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The effectiveness of gamification-based platforms in developing psychological hardiness among students with high levels of psychological disorders

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Abstract: Many diverse educational situations present various challenges, which must be considered to find suitable solutions. Gamification-based platforms have significantly contributed to enhancing learning by employing various motivational elements that greatly contribute to developing intrinsic motivation. This study focused on examining the effectiveness of gamification-based platforms in developing psychological hardiness, exploring four dimensions: commitment, control, challenge, and connection. In this study, a quasi-experimental approach was applied to two experimental groups. The first group used a gamification-based platform, while the second group used a regular platform without gamification. The study aimed to explore the effectiveness of gamification-based platforms in developing psychological hardiness among students with high levels of psychological disorders. Therefore, the study was conducted with a total of 46 eligible students detained in the Jeddah correctional facility. The study discussed the results and statistical tests used to examine the effect of gamification on psychological hardiness across its four dimensions. Several limitations and challenges that may have influenced the study's findings were also discussed, highlighting the need for further research. The results confirmed the effectiveness of using the gamification strategy in enhancing psychological hardiness by developing a sense of commitment, challenge, and control.

Keywords: *Challenge, connection, Commitment, Control, Gamification, Psychological hardiness.*

1. Introduction

Attractiveness and sustained attention are among the most important elements that transform education from a traditional, boring style to an interactive one. Recently, interest in the use of digital learning platforms has increased due to the many circumstances and challenges facing the educational process. This has led specialists to focus significantly on selecting reliable digital platforms to achieve the desired educational goals [1, 2]. Digital platforms have become effective and powerful tools in educational environments [1-6], and studying gamification within them is important.

The term "gamification" refers to the strategic application of game design principles. This strategy typically facilitates the use of digital educational platforms to solve problems, fostering autonomy and connectedness among group members [7]. Also, the gamification in education is a strategy for motivating students to learn using game elements in educational settings. It aims to maximize enjoyment and engagement by encouraging learners to continue learning. Gamification can influence student behavior and motivate them to attend, participate, and take initiative in teamwork to achieve desired educational goals. Gamification is defined as "the application of game design elements and principles in a non-game context to motivate and engage users" [8].

In a study conducted by Li et al. [9] entitled "Examining the Effectiveness of Gamification as a Tool Promoting Teaching and Learning in Educational Settings: A Meta-Analysis." The study included

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5,071 participants across 49 samples. It demonstrated moderate effects of educational discipline, gamification design principles, game duration, and learning environment. The results of this study are consistent with another study conducted by Alzahrani et al. [10], which included 60 students who were divided into two groups to measure the impact of educational platforms on student engagement during the COVID-19 pandemic. The first group used an educational platform with gamification, while the second group used the same platform without gamification. The results indicated a positive effect in favor of the group that included gamification. The study also recommended the use of digital incentives such as points, badges, levels, and leaderboards to increase effectiveness and excitement, thereby motivating students to engage more actively in the learning environment [1, 2]. It should be noted here that a distinction must be made between learning objectives that align with the content and fun and enjoyment objectives that engage learners in education. While the game content determines the learning objectives, the fun and play objectives are linked to the game design elements and their ability to motivate and meet psychological needs. This means that the design and presentation of the content are just as important as the learning outcomes; both are interconnected to achieve specific goals [11].

In our current era, psychological pressures resulting from numerous challenges are on the rise. Psychologists indicate that these pressures have various psychological and social effects. Furthermore, such pressures may lead to feelings of anxiety, lack of confidence, and social disconnection [12]. On the other hand, these challenges can help an individual gain psychological hardiness in all its dimensions (commitment, control, and challenge). They can also contribute to making these challenges a central part of an individual's personality, enabling them to utilize these qualities spontaneously in various life situations [13].

Psychological hardiness varies across all age groups, but it may differ significantly during adolescence, as it overlaps with many of the physiological changes taking place in adolescents. There may also be differences between men and women, because some studies confirm that male adolescents are more psychologically hardy than females [14]. Developing students' psychological variables requires multiple digital activities [15-17], so it is important to consider gamification.

While psychological stress, anxiety, and depression are prevalent at varying rates among people who live normal lives and carry out their daily activities with complete freedom, it is even more likely that these psychological stresses will increase among people who live in prisons and face judicial sentences, which may extend to many long years. A study conducted by the Department of Psychiatry at the University of Oxford found that prisoners suffer from poor physical and mental health. Also, mental disorders are twice as prevalent among prisoners as among the general population. The study confirmed that 11.4% of prisoners had depression, as compared to 6-8% of the general population, and 9% of prisoners had post-traumatic stress disorder, and 3% had a psychotic disorder [18].

Many previous studies have indicated the role of gamification in enhancing students' engagement in the learning process and fostering their creative thinking. Furthermore, some studies have demonstrated the significant effectiveness of gamification elements in enhancing multiple variables, including psychological variables, as well as variables related to productivity and self-efficacy. Also, motivational processes are based on the ability of digital stimuli to influence intrinsic motivation through external incentives [1, 2, 4, 19-21]. Despite the existence of these studies, to the researcher's knowledge, few studies directly discuss the effect of gamification on enhancing psychological hardiness. Furthermore, the majority of previous studies that have discussed gamification or psychological hardiness have focused largely on students who do not have complex psychological disorders. From this perspective, the researcher believed that it is necessary to discuss the effectiveness of gamification-based platforms in developing psychological hardiness among imprisoned students. By answering the current research question:

Q: What is the effectiveness of the proposed design of a gamification-based platform in developing psychological hardiness among students with high levels of psychological disorders in four dimensions (commitment, control, challenge, and connection)?

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H_1: There is no statistically significant difference at the level of 0.05 between the mean scores of the first experimental group that used a gamification-based platform and the second experimental group that used a regular platform without gamification in developing psychological hardiness among students with high levels of psychological disorders in four dimensions (commitment, control, challenge, and connection).

2. Literature Review

2.1. Gamification-Based Platforms

Gamification strategies generally aim to employ the concept of play according to pre-planned methods to achieve specific goals. It also plays an effective role in supporting students to engage in learning and overcome the challenges they face. This has been demonstrated in numerous studies that have reinforced the role of gamification in making education more engaging by creating learning environments in which students feel a positive role, Manzano-León et al. [22] and Ruiz et al. [23]. Khuzzan et al. [24] mentioned in their study, which discussed the impact of gamification on students, which addressed many gamification elements, such as feedback, rewards, levels, and others, were addressed. It concluded with the positive role of gamification in education and in stimulating positive student behavior toward learning. This was confirmed by the study's recommendation to use gamification as a new, innovative strategy in learning and teaching. This is reinforced by Jihadillah's discussion of the role of gamification in science education [25], which emphasized that gamification has a positive impact on students' motivation to learn by increasing student engagement in behavioral, cognitive, and emotional dimensions, in addition to creating an active learning environment in which students play a positive role.

2.1.1. The Benefits of Gamification in Education

We can review the advantages of using gamification in education through what was mentioned by Samir [26] and Swain [27]:

2.1.1.1. Increasing Participation and Engagement in Education

This aligns with what was mentioned above, through a review of studies that demonstrate the positive role of gamification in education and how it can be made more enjoyable and engaging. Perhaps what increases this participation and motivation is the enthusiasm and challenge that are generated in students in order to achieve the required goals, and also get more positive motivation through which the students feel that they are an essential part of the team [28, 29].

2.1.1.2. Creating Meaningful Learning

This is achieved by promoting correct understanding, facilitating the absorption of knowledge, and consolidating it in long-term memory. This is because gamification in education primarily focuses on applying knowledge in an interactive environment among peers [30].

2.1.1.3. Diversity in Learning Methods

Gamification in education focuses on creating diverse learning methods through which students can acquire knowledge in multiple ways that accommodate individual differences and fulfill their diverse learning needs. This diversity poses a significant challenge for educational designers, who are responsible for designing education to meet the needs of all students and provide each student with an equal opportunity as their peers.

2.1.1.4. Evaluation and Immediate Feedback

Gamified learning provides feedback that helps students identify their strengths and weaknesses, which in turn positively impacts their learning [28].

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2.1.1.5. Real-World Application of Theoretical Scenarios

The true importance of education lies in the ability to apply theoretical knowledge to practical, real-world situations. This reinforces the consolidation of knowledge through practical application, which in turn emphasizes the importance of linking learning to real-world contexts by applying theoretical knowledge and experiences. Such an application positively impacts the consolidation of knowledge and experience. This can be achieved through the implementation of gamification strategies in education.

2.1.2. Gamification Elements and Applied Learning Theories

There are many elements that can be applied to gamification strategies in education, including motivating students with points, badges, rewards, and levels. All these are designed to motivate students to complete required tasks and overcome challenges to achieve desired goals [31]. Additionally, they aim to maintain students' attention and foster motivation to reach the ultimate learning objectives. Furthermore, engaging students through stories and narratives is an effective method to enhance their engagement in learning by immersing them in real-world scenarios, motivating problem-solving, and monitoring their progress [32]. In addition, the attractiveness of the design and ease of use of the content significantly contribute to increasing learner engagement during gamification. It is important to note here that the aesthetics used in attractive gamification design do not mean aesthetics that are purposeless or negatively impact student engagement. Rather, the intent is to implement the gamification strategy in a way that makes students feel comfortable and engaged with the content, while simultaneously encouraging them to continue achieving the desired goals.

The behavioral learning theory is considered one of the most important theories supporting the implementation of gamification strategies in education. It provides stimuli and challenges, offers rewards and incentives, which in turn encourage and motivate desired behavior and prevent undesirable behavior. This can be achieved through gamification and providing positive incentives such as points, rewards, levels, etc [33]. Motivation is a fundamental pillar of gamified learning. Keller's motivational model of attention, relevance, confidence, and satisfaction (ARCS), as well as self-determination theory, are considered the most effective models for measuring and enhancing learning motivation. The self-determination theory also emphasizes that using external motivators, such as rewards, can develop learners' intrinsic motivation. This can be achieved through a gamification strategy that uses points and badges to develop learners' motivation [34]. Furthermore, constructivist theory emphasizes that learning is an interactive process that occurs in real and relevant situations [35]. This is achieved in gamified academic spaces by creating authentic, tangible learning environments and designing rich and collaborative learning environments.

2.2. Psychological Hardiness

Situations, events, and crises vary, and people differ in how they deal with them. While some individuals are able to handle negative situations effectively, others struggle to do so. Psychological hardiness is defined as behaviors that transform potential threats into difficult events and situations into opportunities for growth and creativity. This means that an individual with high psychological resilience must be open to the changes that occur in life and adapt to them positively [36]. Additionally, psychological hardiness is characterized by individuals' ability to transform difficult life events into opportunities by employing strategies and methods that enable them to adapt [37]. It is worth noting that an individual's exposure to psychological stress is inevitable because the nature of life includes a mixture of obstacles, difficulties, and fluctuating circumstances. This means that feelings of failure and frustration are likely to occur in life. This requires the individual to work on developing a high level of psychological hardiness that will enable them to face the challenges and fluctuations they may encounter.

Psychological hardiness consists of three main dimensions: commitment, control, and challenge. Commitment is a psychological contract that the individual commits to regarding their goals, values, and others. This means that psychological hardiness requires the individual to comply with rules

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regarding others. People with a high level of commitment tend to care about others and actively participate in activities rather than avoiding difficult situations and isolating themselves from others. Control also refers to the ability to make decisions, effectively confront challenges, and find solutions. Individuals can control challenges when they sense that internal sources and motivations are the source of their control, and ignore external forces that may impose restrictions on them in achieving their goals. In addition, challenge is the individual's ability to adapt to new situations and to view uncomfortable situations as an opportunity to overcome problems. Challenge helps the individual quickly adapt to painful life situations, view them positively, and maintain psychological balance while avoiding fears and negative thoughts [38-40].

In addition to the three components of psychological hardiness, a fourth component that Salvatore Maddi identified is connection, which is considered essential for individuals who recover and resist stress. Social support plays an important role in overcoming the harmful effects of stress. This means that people who are able to resist stress usually have social relationships and receive social support in difficult situations [41].

3. Methods

3.1. Experimental Design

This study employed a descriptive approach and systems development during the study, analysis, and design phases. A quasi-experimental approach was also utilized to examine the relationship between the independent variable (gamification-based platform) and the dependent variable (psychological hardiness). The quasi-experimental method was applied to two experimental groups: the first group used a gamification-based platform, while the second group used a standard platform without gamification, as shown in Table 1. The psychological hardiness scale was administered to both groups after the intervention.

Table 1.
The experimental design used in this study

Two experimental groups	Independent variable	dependent variable
The first experimental group	Learning by using a gamification-based platform	The psychological hardiness
The second experimental group	Learning by using a regular platform without gamification	

3.2. Sample

The study included a total of 46 eligible students who were detained in the Jeddah correctional facility. These students are permitted to complete their university studies in various academic courses. The sample participants were randomly divided into two groups, each consisting of twenty-three students. The first group was studied using a gamification-based platform, while the second group was studied using a regular platform without gamification.

3.3. Psychological Hardiness Scale

In this study, a scale for psychological hardiness was designed. The scale focused on the four dimensions of psychological hardiness: commitment, control, challenge, and connection. The scale was divided into four sections. The first section consists of eight items that focus on students' commitment to their goals and values, as well as their commitment to others. The second section consists of eight items to measure students' control and their ability to make decisions, face challenges, and find appropriate solutions to problems. The third section consists of seven items to measure the challenge dimension, including how students view new situations positively, maintain balance, and avoid fears and negative thoughts. The fourth section consists of seven items to measure the connection dimension and how the social dimension can play an important role in helping students overcome the harmful effects of fears, stress, and negative thoughts. In all four sections of the scale, responses were indicated on a five-

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point Likert scale, with 1 corresponding to strongly disagree, 2 to disagree, 3 to neutral, 4 to agree, and 5 to strongly agree.

When designing this scale, several important criteria and guidelines were taken into account, such as the use of clear words that clearly define the meaning and measure a specific objective. The scale's items were also arranged appropriately, such that each item serves as a context for the next [42]. The scale was checked for validity using content and face validity processes. Additionally, it was presented to a number of educational technology specialists, and some feedback was obtained to improve the scale. Moreover, Cronbach's alpha was calculated to measure the internal consistency of the scale (see Table 2), and all values were between 0.82 and 0.86, indicating that the scale has good reliability.

Table 2.
Reliability of the scale.

Variables	N of Items	Cronbach's Alpha (α)
Items that measure the commitment dimension	8	0.84
Items that measure the control dimension	8	0.86
Items that measure the challenge dimension	7	0.82
Items that measure the connection dimension	7	0.83

3.4. Procedures

The Talent LMS platform was used as an educational platform through which a gamification strategy could be applied. The Talent LMS platform features a variety of competitive gamification elements, including points, levels, badges, leaderboards, and more.

The learning environment in this study was developed through the implementation of some learning tasks in the website development course. The content included several objectives related to how to develop a website by understanding the basic standards of website design, formatting content on the website, and adding tables and images. It also included how to hyperlink content to external websites. In addition, the intellectual property rights associated with websites were discussed, and how to develop a website that takes into account the diversity and differences among the target audience of this website.

A Number of Gamification Elements Were Used in This Course, as Follows:

- Points: A number of points were allocated to each student for completing a number of required tasks. Additionally, points were awarded individually to students, and points were added to students working in groups. Thus, there were two groups of points: one for each student, and the other for each group. For example, the student is awarded 5 points upon entering the platform and completing any educational task. The student is awarded 10 points when obtaining a certificate and 10 points when participating in a discussion. In addition, each group is awarded 10 points for participating in group discussions and 20 points for completing a problem-solving task.
- Badges: A number of different badges were allocated, alongside students being awarded a learning badge, a test badge, a task completion badge, and a communication badge, and receiving certificates and participating in surveys.
- Levels: the student moves to a higher level when he obtains 500 points or 5 badges. Also, groups move to higher levels upon earning 2,000 points or 100 badges.
- Leaderboards: three leaderboards have been activated: one for points, another for badges, and a third for levels. The leaderboards were used for individuals as well as groups.

The study was conducted using a quasi-experimental approach as previously discussed. The first experimental group utilized the TalentLMs platform with gamification features, including points, badges, levels, and leaderboards. The second experimental group studied on the TalentLMs platform

without gamification. After completing the experiments with both groups, the psychological hardiness scale was administered to all students, dividing them into two groups.

4. Results

4.1. The Commitment Dimension

Table 3.
Descriptive Statistics for measuring commitment dimension.

	Items	Groups	*The descriptive statistics*			
			Mean	**Median**	**Mode**	**SD**
1.	When I have specific goals, I do not give up on achieving them.	G 1	2.91	3.1	2	1.37
		G2	1.94	2.07	0.67	0.92
2.	Values in life are essential for me and cannot be compromised.	G 1	4.2	3	3	1.31
		G2	2.01	1.99	2	0.87
3.	Accomplishing tasks does not necessarily require everyone to participate if there is someone who can accomplish them with a high degree of mastery.	G 1	2.88	3.5	3	0.81
		G2	3.1	2.98	3	0.91
4.	When I am assigned a task, I try to get more time to complete it.	G 1	3.94	3.8	3	1.07
		G2	3	2.93	2	0.72
5.	It is not necessary to achieve goals that are hindered by many obstacles.	G 1	2.9	3.4	3	0.71
		G2	3.2	2.93	3	0.83
6.	It is not necessary to adhere to all values because it is impossible to achieve that.	G 1	3.2	3.5	3	0.93
		G2	3.5	3.8	3	0.88
7.	I am very eager to have an effective role in completing tasks with my team.	G 1	4	3.74	4	0.82
		G2	3	2.39	3	1.04
8.	I do not care much about attending discussions with my colleagues because I think that it is a waste of time.	G 1	3.19	1.94	2	1.42
		G2	4	3.23	3	2.84
	Average	G 1	3.40	3.25	2.875	1.055
		G2	2.97	2.92	2.458	1.126

Note: ***G 1**: The students in the first group who learned by using a gamification-based platform
***G 2:** The students in the second group who learned by using a regular platform without gamification.

Table 3 summarizes participants' responses to the commitment dimension. The responses were measured using a five-point Likert scale, with 1 indicating strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. As presented in Table 3, the overall mean for all items of the commitment dimension was 3.40 for the students in the first group, who studied using a gamification-based platform, and 2.97 for the students in the second group, who studied using a regular platform without gamification.

The "T" test was used to identify the significance of the differences between the two experimental groups in the commitment dimension, as presented in Table 4.

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Table 4.
T-test Presents Differences between two groups (G1 and G2) in the commitment dimension.

	Items	t-test	Sig. (2-tailed)
1.	When I have specific goals, I don't give up on achieving them.	0.654	0.001
2.	Values in life are essential for me and cannot be compromised.	1.094	0.021
3.	Accomplishing tasks does not necessarily require everyone to participate if there is someone who can accomplish them with a high degree of mastery.	0.823	0.014
4.	When I am assigned a task, I try to get more time to complete it.	1.055	0.007
5.	It is not necessary to achieve goals that are hindered by many obstacles.	1.492	0.032
6.	It is not necessary to adhere to all values because it is impossible to achieve that.	1.202	0.019
7.	I am very keen to have an effective role in completing tasks with my team.	1.109	0.037
8.	I don't care much about attending discussions with my colleagues because I think that it's a waste of time.	0.901	0.013

The results in Table 4 show that there were significant differences between the two groups in the commitment dimension: the first group was studied using a gamification-based platform, while the second group was studied using a regular platform without gamification.

4.2. The Control Dimension

Table 5.
Descriptive Statistics for measuring control dimension

	Items	Groups	*The descriptive statistics*			
			Mean	Median	Mode	SD
1.	I do not hesitate to make a decision as long as it serves my personal interests.	G 1	4	3.41	4	1.02
		G2	3.2	2.04	3	1.58
2.	I always try to listen to all points of view before making my decisions.	G 1	4	3.82	4	1.11
		G2	3.6	2.56	3	1.72
3.	I am always keen to stay away from problems and complicated situations.	G 1	4	3.73	4	1.19
		G2	3.1	2.38	3	1.74
4.	I enjoy engaging with more complex issues, even if they do not require it.	G 1	3.8	2.98	3	1.93
		G2	2.35	2.06	2	2.31
5.	It is difficult to find solutions to all problems, so I believe that some problems have no solution.	G 1	3.9	3.24	4	1.78
		G2	2.14	1.98	2	2.12
6.	I am not careful to read the instructions and restrictions before starting a task.	G 1	2.3	1.99	2	1.89
		G2	3.4	2.67	3	1.23
7.	I try to face challenges even if I am not interested in them.	G 1	4	3.4	4	0.86
		G2	2.89	2.01	2	1.89
8.	In my opinion, a person who always looks for complex matters will end up unable to solve the simplest issues.	G 1	3.7	2.89	3	1.87
		G2	3.1	2.03	3	2.09
	Average	G 1	3.713	3.185	3.5	1.46
		G2	2.973	2.216	2.63	1.84

Note: *G 1: The students in the first group who learned by using a gamification-based platform
***G 2:** The students in the second group who learned by using a regular platform without gamification.

Table 5 summarizes participants' responses to the control dimension. The responses were measured using a five-point Likert scale, with 1 indicating strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. As presented in Table 5, the overall mean for all items of the control dimension was 3.713 for the students in the first group, who studied using a gamification-based platform, and 2.973 for the students in the second group, who studied using a regular platform without gamification.

The "T" test was used to identify the significance of the differences between the two experimental groups in the control dimension, as presented in Table 6.

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Table 6.
T-test Presents Differences between two groups (G1 & G2) in the control dimension.

	Items	t-test	Sig. (2-tailed)
1.	I do not hesitate to make a decision as long as it serves my personal interests.	1.432	0.021
2.	I always try to listen to all points of view before making my decisions.	1.103	0.002
3.	I am always keen to stay away from problems and complicated situations.	1.241	0.008
4.	I enjoy getting involved in more complex issues, even if it doesn't require it.	0.931	0.015
5.	It is difficult to find solutions to all problems, so I believe that some problems have no solution.	0.702	0.024
6.	I am not careful to read the instructions and restrictions before starting a task.	1.012	0.031
7.	I try to face challenges even if I am not interested in them.	1.204	0.009
8.	In my opinion, a person who always looks for complex matters will end up unable to solve the simplest issues.	0.634	0.004

As shown in Table 6, there were significant differences between the two groups in the control dimension: the first group was studied using a gamification-based platform, while the second group was studied using a regular platform without gamification.

4.3. The Challenge Dimension

Table 7.
Descriptive Statistics for measuring the challenge dimension.

	Items	Groups	*The descriptive statistics*			
			Mean	Median	Mode	SD
1.	I try to stay away from situations that require more effort and work.	G 1	3.2	3.6	3	1.30
		G2	4	3.6	3	1.04
2.	When I complete any task that requires me, I look for the simplest way to do it.	G 1	2	3.1	2	1.89
		G2	3	4.1	3	1.41
3.	I can't waste any more time doing tasks that I may not need in the future.	G 1	4	3.2	4	0.97
		G2	3	2.93	3	1.56
4.	I hesitate to participate in solving problems as long as someone has already tried to solve them and was unable to do so.	G 1	2	3.8	2	2.87
		G2	3.4	2.6	3	1.61
5.	I have some fears of failing to accomplish some tasks.	G 1	2.5	3.03	2	2.32
		G2	4	3.84	4	1.21
6.	Painful situations in my life have caused me to withdraw from active participation in many circumstances.	G 1	2.4	2.08	2	1.02
		G2	4	3.91	4	0.65
7.	Adventures in life are wrong decisions made by their owners.	G 1	2.2	1.95	2	2.87
		G2	3.9	3.2	3	1.39
	Average	G 1	2.61	2.97	2.43	1.89
		G2	3.6	3.45	3.29	1.27

Note: *G 1: The students in the first group who learned by using a gamification-based platform
*G 2: The students in the second group who learned by using a regular platform without gamification.

Table 7 summarizes participants' responses to the challenge dimension. The responses were measured using a five-point Likert scale, with 1 indicating strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. As presented in Table 7, the overall mean for all items of the challenge dimension was 2.61 for the students in the first group, who studied using a gamification-based platform, and 3.6 for the students in the second group, who studied using a regular platform without gamification.

The "T" test was used to identify the significance of the differences between the two experimental groups in the challenge dimension, as presented in Table 8.

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Table 8.
T-test Presents Differences between two groups (G1 and G2) in the challenge dimension.

	Items	t-test	Sig. (2-tailed)
1.	I try to stay away from situations that require more effort and work.	1.030	0.006
2.	When I complete any task that requires me, I look for the simplest way to do it.	0.657	0.021
3.	I can't waste any more time doing tasks that I may not need in the future.	1.367	0.008
4.	I hesitate to participate in solving problems as long as someone has already tried to solve them and was unable to do so.	0.894	0.033
5.	I have some fears of failing to accomplish some tasks.	1.106	0.041
6.	Painful situations in my life have made me withdraw from active participation in many situations.	0.705	0.003
7.	Adventures in life are wrong decisions made by their owners.	1.124	0.001

As shown in Table 8, there were significant differences between the two groups in the challenge dimension: the first group was studied using a gamification-based platform, while the second group was studied using a regular platform without gamification.

4.4. The Connection Dimension

Table 9.
Descriptive Statistics for measuring connection dimension.

	Items	Groups	*The descriptive statistics*			
			Mean	Median	Mode	SD
1.	It is fun to be part of a team in order to accomplish a task.	G 1	2.46	3.1	3	1.31
		G2	3	3.4	3	0.98
2.	Perhaps there is no one in the society in which we live who agrees with our point of view.	G 1	3.9	4.1	3	0.81
		G2	3.6	3.8	3	0.93
3.	Working within a team may be harmful because there is dependency on specific people.	G 1	3.7	3.3	4	0.78
		G2	3.3	3.2	3	0.70
4.	I prefer to solve my problems on my own without asking anyone for help.	G 1	3.1	3.6	4	0.75
		G2	3.8	3.1	3	0.88
5.	I avoid helping others because they may have bad intentions towards us.	G 1	2.8	3.3	2	1.39
		G2	3.2	3.8	3	1.27
6.	When there is a new colleague, I take the initiative to know them.	G 1	2.5	3.1	3	1.05
		G2	2.3	2.91	3	1.42
7.	It is better that you have a limited circle of friends.	G 1	3.8	3.5	4	1.03
		G2	3.8	3.1	3	1.64
	Average	G 1	3.18	3.43	3.28	1.02
		G2	2.96	3.33	3	1.12

Note: *G 1: The students in the first group who learned by using a gamification-based platform
***G 2:** The students in the second group who learned by using a regular platform without gamification.

Table 9 summarizes participants' responses to the connection dimension. The responses were measured using a five-point Likert scale, with 1 indicating strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree. As presented in Table 9, the overall mean for all items of the connection dimension was 3.18 for the students in the first group, who studied using a gamification-based platform, and 2.96 for the students in the second group, who studied using a regular platform without gamification.

The "T" test was used to identify the significance of the differences between the two experimental groups in the connection dimension, as presented in Table 10.

Table 10.
T-test Presents Differences between two groups (G1 and G2) in the connection dimension.

	Items	t-test	Sig. (2-tailed)
1.	It is fun to be part of a team to accomplish a task.	17702.000	0.184
2.	Perhaps there is no one in the society in which we live who agrees with our point of view.	17546.000	0.628
3.	Working within a team may be harmful because there is dependency on specific people.	17041.000	0.393
4.	I prefer to solve my problems on my own without asking anyone for help.	17601.000	0.587
5.	I avoid helping others because they may have bad intentions towards us.	17378.500	0.831
6.	When there is a new colleague, I take the initiative to know them.	17038.000	0.461
7.	It is better that you have a limited circle of friends.	17560.000	0.971

As shown in Table 10, there were no significant differences between the two groups in the connection dimension: the first group was studied using a gamification-based platform, and the second group was studied using a regular platform without gamification.

5. Dissections

By reviewing the results presented in Table 3 of the study on the effectiveness of gamified learning on the commitment dimension, through comparing the two groups (one using gamification and the other without), the results showed that students in the group that used gamification methods had a high level of persistence in achieving their goals. They also valued important life principles and were open to discussions and completing tasks as a team, regardless of any challenges that might hinder problem-solving. This was confirmed by the t-test in Table 4, which showed statistically significant differences between the two groups.

In addition, the results in Table 5 confirmed that the students in the first group, who used gamification, were keen to listen to all perspectives before making decisions. They enjoyed engaging in problem-solving and delving into complex issues. They also adhered to the limitations and instructions given to them. The results in Table 6 showed statistically significant differences between the two groups, in favor of the first group that used the gamification strategy.

Furthermore, the results in Table 7 confirmed that students studied through gamification exhibited a high level of challenge, indicating they did not avoid situations requiring significant effort. They also demonstrated a desire to find solutions without necessarily seeking the easiest path. Their perspective on future tasks focused on seeking more challenges and opportunities, and they were willing to undertake tasks and solve problems even if they were not currently required to do so. A distinguishing characteristic of this group was that they did not feel anxious or fearful about the tasks assigned to them, and they had a strong desire for adventure and competition. The results in Table 8 confirmed this difference between the two groups, as shown by the statistically significant difference revealed by the t-test.

On the other hand, the results in Tables 9 and 10 do not show any difference between the two experimental groups in the connection dimension. Both groups may lack the desire to cooperate or interact with others, whether peers or society. Also, students in both groups prefer having a limited number of friends and have some distrust of those around them. This suggests that the psychological state of the students may be due to past negative experiences with other people, which led to a negative perception of people in general. The isolation of students in prison could also contribute to their preference for solitude and staying away from their peers.

Overall, the study demonstrated the positive impact of using gamification strategies in enhancing psychological hardiness, particularly in fostering a sense of commitment, challenge, and control, even in the presence of high levels of anxiety, depression, and other negative emotions. This study aligns with previous research, which has shown that gamification significantly contributes to improving student performance, enhancing their engagement and participation in learning, and ultimately positively

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influencing their overall behavior [1, 2, 43, 44]. According to the results, it may be appropriate to combine gamification and AI in future studies to investigate their synergy in improving psychological variables [45-54].

6. Limitations

This study discussed the effectiveness of gamification-based platforms in developing psychological hardiness, focusing on four dimensions: commitment, control, challenge, and connection. The effectiveness was measured based on the specific platform (The Talent LMS platform) used in this experiment; therefore, the results cannot be generalized to all platforms, as the effectiveness of gamification on psychological hardiness may vary. Furthermore, the study was conducted with incarcerated students, and due to security restrictions, their access to the learning platform may not have been consistent, which could potentially affect the study's findings.

7. Conclusion

This study contributes to the development of an educational platform for enhancing psychological hardiness by using gamification strategies. The study examined the effectiveness of various gamification elements, such as points, badges, levels, etc., on psychological hardiness across four dimensions: commitment, control, challenge, and connection. Future studies could focus more on the connection dimension, given the limited research currently available on this aspect. Furthermore, several challenges may affect psychological hardiness, potentially linked to students' psychological states. Since there is considerable variation in students' psychological conditions, future research should consider designing diverse approaches that account for these differences, incorporating scientific principles and guidelines that address the varying mental health needs of students.

Transparency:

The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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References

[1] N. T. Alrashedi, S. M. H. Alsulami, A. I. Flatah, A. H. Najmi, and W. S. Alhalafawy, "The effects of gamified platforms on enhancing learners' ambition," *Journal of Ecohumanism*, vol. 3, no. 8, pp. 3393-3403, 2024. https://doi.org/10.62754/joe.v3i8.5004

[2] N. T. Alrashedi, A. H. Najmi, and W. S. Alhalafawy, "Utilising gamification to enhance ambition on digital platforms: An examination of faculty members perspectives in times of crisis," *Journal of Ecohumanism*, vol. 3, no. 8, pp. 3404-3416, 2024. https://doi.org/10.62754/joe.v3i8.5003

[3] F. M. Alnimran and W. S. Alhalafawy, "Qualitative exploration of the opportunities and challenges of online training according to the behavioral intention variables of the most trained teachers during the COVID-19 pandemic," *Journal of Infrastructure, Policy and Development*, vol. 8, no. 8, p. Article 4837, 2024. https://doi.org/10.24294/jipd.v8i8.4837

[4] H. O. Ibrahim, F. S. Al-Hafdi, and W. S. Alhalafawy, "Ethnographic insights of educational digital life behaviours: A study of affluent schools," *Journal of Ecohumanism*, vol. 3, no. 7, pp. 4413-4428, 2024.

[5] A. Najmi, Y. Alameer, and W. Alhalafawy, "Exploring the enablers of IoT in education: A qualitative analysis of expert tweets," *Journal of Infrastructure, Policy and Development*, vol. 8, no. 10, p. 5079, 2024.

[6] A. M. Zohdi, F. S. Al-Hafdi, and W. S. Alhalafawy, "The role of digital platforms in studying the holy qur'an: A case study based on the voices of students from diverse cultures at the prophet's mosque," *Journal of Ecohumanism*, vol. 3, no. 7, pp. 3050-3062, 2024. https://doi.org/10.62754/joe.v3i7.4440

[7] A. Christopoulos and S. Mystakidis, "Gamification in education," *Encyclopedia*, vol. 3, no. 4, pp. 1223-1243, 2023. https://doi.org/10.3390/encyclopedia3040089

[8] H. Cloke, "What is gamification? Definition, examples & key strategies. Growth Engineering," 2025. https://www.growthengineering.co.uk/definition-of-gamification/

[9] M. Li, S. Ma, and Y. Shi, "Examining the effectiveness of gamification as a tool promoting teaching and learning in educational settings: a meta-analysis," *Frontiers in Psychology*, vol. 14, p. 1253549, 2023. https://doi.org/10.3389/fpsyg.2023.1253549

[10] F. K. J. Alzahrani, F. M. Alshammary, and W. S. Alhalafawy, "Gamified platforms: the impact of digital incentives on engagement in learning during Covide-19 pandemic," *Cultural Management: Science and Education (CMSE)*, vol. 7, no. 2, pp. 75-87, 2022. https://doi.org/10.30819/cmse.6-2.05

[11] M. Kalogiannakis, S. Papadakis, and A.-I. Zourmpakis, "Gamification in science education. A systematic review of the literature," *Education sciences*, vol. 11, no. 1, p. 22, 2021. https://doi.org/10.3390/educsci11010022

[12] N. A. Al-Hajj Muhammad, "Psychological hardiness and its relationship to optimism among Lebanese adolescents," *Arab Journal for Scientific Publishing*, vol. 23, pp. 103-122, 2020.

[13] X. Li, "A theoretical analysis of the preventive role of English as a foreign language teachers' occupational adjustment and psychological hardiness in their job burnout," *Frontiers in Psychology*, vol. 13, p. 939617, 2022. https://doi.org/10.3389/fpsyg.2022.939617

[14] J. R. Sinha, "Psychological hardiness among adolescents," *The International Journal of Indian Psychology*, vol. 6, no. 2, pp. 190–194, 2018. https://doi.org/10.25215/0602.020

[15] R. Saleem, M. Zaki, and W. Alhalafawy, "Improving awareness of foreign domestic workers during the COVID-19 pandemic using infographics: An experience during the crisis," *Journal of Infrastructure, Policy and Development*, vol. 8, no. 5, p. 4157, 2024. https://doi.org/10.24294/jipd.v8i5.4157

[16] M. Z. T. Zaki *et al.*, "The effect of mobile search retrieval types on self-regulated learning among middle school students," *Journal of Ecohumanism*, vol. 3, no. 8, pp. 3382-3392, 2024. https://doi.org/10.62754/joe.v3i8.5005

[17] M. Z. T. Zaki, W. Y. El-Refai, A. H. Najmi, F. S. Al-Hafdi, W. S. Alhalafawy, and F. M. Abd El Bakey, "The effect of educational activities through the flipped classroom on students with low metacognitive thinking," *Journal of Ecohumanism*, vol. 3, no. 4, pp. 2476-2491, 2024. https://doi.org/10.62754/joe.v3i4.3770

[18] Department of Psychiatry, "University of Oxford, People in prison have higher rates of mental illness, infectious diseases and poor physical health – new study," 2024. https://www.psych.ox.ac.uk/news/people-in-prison-have-higher-rates-of-mental-illness-infectious-diseases-and-poor-physical-health-2013-new-study

[19] S. Høgheim and R. A. Federici, "Interest in teacher education: exploring the relation between student teacher interest and ambitions in teacher education," *European Journal of Teacher Education*, vol. 45, no. 5, pp. 581-599, 2022. https://doi.org/10.1080/02619768.2020.1860006

[20] D. de Paula Porto, G. M. de Jesus, F. C. Ferrari, and S. C. P. F. Fabbri, "Initiatives and challenges of using gamification in software engineering: A Systematic Mapping," *Journal of Systems and Software*, vol. 173, p. 110870, 2021. https://doi.org/10.1016/j.jss.2020.110870

[21] D. Y. Tan and C. W. Cheah, "Developing a gamified AI-enabled online learning application to improve students' perception of university physics," *Computers and Education: Artificial Intelligence*, vol. 2, p. 100032, 2021. https://doi.org/10.1016/j.caeai.2021.100032

[22] A. Manzano-León, J. M. Rodríguez-Ferrer, J. M. Aguilar-Parra, J. M. Fernández-Campoy, R. Trigueros, and A. M. Martínez-Martínez, "Play and learn: The influence of gamification and game-based learning on the reading processes of secondary school students," *Revista de Psicodidáctica*, vol. 27, no. 1, pp. 38-46, 2022. https://doi.org/10.1016/j.psicod.2021.07.001

[23] J. J. R. Ruiz, A. D. V. Sanchez, and O. R. B. Figueredo, "Impact of gamification on school engagement: A systematic review," *Frontiers in Education*, vol. 9, p. 1466926, 2024. https://doi.org/10.3389/feduc.2024.1466926

[24] S. M. S. Khuzzan, N. S. M. Yushaa, and M. Hanid, "Gamification elements and its impact on students," *Journal of Technology and Operations Management*, vol. 16, no. 2, pp. 62-75, 2021. https://doi.org/10.32890/jtom2021.16.2.6

[25] M. Jihadillah, "The effectiveness of gamification-based learning in science education: A systematic review of student motivation, engagement, and cognitive learning outcomes," *Journal of Educational Innovation and Transformation Global*, vol. 1, no. 1, pp. 29-40, 2025.

[26] K. Samir, "Gamification in education: Definition, benefits, elements, and application with examples. Zamn," 2024. https://zamn.app/blog/التلعيب-في-التعليم/. [Accessed June 11, 2025]

[27] E. Swain, "All you need to know about gamification in education," 2025. https://www.lingio.com/blog/gamification-in-education. [Accessed 13 July 2025]

[28] S. Bai, K. F. Hew, and B. Huang, "Does gamification improve student learning outcome? Evidence from a meta-analysis and synthesis of qualitative data in educational contexts," *Educational Research Review*, vol. 30, p. 100322, 2020. https://doi.org/10.1016/j.edurev.2020.100322

[29] L. S. Ferro, "The Game Element and Mechanic (GEM) framework: A structural approach for implementing game elements and mechanics into game experiences," *Entertainment Computing*, vol. 36, p. 100375, 2021. https://doi.org/10.1016/j.entcom.2020.100375

[30] L.-M. Putz, F. Hofbauer, and H. Treiblmaier, "Can gamification help to improve education? Findings from a longitudinal study," *Computers in Human Behavior*, vol. 110, p. 106392, 2020. https://doi.org/10.1016/j.chb.2020.106392

[31] S. G. M. Ramos and R. A. Ferreira, "Gamification elements and engagement: Exploring students' perception in an English reading course," *Video Journal of Social and Human Research*, vol. 2, no. 1, pp. 13–34, 2023.

[32] Y.-F. Wang, Y.-F. Hsu, and K. Fang, "The key elements of gamification in corporate training–The Delphi method," *Entertainment Computing*, vol. 40, p. 100463, 2022. https://doi.org/10.1016/j.entcom.2021.100463

[33] S. Bassanelli, N. Vasta, A. Bucchiarone, and A. Marconi, "Gamification for behavior change: A scientometric review," *Acta Psychologica*, vol. 228, p. 103657, 2022. https://doi.org/10.1016/j.actpsy.2022.103657

[34] C. Baah, I. Govender, and P. Rontala Subramaniam, "Exploring the role of gamification in motivating students to learn," *Cogent Education*, vol. 10, no. 1, p. 2210045, 2023. https://doi.org/10.1080/2331186X.2023.2210045

[35] R. Richey, J. Klein, and M. Tracey, *The instructional design knowledge base: Theory, research, and practice*. New York: Routledge, Taylor & Francis Group, 2011.

[36] M. Oral and N. Karakurt, "The impact of psychological hardiness on intolerance of uncertainty in university students during the COVID-19 pandemic," *Journal of Community Psychology*, vol. 50, no. 8, pp. 3574-3589, 2022. https://doi.org/10.1002/jcop.22856

[37] F. Altınsoy and A. Aypay, "A post-traumatic growth model: psychological hardiness, happiness-increasing strategies, and problem-focused coping," *Current Psychology*, vol. 42, pp. 2208-2220, 2023. https://doi.org/10.1007/s12144-021-02466-0

[38] A. Khosravi and E. Namani, "Investigating the structural model of the relationship between self-compassion and psychological hardiness with family cohesion in women with war-affected spouses: The mediating role of self-worth," *Contemporary Family Therapy*, vol. 44, pp. 276-283, 2022. https://doi.org/10.1007/s10591-021-09579-5

[39] A. Ravindran and M. Vimala, "Psychological hardiness and optimism: A study among orphans and non-orphans," *World Journal of Advanced Research and Reviews*, vol. 22, no. 1, pp. 461-469, 2024. https://doi.org/10.30574/wjarr.2024.22.1.1064

[40] A. Tahmasbi, "The relationship between job burnout and mental health: Moderating role of psychological hardiness and organization-based self-esteem," *Journal of Industrial and Organizational Psychology Studies*, vol. 7, no. 1, pp. 91–108, 2020.

[41] P. Mund, "Kobasa concept of hardiness," *International Research Journal of Engineering, IT and Scientific Research*, vol. 2, no. 1, pp. 34-40, 2016.

[42] D. A. Dillman, J. D. Smyth, and L. M. Christian, *Internet, phone, mail, and mixed mode surveys: The encompassed design method*. Hoboken: John Wiley & Sons, 2014.

[43] S. Litvin, R. Saunders, M. A. Maier, and S. Lüttke, "Gamification as an approach to improve resilience and reduce attrition in mobile mental health interventions: A randomized controlled trial," *PloS One*, vol. 15, no. 9, p. e0237220, 2020. https://doi.org/10.1371/journal.pone.0237220

[44] J. Xu *et al.*, "Psychological interventions of virtual gamification within academic intrinsic motivation: A systematic review," *Journal of Affective Disorders*, vol. 293, pp. 444-465, 2021. https://doi.org/10.1016/j.jad.2021.06.070

[45] T. S. Alharbi, F. S. Al-Hafdi, and W. S. Alhalafawy, "Exploring the framework for intelligent operations (FiOps) for teachers in the era of generative AI (GenAI)," *International Journal of Learning, Teaching and Educational Research*, vol. 24, no. 8, pp. 942-964, 2025. https://doi.org/10.26803/ijlter.24.8.42

[46] W. O. Alsayed, F. S. Al-Hafdi, and W. S. Alhalafawy, *Chatbots in education. In S. Papadakis & M. Kalogiannakis (Eds.), Empowering STEM Educators With Digital Tools*, 1st ed. Hershey, USA: IGI Global Scientific Publishing, 2024.

[47] S. K. Brooks *et al.*, "The psychological impact of quarantine and how to reduce it: Rapid review of the evidence," *The Lancet*, vol. 395, no. 10227, pp. 912-920, 2020. https://doi.org/10.1016/S0140-6736(20)30460-8

[48] A. Buckingham and E. J. Richardson, "The relationship between psychological resilience and pain threshold and tolerance: optimism and grit as moderators," *Journal of Clinical Psychology in Medical Settings*, vol. 28, pp. 518-528, 2021. https://doi.org/10.1007/s10880-020-09731-7

[49] W. Cao *et al.*, "The psychological impact of the COVID-19 epidemic on college students in China," *Psychiatry Research*, vol. 287, p. 112934, 2020. https://doi.org/10.1016/j.psychres.2020.112934

[50] S. Chaudhry, A. Tandon, S. Shinde, and A. Bhattacharya, "Student psychological well-being in higher education: The role of internal team environment, institutional, friends and family support and academic engagement," *Plos One*, vol. 19, no. 1, p. e0297508, 2024. https://doi.org/10.1371/journal.pone.0297508

[51] D. Fletcher and M. Sarkar, "Psychological resilience: A review and critique of definitions, concepts, and theory," *European Psychologist*, vol. 18, no. 1, pp. 12–23, 2013. https://doi.org/10.1027/1016-9040/a000124

[52] R. C. IJntema, W. B. Schaufeli, and Y. D. Burger, "Resilience mechanisms at work: The psychological immunity-psychological elasticity (PI-PE) model of psychological resilience," *Current Psychology*, vol. 42, pp. 4719-4731, 2023. https://doi.org/10.1007/s12144-021-01813-5

[53] A. Keilmann, A. Limberger, and W. J. Mann, "Psychological and physical well-being in hearing-impaired children," *International Journal of Pediatric Otorhinolaryngology*, vol. 71, no. 11, pp. 1747-1752, 2007. https://doi.org/10.1016/j.ijporl.2007.07.013

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 10, No. 1: 571-585, 2026
DOI: 10.55214/2576-8484.v10i1.11635

[54] H. Y. Li, H. Cao, D. Y. P. Leung, and Y. W. Mak, "The psychological impacts of a COVID-19 outbreak on college students in China: A longitudinal study," *International Journal of Environmental Research and Public Health*, vol. 17, no. 11, p. 3933, 2020. https://doi.org/10.3390/ijerph17113933

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