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Original Article

Preparedness of Nursing Students toward Implementation of Gaming as an Educational Strategy at Faculty of Nursing Damanhour University

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Abstract:

Background: Gaming is an innovative teaching strategy used to helps students to be engaged in the learning process and inspires their motivation. It is considered an alternative method of traditional teaching which depending on fun and joyful learning. **This study aims:** To assess the preparedness of nursing student toward implementation of gaming as educational strategy at Faculty of Nursing Damanhur University. **Research design:**Descriptive design was used to conduct the present study. **Subjects:** students enrolled in the four academic years (n=350) using a systematic random sampling. **Tools:** "Nursing students' preparedness towards gaming questionnaire ".It consisted of 59 questions in three parts to measure the preparedness of nursing student toward implementation of gaming as education strategy. **Results:** The findings of this study revealed that there was statistically significant preparedness toward implementation of gaming as educational strategy among the nursing students. **Conclusion:** It concluded that a highly statistically significant difference between preparedness of nursing students and implementation of gaming as an educational strategy. **Recommendations:** Providing students with workshops and training program to help them dealing with gaming strategy, providing students with courses and traning programs in computer using to help them improving their skills in computer use.

Keywords: **preparedness,** nursing students, gaming as an educational strategy, Nursing education.

Introduction:

Technology is a production of humans' development. [(1)] It is becoming a global phenomenon in a short time.[(2)] Now, technology innovation devices or portable digital assistant devices are available anywhere.[(3,4)] Educators prefer technology usage in teaching and learning because it's flexible, available and comfortable.[(3,5)] It is implemented increasingly in higher education.[(2)] Educators try to be up to date by using technology in education.[(6)] Technology has a very important role that serves higher education by changing the teaching-learning landscape. [(3,5)]

The use of digital technology in nursing education offers numerous advantages that enhance both the learning experience and outcomes for students. It provides greater access to resources, including interactive simulations and online learning platforms, which support a more flexible and personalized learning environment. Furthermore, technology helps bridge the gap between theory and practice by offering students opportunities to engage in clinical simulations and case-based learning, thus improving their clinical reasoning and decision-making skills. The educators must try to understand students' needs and pay attention to their training and education to make them better. So, many universities try to replace the traditional ways by using technology in nursing and produce innovative strategies in nursing education as gaming. [(7,8)]

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Gaming strategy as an innovative teaching strategy has gained attention for its ability to enhance student engagement and foster active learning. In the context of education, game-based learning introduces elements of competition, collaboration, and problem-solving, which can make complex concepts more accessible and enjoyable for students. [9] In addition, it is considered an alternative method of traditional teaching which depending on fun and joyful learning. [1] Game based learning make the learning more playful and help students play as a team. Educational games play a positive role in learning process. They produce the learning subject in an interesting way with fun. [9,10]

Game based learning provides alternative methods for educators to improve intended learning outcomes [14]. Combination of serious games and gamification in learning activities support students' critical thinking, feedback, memorization, retention, active participation and positive experiences [14]. Providing innovative pedagogical solution is one of its advantages because nursing students can use it anytime and anywhere [7]. Students learn an experimental learning by gaming which develop their skills such as problem solving, decision making and clinical reasoning [12,14].

Gaming strategy encourages students improve skills such as creativity, critical thinking, communication, decision making, and problem solving.[11] moreover, it helps them to extend the process of the educational material outside the classroom which increase chances in finding and long memorize of information.[12] It provides students' learning with fun and interesting and by developing a positive attitude toward learning.[11] It increase students excitement to learn the subject and at the same time improve memorization of them.[13]

In addition, gameing as an educational strategy regarding their answers feedback which help student to memorize the information easily.[12] Also, motivation and engagement are very important benefits of gaming which educator try to improve them in their teaching process. [11,15] Game based learning help student to be active learner, thinking out of the box, intensity of preparation and have a collaborative awareness to the subject [13,14].

Researches continue to show how helpful gaming can be when it applied appropriately in the classroom. Gaming encourages students to have a positive attitude toward education, assists them in becoming self - learners, and encourages critical thinking, all while improving social skills. [14] Gaming creates positive social connections, develops 21 century abilities, and enhances academic performance, in addition to adaptability and attention seeking.[14, 15]

According to Ismel.M et al. [19] both educators and students regard game-based learning (GBL) as an engaging and beneficial teaching method, with strong support for its adoption. At Alexandria University, students utilize GBL for both instructional purposes and course evaluation, while at Damanhour University, it is exclusively integrated into teaching, with significant impact across student groups. GBL is generally used to enhance student satisfaction and enjoyment, and students also demonstrate a moderately high level of competency in information handling.[19]

In addition, according to El Idrissi et al(2022).[20] in their study about the impact of serious game on the nursing students' learning, behavioral engagement, and motivation in Morocco to examine the effects of the serious game on nursing students' motivation and their ability to learn. The main findings demonstrate, on the one hand, the game's beneficial influence on the acquisition of clinical knowledge in nursing through a comparison of the scores attained by the experimental and control groups.[20]

On the other hand, technology has also difficulties facing both teachers and students such as; the educator should know more and more about how to use technology in education, educators' attitude toward increasing their training demands to achieve successful intended learning outcomes and it can be time-consuming for educators.[16] As for the students they have bad writing skills because of ongoing chatting, social communication is decreased because of only communication from mobile screen, loss their focus they can do many things on the smartphone or laptop in the same time and it can be expensive for many students.[16,17,18]

Also El Idrissiet al (2022)[20] agreed that there were potential disadvantages of using serious games in nursing education include the need for skilled educators to effectively integrate and guide game use within learning environments. If games are not well-designed or are poorly integrated into the curriculum, their educational impact could be limited. Additionally, achieving full integration with quality mechanisms and active instructor support may require significant resources and training, which could be challenging in some educational settings.[20]

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Objective of the study:

The current study aimed **to** assess the preparedness of nursing student toward implementation of gaming as an educational strategy at Faculty of Nursing Damanhour University.

Research questions

1. What is nursing students' preparedness toward the gaming?
2. What are the advantages and challenges of gaming as perceived by nursing students?

II. Materials and Methods

Research Design:

A descriptive study design was adapted to carry out this study.

Setting:

The study was carried out at Faculty of Nursing Damanhur University, Egypt throughout the academic year 2020-2021. It included departments such as: Adult nursing, Critical and emergency nursing, Obestatric and gynecology, Pediatric nursing, Nursing administration, Psychatric nursing, Community nursing and Nursing education.

Sampling:

The total numbers of nursing students in year 2020/2021 are 1865 students. Population size was1865 students, prevalence of the problem was 50%, confidence level of student was 95%, margin of error was 5%, minimum sample size was (350 students for possible non response)

Academic year	Study sample	Total number of students per class
Frist year	(350 ×457)/1865	86
Second year	(350 ×639)/1865	120
Third year	(350×445)/1865	83
Forth year	(350×324)/1865	61

*According to students affairs, faculty of nursing Damanhour University

Study Tools:

One tool was included in this study. **"Nursing students' preparedness towards gaming questionnaire"**

It was modified by the researcher [8, 19-22] after reviewing of recent literature. The questionnaire consisted of 3 parts**:Part I:** socio-demographic data: this included collecting data about age, gender, grade,…etc**, part II: " this part consisted of 4 dimensions:** dimension Ⅰ: The ability to learn autonomously in gaming, dimension Ⅱ: learner-content interaction in gaming, dimension Ⅲ: learner-instructor interaction in gaming, dimension Ⅳ:learner-learner interaction in gaming, **part III:** Opinions of the students of advantages and challenges of gaming.

As for scoring system, which was used for scoring for positive statements strongly agree (5), agree (4), neutral (3), disagree (2), strongly disagree (1). Reversed score was taken into consideration. The scoring system is as follows: Low Preparedness score: < 50% Moderate Preparedness score: %50 %-< 75% High Preparedness score: ≥75%

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Methods:

The study was executed according to the following:

1. Official letters were directed to the Dean of the Faculty of Nursing, Damanhur University and heads of all scientific departments after explanation of the aim of the study to obtain permission to collect data from nursing students.
2. The tool was adapted and translated by researcher after a thorough review of literature.
3. Content validity of the tool by five experts of nursing education field.
4. The tool reliability was measured using Cranach's alpha test. The tool was reliable and the test value was (0.984)
5. A pilot study: the tool was tested for feasibility and applicability by exposing it to group of students (n=35) who were not included in the original study sample. The aim of the pilot study was assess item clarity, feasibility and applicability and confirm the anticipated amount of time needed by respondents to complete the questionnaire. Necessary modification was done accordingly.

Data collection procedure :

Data was collected through using WEB2 application (Google forum). A small group of students in the faculty were given an explanation of the goal of the study. Responses to all of their questions were given. The students were given the link of Google Forum and they shared it with their colleagues to fill it contact with students was made through application such as what's app, Telegram, Facebook groups and Messenger. This task continued for two weeks

Statistical analysis:

Following the collection of data, appropriate statistical analysis tests were employed to determine significant relationships and address the study topic. Using statistics SPSS (statistics Package for Social Sciences) version 25.0, it was edited, coded, and moved into the intended format.When applicable, data were categorized into numerical or category groups.

Ethical considerations:

- The research approval was obtained from the ethical committee at the Faculty of Nursing, Damanhur University, prior to the start of the study.
- Right to withdraw to participate in the research was assured.

Results:

Distribution Of the Studied Nursing Students According to The Levels Of Preparedness towards Implementation of Gaming as Educational Strategy:

According to the figure, respectively two thirds of the high students in the studied sample (57.7%) had high ability to learn autonomously, about one third had moderate level and (6.9%) had low level.

The figure indicated that, half of the students in the studied sample (52.3%) had high level of preparedness of learner- content interaction in gaming, more than one third of them (40.3%) had moderate levels, (7.9%) had low levels.

Regarding to levels of preparedness about two thirds of the students in studied sample (54.9%) had high level of preparedness of learner-instructor interaction in gaming, more than one third of them (35.4%) had moderate levels, (9.7%) had low level.

With respect to levels of preparedness about two thirds of them (63.7%) had high level of preparedness of learner-learner interaction in gaming, while about one third (29.7%) had moderate levels, (6.6%) had low levels.

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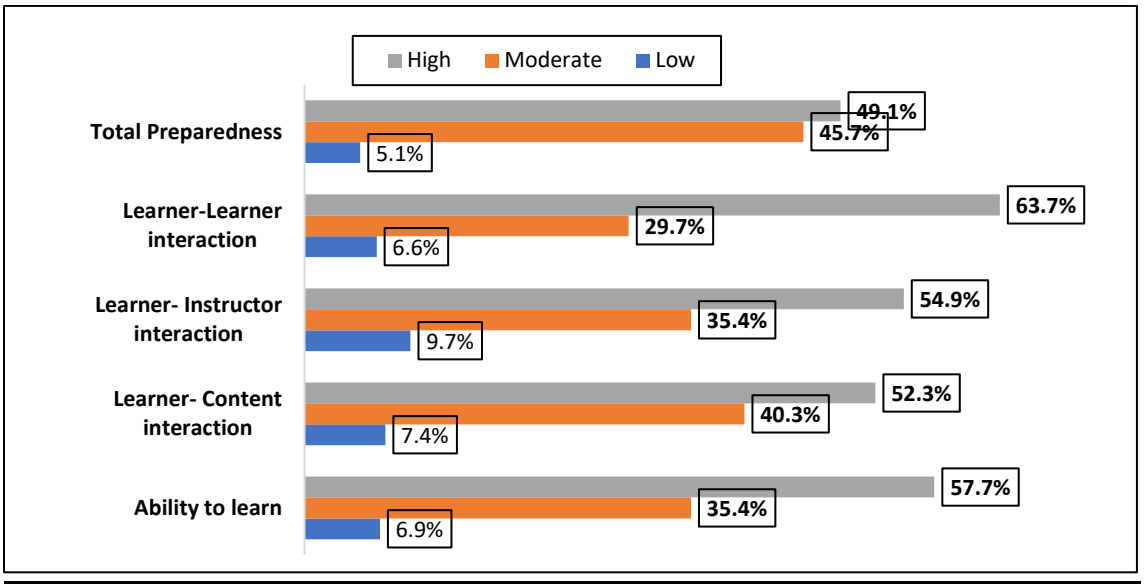

Figure (1) students level of preparedness towards implementation of gaming as educational strategy.

Table 1 illustrate the distribution of the Studied Nursing Students According to the Mean Score of Preparedness towards Implementation of Gaming as an Educational Strategy:

According to the table, mean score percentages of the students in the studied sample were ranked that the first (79.68%) was learner-learner interaction in gaming, the second (78.98%) was ability to learn autonomously, the third (78.56%) was learner-content interaction in gaming and the forth (76.32%)was learner-instructor interaction in gaming.

Table (1): Distribution of the Studied Nursing Students According to the Mean Score of Preparedness towards Implementation of Gaming as an Educational Strategy:

Items	Mean Scores		Mean Percentage Score	Rank
	Min- Max	Mean ± SD		
Ability to learn autonomously	13-65	51.33 ± 8.335	78.98%	2
Learner - Content interaction in gaming	24-120	94.27 ± 15.77	78.56%	3
Learner - Instructor interaction in gaming	8-40	30.53 ± 6.257	76.32%	4
Learner - Learner interaction in gaming	11-55	43.83 ± 7.480	79.68%	1
Total Preparedness	56-280	219.96 ± 35.00	78.56%	

Table (2) Provide the relationship between the Studied Nursing Students' Level of Preparedness towards Implementation of Gaming as an Educational Strategy and Their Basic Characteristics

The table indicated that there was a significant relationship ($p \leq 0.05$) between the students in the studied sample level of preparedness of gaming with their age and sex.

Table (2): Relationship between the Studied Nursing Students' Level of Preparedness towards Implementation of Gaming as an Educational Strategy and Their Basic Characteristics:

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Items	Levels of Preparedness						Total N=350		Test of Significance
	Low (N= 18)		Moderate (N= 160)		High (N= 172)				
	No.	%	No.	%	No.	%	No.	%	
Age (years)									
17-	3	15.0	11	55.0	6	30.0	20	5.7	X^2=10.494
19-	10	6.9	58	40.3	76	52.8	144	41.2	P=0.033*
21-22	5	2.7	91	48.9	90	48.4	186	53.1	
Sex									
Male	7	6.2	61	54.5	44	39.3	112	32.0	X^2=6.408
Female	11	4.6	99	41.6	128	53.8	238	68.0	P=0.041*
Academic year									
First	8	9.3	33	38.4	45	52.3	86	24.6	X^2=11.952
Second	8	6.6	62	51.7	50	41.7	120	34.3	P=0.063
Third	2	2.4	38	45.8	43	51.8	83	23.7	
Fourth	0	0.0	27	44.3	34	55.7	61	17.4	
Place of residence									
Urban	2	2.4	33	39.3	49	58.3	84	24.0	X^2=4.538
Rural	16	6.0	127	47.7	123	46.3	266	76.0	P=0.103

X^2 Chi Square Test * Statistically significant at $p \leq 0.05$

Table 3 Showed the relationship between the studied nursing students' level of preparedness and their computers and internet availability, usage and efficiency:

The result revealed that, there was a highly significant relationship (P≤0.001) between studied students' level of preparedness towards gaming and having personal computer, having smart phone and having internet at smart phone (WIFI). As the table, there was significant relationship (P≤0.05) between studied students' level of preparedness towards gaming and having personal internet at home, previous study with games, hours of computer use in gaming and duration of surfing internet.

In the other hand, there was not a significant relationship (P> 0.05) between studied students' level of preparedness towards gaming and level of skills of skills in computer, internet surfing and level of technology use skills.

Table (3) Relationship between the Studied Nursing Students' Level of Preparedness towards Implementation of Gaming as Educational Strategy and their Computers and Internet Availability, Usage and Efficiency:

Items	Levels of Preparedness						Total N=350		Test of Significance
	Low (N= 18)		Moderate (N= 160)		High (N= 172)				
	No.	%	No.	%	No.	%	No.	%	
Have personal computer									
No	11	6.4	95	54.9	67	38.7	173	49.4	X^2=14.865
Yes	7	4.0	65	36.7	105	59.3	177	50.6	P=0.001*
Level of skills in computer use									
Poor	6	6.8	45	51.1	37	42.0	88	25.2	X^2=5.149
Fair	11	5.3	94	45.4	102	49.3	207	59.1	P=0.272

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Good	1	1.8	21	38.2	33	60.0	55	15.7	
Have smart phone									
No	3	33.3	4	44.4	2	22.2	9	2.6	X^2=15.64
Yes	15	4.4	156	45.7	170	49.9	341	97.4	0 P=0.000*
Have personal internet at home									
No	6	9.1	38	57.6	22	33.3	66	18.9	X^2=9.105
Yes	12	4.2	122	43.0	150	52.8	284	81.1	P=0.011*
Have internet at smart phone (WIFI)									
No	8	6.5	72	58.5	43	35.0	123	35.1	X^2=15.26
Yes	10	4.4	88	38.8	129	56.8	227	64.9	7 P=0.000*
Previous study with games									
No	15	5.8	127	49.4	115	44.7	257	73.4	X^2=7.608
Yes	3	3.2	33	35.5	57	61.3	93	26.6	P=0.022*
Duration of computer use in gaming (hours)									
One	5	4.0	58	46.8	61	49.2	124	35.4	X^2=12.52
Two	1	2.1	16	33.3	31	64.6	48	13.7	7
Three	0	0.0	8	34.8	15	65.2	23	6.6	P=0.051*
Four and more	12	7.7	78	50.3	65	41.9	155	44.3	
Duration of surfing internet (hours)									
One	1	1.8	30	54.5	24	43.6	55	15.7	X^2=16.26
Two	6	9.0	29	43.3	32	47.8	67	19.1	8
Three	8	12.3	23	35.4	34	52.3	65	18.6	P=0.012*
Four	3	1.8	78	47.9	82	50.3	163	46.6	
Internet surfing									
General information	5	2.8	85	47.2	90	50.0	180	51.4	X^2=7.711
Gaming	4	10.3	15	38.5	20	51.3	39	11.1	P=0.260
Social media sites	7	9.0	37	47.4	34	43.6	78	22.4	
Films/ Music	2	3.8	23	43.4	28	52.8	53	15.1	
Level of technology use skills									
Poor	7	7.4	47	49.5	41	43.2	95	27.1	X^2=3.379
Fair	10	4.5	97	43.3	117	52.2	224	64.0	P=0.497
Good	1	3.2	16	51.6	14	45.2	31	8.9	

Table (4): **Table 4 revealed relationship between the studied nursing students' mean score of preparedness and their computers availability, usage and efficiency:**

The table showed that there were relationships between the students in the sample mean score of preparedness with having personal computer (P=0.000), fair level of skills in computer (P=0.023), having smart phone (P=0.002), having internet at home (P=0.00), having internet at smart phone (WIFI) (P=0.00), previous study with games (P=0.006), hours in using computer in gaming (P=0.001), hours in surfing internet and internet surfing (P=0.037).

In the other hand, there was no significant relationship between the students in the sample mean score of preparedness with level of technology (P=0.165)

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Table (4) Relationship between the Studied Nursing Students' Mean Score of Preparedness towards Implementation of Gaming as Educational Strategy and their Computers Availability, Usage and Efficiency:

Items	Mean Score of Preparedness Mean ±SD	Test of Significance
Have personal computer		
▪ No	212.88±36.91	t=14.510
▪ Yes	226.87±31.63	P=0.000*
Level of skills in computer use		
▪ Poor	211.77±38.11	F=3.830
▪ Fair	221.53±34.37	P=0.023*
▪ Good	227.13±29.99	
Have smart phone		
▪ No	184.78±54.35	t=9.561
▪ Yes	220.89±33.98	P=0.002*
Have personal internet at home		
▪ No	203.83±36.86	t=18.108
▪ Yes	223.70±33.52	P=0.000*
Have internet at smart phone (WIFI)		
▪ No	212.25±35.08	t=9.412
▪ Yes	224.13±34.32	P=0.002*
Previous study with games		
▪ No	216.85±35.83	t=7.759
▪ Yes	228.54±31.19	P=0.006*
Duration of computer use in gaming (hours)		
▪ One	220.50±34.79	F=4.102
▪ Two	229.83±26.96	P=0.001*
▪ Three	237.65±27.63	
▪ Four and more	237.35±25.59	
Duration of surfing internet (hours)		
▪ One	214.47±34.84	F=2.888
▪ Two	212.88±40.41	P=0.036*
▪ Three	217.82±41.51	
▪ Four	225.57±28.705	
Internet surfing		
▪ General information	222.16±31.54	F=2.863
▪ Gaming	221.21±40.09	P=0.037*
▪ Social media sites	210.15±39.82	
▪ Films/ Music	225.98±32.81	
Level of technology use skills		
▪ Poor	214.19±36.29	F=1.812
▪ Fair	222.32±35.01	P=0.165
▪ Good	220.58±29.41	

F ANOVA test t Student T Test * Statistically significant at $p \leq 0.05$

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Table 5 Illustrate correlation matrix between dimensions of preparedness towards implementation of gaming as educational strategy among the nursing students:

The table revealed that there was a high statistically significant strong positive correlation between overall dimensions; ability to learn, learner-content interaction, learner-instructor interaction, learner-learner interaction of preparedness towards implementation gaming among students in the sample.

Advantages of gaming	(n=350)	
	No.	%
Increase concentration, repeat comprehension of the curriculum, consolidate information, interaction with others and motivation.	148	42.2%
Developing educational skills, facilitating access to information, increase enthusiasm, excitement and increases fun.	96	27.4%
Good psychological state and reduce depression, increase self-confidence, give freedom of education, creativity and creating new ideas	68	19.4%
Others	38	10.8%

Table (5) Correlation Matrix between dimensions of preparedness towards implementation of gaming as educational strategy among the nursing students:

Items		**Ability to learn**	**Learner-Content Interaction**	**Learner - Instructor Interaction**	**Learner -Learner Interaction**	**Total Preparedness**
Ability to learn	r					
	P					
Learner-Content Interaction	r	0.883				
	P	0.000*				
Learner-Instructor Interaction	r	0.681	0.802			
	P	0.000*	0.000*			
Learner-Learner Interaction	r	0.731	0.798	0.812		
	P	0.000*	0.000*	0.000*		
Total Preparedness	r	0.905	0.970	0.876	0.893	
	P	0.000*	0.000*	0.000*	0.000*	

r Pearson Correlation Coefficient * Statistically significant at ≤ 0.05

Table (6) explained the opinions of students toward the advantages of gaming as educational strategy:

The table shows that about less than half of the students' sample in the current study stated that Increase concentration, repeat comprehension of the curriculum, consolidate information, interaction with others and motivation. The table indicates that less than one third of the students wrote that gaming developing educational skills, facilitating access to information, increase enthusiasm, excitement and increases fun. Also, the table explains less than twenty (19.4%) of the students in the sample stated that gaming makes good psychological state and reduce depression, increase self-confidence, give freedom of education, creativity and creating new ideas. Finally, about (10.8%)stated other statements.

Table (6) Advantages of Gaming as Educational Strategy related to Students' opinion:

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Table 7 illustrated the challenges that students stated in the study about gaming as an educational strategy:

The table shows that about less than half of the students' sample in the current study stated that gaming May be wasting our time, poor internet, power outages and technical problems in playing. Less than one third of students in the sample of the study stated that Lack of materials (computer, mobile phone, internet), inability to use technology, financial obstacles and possibilities. About (20%) of the studied students stated that lack of appropriate environment, lack of response or training of educator and student and lack of focus. Less than ten percent (5.7%) of the students in the sample stated other statements.

Table (7) Challenges of Gaming as Educational Strategy related to Students' Opinion:

Challenges of gaming	(n=35)	
	No.	%
May be wasting our time, poor internet, power outages and technical problems in playing.	160	45.7%
Lack of materials (computer, mobile phone, internet), inability to use technology, financial obstacles and possibilities.	100	28.5%
Lack of appropriate environment, lack of response or training of educator and student and lack of focus.	70	20%
Others	20	5.7%

Discussion:

Nursing expertise is dependent on the preparation of nursing students who have recently graduated for a necessary work environment and care practices that take shape throughout nursing education.[23] As nursing is both a scientific subject and a practical discipline, educators must teach undergraduate nursing students how to apply knowledge which was taught in classrooms to actual clinical practice.[24] Mapping the connection between theoretical knowledge and the practical applications of this knowledge is an essential part of providing nursing students with the skills, mindsets, and attitudes they require for clinical work.[25]

There is a continuous dynamic change in the work environment, such as the new technological health system or disease revolution. As a result, nursing students' skills must meet the requirement for constant improvement that future health professionals require.[26] Nurse educators are challenged to use teaching strategies that maintain students' motivation to learn.[27] Game-based learning is considered one of these strategies, as it is steadily gaining appeal as an influential tool to facilitate learning. This has been shown effective in motivating students to learn in an enjoyable way and has been shown to promote knowledge retention and 21st-century skills.[28,29]

Gaming strategy is an important opportunity to help the student to think long and hard, develop the ways of education, lifelong learning perspective, ability to motivate players, and authentic communicative practices.[30] However, there is a lack of research concerned with gaming strategies to be used in the learning process and the readiness of nursing students toward it. Accordingly, this study aimed to assess the preparedness of nursing students for the implementation of gaming as an educational strategy at the Faculty of Nursing at Damanhur University.

The findings of the current study offer important insights into the preparedness of nursing students at Damanhur University to adopt gaming as an educational strategy. Several key factors, including demographic characteristics, computer and internet usage, and levels of preparedness for learner-content, learner-instructor, and peer interactions, have been examined in detail.

Regarding the demographic analysis of the nursing students revealed that the majority of the sample consisted of young adults, with more than half of the students aged between 21-22 years. This age group

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typically represents the generation of young adults who are more familiar with digital tools and modern educational technologies, which could potentially facilitate the integration of gaming as an educational strategy. This is may be due to they ended their high school and started higher education at the same time as a result of the education system in Egypt.

In the essence, Mohamed et al.[31] in their study about the impact of using social networking as a learning aid on nursing students' academic engagement and achievement, the highest percentage of nursing students' age group ranged between (20-21) years old.

In the current study showed that the gender about two thirds of the participants were female Also, the study found a statistically significant relationship between gender and preparedness (p=0.041), indicating that female students may be more prepared or adaptable to the integration of gaming strategies. Further research could explore the underlying reasons for this difference, such as differences in learning preferences or prior exposure to technology. This may be due to Egyptian culture that prefer female in nursing profession. Also, this aligns with global trends in nursing education, where females represent the dominant demographic.

This was consistent with Ignacio et al.(2020) [32] in their study about the use of web-based classroom gaming. They enrolled 128 undergraduate nursing students to determine the effectiveness of utilizing a web-based classroom gaming platform on students. The majority of students were females (83.7%) with a mean age of 20 years. Also, this agreed with Almashayek et al.(2022) [33] in their study about effective method for nurses education: gaming versus lecturing, they concluded that female students were more than male students, as female students were about two thirds and male students were one third.

Also, the current study was supported by Martos et al. (2024) [34] in their study about the effectiveness of gamification in nursing degree education where quasi-experimental study was conducted with 122 students from the nursing degree program and about three quarters of the student were female.

These findings were somewhat different from what was reported by Roca et al. (2023) [35] in their study about assessing health science students' gaming strategy experience. In a cross-sectional study on students from the faculty of health sciences, male students were more than female students.

As regards the place of residence, more than three quarters of the students were from rural areas and about one quarter was from urban areas. The study found a statistically significant relationship between the studied nursing students' mean score of preparedness and rural areas as a place of residence (P=0.026). This is because Boheira is considered rural governorate.

The current result disagreed with Abd El-Aziz et al (2022)[36] in their study about the effect of Kahoot game based versus nongame based on learning achievements and anxiety among nursing students disagreed with these results as they found that more than three quarters in Kahoot game-based group and in nongame-based group were from urban areas. Also, the study reported homogeneity between nursing students in both groups with no statistically significant difference between them regarding all socio-demographic characteristics.

Today most students are using smartphones and personal computers as means of communication and to be interactive on social media because it enables them to connect the internet, and it has many features. They can gain benefits from smartphones as it provide them internet access, e-mails, a global positioning system, and personal digital assistance. In addition, the health care system is increasingly becoming dependent on technology; consequently, nurses and/ or student nurses in all regions of the world are expected to develop their skills in information and communication technology.[34]

A key finding from the study was that while over half of the students (50.6%) had access to personal computers, a significant proportion (49.4%) did not, which could present challenges as lack of materials (computer, mobile phone, internet), lack of appropriate environments and financial obstacles and possibilities for widespread adoption of gaming strategy in education. This is a clear justification for addressing the digital

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divide and improving access to essential technological resources for students, especially those from rural and low-income backgrounds.

The present findings are similar to Mahmoud et al (2020)[37] in their study about barriers and opportunities; nursing students perspectives, they reported that about half of the students lack personal computers, which poses challenges for effectively utilizing e-learning tools, educational software, or gaming strategies. The lack of access to necessary technology, such as computers and smartphones, is highlighted as a significant barrier in their study, reflecting a broader issue of digital inequality among students.

Internet availability was much higher, with more than three quarters of the students having personal internet at home and about two thirds having internet data on their smartphones. The strong internet penetration provides a favorable foundation for introducing digital learning tools, including gaming strategy, into the curriculum, as it can increase comprehension of the curriculum, increase concentration, repeat and consolidate information, also, it can increase motivation and love of studying.

The current findings are in line with Plass et al (2015)[38] in their study about foundations of game-based learning, they found that game-based learning (GBL) is beneficial in engaging students by providing a more interactive learning environment. Educational games can adapt to individual learning paces and provide instant feedback, enhancing motivation and participation, particularly when students have access to the necessary internet and devices.

In the current work, the study also indicated that while above half of students had a fair level of skill in using computers, a notable portion had either about one quarter had poor skills and less than twenty had good skills. This disparity in technological proficiency from the researcher point of view may be due to that students need additional training or support might be necessary to ensure that all students can fully engage with gaming strategy platforms. This finding is reinforced by the significant correlation ($p=0.001$) between the students' preparedness for gaming strategy and their computer usage and skills.

The current findings were supported by Harerimana et al (2020)[39] in their study about types of ICT applications used and the skills' level of nursing students in higher education, they found that more than half of the nursing students had a fair level of computer skills, while one quarter of students exhibited poor skills, and less than twenty had good skills in using ICT applications. This distribution highlights the varying levels of digital literacy among nursing students, with a significant portion only possessing moderate competency in using ICT tools necessary for their education.

The result of preparedness in the current study showed that students generally had a positive attitude toward the implementation of gaming as an educational tool. More than half of the students demonstrated a high level of preparedness for autonomous learning, learner-content interaction, learner-instructor interaction, and learner-learner interaction domains the study participate respectively.

As regarding, more than half of the students demonstrated a high level of preparedness for the ability to learn autonomously domain in the study may be due to that students need to learn anytime and anywhere, be able to self-evaluate, have immediate feedback, increase concentration and attentional capacity and view oneself positivity as a learner.

Present findings are similar to Bodur et al. (2024)[40] in their study about assessing the virtual reality perspectives and self-directed learning skills of nursing students, they supported the findings regarding nursing students' preparedness and positive attitudes toward game-based learning. They found that more than half of the students showed a high level of preparedness for self-directed learning, there was a significant emphasis on effective engagement with the content. The use of serious games facilitated better interactions with instructors, and students experienced enhanced collaboration with peers..

It was also supported by Maheu-Cadotte et al. (2021) [41] they provided relevant findings that support the understanding of preparedness and attitudes toward gaming strategy in education among nursing students. The study indicated that healthcare students, including nursing students, had a generally favorable view of

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serious games as educational tools. This highlights a willingness to engage with gaming strategy as part of their learning experience. Many students reported feeling more capable of self-directed learning when using serious games, also serious games facilitate improved interactions between students and instructors.

However, a minority of students (around 7%) showed low preparedness for autonomous learning and learner-instructor interaction domains study participate. This could reflect a preference for more traditional, instructor-led learning methods, a lack of confidence in self-directed learning through gaming strategy, inability to use technology or underestimating the method of learning. Addressing this issue may require careful introduction and orientation to gaming-based learning strategy, to ease students into more independent and interactive methods of learning.

According to the current result in a previous study conducted by Halasa et al.(2021)[42] who examined student achievement in traditional learning environments compared to a combination of blended and flipped learning methods. They found that many students expressed a strong preference for traditional, instructor-led learning methods, highlighting the value they placed on the structure and direct interaction with educators that these methods provided. The research indicated that students in traditional learning settings achieved academic performance levels comparable to those participating in blended and flipped learning models.

As for learner-content interaction domain in the current study, about half of the students have preparedness to implement gaming as an educational strategy. From the researcher point of view this may be due to that students need to ease the process of learning, be encouraged to learn more, increase the capacity, feel freedom in learning process and be decision maker.

It is interesting to note that students are open to the idea of using gaming strategy in their education, especially when it involves interaction with peers. Peer learning has long been recognized as an effective strategy in nursing education, and the high level of preparedness for learner-learner interaction domain the study participated, in gaming strategy further supports this. This finding suggests that multiplayer or cooperative educational games, which require peer collaboration, may be particularly effective in this educational context.

The analysis revealed significant relationships between certain demographic factors and levels of preparedness. Specifically, there was a statistically significant relationship between age ($p=0.033$) and preparedness,. This could be due to the increased academic maturity or prior exposure to different teaching strategies among students. Similarly, a significant relationship between gender and preparedness ($p=0.041$) indicates that female students were more receptive to this method.

Interestingly, there was no significant relationship between students' academic year or place of residence and their preparedness ($p>0.05$), suggesting that readiness to adopt gaming strategies transcends these variables. However, urban students showed a slightly higher mean score of preparedness than rural students ($p=0.026$), potentially this may be due to greater access to technology in urban areas.

The strong positive correlations between different domains study participate of preparedness-autonomous learning, learner-content interaction, learner-instructor interaction, and learner-learner interaction demonstrate that these components are interrelated and reinforce each other in a gaming-based learning strategy environment. This finding supports the idea that fostering one aspect of preparedness (e.g., autonomous learning) can enhance other areas (e.g., content interaction or peer collaboration).

Such interconnectivity suggests that a holistic approach to introducing gaming strategy, one that strengthens multiple facets of learning, would be most effective. Students who are prepared to engage in one form of interaction, such as with content, are likely to be equally prepared for interactions with peers and instructors, thereby enhancing the overall learning experience.

The current study found no statistically significant relationship between students' mean scores of ability to learn and their age, sex, or academic year. This suggests that these variables do not play a critical role in students' learning autonomy, consistent with findings from studies by Abdulghani et al. (2018)[43] in

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their study about factors determine academic achievement in high achieving undergraduate medical students, they also found no significant differences in self-directed learning readiness based on age or gender. Similarly, Ismail et al. (2017)[44] in their study about Perception of nursing students and educators toward game based learning as an active learning strategy, they suggested that learning autonomy is more influenced by intrinsic factors than by demographic ones.

However, the study identified a significant relationship between students' mean score of learning ability and their place of residence (urban vs. rural). Urban students scored higher, possibly due to better access to educational resources. This finding aligns with research by Lee et al. (2019)[45] which highlights the positive effect of urban environments on learning due to better infrastructure and resources. In contrast, Wang et al (2022)[46] they found no significant difference between rural and urban students' learning abilities, arguing that technological advances have minimized the rural-urban gap.

According to the current study significant positive relationships were found between students' mean score of ability to learn and having a personal computer, internet access at home, and a smartphone. These results are in line with Henderson et al. (2020)[24] who emphasized that technology access significantly enhances students' learning autonomy. Additionally, Ng et al. (2018)[47] in their study about self-regulation principles with flipped classroom pedagogy for first-year university students, they identified that students with better technological access were more capable of engaging in self-directed learning.

Interestingly, the duration of computer use for gaming strategy was also positively related to learning ability, with students who spent more hours gaming strategy scoring higher. This is a line with Whitton (2018)[48] in his study about Playful learning: tools, techniques, and tactics, he suggested that gaming strategy, when moderated, can enhance problem-solving skills and learning autonomy.

This contrasts with studies like Kuss et al. (2019)[49] in their study about a systematic review of the co-occurrence of gaming strategy disorder and other potentially addictive behaviors, they which highlighted the negative effects of excessive gaming strategy on academic performance. However,

Students with better technology use skills demonstrated a statistically significant advantage in learning ability. This finding echoes the results of O'Connell et al. (2022)[50] in their study about digital scholarship for academic leadership in online learning and teaching, they found that digital literacy enhances students' confidence in managing their learning independently.

In line with the current study findings Jin et al (2024)[51] reported that in their study about the effect of virtual game–based integrated clinical practice and simulation program on undergraduate nursing students' attitude toward learning, the effect of the program was statistically significant in self-directed learning (P = .027).

The current findings were also similar Chang et al (2024)[52] in their study about the effects of game-based learning integrated with the self-regulated learning strategy on nursing students' entrustable professional activities: A quasi-experimental study, a quasi-experimental design was employed in this study, involving a total of 55 nursing university students, The findings showed that the integration of game-based learning with the self-regulated learning strategy could significantly improve students' learning performance, self-efficacy, and learning motivation.

As for the current study a statistically significant relationship was found between place of residence and learner-content interaction, with urban students showing higher levels of interaction. This finding parallels the Ding et al. (2021)[53] study, which found that urban students tend to have greater access to diverse and high-quality content, enhancing their interaction with learning materials.

The study identified a significant relationship between place of residence and learner-content interaction, with urban students performing better due to increased access to educational resources. Lee et al. (2019)[45] in their study about advancement and research trends of smart learning environments in the mobile era, they highlighted that urban environments tend to have better educational infrastructure, which supports

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learning. However, Wang et al (2022) [46] argued that the technological gap between rural and urban areas has diminished, making the difference in learning ability less pronounced.

Significant positive relationships were found between the mean scores of learner-content interaction and various factors related to computer and internet availability, usage, and efficiency among nursing students. The data reveal that students who have personal computers (mean score of 97.37±14.09) and smartphones (mean score of 94.74±15.30) show considerably higher scores in learner-content interaction compared to those who do not have access to these technologies. This aligns with previous research, which suggests that access to personal computing devices significantly enhances engagement and interaction with educational content (Hwang et al., 2020)[54].

Furthermore, the results indicate that having personal internet access at home (mean score of 95.77±15.26) is associated with improved learner-content interaction, emphasizing the role of reliable internet connectivity in facilitating online learning. Studies have shown that students with stable internet access are better positioned to engage with digital learning resources, leading to increased academic performance (Al-Mahrooqi et al., 2019)[55].

Interestingly, the duration of computer use for gaming strategy was also positively related to learning ability, with students who spent more hours gaming strategy scoring higher. This contrasts with studies like Kuss et al. (2019)[49], which highlighted the negative effects of excessive gaming strategy on academic performance. However, Whitton (2018)[48] suggested that gaming, when moderated, can enhance problem-solving skills and learning autonomy.

Prolonged engagement with educational gaming strategy helps students develop their technological skills and comfort levels. Research indicates that regular interaction with digital tools can enhance students' readiness to utilize technology for learning, ultimately improving their academic performance and engagement (Mavroudi et al., 2021)[56]. This points to the importance of encouraging extended use of educational games to develop necessary skills.

Regarding the nursing students' preparedness toward learner-instructor interaction in gaming strategy, the findings indicate that demographic factors such as age, sex, academic year, and place of residence have varying degrees of influence on learner-instructor interaction. Below, we discuss these findings in relation to existing literature, highlighting studies that support and contradict our results.

Previous studies have reported similar results, suggesting that age may not significantly impact the quality of learner-instructor interactions. For instance, a study by Dijkstra et al. (2020)[57] in their study about the influence of teacher-student and student-student relationships, they found that age did not correlate with perceived interaction levels, indicating that factors such as personality and learning environment are more influential.

Studies by Hsieh et al. (2019)[58] supported this finding, showing that both male and female students perceived similar levels of instructor interaction. This can be attributed to the contemporary educational focus on inclusivity and equal opportunity. However, other studies suggest that gender may influence interaction preferences, with female students often reporting a stronger desire for interaction and feedback from instructors (Baker et al., 2024)[59].

The current findings had a statistically significant difference in learner-instructor interaction and various computer and internet use-related data. The findings indicate that specific factors, such as having a personal computer and internet access, significantly influence the quality of learner-instructor interactions. Al-Mahdi et al. (2021)[60] have found that students with personal computers reported higher levels of engagement and interaction with instructors, as technology facilitates better communication and resource access.

However, some research suggests that while technology can enhance interaction, it may also lead to distractions if not managed properly (Gonzalez et al., 2020)[61] in their study about factors influencing

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students' perceived impact of learning and satisfaction in computer supported collaborative learning, they indicated that the mere availability of a computer does not guarantee improved interaction, as its effective use is crucial.

No significant difference in learner-instructor interaction was found based on smartphone ownership and this was in line with Al-Khaldi et al. (2020)[62], who noted that while smartphones provide access to educational resources, they do not necessarily enhance interaction unless integrated thoughtfully into the learning process.

In the current study, Students with personal internet access at home demonstrated significantly higher learner-instructor interaction scores, This finding is supported by a study from Abd El-Aziz et al. (2020)[36], which emphasized that stable internet access fosters more consistent communication with instructors, leading to improved educational outcomes.

However, some scholars caution against excessive gaming strategy, arguing that it may detract from academic engagement and thus negatively impact interactions (Ng et al., 2022)[47] in their study about flipped classroom and gamification approach: its impact on performance and academic commitment. This suggests that while gaming strategy can be beneficial, moderation and context are essential.

The present study is in the same line with Mingyu et al (2023)[64] who showed that the findings in his study about educational games and game-based approaches in higher education, point out that only the cooperation of learners, educators, and institutions can meet the challenges and finally lead to effective learning outcomes. Also agreed with Ortega et al (2023)[65] who indicated that the level of significance was high in aspects related to lecturer-student communication and communication among students.

Present findings indicated the high acceptance of nursing students for all ways of gaming as an educational tool, in particular learner-learner interaction domain the study participated in gaming strategy. This is likely because students are motivated to learn when they are in a group. They no longer feel isolated and benefit from other people's feedback.

There is no statistically significant difference in learner-learner interaction scores based on age (F=0.955, P=0.386). However, the students aged 19-20 years showed the highest mean score (44.38±7.920), while the youngest group (17 years) had the lowest mean score (42.25±6.423). This suggests that older students may feel more comfortable collaborating with their peers, possibly due to more experience in group work and communication.

This trend aligns with Smith et al. (2019)[66], who found in their study promoting social inclusion in educational settings: Challenges and opportunities , older students often report higher levels of peer interaction, potentially due to increased maturity and academic experience, which can enhance collaborative learning skills. Conversely, Johnson (2020)[67] in their study about exploring reactions to game-based selection assessments, they suggested no significant age-related difference in peer collaboration, supporting the insignificance found in the present study.

The academic year did not show a significant effect on learner-learner interaction scores (F=1.161, P=0.325). However, fourth-year students had the highest mean score (44.84±6.121), possibly reflecting greater confidence and familiarity with peers through accumulated experience over the years. First-year students had a similar but slightly lower mean score (44.59±7.630), suggesting that while interaction levels are relatively consistent across academic years, senior students may benefit from more collaborative learning.

This finding is similar to Cook KJ(2022)[68], who showed that senior students generally exhibit better collaboration and communication skills compared to their junior counterparts, as they have more experience working with peers. On the other hand, Thomas & Nair (2023)[69] found that junior students may sometimes have stronger peer engagement due to the novelty and need for support early in their academic journey, though this was not observed in the present study.

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The findings showed that access to computers, internet availability, and good digital skills significantly enhance learner-learner interactions domain the study participated among nursing students. Students who possess these technological resources and competencies are better equipped to engage with peers in collaborative learning environments.

This is consistent with Lee et al. (2019)[45] who found that students with higher digital literacy were more confident in participating in online peer discussions and collaborative projects. Also This is in line with Garcia et al. (2021)[70], who reported that smartphones, through the use of various educational apps and communication platforms like WhatsApp or Zoom, increase peer collaboration.

In the opposite, Yang & Lee (2021)[71], however, argued that online gaming strategy could reduce academic collaboration due to its distraction, which could explain the lower scores for gaming-focused internet surfing.

Finally, in comparison to other teaching approaches, the freedom of choice in their own learning process fostered other key clinical competencies required in nursing practice, such as creativity, innovation for decision-making or problem-solving, or criticism.[39] One possible explanation for these findings may be a lack of value in teaching non-scientific aspects of care, especially given that content-driven teaching is still the most common style in many nursing faculties.[40,41] As a result, these innovative strategies may encourage these competencies by fostering new ideas, critical thinking, creatively alternative solutions, and teamwork-related abilities.[42]

Conclusions and Recommendations:

Conclusion:

Overall, it is can be concluded from the current study that there is high acceptance of nursing students for gaming as an educational tool, supporting the use of games in educational strategies. Also, this study suggest that the wide availability of recent technology positively supports the idea of new educational strategies, and irrespective of the skills, a great passion for education is shown This is important because learning is not only a cognitive process but also an experiential one, especially for adult students. Furthermore, the usage of games in teaching can help call attention to the central role of the body in nursing education and further develop skills such as reflection and self-awareness.

Gaming strategy could even be fully integrated for achieving intended learning outcomes because games add diversity to educational teaching modules. Nevertheless, the integration of games depends on educators' contributions and the way they design and incorporate games into their educators. This means that teachers should be equipped with knowledge and experience, and be aware of guiding students as regards the proper way of playing games. Accordingly, games can be treated mainly as supplementary elements since full integration requires high-quality mechanisms, student engagement, and teachers' support.

Based on the findings of the current study the following recommendation could be made:

- The current study recommended the following:
- Providing students with workshops and training programs to help them deal with gaming strategy
- Integrating gaming strategy into undergraduate and postgraduate nursing courses.
- Preparing students psychologically to use gaming strategy through attending workshops to avoid psychological disturbance.
- Providing students with courses and training programs in computer using to help them improving their skills in computer use.
- Encouraging faculty nursing educators to attend in-service training program.
- Further experimental studies should be conducted to measure the impact on two groups, control and study samples, across all four academic years in the faculty. This should involve comparing changes in knowledge, skills, and attitudes between the control and study samples.

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