study, a phenomenological method helped researchers better understand how nursing students interpreted their participation in gamified activities and how it affected their capacity for learning, motivation, and critical thought. This approach made it possible to record the participants' various and distinctive points of view. The researcher investigated how the use of gamified activities affected the setting for learning, instructional strategies, and student-teacher relationships by taking a phenomenological approach. With the help of this design, it was possible to gain a comprehensive knowledge of the context-dependent influences on the experiences and results of nursing students participating in gamified activities (Doyle et al., 2009).

The majority of the time, qualitative data gathering techniques like interviews were used in phenomenological designs. These in-depth narratives from the participants' interviews helped the researcher obtain a thorough knowledge of their experiences. Practical implications and suggestions for nursing education were developed with the use of a phenomenological design. The researcher evaluated the benefits and drawbacks of gamified activities and provided suggestions on how to best apply them in educational settings by comprehending the subjective experiences and views of nursing students. This information could help teachers, curriculum designers, and policymakers determine the best ways to use gamified activities in lessons to improve learning outcomes, motivation, critical thinking skills, and student engagement (Tashakkori & Creswell, 2007).

# **3.3 Population and Setting**

The accessible population for this study consisted of undergraduate adult health nursing students at Ibn Sina College, which is a part of Nablus University for vocational and technical education. The total number of students in the population was 90 (23 male nurses, 57 female nurses and 10 female midwives).

#### 3.3.1 Sampling

For the quantitative component of the study, the sample size was estimated based on the findings of a pilot study investigating the effect of a gamification on learning outcomes based intervention. The average mean of total learning outcomes the pretest and posttest were 3.229  $\pm$  0.511 and 3.681  $\pm$  0.690, respectively. By using a G-power software, considering SD 1 = 0.511, SD 2 = 0.690, Mean 1= 3.229, Mean 2 = 3.681, Effect size d = 0.744,  $\alpha$  = 0.05, Power (1- $\beta$ ) = 0.937, 45 students was estimated to be needed in each group. The 90 students were conveniently selected and using a simple random sampling assigned to either an intervention or a control group. Table (3.1) shows the process of determining sample size.

t tests - Means: Difference between two independent means (two groups)	
Analysis:	A priori: Compute required sample size
Input:	Tail(s) = Two
Effect size d	= 0.7444827
α err prob	= 0.05
Power (1- $\beta$ err prob)	= 0.937
Allocation ratio N2/N1	= 1
Output:	Noncentrality parameter $\delta = 3.5313915$
Critical t	= 1.9872899
Df	= 88
Sample size group 1	= 45
Sample size group 2	= 45
Total sample size	= 90
Actual power	= 0.9373167

Table 3.1. G- Statistical Power for Sample Size

In the qualitative component of the study, a simple randomized sampling was used that involved selecting participants who had been experienced the gamified intervention. The total number was 15 participants; male nursing students (n = 5), female nursing students (n = 6) and female midwives (n = 4).

# 3.3.2. Inclusion Criteria

Nursing and midwifery students who engaged in adult health nursing course students at fall semester 2023 and who consent to participate in the study were included.

#### 3.3.3 Exclusion Criteria

Nursing and midwifery students who did not enrolled in adult health nursing course students at fall semester 2023 and who did not consent to participate in the study were excluded.

# **3.4 Ethical Considerations**

All participants were asked for their informed consent. Participants were made aware of their freedom to leave the research at any time and without consequence. Participants were

not named in any papers or reports emerging from the study, and all data were kept anonymous. The study were approved by the institutional review board (IRB) from Arab American University.

Since the instruments were open access, anyone may use them for free as long as they complied with the conditions set out by the creators. Reassuring that usage of these instruments adhered to the conditions and regulations of the open access licenses, which permit their use in educational and research settings.

This method of gamification needs to be used with the control group in the upcoming semesters to ensure that there is no bias for the students in the intervention group over those in the control group.

# 3.5 Rigor for the Qualitative Data

The study's credibility was established by carefully evaluating the accuracy of the data and simultaneously engaging in audio recordings and reading the transcripts. The researcher took an active part in each step of the data gathering procedure in order to demonstrate dependability. As the researcher provided a sample of the interview transcripts for review, conformability was attained. The researcher carefully summarized each issue before beginning the coding process. Transcriptions were thoroughly verified to ensure correct translations. The thorough description of what happened, along with a large collection of quotes from participants, validated the study's conclusions even more.

# **3.6 The Procedure of the Study**

- 1. The students were grouped in either the intervention group or the control group prior to the start of the lessons.
- 2. While the intervention group incorporated gamification into their teaching, the control group was unaware of the gamified activities.
- 3. There were no variations between the two groups in terms of evaluation, lessons, material, lecturer, etc. other from the application of gamification.
- 4. Students were informed about the aim of the investigation and the confidential and anonymous treatment of their data.

- 5. The gamification and conventional classes were launched after receiving informed permission.
- 6. The course started in September 3, 2023.
- 7. Following the final gamification and traditional education, as well as the final theoretical evaluation, the study results were gathered at the end of semester which was in December 15, 2023.
- 8. Reminding the intervention group students that their involvement in these activities shouldn't have any effect on how well they are evaluated in the course.
- 9. Figure (3.1) shows a diagram for the flow of the study and characteristics of both control and intervention groups.



Figure 3.1. Diagram for the Flow of the study

# **3.7 Data Collection**

The study period was between September 3, 2024 and December 15, 2024. This study had both quantitative and qualitative data. So the process of data collection was as following:

#### 3.7.1 The quantitative component of the study

The quantitative data were collected by a questionnaire. It gathered characteristics of participants and their learning outcomes. It encompassed a range of questions targeting various aspects such as knowledge acquisition, critical thinking skills, motivation, and engagement. The questionnaire composed of structured questions, utilizing a standardized response format, which facilitated ease of completion for the participants. The structured format enabled the participants to provide specific and measurable responses, enhancing the quantitative analysis process.

The questionnaire administered to both the intervention group, which received gamified activities beside their traditional teaching methods, and the control group, which received traditional activities only. Questionnaire used English. Students were already studying in English and the completed two courses in English beside their admission exam. By comparing the responses between the two groups, the effectiveness of gamified activities have been assessed. Questionnaire was administered pre and post gamification activities for both control and intervention groups. The questionnaire composed of four parts:

Demographic data: This included students` gender, specially track and final marks in adult health nursing course. Two transcripts about grades were requested from exams registration department. The first transcript for section (A) which represented the control status in the study, while the second for section (B) which represented the intervention status in the study.

Student Course Engagement Questionnaire (SCEQ): Engagement has both behavioral and emotional components. A behavioral component was a type of engagement that took into account a student's unique approach and learning style, their reasons for studying, and their success-oriented methods. The term "affective engagement" referred to a student's level of emotional participation in their learning of the course material and their emotional commitment to studying the course material. Students who were more emotionally and behaviorally engaged could learn more, and this might improve their perseverance, sense of accomplishment, and academic performance.

The Student Course Engagement Questionnaire had 23 equally weighted items each assessed using a five-point Likert's scale. The 1–5 Likert's scale indicated responses to statements where 1 indicated that the statement was "much less like me", whereas 5 indicated that the statement was "much more like me". The middle point on the scale (3) indicated no preference, such that the statement was neither "more like me" nor "less like me". It had Cronbach's alpha coefficients > 0.76. It is generally agreed that a reliability level of  $\alpha$  of 0.6–0.7 indicates an acceptable level, and 0.8 or higher indicates a very good one (Brown et al., 2017).

The critical thinking disposition scale: The critical thinking disposition scale comprised 35 items categorized into eight factors: intellectual integrity (six items), creativity (four items), challenge (six items), open-mindedness (three items), prudence (four items), objectivity (four items), truth seeking (three items), and inquisitiveness (five items).

The scale demonstrated good reliability (Cronbach's alpha = 0.892), and the factors showed acceptable internal consistency (range: 0.562 - 0.836). The 1–5 Likert's scale indicated responses to statements (1 = strongly disagree, 2 = disagree. 3= neutral 4= agree and 5= strongly agree). This critical thinking disposition scale provided a valuable tool for measuring the critical thinking tendencies of nursing students (Kwon et al., 2006)

Instructional Materials Motivation Scale (IMMS): IMMS is a 36-item scale used to measure students' motivation related to the materials used in teaching. IMMS was developed by Keller (2009) regarding the attention (12 items), relevance (nine items), confidence (nine items), and satisfaction (six items). The 1–5 Likert's scale indicated responses to statements where 1 indicated that the statement was "not true", whereas 5 indicated that the statement was "very true". The middle point on the scale (3) indicated "moderately true", and the statements (slightly true = 2, mostly true =4). The Cronbach's Alpha value for the whole scale was 0.96 (Hauze & Marshall, 2020; Keller, 1987).

#### 3.7.2 The Qualitative Component of the Study

In the qualitative component of the study, data was collected through individual semistructured interviews. These interviews provided an opportunity for participants to share their experiences in more depth and provide rich insights into the impact of gamified activities on their learning. The interviews lasted approximately 40 to 60 minutes, allowing for a comprehensive exploration of the participants' perspectives. The interviews followed a semistructured format, meaning that there was an initial open question to encourage participants to freely express their thoughts and experiences. The interviewer used guided questions to delve deeper into specific aspects of their experiences with gamified activities.

This approach allowed for flexibility in the interview process while ensuring that key topics of interest were covered. All interviews were conducted on a one-on-one basis, in a private setting to create a comfortable environment for the participants to share their thoughts openly. Anonymity was maintained throughout the process to protect the participants' identities. Each participant was assigned a number label to ensure confidentiality in both the transcript and audio recordings. To ensure accurate data analysis, all interviews were transcribed accurately and faithfully. The transcripts served as the primary source of qualitative data, capturing the participants' narratives and perspectives in their own words. The audio recordings have been kept for reference and verification purposes. The interviews were guided by the following five qualitative questions:

- 1. Please share your experience with this course, focusing on the use of the gamification method as a teaching approach. Feel free to express your thoughts openly and spontaneously.
- 2. How did this approach of learning (gamification) impact your level of engagement in the class activities?
- 3. Discuss your sense of accomplishment in the course and how it contributed to your motivation in understanding the course goals and expectations?
- 4. Could you give examples of how you approach thinking differently from other people and how this approach has resulted in an effective outcome?
- 5. Could you give examples of how you get knowledge acquired and explain how this relationship has resulted in a positive outcome?

By using both self-completion questionnaires for quantitative data and individual semistructured interviews for qualitative data, the study aimed to gather comprehensive and diverse insights into the learning outcomes of nursing students engaging with gamified activities. The combination of these data collection methods allowed for a more holistic understanding of the research topic and enhanced the validity and reliability of the findings.

#### **3.8 Interventional Tool**

Non-digital gamified activities that will behave been used for adult health nursing students. They incorporated game elements such as points, badges, leaderboards, and challenges to enhance student engagement and motivation. They were designed to align with the learning objectives of the course, and were interactive and user-friendly to promote student engagement.

#### **3.8.1 Gaming Design**

Some factors were taken into account when creating a game. The game's learning objectives were clear and related to patient nursing care. The goals were created to encourage commitment to treatment plans, enhance critical thinking abilities, and improve understanding of nurse management. The story included decisions and problems that called for the player to use their understanding in nurse management. The game mechanics were created to maintain the player's interest and motivation (Brull & Finlayson, 2016).

The game has elements that encouraged participation, such as points, badges, awards, and promotion systems. The game's graphics looked attractive and clear. The game used visual cues to progress learning goals and present crucial information. Because it was interactive, the player could choose their course of action and watch how it turned out. The game gave the user feedback on their performance and progress (Daniel, et al., 2018).

Ratings, progression and specific suggestions served as the feedback. Users may cooperate and engage in friendly competition thanks to the game's multiplayer function. This improved motivation and supported peer learning (Daniel, et al., 2018; Brull & Finlayson, 2016; Garrison, et al., 2021; Kim B., 2015).

# 3.8.2 The Course's Schedule of Intervention

Table (3.2) presents the course schedule for a specific curriculum, showcasing the distribution of content, total hours, and the allocation of traditional teaching and gamification methods. Each week of the course is outlined, along with the corresponding content, total

hours, and the breakdown of hours between traditional teaching and gamification. The gamification aspect involves the implementation of various games and interactive activities to enhance learning engagement and outcomes. Each student received a copy of the materials, and alongside that, all the games were made available. Prior to commencing each game, a discussion took place.

Content	Total	Traditional		Gamification	_
	Hours	Teaching	Hours	Games	Week
Fluid and				Game 1: Points system game	
Electrolytes and	6	3	3	Acid-base disturbances,	1,2
Acid-Base				Hypovolemia and hypervolemia,	
Disturbances				Hypokalemia and hyperkalemia,	
				Hyponatremia and	
				hypernatremia, Hypocalcemia	
				and Hypercalcemia	
Respiratory	12	6	6	Game 2: Leaderboards	2,3,4
System				(Tonsillitis, Laryngitis, Sleep	
				apnea, Tracheobronchitis,	
				Pneumonia, Pleural effusion,	
				Pulmonary embolism,	
				Pulmonary edema,	
				Pneumothorax)	
				Game 3: Interactive scenarios/	
				Role play games/Asthma Vs.	
				COPD	
Cardiovascular	15	8	8	Game 4: Quiz Bowl-Style Game	5,6,7
System				- Cardiovascular Disorders	
				Game 5: ECG Interpretation	
				Challenge with PowerPoint	
Gastrointestinal	12	6	6	Game 6: Jeopardy-Style Game/	8,9, 10
System				Gastrointestinal Disorders	
				Game 7: Interactive	
				Scenarios/Role Play	
Renal System	10	5	5	Game 8: Flipped classroom	10, 11, 12
				Game 9: Crossword puzzle	
				about hemodialysis and	
				peritoneal dialysis	
Immune System	4	2	2	Game 10: Escaping Room	12, 13, 14
Integumentary	5	3	2	Game 10: Escaping Room	14,15,16
System					

Table 3.2. Intervention Course Schedule

## **3.8.3** The gamified activities

A different style of games were designed and used beside the traditional teaching methods among the intervention groups. They include the following:

## **3.8.3.1** Quests and Challenges

Quests and challenges within a gamified setting are engaging mystery-solving tasks that encourage the development of critical thinking abilities. These tasks instill a sense of purpose and guidance among students as they engage in the learning process. Quests enable students to collaborate as a team or pursue individual efforts, fostering a sense of unity within the gamified environment (Alsawaier, 2018). Table (3.3) shows game of acid-base balance challenge. Figure (3.2) presents an illustration that clarifies major components of this game.

Game 1: Acid	-Base Balance Challenge
Objective	The objective of the game was to gain the most points by accurately
	diagnosing and controlling different acid-base disturbances.
Elements	"Acid-Base Cards" were game elements that each represented a specific
	instance of an acid-base disturbance. The cards should include information on
	the patient's symptoms, test results, and diagnoses. Each card received a
	varied amount of points depending on the complexity or difficulty of the acid-
	base disturbance scenario. Easy card earns ten points, Medium twenty, and
	Hard thirty. Each round was given a time restriction to create a sense of
	intensity and difficulty.
Preparation	The nursing students were separated into teams. After being shuffled, the
	Acid-Base Cards were placed face-down into a set.
Session	The timer began and a team was chosen at random to draw the first card. The
Organization	group reviewed the scenario on the card and examined the acid-base
	disruption. They must identify the kind of disruption (e.g., respiratory
	acidosis, metabolic alkalosis) and the underlying cause within the time frame
	specified, as well as recommend relevant treatments.
Scoring	Following the expiration of the time limits, the team presented its analysis and
	interventions. If their response was accurate, they received the points given
	to that card. If they answered incorrectly, no points were provided and the
	opportunity was passed on to the next team.
Rotation	The Acid-Base Cards were rotated forward to the following team. The round
	form was repeated until all teams had an opportunity to play or until a set
	number of rounds were finished.
Final score	At the end of the game, add up the points obtained by each team. The game
	was won by the team with the highest score.

Table 3.3. Acid-Base Balance Challenge



Figure 3.2. Gaming Process of Acid Base Balance Challenge

# 3.8.3.2 Leaderboards

Leaderboards may be used to categorize and include a variety of factors, such as the quantity of right answers, the amount of time spent, or the accomplishment of goals. They may also be used to rank and classify responses to tasks. Since the game already includes the essential information, incorporating leaderboards into educational settings is quite simple and doesn't interfere with gameplay (Yahia, 2021). Table (3.4) shows game of leaderboards /Respiratory challenge. Figure (3.3) presents an Illustration that clarifies major components of this game.

Game 2. Leaderboards /Respiratory Challenge	
Oliveti was the shire the same and many the leaded and a	
<b>Objective</b> The objective was to win the game and move up the leaderboards and	na
effectively identify and manage respiratory problems.	
<b>Elements</b> A set of scenarios showing various respiratory disorders was develope	ed.
Each patient's case contained vital signs, a medical history, symptoms, and	nd
diagnostic results. A system for scoring was developed, with poir	ıts
awarded for diagnosis accuracy, treatment appropriateness, and reaction	on
speed. As an example: Correct diagnosis: 10 points, suitable managemen	nt:
10 points, prompt reaction (within the time limit): five points, wrote	ng
diagnosis:-five points, and improper management: -five points. Ea	ch
scenario included time constraints to encourage quick thinking an	nd
decision-making. A leaderboard was created to record and show tea	ım
results.	
<b>Preparation</b> Nursing students were divided into teams. Leaderboards were created.	
Session The timer was started, and then a team was chosen at random to begin the	he
Organization first scenario. The team reviewed the scenario card, assessed the patien	t's
condition, and made decisions about patient care in the time allowe	ed.
Participants were encouraged to extensively investigate their alternativ	es
while emphasizing the need of making quick selections.	
<b>Scoring</b> When the time restriction expired, the team gave its diagnosis and treatme	ent
approach. Leading a discussion to evaluate their opinion and provi	de
suggestions. Calculating the score using the given scoring system, and	nd
updating the leaderboards as needed.	
<b>Rotation</b> The scenario cards were distributed to the next team. The round-structu	ire
approach was repeated until each team completed a certain number	of
scenarios.	
<b>Final score</b> At the end of the game, on the leaderboards, the scores were shown	in
calculation descending order. Identifying the winner and praising the individual	or
team with the highest score.	

Table 3.4. Leaderboards /Respiratory Challenge



Figure 3.3. Illustration of Leaderboards /Respiratory Challenge

# 3.8.3.3 Role-Playing & Storytelling

Role-playing has a favorable impact on the learning outcomes and motivation of nursing students (Sert et al., 2023). Integrating storytelling elements into case studies or scenarios can immerse students in the learning process and make it more relatable (Moore, 2023). Table 3.5, Table (3.6) and Figure (3.4) illustrate and summarize the gameplay rules of interactive scenarios.

<ul> <li>Objectives</li> <li>To improve understanding of asthma and COPD, as well as management techniques.</li> <li>To improve empathy and communication skills while dealing with people suffering from respiratory diseases.</li> <li>To promote unity and assistance among nursing students when dealing with respiratory problems.</li> <li>Time The game was completed within 30 minutes.</li> <li>Gameplay</li> <li>Depending on the number of participants, divide the nursing students into pairs or small groups.</li> <li>Assigning either Asthma or COPD to each pair/group.</li> <li>Giving each pair/group a scenario description and conversations.</li> <li>Instructing participants to take turns presenting Asthma and COPD while keeping to the dialogues supplied.</li> <li>Encourage participants to sympathize with the experiences and challenges of their given character.</li> <li>Facilitating a debate among the participants following the role-play, concentrating on the following points: <ul> <li>Asthma and COPD have similarities and differences.</li> <li>Management approaches for both situations.</li> <li>The emotional and psychological consequences of having chronic respiratory diseases.</li> <li>The value of empathy, support, and open communication in patient care.</li> <li>Encourage participants to express their thoughts and observations from the role-playing session.</li> <li>Summarizing the debate and emphasizing the main lessons from the exercise.</li> </ul> </li> </ul>	Game 3: In	teractive Scenarios/ Role Play
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<ul> <li>suffering from respiratory diseases.</li> <li>To promote unity and assistance among nursing students when dealing with respiratory problems.</li> <li>Time The game was completed within 30 minutes.</li> <li>Gameplay 1. Depending on the number of participants, divide the nursing students into pairs or small groups.</li> <li>2. Assigning either Asthma or COPD to each pair/group.</li> <li>3. Giving each pair/group a scenario description and conversations.</li> <li>4. Instructing participants to take turns presenting Asthma and COPD while keeping to the dialogues supplied.</li> <li>5. Encourage participants to sympathize with the experiences and challenges of their given character.</li> <li>6. Facilitating a debate among the participants following the role-play, concentrating on the following points:</li> <li>Asthma and COPD have similarities and differences.</li> <li>Management approaches for both situations.</li> <li>The emotional and psychological consequences of having chronic respiratory diseases.</li> <li>The value of empathy, support, and open communication in patient care.</li> <li>Encourage participants to express their thoughts and observations from the role-playing session.</li> <li>Summarizing the debate and emphasizing the main lessons from the exercise.</li> </ul>		• To improve empathy and communication skills while dealing with people
<ul> <li>To promote unity and assistance among nursing students when dealing with respiratory problems.</li> <li>Time The game was completed within 30 minutes.</li> <li>Gameplay 1. Depending on the number of participants, divide the nursing students into pairs or small groups.</li> <li>2. Assigning either Asthma or COPD to each pair/group.</li> <li>3. Giving each pair/group a scenario description and conversations.</li> <li>4. Instructing participants to take turns presenting Asthma and COPD while keeping to the dialogues supplied.</li> <li>5. Encourage participants to sympathize with the experiences and challenges of their given character.</li> <li>6. Facilitating a debate among the participants following the role-play, concentrating on the following points:         <ul> <li>Asthma and COPD have similarities and differences.</li> <li>Management approaches for both situations.</li> <li>The emotional and psychological consequences of having chronic respiratory diseases.</li> <li>The value of empathy, support, and open communication in patient care.</li> <li>Encourage participants to express their thoughts and observations from the role-playing session.</li> <li>Summarizing the debate and emphasizing the main lessons from the exercise.</li> </ul> </li> </ul>		suffering from respiratory diseases.
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<ol> <li>Gameplay 1. Depending on the number of participants, divide the nursing students into pairs or small groups.</li> <li>Assigning either Asthma or COPD to each pair/group.</li> <li>Giving each pair/group a scenario description and conversations.</li> <li>Instructing participants to take turns presenting Asthma and COPD while keeping to the dialogues supplied.</li> <li>Encourage participants to sympathize with the experiences and challenges of their given character.</li> <li>Facilitating a debate among the participants following the role-play, concentrating on the following points:         <ul> <li>Asthma and COPD have similarities and differences.</li> <li>Management approaches for both situations.</li> <li>The emotional and psychological consequences of having chronic respiratory diseases.</li> <li>The value of empathy, support, and open communication in patient care.</li> <li>Encourage participants to express their thoughts and observations from the role-playing session.</li> <li>Summarizing the debate and emphasizing the main lessons from the exercise.</li> </ul> </li> </ol>	Time	The game was completed within 30 minutes.
<ol> <li>Assigning either Asthma or COPD to each pair/group.</li> <li>Giving each pair/group a scenario description and conversations.</li> <li>Instructing participants to take turns presenting Asthma and COPD while keeping to the dialogues supplied.</li> <li>Encourage participants to sympathize with the experiences and challenges of their given character.</li> <li>Facilitating a debate among the participants following the role-play, concentrating on the following points:         <ul> <li>Asthma and COPD have similarities and differences.</li> <li>Management approaches for both situations.</li> <li>The emotional and psychological consequences of having chronic respiratory diseases.</li> <li>The value of empathy, support, and open communication in patient care.</li> <li>Encourage participants to express their thoughts and observations from the role-playing session.</li> <li>Summarizing the debate and emphasizing the main lessons from the exercise.</li> </ul> </li> </ol>	Gameplay	1. Depending on the number of participants, divide the nursing students into
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<ol> <li>Giving each pair/group a scenario description and conversations.</li> <li>Instructing participants to take turns presenting Asthma and COPD while keeping to the dialogues supplied.</li> <li>Encourage participants to sympathize with the experiences and challenges of their given character.</li> <li>Facilitating a debate among the participants following the role-play, concentrating on the following points:         <ul> <li>Asthma and COPD have similarities and differences.</li> <li>Management approaches for both situations.</li> <li>The emotional and psychological consequences of having chronic respiratory diseases.</li> <li>The value of empathy, support, and open communication in patient care.</li> <li>Encourage participants to express their thoughts and observations from the role-playing session.</li> <li>Summarizing the debate and emphasizing the main lessons from the exercise.</li> </ul> </li> </ol>		2. Assigning either Asthma or COPD to each pair/group.
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<ul> <li>care.</li> <li>Encourage participants to express their thoughts and observations from the role-playing session.</li> <li>Summarizing the debate and emphasizing the main lessons from the exercise.</li> </ul>		• The value of empathy, support, and open communication in patient
<ul> <li>Encourage participants to express their thoughts and observations from the role-playing session.</li> <li>Summarizing the debate and emphasizing the main lessons from the exercise.</li> </ul>		care.
• Summarizing the debate and emphasizing the main lessons from the exercise.		• Encourage participants to express their thoughts and observations from the role-playing session.
		• Summarizing the debate and emphasizing the main lessons from the exercise.

Table 3.5. Interactive Scenarios/ Role Play



Figure 3.4. Game Scenario / Asthma vs. COPD

Objectives	<ul> <li>To increase students' understanding of digestive issues, including Ulcerative Colitis, Peptic Ulcer Disease, Gastritis, Hiatus Hernia, and GERD.</li> <li>To encourage critical thinking and effective communication among</li> </ul>
	nursing students.
Time	30 minutes
Gameplay	• Breaking participants into smaller groups of nursing students.
	• Assigning each group a scenario involving a digestive issue.
	• Giving the groups necessary information about the disease they were allocated, including symptoms, diagnostic options, courses of treatment, and nurse interventions.
	• A role-play scenario involving interactions between healthcare professionals (nurses, doctors, or other providers) and patients was given to each group.
	• Participants behaved openly and professionally throughout the role play, demonstrating appropriate communication techniques and therapeutic skills.
	• The instructor observed the participants' performances and provided comments, encouragement, and suggestions for improvement.

 Table 3.6. Interactive Scenarios/Role Play (Gastrointestinal Disorders)

#### 3.8.3.4 Game Four/Quiz Bowl-Style Game

A quiz bowl-style game is a competition where two teams of nursing students face off against each other to answer questions about disorders. In this format, a moderator asks questions to the teams and the first team to buzz in and answer the question correctly earns points. There are usually several rounds of questions, with increasing difficulty levels. The teams are given a certain amount of time to discuss their answers among themselves before buzzing in to give their response. This format encourages teamwork and collaboration among the nursing students, as they need to communicate and strategize with each other in order to win the competition (Daniel, et al., 2018). Table (3.7) shows the Quiz Bowl-Style Game - Cardiovascular Disorders. Table (3.8) shows the game of ECG Interpretation Challenge with PowerPoint.

Objective	To avaluate and rainforce knowledge on cardiovascular problems using a
Objective	To evaluate and tennorce knowledge on cardiovascular problems using a
	competitive quiz bowl format.
Time	There were forty to sixty minutes throughout the game. This game was
	divided into three phases.
Gameplay	1. Forming two teams of nursing students, Team A and Team B.
	2. Designating a moderator to ask questions and keeping score.
	3. Formulating a set of questions concerning cardiovascular diseases and
	classifying them according to their degree of difficulty (easy, medium, and
	hard).
	4. Selecting the order of play (e.g., Team A started first and Team B started
	first in the first and second rounds).
	5. Each round had multiple questions of varying difficulty levels.
	6. The moderator announced the team that buzzed in before answering a question
	<ul><li>7. The team that buzzed in first gets a limited amount of time (e.g., 10 seconds) to consider their response among themselves before responding.</li></ul>
	8. If the team gave the proper response, they received points based on the difficulty level of the question. If the response was wrong, the opposite side might take the points by replying right.
	9. Changing the order of play between rounds to provide both sides equal opportunity.
	10. Keeping track of each team's points gained throughout the game.
	11. At the completion of the final round, total points for each team are
	calculated and the winner is announced.

Table 3.7. Quiz Bowl-Style Game - Cardiovascular Disorders

Objective	To learn and improve ECG interpretation abilities by studying ECG
	strips delivered via PowerPoint.
Elements	• PowerPoint Presentation: Creating a PowerPoint presentation with slides displaying numerous ECG strips reflecting different heart diseases and abnormalities.
	• Scenarios: Creating a series of scenario cards, each of which describes a distinct patient situation that corresponds to the ECG strips exhibited in the PowerPoint presentation.
	• Timer: Setting a time limit for each scenario to enhance urgency and difficulty.
Preparation	Forming teams of nursing students. Using a projector to show the
	PowerPoint presentation to all participants.
Session	Beginning the first scenario by starting the timer and picking a player or
Organization	team at random. Displaying a slide from the PowerPoint presentation
	including an ECG strip. Reading aloud or handing out the matching
	scenario card outlining the patient's situation. The participant assessed
	the presented ECG strip and detected any heart problems or
	abnormalities within the time limit.
Rotation	Passing the turn around to the next player or team. Repetition of the round structure until all teams had completed a set number of situations.
Final Score	Points are assigned depending on the accuracy of ECG interpretation.
Calculation	Increasing the number of points awarded for accurately recognizing
	heart diseases, irregularities, or arrhythmias. Following the expiration of
	the time restriction, the team gave its interpretation and diagnosis.
	Leading a conversation to assess their comments and provide feedback.
	Adding up the points earned by each team and game was won by the
	team with the highest score.

Table 3.8. Game 5 ECG Interpretation Challenge with PowerPoint

#### 3.8.3.5 Jeopardy-Style Game

A jeopardy-style game was another popular format for a competition. In this format, a game board was set up with different categories related to the topic. Each category had a set of questions with different point values assigned to each question. The team that buzzed in first with the correct answer earned the point value assigned to that question. The jeopardy-style game encouraged nursing students to review their knowledge of disorders across different categories and at different levels of difficulty. It also allowed them to choose which questions to answer based on their level of confidence in a particular topic (Reed, 2020; Victor, et al., 2019; Squire, N. , 2019; Aljezawi & Albashtawy, 2015). Table (3.9) clarifies Jeopardy-Style Game for gastrointestinal disorders
Objectives	To improve nursing students' knowledge and awareness of gastrointestinal
-	illnesses. To encourage motivation, participation and critical thinking among
	nursing students.
Time	Both the number of players and the number of rounds played shaped how
	long the game would last. Each round had a time restriction to guarantee that
	the game ran well. Each round, for example, was finished in 20 minutes. To
	guarantee effective time management the total duration for the game
	including breaks and transitions between rounds was calculated in advance
Comonlar	1 Desticipants were concreted into teams, each with an agual number of
Gamepiay	1. Participants were separated into teams, each with an equal number of
	nursing students.
	2. Teams had a certain period of time (thirty seconds) to buzz in and answer after the questions were read aloud by a moderator.
	3. The first team to buzz in has the chance to answer.
	4. They received the given point value for the question if they answered properly.
	5. If they give an erroneous answer, the question is passed on to the next team.
	6. Before responding, teams might convene and discuss their responses.
	7. However, once a squad was summoned, they responded within the time limit.
	8. The moderator recorded the number of points awarded to each team.
	9. There were several rounds in the game, each with a different set of categories and point values.
	10. The team with the highest final score at the conclusion of the game became the winner.

Table 3.9. Game 6 Jeopardy-Style Game/ Gastrointestinal Disorders

#### 3.8.3.6 Hiatus Hernia and Mr. GERD/ Scenario

This is a scenario that presented a dialogue between the Hiatus Hernia and the GERD disorders:

Mr. Hiatus Hernia and Mr. GERD meet in a clinic.

Mr. Hiatus Hernia: "Hello, "What brought you here?"

Mr. GERD: "My doctor suggested that I come here to see if my recent bout of severe heartburn is related to my acid reflux."

Mr. Hiatus Hernia: "I see. Sometimes I have acid reflux. "How long has heartburn been you?"

Mr. GERD: It has now been a few months. No benefits from antacids..."

Mr. Hiatus Hernia: "I am aware of how bothersome that may be." Have you changed your way of life in any way to help manage your symptoms?"

Mr. GERD: "It's been challenging for me to follow a strict diet, even though I've attempted to stay away from trigger foods and eat later at night."

Mr. Hiatus Hernia: "I know. Although implementing the modifications could be challenging, they can have a big effect. Have you and your physician addressed the idea for medication to help control your acid reflux??"

Mr. GERD: "No, not just yet. "Although I'm afraid to take medication, I'm willing to do everything to find calm."

Mr. Hiatus Hernia: "My acid reflux has significantly improved after I started taking medicine for my hiatus hernia." It's important to discuss it with your physician."

# 3.8.3.7 Peptic Ulcer Disease vs. Gastritis/ Scenario

This scenario was presented through PowerPoint and then simulated by students. Animations and gifs were used to present significant causes, risk factors, signs and symptoms, diagnostic criteria and medical and nursing management. Figure (3.5) illustrates contents of this scenario.



Figure 3.5. Scenario Cues of Peptic Ulcer Disease

## 3.8.3.8 Irritable Bowel Disease/ Scenario

This scenario was presented through PowerPoint and then simulated by students. Animations and gifs were used to present significant causes, risk factors, signs and symptoms, diagnostic criteria and medical and nursing management. Figure (3.6) illustrates contents of this scenario.

## 3.8.3.9 Appendicitis/ Scenario

A 28-year-old male patient arrived at the emergency department complaining of severe abdominal pain. He reported that the pain started in the center of his abdomen and had since moved to the lower right side. He also reported nausea, vomiting, and loss of appetite. The patient had no known allergies and took no medications. Upon examination, the nurse noted that the patient's abdomen was tender to the touch. This game was presented by funny PowerPoint slides focusing on significant concepts, signs and symptoms and diagnosis and management of appendicitis. Students will simulate it. Figure (3.7) illustrates contents of this scenario.



Figure 3.6. Scenario Cues of Irritable Bowel Disease



Figure 3.7. Scenario Cues of Appendicitis

# 3.8.3.10 Flipped Classroom

A flipped classroom approach combined with gamification can be an effective way to engage nursing students in learning about renal disorders. An outline of how can design a flipped classroom nursing gamification experience focused on renal disorders (Elzeky, et al. , 2022). Table (3.10) shows the Flipped classroom for renal disorders.

# 3.8.3.11 Crossword Puzzle about Hemodialysis and Peritoneal Dialysis

This game was designed to differentiate between peritoneal dialysis and hemodialysis. It was presented as PowerPoint slides including questions in a funny form. Figure (3.8) illustrates cues of this game.



Figure 3.8. Crossword Puzzle about Hemodialysis and Peritoneal Dialysis

l classroom/ Renal Disorders
Offering prepared lectures regarding renal illnesses to students, covering
common problems, diagnostic techniques, and treatment choices.
Making certain that the material was brief and easy to grasp. Assigning
pre-class readings, such as textbook chapters, to help students
comprehend the subject better.
Forming small groups of students and assigning each group a distinct
case study relevant to a certain renal condition. Instructing students on
how to examine a case, identify signs and symptoms, and recommend
suitable nursing solutions. Providing direction and assistance to students
as they go through the case study, answering any questions or providing
explanations as required.
Giving students a variety of tasks that allowed them to explore further
into certain kidney problems. They made informative posters,
brochures, or lectures, for example, to educate their peers about a certain
kidney condition. Encouraging students to reflect on their learning
experiences and share their ideas in a discussion forum. Inviting them to
share the difficulties they had throughout the case studies and quiz show,
as well as what they gained from the experience.
Using standard assessments, such as quizzes that examined students'
knowledge of essential concepts and nursing interventions, to assess
students' comprehension of renal illnesses.
Consider introducing a gamification aspect into the exam, such as
providing additional points to students who performed well in the quiz
show or case studies.

Table 3.10. Flipped Classroom/ Renal Disorders

## 3.8.3.12 Escaping Room

An escape room in nursing education is a scenario-based, interactive learning experience that challenges students to apply their knowledge and skills in solving puzzles and tasks within a time-limited environment, fostering critical thinking, teamwork, and clinical decision-making abilities (Edwards, et al., 2019; Gómez-Urquiza, et al., 2019).

The game elements of escaping room were used in teaching immune and skin disorders. Incorporating escape room rules into the activity of distributing puzzles about immune and skin disorders in a separate room adjacent to the classroom by the following steps:

1. Setting the stage: Explaining to the students that they were confined in a room and had to solve a series of puzzles connected to immunological and skin problems in order to escape.

- 2. Setting the aim: State the purpose of the escape room activity clearly, such as "Your goal is to solve all the puzzles within a specified time to find the key that unlocks the room and escape."
- 3. Puzzle distribution: Distributing the immunological and skin disorder puzzles across the room, ensuring that they were difficult yet solvable with the facts and ideas taught in class.
- 4. Clue system: Giving students hints to help them solve the challenges. These clues took the shape of written notes and kept objects placed across the room.
- 5. Timeframe: Assigning a time limit to the students in order for them to finish the escape room exercise. This increased the sense of urgency and urged them to work quickly.
- 6. Collaboration: Students were divided into small groups to enhance teamwork and collaboration.
- 7. Problem-solving and critical thinking: To solve the puzzles, students had to use their knowledge of immunological and skin problems, analyze material, and think critically. Matching symptoms to specific ailments, establishing diagnostic techniques, and connecting treatment choices to related conditions were all part of these puzzles.
- 8. Debriefing: Conducting a debriefing session after the specified time or after all groups have successfully solved the challenges. Discussing the problems, reiterating essential concepts, and providing opportunities for students to reflect on their experience and information acquired.

# **3.9 Conducting a Pilot Study**

To ensure the reliability and validity of the questionnaire, a pilot study was conducted prior to the main data collection phase. A pilot study was essential while investigating a novel intervention like gamification in nursing education. It allowed to assess feasibility, refine methodology and data collection instruments, determine sample size, test the intervention, refine the data analysis plan, and address ethical considerations. By evaluating the feasibility of the research design, identifying challenges, and making necessary adjustments, researcher ensured a smooth implementation of the main study. (Ursachi et al., 2015).

Pilot studies also provided valuable insights into the reliability and validity of measurement tools, helped estimating the required sample size for statistical power, optimize the intervention design, refine data analysis techniques, and gather participant feedback for enhancement. In addition to that a pilot study enhances the rigor and validity of the main study, leading to more robust and trustworthy findings (Tashakkori and Creswell, 2007).

### **3.9.1 Procedure for the Pilot Study**

This pilot study was conducted in Summer Semester from July 1, 2023 to August 10, 2023 at Nablus University. An adult health nursing course was offered at that semester. Students were in their second year of nursing and midwifery (49 students). The procedure for this pilot study was as following:

- 1. Study Design: The design for pilot study was pre-post intervention design.
- 2. Ethical Considerations: Ethical approvals from the relevant institutional review board were obtained. The privacy, confidentiality, and voluntary participation of the nursing students were ensured.
- Participant Selection: Nursing and midwifery students enrolled in the adult health nursing course during the specified summer semester were included. Sample size was 49 students.
- 4. Intervention: a gamified intervention strategy was implemented to the adult health nursing course. This involved incorporating game elements, such as points, badges, leaderboards and challenges into the learning process.
- Data Collection: A pre-post self-administered questionnaire was used to assess students' demographic data, engagement, motivation and critical thinking (Appendix A).
- 6. Data Analysis: Descriptive statistics, reliability tests and paired samples statistics were used.

#### 3.9.2 Results of Pilot Study

Table (3.11) shows demographic data gathered pre and post gamification. The data represented participant gender and specialty track distribution. (30.6%) of participants were men, while (69.4%) were women. Nursing accounted for (71.4%) of the specialty track, while

midwifery accounted for (28.6%). The table indicates that there was a greater proportion of females and nursing track participants in this study.

		Frequency	Percent
Gender	Male	15	30.6
	Female	34	69.4
Specialty Track	Nursing	35	71.4
	Midwifery	14	28.6

Table 3.11. Demographic Data (Pre-Post) of Pilot Study

Table (3.12) contains statistics on the internal consistency (reliability) of the scales used in the pretest and posttest. Cronbach's Alpha is a measure of how closely connected a group of items are, reflecting the scale's reliability in assessing the final construct. Higher Cronbach's Alpha readings often indicated more internal consistency. The "Total" scale had relatively high Cronbach's Alpha values in both the pretest and posttest (0.813 and 0.829, respectively), indicating great internal consistency for the combined collection of items. Individual measures ("Engagement," "Motivation," and "Critical Thinking") had Cronbach's Alpha values that were acceptable, suggesting that the items on each scale were consistently assessing the same underlying concept (Ursachi et al., 2015).

**Cronbach's Alpha** Scale N of Items **Reliability Statistics/Pretest** Engagement 0.824 23 Motivation 0.812 36 **Critical Thinking** 0.804 35 **Reliability Statistics/Posttest** Engagement 0.832 23 Motivation 0.809 36 **Critical Thinking** 0.846 35

Table 3.12. Reliability Statistics of Pilot Study

Table (3.13) shows the means and standard deviations of the pretest and posttest scores for each variable, as well as the mean and standard deviation of the paired differences (pretest minus posttest), are reported for each pair. The "Significance (2-tailed)" number is the p-value for a paired t-test, which is used to assess if the differences between pretest and posttest

scores are statistically significant. The p-value for Engagement was 0.008, suggesting that the means differences were statistically significant. The p-value for Motivation was 0.002, suggesting that the means differences were statistically significant. The p-value for Critical Thinking was 0.033, suggesting that the means differences were statistically significant.

		Mean	Std. Deviation	P value			
Pair 1	Pre test	3.367	0.668				
Engagement	Post test	3.878	1.130				
Paired Differences	Pre -Post	-0.510	1.293	0.008			
Pair 1	Pre test	2.959	0.841				
Motivation	Post test	3.490	0.916				
Paired Differences	Pre -Post	-0.531	1.120	0.002			
Pair 3	Pre test	3.361	0.0253				
Critical Thinking	Post test	3.677	0.0249				
Paired Differences	Pre -Post	-0.316	0.158	0.033			
P values were based on Paired t test							

Table 3.13. Pilot Study/ The Differences in Means of Learning Outcomes

# **Chapter Four: Results**

This chapter presents the data analysis process, either for the quantitative data or the qualitative one. It has an extensive review of the quantitative and qualitative data, showing all features of results of this study.

## 4.1 Data Analysis

The software SPSS version 20 was used to analyze the data. A Cronbach's Alpha was used to verify the reliability. The data were described using descriptive statistics, such as frequencies, percentages means, and standard deviations. To determine if quantitative data were normally distributed, the Shapiro-Wilk test was utilized. The chi-square test was utilized to compare two groups about categorical variables. Mean comparisons between and within groups were conducted using paired, independent t-tests and ANOVA tests.

Effect sizes were used to assess the improvement between pretest and post test results that reflected the effect of intervention method. Effect sizes were described by Cohen (1988) as "small (d =.2)," "medium (d =.5)," and "large (d =.8)," recognizing the difficulty in defining terms precisely in the broad area of behavioral research. The average percentile position of treated participants relative to untreated participants is shown by effect sizes. An effect size of 0.0, for instance, indicates that the mean for the treated group is at the 50th percentile of the untreated group. The treated group's mean is at the 79th percentile of the untreated group, according to an effect size of 0.8, and at the 95.5th percentile of the untreated group, according to an effect size of 1.7 (Becker, 2000).

Eta squared is a measure of the proportion of variance in the dependent variable explained by the independent variable. Larger Eta Squared values indicate a stronger effect of the independent variable on the dependent variable. Interpreting the Partial Eta Squared could be followed as: 0.01 indicates a small effect, 0.06 indicates a medium effect and 0.14 indicates a large effect (Becker, 2000).

# **4.2 The Quantitative Results**

### 4.2.1 Reliability and Validity Tests

Before the primary data collection phase, a pilot study was conducted to confirm the validity and reliability of the questionnaire. Statistics on the internal consistency (reliability) of the scales used in the pilot and main study's pretest and posttest are shown in (Table 4.1). Cronbach's Alpha was used to assess how interrelated a set of components were, indicating how reliable the scale was in determining the end build. Greater internal consistency was often indicated by higher Cronbach's Alpha values. The "Total" scale demonstrated noticeably high Cronbach's Alpha values, indicating strong internal consistency for the whole collection of items. Cronbach's Alpha of 0.6–0.7 is generally regarded as an acceptable standard of reliability, and 0.8 or above as a very good level. Higher than 0.95 readings, however, are not always favorable since they might be a sign of redundancy (Ursachi et al., 2015).

**Cronbach's Alpha** Instrument Items **Pilot study** Main study (n) Pretest Posttest Pretest Posttest Student Course Engagement Ouestionnaire 23 0.824 0.832 0.822 0.828 Instructional Materials Motivation Scale 36 0.812 0.809 0.804 0.778 The critical thinking disposition scale 35 0.804 0.846 0.823 0.831

Table 4.1. Reliability Statistics for Pilot and Main Studies

## 4.2.2 Tests for Normality

Figure (4.1) displays the findings from the Shapiro-Wilk test, which used histograms to assess the normality of learning outcomes. It emerged that the p-value for the mark categories was less than 0.05 (< 0.001). As so, there is significant proof against the null hypothesis of normality. On the other hand, the critical thinking (p = 0.127), motivation (p = 0.51), and engagement (p = 0.300) p-values were all higher than the significance level of 0.05. Thus, for these variables, the null hypothesis of normality is not significantly rejected. It's worth noting that the Shapiro-Wilk test is regarded as the most reliable normality test, with the Anderson-Darling, Lilliefors, and Kolmogorov-Smirnov tests next in order of power (Razali & Wah, 2011).



Figure 4.1. Histogram Boxplot for Learning Outcomes Normality

## 4.2.3 Description of Participants' Characteristics

The dataset included 90 students split into control (45) group and intervention (45) group. Twelve males, twenty-eight women nurses, and five women midwives made up the control group; in the intervention group, there were eleven males, twenty-nine women nurses, and five women midwives.

Person chi-square test was used to assess the demographic characteristics of adult health nursing students participating in this study. Regarding to control versus intervention groups, when comparing the groups of the gender and specialty categories, the p-values were more than the significance level (p = 0.05), with p = 0.809 for gender and p = 1 for specialty that reflected proving the groups' independence from one another. For each participant characteristic, frequencies, percentages and independence tests are shown in the (Table 4.2).

			G	Froup	Total	P value*
		-	Control	Intervention		
Tatal		Ν	45	45	90	
Total		% of Total	50.0%	50.0%	100.0%	
		Ν	12	11	23	
	Male	% within Gender	52.2%	47.8%	100.0%	
Condon		% within Group	26.7%	24.4%	25.6%	0.809
Gender		N	33	34	67	
	Female	% within Gender	49.3%	50.7%	100.0%	
		% within Group	73.3%	75.6%	74.4%	
		N	40	40	80	
	Nursing	% within Specialty	50.0%	50.0%	100.0%	
C	-	% within Group	88.9%	88.9%	88.9%	
Specialty		N	5	5	10	1.000
	Midwiferv	% within Specialty	50.0%	50.0%	100.0%	
	·	% within Group	11.1%	11.1%	11.1%	
P values are based on the Pearson Chi-Square						

Table 4.2. The Baseline Characteristics of the Intervention and Control Groups

#### 4.2.4 Description of Mark Distribution among Intervention and Control Groups

As shown in Table (4.3) the control group scores increased in value as the mark categories went from 65–69 to 90–100. As compared to the intervention group, the scores for categories 65–69 and 70–79 were higher. Scores for the intervention group vary from category to category, with the maximum score found in the 80–89 range. In comparing means scores of marks with the same groups, the highest means were for intervention group (M= 80.22, SD =5.130).

Regarding the course syllabus evaluation, as mentioned in the study's introduction, the intervention group's mean score was 80.22, which classified them in the "very good" category. As opposed to this, the control group's mean score of 79.76 placed into the "good" range. According to these findings, the intervention group outperformed the control group on average, and each group's overall competence was reflected in their assessment categorizations.

#### 4.2.5 Gamification and Adult Health Nursing Students' Learning Outcomes

The learning outcomes include four major themes: knowledge acquisition, engagement, motivation and critical thinking. The results of the study clarified the effect of gamification on these inputs by identifying differences between the control and intervention groups in addition to determine the effect sizes by conducting the appropriate statistical tests after confirming the assumptions of each test, such as normality, homogeneity, and independency.

#### Note: How the means of engagement, motivation and critical thinking are calculated?

There were twenty-three items in the engagement tool, thirty-six items in the motivation tool, which were evenly divided into four domains, and eight domains in the critical thinking tool. Every item in the domains was given a score between one and five. The mean of these domain means was then calculated after determining the mean for each domain. This final score represented the study unit and acted as a representative score for each response.

**Hypothesis # one:** There are statistically significant differences at the significance level (p = 0.05) in the mean scores of learning outcomes (knowledge acquisition, engagement, motivation and critical thinking) between the intervention status who are studying adult health nursing using gamified activities beside traditional and the control status who are studying by the traditional method.

The Hypothesis one included four learning outcomes: knowledge acquisition, engagement, motivation and critical thinking, therefore each outcome was analyzed separately.

### 4.2.5.1 Learning Outcome One/Knowledge Acquisition

Knowledge acquisition had been measured according to students' marks in adult health course. Before the intervention, there was no baseline or first measurement for the students` marks. A comparison between the control and intervention groups was performed in order to examine the effect of gamification on knowledge acquisition with categories of marks and their respective mean scores. The mean of students' marks in the control group was ( $79.76 \pm 5.985$ ) while in the intervention was ( $80.22 \pm 5.130$ ). Because of the marks were not normally

distributed, an alternative nonparametric test to independent t test was Mann-Whitney test. The p-values of marks mean = 0.725 and mark categories = 0.387 and they were higher than the significance level of 0.05, indicating that there were no significant differences in the findings. Table (4.3) shows the mark distribution and their differences in means regarding to control and intervention groups.

		Mark	categories					
Groups	65-69 Accepted	70-79 Good	80-89 V good	90-100 Excellent	Р	Mar Mea	ks n	Р
	Ν	Ν	Ν	Ν		Μ	SD	
Control	3	18	21	3		79.76	5.985	
Intervention	2	14	27	2	0.387	80.22	5.130	0.725
Total	5	32	48	5		79.99	5.548	
*P values were based on the Mann-Whitney Test								

Table 4.3. Mark Distribution and Their Differences in Means Regarding Groups

### 4.2.5.2 Learning Outcome Two/Students Engagement

In order to assess the influence of gamification on students' engagement, it was necessary to examine at the relevant study hypothesis. The hypothesis states that there are statistically significant differences at the significance level (p = 0.05) between the mean scores of engagement of intervention group who studying adult health nursing using gamified activities, and the mean scores of engagement of control group who studying in the traditional method.

The independent samples t- test exhibited that the mean scores of engagement of pretest for control group  $(3.178 \pm 0.393)$  while for intervention  $(3.097 \pm 0.308)$ , the mean scores of engagement of posttest for control group was  $(3.438 \pm 0.243)$  while for intervention was  $(3.854 \pm 0.317)$  and the mean of gain scores of engagement (the difference between posttest and pretest) for control was  $(0.258 \pm 0.406)$  while for intervention was  $(0.756 \pm 0.455)$ . The p-value of the pretest mean scores was more than the significance level of p = 0.05 (0.267) which verified no significant difference between the control and intervention groups. On the other hand, there were significant differences in posttest and gain scores with p values < 0.05 (< 0.001, < 0.001). It was in favor of the intervention group.

Compared to the pretest mean score of  $(3.138 \pm 0.353)$ , the posttest mean engagement score was  $(3.646 \pm 0.350)$ , indicating a significant improvement. The results of mean  $(0.508 \pm 0.497)$  was the computed difference between the pretest and posttest scores. The paired sample t-test associated p-value was < 0.001, which denoted a statistically significant difference. According to the results of paired test, the Cohen's d formula involved dividing the difference between means by the standard deviation. The result was (1.022), indicating a large effect size. Table (4.4) reveals the results of the independent sample and paired sample t-tests.

#### 4.2.5.3 Learning Outcome Three/Students Motivation

For assessing the impact of gamification on students' motivation, it was imperative to thoroughly examine the pertinent research hypotheses. The hypothesis states there are statistically significant differences at the significance level (p = 0.05) between the mean scores of motivation of intervention group who studying adult health nursing using gamified activities, and the mean scores of motivation of control group who studying in the traditional method. The p value of (0.612) that had been demonstrated by the independent t-test revealed that there was no significant difference in the pretest means of motivation between the control (2.932 ± 0.311) and intervention (2.968 ± 0.371) groups. On the other hand, the results revealed statistically significant differences in the means of the posttest and gain scores between the control ( $3.332 \pm 0.229$ ,  $0.401 \pm 0.327$ ) and the intervention ( $3.754 \pm 0.252$ ,  $0.786 \pm 0.418$ ). The intervention group achieved this noteworthy finding with p-values < 0.05 (< 0.001, < 0.001).

According to motivation scale that had been used in data collection, there were four subdomains including: attention, relevance, confidence and satisfaction. The intervention group had the highest means of gain scores in attention, relevance and satisfaction with p values < 0.05 (< 0.001, 0.011 and 0.028 respectively). There were no significant differences in confidence theme between the two groups (p=0.28) as shown in (Figure 4.2).



Figure 4.2. The Difference of Means of Gain Scores of Motivation Subdomains

The paired sample t test revealed a statistically significant improvement of motivation (p < 0.001) between the pretest mean score  $(2.9498 \pm 0.341)$  and posttest  $(3.543 \pm 0.320)$ . Cohen's d was (1.41) which proved the large effect size. Table (4.4) illustrates the results of the independent- sample and paired- sample t-tests.

## 4.2.5.4 Learning Outcome Four/Critical Thinking

The differences between the pre- and post-test means must be understood in order to respond to the question of how gamification affected adult health nursing students' critical thinking. The p value of (0.959) that had been demonstrated by the independent t-test revealed that there was no significant difference in the pretest means of critical thinking between the control ( $3.473 \pm 0.321$ ) and intervention ( $3.476 \pm 0.348$ ) groups. On the other hand, the results revealed statistically significant differences in the means of the posttest and gain scores between the control ( $3.928 \pm 0.260$ ,  $0.455 \pm 0.368$ ) and the intervention ( $4.125 \pm 0.294$ ,  $0.648 \pm 0.400$ ). The intervention group achieved this noteworthy finding with p-values < 0.05 (0.001, 0.019). More details are shown in (Table 4.4).

Eight subdomains of the critical thinking disposition scale were determined throughout the data collection process. These subdomains are: intellectual integrity, creativity, challenge,

open-mindedness, prudence, objectivity, truth-seeking, and inquisitiveness. With p-values < 0.05, the intervention group had the greatest mean gain scores in creativity, challenge, openmindedness, and objectivity (0.03, 0.016, 0.018, and 0.035, respectively). However, there were no significant differences between the two groups in terms of mean gain scores for intellectual integrity (0.12), prudence (0.054), truth-seeking (0.43), and inquisitiveness (0.98) (p=0.28), as illustrated in (Figure 4.3).



Figure 4.3. The Difference in Means of Gain Scores of Critical Thinking Subdomains

According to the paired sample t-test, the pretest mean score of  $3.475 \pm 0.333$  and the posttest mean score of  $4.026 \pm 0.293$  showed a statistically significant improvement in critical thinking (p < 0.001). A strong effect size was validated by Cohen's d value of (1.36). Table (4.4) illustrates the results of the independent- samples and paired- samples t-tests.

Dependent VS. Independen	Μ	SD	t	P value	
	Control	3.178	0.393	1 1 1 0	0.0678
Pretest Engagement * Group	Intervention	3.097	0.308	1.118	0.267*
Besttest Encomment * Cusur	Control	3.438	0.243	6 006	< 0.001a
Posttest Engagement * Group	Intervention	3.854	0.317	0.990	< 0.001*
Coin Score of Engagement * Crown	Control	0.258	0.406	5 500	< 0.001a
Gain Score of Engagement * Group	Intervention	0.756	0.455	-3.300	< 0.001
Protoct Mativation * Chaun	Control	2.932	0.311	0 509	0 61 <b>2</b> ª
Pretest Motivation * Group	Intervention	2.968	0.371	-0.508	0.012
Bosttost Mativation * Crown	Control	3.332	0.229	8 207	$< 0.001^{a}$
Fostiest Motivation · Group	Intervention	3.754	0.252	-0.307	< 0.001
Coin Score of Mativation * Crown	Control	0.401	0.327	1 971	$< 0.001^{a}$
Gain Score of Motivation · Group	Intervention	0.786	0.418	-4.0/1	< 0.001
Protost Critical Thinking * Crown	Control	3.473	0.321	0.051	0.050 <sup>a</sup>
Tretest Critical Thinking * Group	Intervention	3.476	0.348	-0.031	0.939
Posttest Critical Thinking * Group	Control	3.928	0.260	-3 364	0.001a
Tostiest Critical Thinking Group	Intervention	4.125	0.294	-5.50+	0.001
Gain Score of Critical Thinking *	Control	0.455	0.368	-2 385	0 019 <sup>a</sup>
Group	Intervention	0.648	0.400	2.303	0.017
Paired Samples	Engagement Posttest	3.646	0.350		
Tan cu Sampies	Engagement Pretest	3.138	0.353	9.700	< 0.001 <sup>b</sup>
Engagement Posttest – Engagement H	Pretest	0.508	0.497		
	Motivation Posttest	3.543	0.320		
Paired Samples	<b>Motivation Pretest</b>	2.9498	0.341	13.401	$< 0.001\ ^{\rm b}$
<b>Motivation Posttest – Motivation Pre</b>	test	0.593	0.420		
	Critical thinking	4.026	0.202		
	Posttest	4.026	0.293		
Paired Samples	Critical thinking	2 175	0 222	13.265	$< 0.001^{b}$
	Pretest	5.475	0.555		
Critical thinking Posttest – Critical th	ninking Pretest	0.541	0.397		
P values were based on the independen	t sample t- test <sup>a</sup> and pai	ired sample	e t- test <sup>b</sup>		

Table 4.4. The Differences of Mean Scores of Engagement, Motivation and Critical Thinking (Pretest & Posttest) Based on Control & Intervention Groups

## 4.2.6 The Effect Size of Gamification on Adult Health Nursing Learning Outcomes

**Hypothesis # two:** There is a positive effect of gamified activities on the learning outcomes (knowledge acquisition, engagement, motivation and critical thinking) of adult health nursing students.

The p value of (< 0.001) revealed a statistically significant difference in gain scores of engagement between the control (0.258  $\pm$  0.405) and intervention (0.756  $\pm$  0.455) groups, with a large effect size of gamification on the engagement of intervention group (Eta<sup>2</sup> = 0.26).

The p value of (< 0.001) revealed a statistically significant difference in gain scores of motivation between the control (0.401  $\pm$  0.327) and intervention (0.786  $\pm$  0.418) statuses, with a large effect size of gamification on the motivation of intervention group (Eta<sup>2</sup> = 0.21).

The p value of (0.019) revealed a statistically significant difference in gain scores of critical thinking between the control ( $0.455 \pm 0.368$ ) and intervention ( $0.648 \pm 0.400$ ) groups, with a medium effect size of gamification on the critical thinking of intervention status (Eta<sup>2</sup> = 0.06). The p value of (0.69) revealed no statistically significant difference in mean scores of students marks between the control (79.76 ± 5.985) and intervention ( $80.22 \pm 5.130$ ) groups, with a very small effect size of gamification on the students marks of intervention group (Eta<sup>2</sup> = 0.002). Table (4.5) illustrates the effect size of gamification on learning outcomes.

Variables		Μ	SD	F	Р	Eta	Eta <sup>2</sup>
Gain Scores of Engagement	Control	0.258	0.405		< 0.001	0.51	0.26
	Intervention	0.756	0.455	30.1	< 0.001	0.31	0.20
Gain Scores of motivation	Control	0.401	0.327	23.7	< 0.001	0.46	0.21
	Intervention	0.786	0.418				
Gain Scores of critical thinking	Control	0.455	0.368	5.7	0.019	0.25	0.06
	Intervention	0.648	0.400				
Mean Scores of marks	Control	79.76	5.985	0.16	0.69	0.04	0.002
	Intervention	80.22	5.130				
P value based on ANOVA test, the effect size based on Eta squared							

Table 4.5. The Effect Size of Gamification on Learning Outcomes

### 4.2.7 Summary of the Quantitative Results

The quantitative findings showed that the gamification had no significant effect on knowledge acquisition that determined by mean differences of marks distribution between the control and intervention groups of adult health nursing students. On the other hand, it had a large effect on students' engagement, motivation and critical thinking which had been proved by the high scores of intervention group.

## **4.3 The Qualitative Results**

Fifteen participants—four midwives, five male nursing and six female nursing students—were included in the sample from which data were gathered. The following questions served as a guide for conducting semi-structured purposive interviews:

- 1. Please share your experience with this course, focusing on the use of the gamification method as a teaching approach. Feel free to express your thoughts openly and spontaneously.
- 2. How did this approach of learning (gamification) impact your level of engagement in the class activities?
- 3. Discuss your sense of accomplishment in the course and how it contributed to your motivation in understanding the course goals and expectations?
- 4. Could you give examples of how you approach thinking differently from other people and how this approach has resulted in an effective outcome?
- 5. Could you give examples of how you get knowledge acquired and explain how this relationship has resulted in a positive outcome?

The first question was relied upon to determine the encoding of the information that students could express in their answers. This, in turn, gave general ideas about the topic and this brainstorming helped in inductive analysis. The other questions were used in drawing specific conclusions from general premises. This method of reasoning helped in deductive analysis.

Manual content analysis involved becoming familiar with the data through repeated face-to-face and audio-recorded interviews. Providing an accurate and appropriate summary of the data while maintaining the context of these findings to allow for a true understanding of the experiences of the students' responses. In order to find and categorize concepts, open coding started with a careful line-by-line analysis of the data. The development of a thorough coding structure came next, after related codes were categorized. Following that, the data were compiled and arranged. At the end, conclusions were drawn in relation to the predetermined themes (learning outcomes) from the quantitative data of this study. Figure (4.4) shows a diagram for steps of qualitative analysis process.



Figure 4.4. Steps of Qualitative Analysis Process

The qualitative results effectively summarized the viewpoints of the students on how adding gamified activities to the adult health nursing course affected their learning outcomes. The learning outcomes included knowledge acquisition, engagement, motivation and critical thinking. A comprehensive review of the themes and subthemes related to the process of these outcomes is provided in (Table 4.6). The related subthemes gave a detailed exploration of certain aspects of each theme, presenting an understanding of the nature of learning outcomes.

	Subthemes		Themes
1.	Enhancement of cognitive abilities	А.	Knowledge acquisition
2.	Success and academic achievement		
3.	Immediate feedback		
4.	Retention of knowledge		
1.	Interesting & Pleasure	B.	Engagement
2.	Interaction		
3.	Group working		
4.	Support		
1.	Satisfaction	C.	Motivation
2.	Confidence		
3.	Relevance		
4.	Attraction		
1.	Problem solving	D.	Critical Thinking
2.	Creativity		
3.	Finding the truth		
4.	Enhancement of intellectual abilities		
5.	Open mindness		

Table 4.6. Themes and Subthemes of Learning Outcomes

### 4.3.1 Knowledge Acquisition

Four subthemes emerged from the qualitative analysis that shed light on the aspects of knowledge acquisition that are impacted by using gamified activities as a teaching strategy. The enhancement of cognitive abilities, success and academic achievement, immediate feedback and retention of knowledge were all of those subthemes.

# 4.3.1.1 Enhancement of Cognitive Abilities

Students highlighted a mutually beneficial relationship between knowledge acquisition and the enhancement of cognitive abilities. Students generally expressed positive responses regarding the enhancement of cognitive abilities through gamified activities. The student number one enjoyed the experience, emphasizing how effective it was for gathering up knowledge quickly. The student number three found comprehending difficult at first, but after getting used to the unique teaching style, they eventually found it to be simpler. Another student highlighted the favorable impact on focus and improved understanding, suggesting a positive influence on cognitive capacities.

Students used a variety of learning strategies, emphasizing reading relevant material, participating part in class discussions, and working together with classmates. It was observed

that students actively engaged in interactive classes and cooperative homework. Furthermore, another found that taking notes, asking questions, and listening to lectures were the best ways to learn. Activities improved their ability to think freely, and they received help summarizing lecture content (S1, S3, S4, S7, S9, S11 and S15).

- S1: "...The most enjoyable aspect was learning the concepts while having a good time. It was useful to obtain knowledge quickly..."
- S3: "...My understanding was difficult at first, but as I grew more used to the lecturer's unique teaching method, it got easier..."
- S4: "...These methods in education had a significant impact on the level of my concentration and enhancing understanding..."
- S7: "...Reading relevant materials, taking part in class discussions, and working with peers were generally how I learned new information..."
- S9: "...Through interactive lessons, collaborative assignments, I actively engaged with the material to learn..."
- S11: "...I learned by listening to lectures, keeping comprehensive notes, and asking questions when I didn't understand anything..."
- S15: "... Our ability to think freely is enhanced by such activities" "...they helped me in summarizing lecture notes..."

## 4.3.1.2 Success and Academic Achievement

Some of students' success and academic achievement were for several reasons: the well- prepared gamified methods, the deep comprehension by applying knowledge in real-world situations, active class participation and seeking additional resources and the efficiency of this strategy in retrieving information during exams (S2, S6, S7, S9 and S10).

- S2: "...As a result, students were well-positioned to do well on exams, which is evidence of the effectiveness of the methods they used..."
- S6: "...This approach enabled me to put my theoretical knowledge to use in real-world situations, which deepened my comprehension and produced better exam results..."
- S7: "...I had discovered that by actively participating in class and looking for extra resources, I had been able to better understand the material and had performed well academically..."
- *S9: "...With this approach, learning became more efficient and accessible. It helped me remembering some information during exams..."*
- S10: "... This type of teaching helped me understand issues better. It enabled me to give proper answers to the written essay questions..."

# 4.3.1.3 Immediate Feedback

The importance of immediate feedback for acquiring knowledge was emphasized by the students. Understanding and memory were enhanced by constructive feedback. It also encouraged and continued interest by pointing out areas that needed additional resources (S4, S6, S11, and S13).

- S4: "...Through open communication and a readiness to accept constructive feedback, and helped my ongoing journey of understanding and self-improvement..."
- S6: "...The rapid feedback and practical application of the concepts made the content more remembered and exciting..."

- *S11: "…When I didn't understand anything. I had discovered that by actively participating in class and looking for extra resources…"*
- S13: "...The immediate responses of the gamified quizzes met my demand for quick encouragement. Being told right away whether I needed to study a subject or not was a great way to maintain my interest..."

## 4.3.1.4 Retention of Knowledge

Students expressed appreciation for the gamified approach's ability to improve retention of knowledge. They underlined how important it was to keep provided knowledge relevant, how to lessen the chance of forgetting, and how successful gamified techniques were at helping learners retain information for longer periods of time. The importance of practical application in enhancing learning and adding excitement and memorability to the topic was emphasized. The easy transfer of information by interactive methods enhanced understanding and had a long-lasting effect, encouraging ongoing passion in taking part in pleasurable educational activities. Students generally agreed that using gamified materials was essential for helping them remember and comprehend difficult concepts (S1, S2, S4, S10, S11, S14 and S15).

- *S1: "…This was very important, that they retained the relevance of the content they had learned…"*
- *S2: "…It reduced the chance of forgetting by ensuring that the knowledge was maintained…"*
- *S4: "...Gamified worked to store information better and for a longer period of time than routine education..."*
- S10: "...This strategy had been helpful since it reinforced what I've learnt and helped me recognizing many points of view..."
- *S11: "…Practical application of the concepts made the content more remembered and exciting…"*

- S14: "... The smooth transmission of knowledge using these interactive techniques not only improved my comprehension but also had a long-lasting effect that makes me interested in participating in more of these enjoyable educational activities..."
- *S15: "...I found that these excellent resources helped me to recall and understand difficult ideas..."*

## 4.3.2 Engagement

Four subthemes emerged from the qualitative analysis that shed light on the aspects of engagement that are impacted by using gamified activities as a teaching strategy. Interesting & pleasure, interaction, group working and support were all of those subthemes.

### **4.3.2.1 Interesting and Pleasure**

The participants reported that their interest and excitement for learning were positively impacted by gamified activities. Students reported becoming more engaged. It has been discovered that the gamified method increases student collaboration by making the learning process more engaging, joyful, and successful. The use of gaming approaches in teaching stimulated the attention of the participants, who were seen to be attentive and engaged during lectures. The skillfully designed games were praised for reflecting the knowledge they contained. In general, students thought that gamified activities were fun, creative, and supportive of happy learning (S3, S4, S6, S10, S11, S12, S13, S14, S15).

- S3: "...It inspired me to actively participate in class and made me want to be there without feeling bored." "It also really helped me be ready for the following lesson..."
- S4: "...These games not only induced students to participate actively but also develop their capacity for thought by asking relevant questions about the material..."
- *S6: "… They made the material more interesting and understandable for the students…"*

- *S10: "…There was a noticeable improvement in the sweetness of the learning process with each next presentation…"*
- *S11: "...Gamified activities were clever and enjoyable methods...." "... They had an effective role in promoting participation..."*
- S12: "...I am personally interested to the application of the game technique in education", "...I stay interested and stay engaged in lectures..."
- *S13: "…I found that the gamified activities seemed to be a fantastic fit for the joy of learning through play…"*
- S14: "...I thoroughly enjoyed studying with this new style ... "
- *S15: "...The activities were interesting for me, especially the escaped room..."*

## 4.3.2.2 Interaction

Participants' favorable engagement with gamified learning was regularly acknowledged by them. A dynamic learning environment and the development of a variety of abilities were considered to be facilitated by interactive classes. Students' constructive competitiveness was encouraged as the subject became more engaging and clear. The use of games to promote engagement and support in-class discussions was a successful strategy. It was noted that collaborating in competitive environments improved viewpoints and enriched learning experiences overall (S2, S5, S9, S10, S12, S15).

- *S2: "…Not only did the games keep me interested, but they also gave the principles an actual application…"*
- *S5: "…In addition, these interactive lessons supported the development of a range of student skills…"*
- S9: "...First of all, they made the material more interesting and understandable for the students. Second, the interactive components increased our competition."
- S10: "... Because games' interactive qualities contributed to the creation of a dynamic learning environment." they had an effective role in promoting participation..."

S12: "...Working with colleagues in a competitive setting enabled me to improve my opinions with others..."
S15: "...Gamified learning encouraged interaction and in-class

#### 4.3.2.3 Group Working

conversations "

The influence of group work on students' engagement was significant because it fostered qualities of commitment, collaboration, and competitiveness while also breaking down the boundaries that led to friendships being popular among students (S6, S11, S13, S14).

- *S6: "...I saw group learning with games encouraged collaboration and gave the learning experience a sense of community..."*
- S11: "...In addition, the cooperative aspect of playing these games in groups was a significant attraction. The competitive attitude of trying to exceed classmates was fostered by this cooperative section, which increased the commitment for each student..."
- S13: "...In addition to its educational advantages, the game technique has been essential in breaking down social boundaries. It has helped me build friendships with my peers and it is easier to talk with my instructor..."
- *S14: "…This cooperative part improved each student's effort by encouraging a competitive mentality of seeking to perform better than peers…"*

#### 4.3.2.4 Support

With the existence of a helpful educational environment and its social and educational appearance, the games contributed a sort of support that increased student's engagement. Some students' fear was subsequently reduced, while others' ways of learning were enhanced ( \$8,\$9,\$10,\$12,\$13).

- *S8: "…This method has successfully reduced lecture-related student fatigue. After finding a balance between taking knowledge and creating a supportive learning environment…"*
- *S9: "…Because games' interactive qualities contributed to the creation of a dynamic learning environment." they had an effective role in promoting participation …"*
- S10: "...These games helped me in participation without fear or anxiety..."
- *S12: "...I discovered that the gamification was social, truly supported learning method..."*
- *S13: "…These methods were very useful to me… "I found that using educational games to organize my learning process…"*

## 4.3.3 Motivation

The qualitative analysis revealed four subthemes that provide insight into the aspects of motivation that were affected when gamified activities were used as a method of learning: Satisfaction, confidence, relevance and attraction.

#### 4.3.3.1 Satisfaction

A lot of satisfaction with the gamified learning technique were regularly expressed by the participants. They discovered that the method greatly increased their sense of fulfillment. Their pleasant experiences were partly attributed to the games' well-structured design and the material's smooth presentation. Participants expressed appreciation for the gamification strategy and expressed optimism that it will be more widely used in a variety of educational contexts. The flexibility that gamified classes gave, allowing them to choose their preferred methods, was another factor that was set up (S3, S4, S7,S12, S13, S14).

- S3: "...Without a doubt, this strategy increased my sense of fulfillment..."
- S4: "...Complex nursing topics were made simpler to understand by combining visual aids, cards and points, scenarios and role plays, and other activities..."

- *S7: "I'm grateful mainly to the gamification approach, the material has been provided in smooth manner..."*
- S12: "...The games were organized and the process by which they performed was always consistent..."
- *S13: "…I would like to hope that this approach is adopted more broadly in all educational settings…"*
- *S14:"...I enjoyed that the gamified classes gave me the option to choose from a range of methods..."*

## 4.3.3.2 Confidence

Participants found the activities to be an environment positively influenced confidence: learning from mistakes without guilt, participation without fear or anxiety, working in competitive settings and specific activities like arranging cards directly focused attention (S1, S4, S6, S8, and S9).

- *S1: "…The activities were fantastic and gave me more confidence in myself. It was wonderful to be able to learn from mistakes without feeling guilty…"*
- S4: "...In general, the gamified exercises had a significant role in my overall course enjoyment and confidence..."
- S6: "... The integration of this process with the curriculum and the careful planning of the game features determining its success. These games helped me in participation without fear or anxiety..."
- *S8: "…Working with colleagues in a competitive setting enabled me to improve my opinions with others."*
- *S9: "…Arranging the cards made me focus directly. I was happy to find the correct cards with high confidence…"*

## 4.3.3.3 Relevance

One important and recurrently favorable aspect linked to the gamified learning process was relevance. They discovered that it was essential to reaching academic objectives. By tying course content to academic experiences, the importance of the gamified method was further highlighted by emphasizing the useful application of data. It was observed that completing assignments within games improved understanding of the course goals, highlighting the useful and significant significance of gamified activities. The well designed games were praised for accurately performing previously taught materials, demonstrating the long-term relevance of gamified content to the educational system as a whole (S1.S2, S8, S10, S15).

- *S1: "…Without a doubt, this strategy increased my sense of fulfillment and trust in my ability to meet the objectives and standards of the course."*
- S2: "...These games not only induced students to participate but also develop their capacity for thought by asking relevant questions about the material..."
- *S8: "…It is well, in my opinion, because the games are well-made and precisely reflect the content we've already learned…"*
- S10: "...I was able to reinforce the course material's relevance and application by relating what I learned to my academic experiences..."
- *S15: "…In addition to doing assignments inside of games improved my comprehension of the objectives and requirements of the course…"*

### 4.3.3.4 Attraction

Students attraction of well-designed games, cooperative group activities, and the positive results seen all contributed to a positive learning environment (S2,S5,S6).

- S2: "...I was attracted by something at the beginning of the course. I was attracted since the games were well-done and the materials had a great appearance..."
- *S5: "...the cooperative aspect of playing these games in groups was a significant attraction..."*

S6: "...The encouraging results of this method are evident... I am becoming attracted to the classroom and taking knowledge with a nice technique..."

# **4.3.4 Critical Thinking**

The qualitative analysis revealed four subthemes that provide insight into the aspects of critical thinking that were affected when gamified activities were used as a method of learning: problem solving, creativity, finding the truth, enhancement of intellectual abilities and open mindness.

### 4.3.4.1 Problem Solving

Students discovered that the gamified method encouraged creativity, teamwork, and a methodical approach through point-scoring systems, all of which were beneficial for problem-solving. It was determined that the gamified activities were effective in improving problem-solving-related cognitive functions (S1, S5, S8).

- S1: "...I adopted a new viewpoint, deviating from traditional methods and making an effort to come up with a novel idea that none of us were aware of before. We played a group game where we tried to solve an issue...."
- *S5: "…This dynamic was further enhanced by the point-scoring system, which was dependent on how rights or wrongs were…"*
- *S8: "…because the games are well-made and precisely reflect the content we've already learned… Our ability to think freely is enhanced by such activities… they helped me in summarizing lecture notes…"*

## 4.3.4.2 Creativity

The gamified method was perceived by students as beneficial for promoting creativity, promoting flexibility, and introducing a personalized element to their relationship to the content. Positive and innovative learning experiences were enhanced by the activities, which encouraged a dynamic and original approach to learning (S1 & S7).

- *S1: "...By participating in a variety of activities and encouraging creativity while producing answers, students not only showed that they were adaptable but also, and this is very important, that they retained the relevance of the content they had learned..."*
- S7: "...This indicated that this specific approach offered a more efficient way to gather knowledge while also adding a personal aspect to the conversations..."

# 4.3.4.3 Finding the Truth

Students thought that the gamified learning method was helpful in encouraging a deeper comprehension of the truth in the course material. The thoughtfully created games and targeted exercises were honored for their contribution to leading participants, within the framework of their educational experiences, in the direction of reality (S1,S2,S9).

- *S1: "...It was wonderful to be able to learn from mistakes without feeling guilty..."*
- S2: "...These games not only induced students to participate but also develop their capacity for thought by asking relevant questions about the material..."
- S9: "...It made me willing to participate without pause and learn through competition among my colleagues, as I made new friends by learning with them in the group and gained insight..."

#### 4.3.4.4 Enhancement of Intellectual Abilities

The gamified learning strategy was well regarded by the participants due to its provision of a supporting the environment, facilitation of critical thinking, promotion of participation, and enhancement of intellectual abilities. The learning process was found to be both pleasurable and productive due to the carefully planned games and targeted exercises, which were shown to improve independent thought and direct focused attention (S4,S7,S8,S9, S13).

- S4: "...It was a pleasant got me thinking about nursing issues in a variety of ways..."
- *S7: "…In addition to doing assignments inside of games improved my comprehension of the objectives and requirements of the course…"*
- S8: "...Adding games to the educational system had a noticeable effect. With analytical questions on the material, these exercises not only promoted students engagement but also improved their intellectual abilities..."
- S9: "...Because the games are well-made and precisely reflect the content we've already learned... Our ability to think freely is enhanced by such activities... they helped me in summarizing lecture notes..."
- S13: "...The activities were interesting for me, especially "the escaped room," which focused my attention. Arranging the cards made me focus directly..."

## 4.3.4.5 Open Mindness

The approach to gamified learning, according to the participants, encouraged them to be open-minded, accept different points of view, grow from their mistakes, and actively participate in the process of learning. The gamified activities' playful and creative elements promoted a warm and optimistic learning experience (S3,S4,S7).

- *S3* "....We were open to receiving criticism on our opinions..."
- S4 "...I actively listen to my colleague's points of view because I respect their viewpoints... Furthermore, I saw mistakes as a chance to improve and learn, transforming the negative experience into a beneficial opportunity for personal growth..."
- S7 "...I learned by listening to lectures, keeping comprehensive notes, and asking questions when I didn't understand anything..."
# 4.3.5 Summary of the Qualitative Results

The qualitative results found that gamification had positively impacted all students' learning outcomes by fostering an educational environment rooted in support, cooperation, competition, creativity, open-mindedness, and various cognitive aspects. These games had effectively engaged students in classroom interactions, strengthening their attitudes and motivation to learn.

# **Chapter Five: Discussion**

### **5.1 Introduction**

This study examined the impact of gamification on learning outcomes among adult health nursing students. The use of mixed techniques allowed the researcher to investigate the research topic's numerous aspects in more detail. While qualitative data showed unique experiences, feelings, and impressions that would not be easily conveyed using quantitative measurements alone, quantitative data allowed for the detection of patterns and trends across a wider sample. This all-encompassing strategy assisted in assessing how gamification affected learning outcomes for adult health nursing students, including information acquisition, engagement, motivation, and critical thinking. Through the use of mixed methods, researchers obtained both qualitative and quantitative information about the mechanisms underpinning the efficiency of gamified activities. As a result, educators and curriculum designers now have access to a more complete and useful understanding of how gamified activities may be applied and maximized in nursing education settings (Tashakkori and Creswell, 2007).

The results of study revealed a high noticeable effect of gamification on students' engagement and motivation. The element of surprise, enjoyment, relevance and attraction to this educational method significantly heightened active participation in the classroom. Gamification played a crucial role in enhancing students' satisfaction levels and increasing their confidence in both the content and the process of learning. Gamification was crucial in improving students' comprehension, analysis, and remembering of the materials, even if average grades did not change significantly. Remembering skills was fostered by the feedback process, which was crucial in supporting information acquisition. Another effect was seen in their critical thinking which characterized by enhancing their intellectual abilities, creativity, problem solving and open mindness.

### **5.2 Comparison with Previous Studies**

In contrast to previous studies that worked primarily on gamification in particular nursing courses—like simulation labs (Brown, et al., 2019), maternity clinical course (Edwards, et al., 2019), fundamentals of Nursing (Elzeky, et al., 2022), Psychiatric nursing

education (Kim & Kim , 2022), nursing management and ethics in nursing (Aljezawi & Albashtawy, 2015), public health education (Grech & Grech, 2021), community health nursing course (Day-Black, 2015) and others—this study went specifically into how gamification principles were applied in the context of adult health nursing course was congruent with a study light of the challenges presented by the Covid-19 situation, gamification techniques (Badges and Leaderboard) were applied to medical surgical nursing students in three learning areas knowledge, clinical performance, and attitude (Fakhary & Yahia, 2021).

In order to engage and motivate students in the adult health nursing course, this study used 10 different types of games, covering a broad range of gamification methods. The format, structure, and level of interaction of these games varied, offering a wide range of gamified learning opportunities. Despite previous studies, which limited themselves to use a maximum of three games. As an illustration, one research used a smartphone application (Berglund et al., 2022). A study used a game of Jeopardy!-style (Aljezawi & Albashtawy, 2015). Two online games have been implemented into use by (Day-Black, 2015). Escape rooms, reveal-a-pic, and crossword puzzles were used by (Murphy, 2021). Points, badges, rankings, and prizes utilized by (Bai, et al. , 2020; Brull & Finlayson, 2016). Kaizen was a multiple-choice game that was introduced by (Roche, et al. , 2018). Only escape rooms were used by (Brown, et al., 2019; Edwards, et al., 2019).

This study used 10 different types of games not only added to the body of literature on gamification, but it also yielded useful data for future research on education. The complex nature of gamification success in various game formats could be examined by this methodological approach, which influenced the development of more targeted and specialized gamified procedures. Students had a great deal of freedom of choice due to the variety of game types used in this study, and this was evident when compared to previous studies (Killam et al., 2021; Weaver et al., 2020). It was challenging to draw conclusions on gender inequalities because the majority of nursing students were female and this issue was congruence with a study conducted in Spain (Rosa-Castillo et al., 2022).

The most significant finding of this study was that it shed some light on the effect size of gamification, in contrast to previous research that did not disclose the extent of games' influence on learning outcomes. Students in this study asserted that gamification was helpful because it allowed for social, cooperative, and safe engagement; nevertheless, another study found that gamification had disadvantages in addition to benefits. These included concerns on the viability and appropriateness of game-based learning strategies as well as observations of specific students' lack of interest or engagement (Fijačko, et al. , 2020).

# **5.3 Gamification and Knowledge Acquisition**

The quantitative results of this study, which showed no statistically significant differences in the means of student marks between the control and intervention statuses, were incongruent with a study that looked at the possible advantages of an Instagram-based educational game for first-year bachelor of nursing students' learning outcomes with respect to gamification and knowledge acquisition. Compared to the control group, the experimental group's final grades increased by an average of 0.62 points (Rosa-Castillo et al., 2023). The lack of noticeable effect on student grades in this study prompted questions regarding potential contextual factors that may have affected the outcomes and demanded more investigation. Regarding the knowledge issue, the results were similar to one study that shown notable improvements in several categories when the gamification approach was used, knowledge being one of those areas (Fakhary & Yahia, 2021).

In a previous study of (Grech & Grech, 2021), the results showed significant progress among students based on the presence of grades at the beginning and end of the study, which was missing in the current study to determine the extent of their degree of improvement. The qualitative findings of the study highlighted the advantages of gamification for learning. It was specifically demonstrated that gamification functioned as a stimulant to enhance participants' comprehension and cognitive capacities. These findings aligned with a study by Chugh and Turnbull (2023), which found that gamification was a successful strategy for improving understanding and implementing innovative teaching methods in the field of education. The results of the study also aligned with those of Tavares (2022) about memory, knowledge retention, and memory improvement, which demonstrated that game-based activities rapidly enhanced short-term learning and memory. It had been demonstrated that gamification's immersive and interactive elements aid in learning retention by providing opportunities for students to apply concepts in real-world contexts (Castro & Gonçalves, 2018). Furthermore, gamification—as shown by Roche et al. (2018)—may enhance learning outcomes and information retention through the use of educational analytics. These findings supported the idea that gamification could be a creative and effective method for assisting students in learning more thoroughly and growing intellectually. This point of view was also in line with another study's conclusion that gamification held enormous promise as a cutting-edge technique for imparting knowledge in nursing education. It was reasonable to call for more research in this area, emphasizing the need to fully comprehend the theoretical underpinnings of gamification and look into its more widespread educational applications (Fijačko, et al. , 2020).

Based on constructivism gamification intervention as a philosophy of learning, aimed to create an environment where students actively construct knowledge by meaningful interactions with the course content (Xu & Shi, 2018). Students were able to investigate, identify, and build their learning through the dynamic environment and engaging, collaborative experiences that gamified activities created. The instructor's immediate feedback and the students' active learning have improved the students' retention and acquisition of knowledge. This was congruent with a study emphasized in active learning in which students simulate real-world situations, games provide nursing students an excellent learning environment. The learner was able to learn through meaningful experiences at a location and time that was appropriate for them thanks to gaming. Students were able to progress from being "spoon-fed" statistical information to forming thoughts, comprehending ideas, and using what they had learned in the real world with the use of active learning techniques. Students should be involved in what they are doing, since this encouraged a greater comprehension of the topics. Students played the game first, comprehended it afterwards, and then applied what they had learned to a different scenario by generalizing (Sarker et al., 2021).

# 5.4 Gamification and Students' Motivation and Engagement

Several research studies on gamification, motivation, and engagement had been carried out, with similar findings (Killam et al., 2021; Weaver et al., 2020; van Gaalen, et al., 2021). Other research' findings supported the idea that gamification might foster a more cooperative and competitive group learning environment (Edwards, et al., 2019; Killam et

al., 2021; Lucas, 2023; Brown, et al., 2019). In a study, there was not a significant improvement in skill performance, but the study's conclusions showed congruence in that the intervention group's motivation, level of preparation, and self-confidence all significantly improved (Elzeky, et al., 2022).

In this study, the effective feedback helped student in acquisitioning knowledge, while a study told that gamification's concepts, including feedback, may be used in a variety of situations to improve motivation, engagement, and learning outcomes (Weaver et al., 2020). In the other hand, a study showed that participants were also invited to offer feedback on their learning experience, in this way gamification helped to increase their engagement and interaction during the session (Day-Black, 2015).

One of the main issue of this study was the pleasure and interesting that enhanced students' engagement which was congruent with a study supported that fun and enjoyment-related components improved engagement in the classroom and had a positive impact on student conduct (Mohamed & Nashwan, 2019). The students' reported that the games' images and animations were a key factor in attracting attention were in line with a research that found similar outcomes; the only exception was that study used electronic material (Inangil et al., 2022).

Another similarity in engaging, energetic instruction that inspired students and the game also taught students how to work together and perform well under pressure by posing a challenge to them (Gómez-Urquiza, et al. , 2019). Another noticeable component of students' motivation was their satisfaction had a congruent in a study revealed that satisfaction and other issues were improved without having any appreciable negative impacts which reflected gamification had become a useful tool in nursing education (García-Viola et al., 2019).

Students actively considered the relevance of formatting and applying these games to the course objectives and content as they were responding. Their motivation was influenced in part by the recognition of this factor. It is significant that prior research, on the other hand, did not specifically address this relevant issue. Success was a noticeable issue that responded by students in this study which was congruent with studies revealed that gamification can motivate learners to actively participate in their learning process by creating a sense of success and growth (Bai, et al. , 2020; Brull & Finlayson, 2016).

Social components in gamification, including cooperative tasks and multiplayer choices, strengthened the sensation of engagement. The gamification method gave priority to meeting the psychological demands of relatedness, competence, and autonomy, in line with the self-determination theory. This approach achieved the aim of raising students' intrinsic motivation and engagement with the gamified learning sessions (Elzeky, et al. , 2022; Brull & Finlayson, 2016).

By matching the learner's ability level with the task's challenges, gamification helped students to promote flow. The flow experience had been enhanced by well carefully designed, fast feedback, and a distinct sense of progress in the game. Through gameplay, avoiding boredom and extreme irritation kept the flow going. This had been supported by theoretical framework of flow theory. Flow theory exhibited flow as an energetic attention on a task while experiencing a great deal of fulfillment and satisfaction (Rachels & Rockinson-Szapkiw, 2018).

Students were motivated by gamified aspects that related to both their internal and external motivations. Regarding to gamified learning theory, there were four elements make up this theory: game elements, behavior and attitude, learning outcomes, and instructional material, and maintaining interest while maintaining the content of the course was a challenge when trying to achieve a balance between these factors. So the gamified learning theory offered a broad conceptual framework for understanding the correlation between gamification and education. Gamification was a teaching strategy and how could affect students education resembling by achievement of the desired learning outcomes (Elzeky, et al., 2022).

Contextual relevance in which the specific learning objectives and setting of adult health nursing should be taken into consideration when designing and implementing gamification. This issue was considered as limitations and challenges in using gamification as teaching strategy. The relevance issue in this study was treated by the declarations of a few interviewees from the study's qualitative portion (S1.S2, S8, S10, S15).

In a study of Anguas-Gracia et al. (2021) discovered that students in a class that used an escape room to gamify their learning had a similarly positive attitude as well as an increase in interest and motivation. This game was listed during qualitative interview: *"The activities were interesting for me, especially the escaped room"* (S15). In other studies there was a different view about a few benefits to using Instagram instead of an escape room. First, it might be done constantly throughout the duration of a topic; second, students could decide when and how much too engage; and third, there was no need for in-class time (Rosa-Castillo et al., 2022). On the other hand, an escape room assisted nursing students in developing their collaborative and critical thinking skills in order to provide secure care (Edwards, et al., 2019).

Regarding to this context, in a Jordanian study Students found the a Jeopardy!-style game format to be enjoyable and acknowledged as a more rewarding teaching method, based on their responses to the satisfaction questionnaire. This study generally demonstrates that students not only selected the game format, but it also enhanced their ability to retain the material. Aljezawi and Albashtawy (2015) conducted the first study of its kind in Jordan to examine the applicability of this game format in nursing education.

# 5.5 Gamification and Students' Critical Thinking

Regarding to gamification and critical thinking, there was a congruency in which gamification affected critical thinking in general (Chang & Yeh, 2021; Jodoi et al., 2021; Ignacio & Chen, 2020; Brull & Finlayson, 2016; Castro & Gonçalves, 2018; Edwards, et al., 2019). On the other hand, this study was different from the previous studies in giving clear results in the context of truth seeking, open mindness and prudence.

There was a congruency in which creative thinking had a positive impact on decision making highlighted the effectiveness of gamification as a valuable component of nursing education (García-Viola et al., 2019). The results of this study also similar in that gamification significantly improved students' ability to empathizing problems solving (Kim & Kim , 2022). Results of this study agreed with the development and reinforcement of specific skills, such as clinical reasoning, problem-solving, and decision-making (Elzeky, et al. , 2022).

In terms of inquisitiveness, there were no differences in means between the control and intervention statuses. However, gamification was found to be an effective tool for improving critical thinking abilities in a prior study, where it encouraged and sparked students' curiosity, allowing them to retain information through play (Mposula, 2019).

The constructivist viewpoint emphasized the importance of nursing students' cooperation and understanding of one another in a gamified environment. Students participated to the collaborative building of knowledge and critical thinking abilities as they collaborate to overcome problems in the gamified learning environment. This supported the idea that gamification might operate as a forum for social engagement and shared meaning-making, encouraging nursing students to work together to build and improve their critical thinking skills (Mposula, 2019; Xu & Shi, 2018).

### **5.6 Strengths of the Study**

This study was anticipated to be the first in Palestine to address the issue regarding nursing education using the game technique. This study used different research methods, quasi-experimental design as well as qualitative design. By using both self-completion questionnaires for quantitative data and individual semi-structured interviews for qualitative data, the study aimed to gather comprehensive and diverse insights into the learning outcomes of nursing students engaging with gamified activities.

The combination of these data collection methods allowed for a more holistic understanding of the research topic and enhanced the validity and reliability of the findings. Different forms of games were used, which gave students more space to choose and integrate without feeling bored. In addition, it discussed the impact of gamification on four aspects of learning outcomes.

### 5.6 Limitations of the Study

The lack of a prior the basis for the students' grades before to the test to measure their level of improvement was one of the study's limitations. The number of females was also greater than that of males, which prevented identifying differences at the gender level. The number of midwives compared to nurses was too small to know the extent of the difference at the specialty level.

Among the limitations included a small sample size and the study's application in one academic setting, which may restrict the applicability of the findings to a wider population. The absence of particular infrastructure in the setting created more challenges for the research.

Students' differing perceptions about the significance of the study also gave rise to worries about potential data contamination. A clinical and simulation component of an adult health nursing course incorporates interactive learning that may be biased when learning through gamification.

### **5.7 Conclusion**

Both the study's results and a greater body of scientific literature confirmed to the positive impacts of gamification on nursing students' learning outcomes. Interesting results were obtained when this influence was analyzed on a variety of learning domains, including knowledge, motivation, engagement, and critical thinking. The results showed that gamification had the potential to be an effective and enjoyable teaching method. While all of these results pointed to the numerous advantages that gamification offered in terms of promoting thorough and significant learning outcomes for students, more research should continue to explore the unanswered questions surrounding gamification and comprehend its implications for best practices in education.

### **5.8 Recommendations**

Gamification has demonstrated its ability to engage learners as a viable substitute for didactic teaching approaches, which may be advantageous for students who are performing poorly or are disengaged. It can make using critical thinking abilities easier. The recommendations of this study is based on three dimensions:

#### 5.8.1 Research and Evaluation

Allocating resources for studies on student engagement, knowledge retention, and the growth of critical thinking that examine the efficacy of gamification in nursing education. Applying study results to guide policy choices and continuously enhance gamification techniques in nursing education. Conducting a longitudinal research is considered necessary to monitor the gamification's long-term impact on learning outcomes and account for any changes over time. Another crucial issue is the independent application of some games to specific educational goals, so it is recommended to performing research to determine how different games differ in terms of how well they influence learning outcomes.

#### 5.8.2 Integrating Gamification into Nursing Education

Using this teaching technique across several educational institutions with greater sample sizes and throughout various nursing education courses is a crucial recommendation. It is also recommended to use this teaching method to other nursing education courses in order to measure the extent of all critical thinking components in future research. Enabling gamification in relation to learning objectives is recommended. Well-defined educational objectives shouldn't have to be overlooked in favor of exciting gaming aspects.

#### 5.8.3 Recommendations for Policy Makers

Providing standards and criteria for gamification in nursing courses to ensure consistency and accuracy across learning environments. Encouraging the use of gamification to achieve particular nursing competencies and abilities.

#### 5.8.4 Student Feedback and Involvement

Setting up systems for getting input from students on gamified learning experiences in order to identify areas that need modification. Including students in the gamification of tools' design and development to ensure that they suit the demands and preferences of learners.

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# Appendices

# **Appendix A: Questionnaire**

Dear students:

This study aims to examine the impact of gamification on Learning Outcomes among undergraduate Adult Health Nursing Students at Nablus University. Every male and female student in the majors of nursing and midwifery who are second-year students in the course of adult health nursing; they are entitled to participate in filling out this questionnaire voluntarily.

The questionnaire may take between 30-40 minutes. The questionnaire consists of four parts: personal information, engagement in the course, motivation for the course, and student critical thinking.

Please do not hesitate to contact me when filling out the questionnaire to inquire about anything.

# Researcher

Hamdallah Hassan Khaled Mobile: 0597337888/ 0567337888/ Email: hamdallah1975@gmail.com

# PART ONE: Demographic data

For your response, please put  $\sqrt{}$  in the adjacent box.

# Gender:

- 1. Male
- 2. Female

# **Specialty track:**

Nursing
Midwifery

Write your mark of adult health nursing course (From 100%):



# PART TWO: Student Course Engagement Questionnaire (SCEQ) (23 items)

The 1–5 Likert's scale indicated your responses to statements as the following:

- 1 = "much less like me"
- 2 = nor "less like me"
- 3 =no preference
- 4 = neither "more like me"
- 5 = "much more like me"

Item	1	2	3	4	5
Raising my hand in class					
Participating actively in small group discussions					
Asking questions when I don't understand the instructor					
Doing all the homework problems					
Coming to class every day					
Asking the teacher to review assignments or tests					
Thinking about the course between class meetings					
Finding ways to make the course interesting to me					
Taking good notes in class					
Looking over class notes between classes					
Really desiring to learn the material					
Being confident that I can learn and do well in the class					
Putting forth effort					
Being organized					
Getting a good grade					
Doing well on the tests					
Staying up on the readings					
Having fun in class					
Helping fellow students					
Making sure to study on a regular basis					
Finding ways to make the course material relevant to my life					
Applying course material to my life					
Listening carefully in class					

# PART THREE: Instructional Materials Motivation Scale (36 items)

- 1 = Not true
- 2 = Slightly true
- 3 = Moderately true
- 4 = Mostly true
- Four Domains Attention (12 items) Relevance (9 items) Confidence (9 items) Satisfactions (6 items)
- 5 = Very true

Attention (12 items)	1	2	3	4	5
There was something interesting at the beginning of this course that got my attention.					
These materials are eye-catching.					
The quality of the writing helped to hold my attention.					
This course is so abstract that it was hard to keep my attention. (Reverse)					
The pages of this course look dry and unappealing. (Reverse)					
The way the information is arranged on the pages helped keep my attention.					
This course has things that stimulated my curiosity.					
The amount of repetition in this course caused me to get bored sometimes. (Reverse)					
I learned some things that were surprising or unexpected.					
The variety of reading passages, exercises, illustrations, etc., helped keep my attention on the course.					
The style of writing is boring. (Reverse)					
There are so many words on each page that it is irritating. (Reverse)					

Relevance (9 items)	1	2	3	4	5
It is clear to me how the content of this material is related to					
things I already know.					
There were stories, pictures, or examples that showed me how					
this material could be important to some people.					
Completing this course successfully was important to me.					
The content of this material is relevant to my interests.					
There are explanations or examples of how people use the					
knowledge in this course.					
The content and style of writing in this course convey the					
impression that its content is worth knowing.					
This course was not relevant to my needs because I already					
knew most of it. (Reverse)					
I could relate the content of this course to things I have seen,					
done, or thought about in my own life.					
The content of this course will be useful to me.					

Confidence (9 items)	1	2	3	4	5
When I first looked at this course, I had the impression					
that it would be easy for me.					
This material was more difficult to understand than I would like for it to be (Reverse)					
After reading the introductory information I felt					
confident that I knew what I was supposed to learn from					
this course.					
Many of the pages had so much information that it was					
hard to pick out and remember the important points.					
(Reverse)					
As I worked on this course, I was confident that I could					
learn the content.					
The exercises in this course were too difficult. (Reverse)					
After working on this course for a while, I was					
confident that I would be able to pass a test on it.					
I could not really understand quite a bit of the material in					
this course. (Reverse)					
The good organization of the content helped me be					
confident that I would learn this material.					

Satisfaction (6 items)	1	2	3	4	5
Completing the exercises in this course gave me a satisfying feeling of accomplishment.					
I enjoyed this course so much that I would like to know more about this topic.					
I really enjoyed studying this course.					
The wording of feedback after the exercises, or of other comments in this course, helped me feel rewarded for my effort.					
I felt good to successfully complete this course.					
It was a pleasure to work on such a well-designed course.					

#### PART FOUR: The critical thinking disposition scale (35 items)

1-"Strongly	disagree"
-------------	-----------

- 2="Disagree"
- 3="Neutral"
- 4="Agree"
- 5="Strongly agree"

### Fight Domains Intellectual integrity (6 items) Creativity (4 items) Challenge (6 items) Open mindness (3 items) Prudence (4 items) Objectivity (4 items) Truth-seeking (3 items) Inquisitiveness (5 items)

Intellectual integrity (6 items)	1	2	3	4	5
Before judging a problem, I overall take the related information into					
account.					
When I approach a problem, I consider the whole situation of the					
problem such as relationship or background.					
When I solve or judge a problem, I utilize a collections of data by					
organizing it systematically.					
When I confront a problem, first of all, I try to grasp the whole					
picture of it.					
When I confront a problem, I consider solving it from many					
different perspectives.					
When I decide on something, I make a decision based on reliable					
and sufficient data.					
Creativity (4 items)					
I like to develop an original idea.					
I prefer to think differently from others.					
I usually come up with an idea that other people don't have.					
I apply a different method than I tried before to solve a problem					
Challenge (6 items)					
I hesitate to start on something that looks difficult.					
I easily give up on the way of doing a project.					
I give up a debate when it does not come to a conclusion quickly.					
I tend to follow what others do.					
I tend not to come up with a conclusion.					
I have a tendency not taking a change well.					
Open mindness (3 items	5)				
I willingly accept a criticism on my opinion.					
I like to listen to other people's opinion on an argument.					
I turn my mistake into an opportunity to learn					
Prudence (4 items)					
I tend to make a decision hastily without considering a matter					
carefully.					
When I am questioned, I think twice before I give my answer.					
I tend to act rashly and carelessly when I face a difficulty.					
Before I decide on something, I think ahead the advantages and					
shortcomings of the result of it.					

<b>Objectivity</b> (4 items)	1	2	3	4	5
Lhave a reputation of heing a rational person			-	-	
Thave a reputation of being a rational person.					
When I judge a matter, I judge objectively.					
I'm hard for me to be fair when I discuss a matter related					
to me directly.					
Ordinarily, I analyze which is right or wrong.					
Truth-seeking (3 item	s)				
When I work on something, I repeatedly appraise the					
matter.					
Although the direction of a project is set, I continue to					
ponder about it to make a better result.					
I continually evaluate whether my thought is right or not.					
Inquisitiveness (5 iten	15)				
When something is happened, I am curious about the					
process of it.					
When I have a question, I try to get the answer.					
I enjoy trying to solve a complicated problem.					
I continually look for pieces of information related to					
solving a problem.					
When I see the world, I see it with a questioning mind.					

# **Appendix B: IRB Approval**



### Appendix C: Adult health nursing course at Ibn Sina College/ Nablus University

### **General Outcome**

Providing competent and safe nursing interventions based on application of the nursing process and demonstration of critical and analytical thinking, appropriate clinical decision making, independent and self - directed judgment during patients' care.

### Student Learning Outcomes based on bloom taxonomy

At the end of this course, students will be able to:

- Remembering level: to remember knowledge and concepts from the arts, sciences, and humanities to plan nursing care to enhance individual patient's health outcomes and quality of life (Anderson & Krathwohl, 2001).
- Understanding level: to understand theoretical knowledge about certain body systems disorders including: pathophysiology, clinical manifestations, and diagnostic evaluation, medical and surgical management (Anderson & Krathwohl, 2001).
- Applying level: to apply safe and effective nursing care in collaboration with members of health care team using critical thinking, problem solving and the nursing process in a variety of settings through direct care (Anderson & Krathwohl, 2001).
- Analyzing level: to analyze the relationships among disease process, clinical presentation, and nursing management of patients with selected major adult health problems (Anderson & Krathwohl, 2001).
- Evaluating level: to appraise policy, legal, cultural, spiritual, ethical concerns and effective skills of communication to provide care in a professional manner (Anderson & Krathwohl, 2001).
- Creating level: to create nursing care plans based on nursing process and reviewing current literatures about major body system disorders (Hinkle & Cheever, 2018).

### **Attendance Policy**

Punctual and regular class attendance is required of all students. Lecture attendance is mandatory. The instructor initiates an administrative withdrawal if a student misses 10% or

more of contact hours of class without justified excuse or 20% and more with justified excuse.

#### **Assignment Policy**

All required work must be in on time in order that the student may benefit from the corrections and study for future examinations. Assignments turned in later than the due date will not be accepted unless the instructor clears the circumstance with the student. Regardless of the circumstance, late work will be assessed a penalty of five (5) points per day for each late day. No assignment will be accepted if more than 5 days late.

### **Course Information**

Table one provides essential information about the Adult Health Nursing Part 1 course (NUR 2551), including the instructor, credit hours, prerequisites, placement, class schedule, contact details and requested references.

Course title	Adult Health Nursing	Instructor	Hamdallah H. Khaled			
	Part 1					
Course code	NUR 2551	Room	Section1: 205, Section 2: 201			
<b>Credit hours</b>	4	Placement	Second year nursing students			
Semester	Fall 2023	Prerequisites	NUR.1331, NUR.1111, NUR.1222,			
			HB1441,HB1442			
Telephone	0567337888	Emails	Hamdallah1975@gmail.com			
Campus	Nablus University /Heww	arah-Nablus/				
Text(s)	Brunner, L. S., Smeltzer,	S. C. O., & Sudo	larth, D. S. (2018). Brunner &			
	Suddarth's Textbook of Medical-Surgical Nursing (14 <sup>th</sup> ed.). Philadelphia:					
	Lippincott Williams & Wa	alkins.				

Table 1. Course Information - Adult Health Nursing Part 1 (NUR 2551)

#### **Grading Policy**

Successful completion of this course requires a grade of (65%). After all students have taken a test, feedback will be provided at a scheduled time. To review tests, make an appointment with instructor during office hours. A student must communicate with a course instructor if unable to take a test on a scheduled day. If there is no communication, a "Zero" will be given for that test. Alternate tests may be given as make-up test after submitting

justified excuse. Table 2 represents grading process including exams, weights and levels.

Level	Course	First Exam	Second Exam	Quizzes	Activities	<b>Final Exam</b>
	100%	20 %	20 %	5%	15%	40%
Excellent	<b>90 - 100</b>	18 - 20	18 - 20	4.5 - 5	13.5 - 15	36 - 40
Very good	80 - 89.99	16 - 17.9	16 - 17.9	4 - 4.9	12 - 13.49	32 - 35.9
Good	70 - 79.99	14 - 15.9	14 - 15.9	3.5 - 3.9	10.5 - 11.9	28 - 31.9
Accepted	65 - 69.99	13 - 13.9	13 - 13.9	3.25 - 3.49	9.75 - 10.49	26 - 27.9
Fail	< 65	< 13	< 13	< 3.25	< 9.75	< 26

Table 2. Grading Process for Adult Health Nursing Course

### **Teaching Methods and Teaching Aids**

Teaching strategies: Strategies included lecture, discussion, and case studies. Teaching Aids: Media resources (YouTube and others) audio-visual aids and computer assisted instruction. Gamified activities were added to interventional group.

### **Student Learning Outcomes Assessment**

Table 3 represents the assessment of student learning outcomes for the course, with checkboxes indicating the presence of exams, quizzes, and various activities for each of the six outcomes that were based on Bloom Taxonomy (1= remembering, 2= understanding, 3= applying, 4=analyzing, 5=evaluating and 6=creating levels).

	Exams				(	Quizzes	
Outcomes	First	Second	Activities	Final	1	2	3
1							
2						$\checkmark$	
3							
4							
5						$\checkmark$	
6							

Table 3. Students' Learning Outcomes Assessment

أثر طريقة اللعب على مخرجات التعلم لدى طلبة البكالوريوس في تمريض صحة البالغين في جامعة نابلس: طرق مختلطة

> حمدالله حسن محمود خالد أ.د محمد البشتاوي د. محمد الجلاد أ.د محمد اسيا أ.د معن الجيزاوي د. عبدالله الخوالدة

> > ملخص

لا تزال المحاضرات أمرًا بالغ الأهمية لتزويد الطلاب بالمعرفة التأسيسية. إن التدريس التفاعلي ليس بديلاً، بل هو أسلوب تكميلي يعزز تجربة التعلم. يمكن أن تؤدي طريقة اللعب إلى تحسين نتائج التعلم من خلال تعزيز الدافعبة والمشاركة والمهارات المعرفية والحركية النفسية. هدفت هذه الدراسة إلى دراسة تأثير استخدام طريقة اللعب على مخرجات التعلم لدى طلبة المرحلة الجامعية الأولى في تمريض صحة البالغين في جامعة نابلس، وذلك بهدف توفير التوصيات المبنية على الأدلة لمحاضري التمريض في هذا السياق.

تم إجراء الدراسة في الفترة الواقعة بين الثالث من أيلول إلى الخامس عشر من كانون الأول من عام 2023 وذلك باستخدام تصميم بحثي بالطرق المختلطة؛ حيث تم استخدام تصميم شبه تجريبي بين 90 طالبا من المرحلة الجامعية في تمريض صحة البالغين من جامعة نابلس. تم توزيع الطلبة عشوائيا إلى مجموعة ضابطة وتجريبية. تم استخدام الطريقة التقليدية مع استخدام طرق اللعب للمجموعة التجريبية بينما اسخدمت طريقة التدريس بالطرق المؤينة التقليدية مع استخدام طرق اللعب للمجموعة التجريبية بينما المجموعة منابل ألي ما المرحلة وتجريبية. تم استخدام الطريقة التقليدية مع استخدام طرق اللعب للمجموعة التجريبية بينما اسخدمت طريقة التدريس بالطرق التقليدية لدى المجموعة الضابطة. تم جمع المعلومات من خلال استبيان قبلي وبعدي لكلا المجموعتين، حيث احتوى الاستبيان على أربعة أجزاء؛ جزء متعلق بالمعلومات الديمغرافية ، ومقياس مشاركة الطلاب في المساق، ومقياس التصرف في التفكير النقدي، ومقياس الدافعية في المواد التعليمية. كذلك تم إجراء التصميم النوعي لدراسة الظاهرة بين (15) طالبا من الدافعية في المواد التعليمية. كذلك تم إجراء المساق، ومقياس المواد التعليمية الدافية المواحقيق المساق، ومقياس المواد أول ألمعلومات من خلال الديمغرافية ، ومقياس مشاركة الطلاب في المساق، ومقياس المورف في المعلومات الديمغرافية من المواد التعليمية. كذلك تم إجراء التصميم النوعي لدراسة الظاهرة بين (15) طالبا من الدافعية في المواد التعليمية. وقد تم جمع البيانات عن طريق الأسئلة الموجهة في المقابلات شبه المنظمة.

تشير القيمة (257.05 ( P=0.21 ) بناءً على اختبار (Mann - Whitney) إلى عدم وجود فروق ذات دلالة إحصائية في متوسط علامات الطلاب لدى المجموعة الضابطة 79.76 (SD=5.985) المجموعة التجريبية 80.22 (SD=5.130). كانت قيم p التي استدت على فحص (Independent t test) أكثر من 0.05 في الاختبار القبلي للمشاركة (P=0.267) ، والدافعية (P=0.612) والتفكير النقدي (P=0.959) لدى المجموعتين الضابطة والتجريبية ، مما يشير إلى عدم وجود فروق إحصائية في الوسائل قبل التجرية. كان متوسط درجة المشاركة في الاختبار البعدي للمجموعة التجريبية 3.854 فروق ذات دلالة إحصائية والحدة المشاركة في الاختبار البعدي للمجموعة التجريبية 3.854 فروق ذات دلالة إحصائية واضحة (CO.001) . كانت درجة الدافعية البعدي للاختبار المتوسط للمجموعة التجريبية 3.754 (SD=0.252)، وهي أعلى من درجة المجموعة الضابطة البالغة 3.332 للمجموعة التجريبية 5.754 (SD=0.252)، وهي أعلى من درجة المجموعة الضابطة البالغة 3.332 النقدي البعدي للمجموعة التحريبية واضحة (SD=0.261)، وهو أعلى من درجة المجموعة المتوسط المجموعة التجريبية 3.754 (SD=0.252)، وهي أعلى من درجة المجموعة الصابطة البالغة 3.332 النقدي البعدي للمجموعة التحريبية 2.50 (SD=0.292)، وهو أعلى من درجة المجموعة الضابطة البالغة SD=0.292) وكانت فروق ذات دلالة إحصائية واضحة (SD=0.291). كان متوسط درجة التفكير النقدي البعدي للمجموعة التجريبية 3.125 (SD=0.292)، وهو أعلى من درجة المجموعة الضابطة البالغة SD=0.2021) وكانت الفروق ذات دلالة إحصائية واضحة (SD=0.291). كان متوسط درجة التفكير النقدي البعدي للمجموعة التجريبية 5.125 (SD=0.292)، وهو أعلى من درجة المجموعة الضابطة البالغة SD=0.2021)، وكانت الفروق ذات دلالة إحصائية واضحة (SD=0.2021). خرجت النقدي البعدي للمجموعة التجريبية 5.125 (SD=0.292)، وهو أعلى من درجة المجموعة الضابطة البالغة SD=0.2021)، وكانت الفروق ذات دلالة إحصائية واضحة (SD=0.2021). خرجت النقدي البعدي المجموعة التجريبية 5.125 (SD=0.292)، وهو أعلى من درجة المجموعة الضابطة البالغة النوعية للدراسة بأن طرق اللعب لها أثر إيجابي على مخرجات تعلم الطلبة من خلال تعزيز بيئة تعليمية متجذرة في الدعم والتعاون، المنافسة والإبداع العقل المتفتح والجوانب المعرفية المختلفة، وتفاعل وتشاركية الطرابي بشكل فعال في غرفة الصف، وتعزيز الدافعية للتفعة والجوانب المعر

يوصى بإجراء بحث طولي لمراقبة عملية التأثير على المدى الطويل على نتائج مخرجات التعلم. ويوصى كذلك باستخدام هذه التقنية عبر العديد من المؤسسات التعليمية، ومسافات أخرى في التمريض وبأحجام عينات أكبر.

الكلمات المفتاحية: طرق اللعب في التدريس؛ تمريض صحة البالغين؛ طلبة المرحلة الجامعية؛ مخرجات التعلم.