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The Impact of Gamification-Based Pedagogical Approaches on Academic Performance and Student Engagement in Educational Settings: Jordanian School Teachers' Perspective

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Abstract

Aim: This study investigates the impact of gamification-based pedagogical approaches on academic performance and student engagement from the perspective of Jordanian school teachers. With the increasing integration of technology and innovative teaching methods, understanding the effectiveness of gamification in educational settings becomes crucial. The objective of this research is to explore how gamification strategies influence both academic performance and student engagement, as perceived by Jordanian school teachers.
Methodology: Employing a quantitative research approach, a sample of 433 Jordanian school teachers was purposefully selected to participate in the study. The research instrument employed is a closed questionnaire, designed to gather comprehensive insights into teachers' perceptions of the effects of gamification on academic performance and student engagement. The data collected underwent rigorous analysis using the Smart Partial Least Squares (SmartPLS) technique. This method enabled a robust examination of the relationships between gamification-based pedagogical approaches, academic performance, and student engagement.
Findings: The findings emphasize the positive impact of gamification-based pedagogical approaches, shedding light on its potential to transform traditional teaching methods. Policymakers, educators, and curriculum designers can draw upon these findings to make informed decisions aimed at enhancing the quality of education in Jordan and potentially in analogous educational systems globally.

Keywords: Gamification, Pedagogy, Academic performance, Students engagement, Teachers autonomy, Self-efficacy, Educational context, Jordan teachers

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INTRODUCTION

In the fast-paced digital era, education systems worldwide are experiencing a paradigm shift, as educators seek innovative strategies to improve learning outcomes and student engagement (Al-Khresheh, 2023). One such approach gaining significant attention is gamification, which involves incorporating game elements, mechanics, and design principles into non-game contexts, including educational settings. Gamification has the potential to transform traditional pedagogical approaches by making learning more interactive, enjoyable, and goal-oriented, thereby catering to the diverse learning preferences of tech-savvy students (Abusa'aleek & Baniabdelrahman, 2020).

The educational landscape in Jordan, like in many countries, faces the evolving challenge of meeting the needs of the 21st-century learner (Aljaraıdeh, 2020). As technology continues to permeate various aspects of daily life, students' expectations and learning preferences have shifted, demanding more engaging and interactive learning experiences. In this context, gamification-based pedagogical approaches emerge as a potential solution to bridge the gap between traditional teaching methods and modern student expectations (Kengatharan, 2020).

Gamification-based pedagogical strategies have become a popular way to increase student motivation and involvement in the learning process (Rather, Parrey, Gulzar, & Rehman, 2023). Teachers can build immersive and engaging learning environments that appeal to students' innate interests in technology and gaming by incorporating game aspects into educational activities like points, awards, quests, and challenges. Gamification has the potential

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to engage students' interest, boost their engagement, and foster a sense of accomplishment in them, all of which contribute to a more positive and fruitful educational experience (Bilro, Loureiro, & Angelino, 2021; Segura-Robles, Fuentes-Cabrera, Parra-González, & López-Belmonte, 2020).

The level of student engagement is a key indicator of how effective a particular educational strategy is. Students who are more engaged are more likely to pay attention, take initiative in their education, and perform better in class (Kengatharan, 2020). As competition, teamwork, and quick feedback are included in gamification-based instructional techniques, they have the potential to increase student engagement levels and tap into their innate desire to learn and succeed (Al-Khresheh, 2023).

The level of independence and freedom that educators have when making judgments about their instructional strategies, classroom management techniques, and curricular preferences is referred to as their level of autonomy (Aljaraıdeh, 2020). It illustrates how much flexibility teachers have in modifying their instructional ideas and approaches to better suit the special requirements and traits of each of their students (Gao, Sun, Fu, Jia, & Xiang, 2020). The confidence teachers feel in their skills to favorably impact students' academic achievement is referred to as their self-efficacy. It is an essential part of their professional identity and has an immediate effect on their teaching strategies, classroom management, and overall efficacy (Zhao & Qin, 2021).

The study investigating the impact of gamification-based pedagogical approaches on academic performance and student engagement from the perspective of Jordanian school teachers holds considerable importance for various stakeholders in the education system. The present study established its social cognitive theory. It is a comprehensive theory that emphasizes the reciprocal interaction between cognitive, behavioral, and environmental factors in shaping human behavior and learning (Schunk & DiBenedetto, 2020). The objectives of the present study are; to examine that the teacher's Autonomy and gamification-based pedagogical has a significant impact on student engagement. To explore that the student's engagement has a mediating impact on the teacher's autonomy, gamification-based pedagogical and academic performance. To examine that the teacher's self-efficacy has moderating impact on student engagement and academic performance. The research questions of the present study are; does the teacher's Autonomy and gamification-based pedagogical has a significant impact on student engagement. Does the student's engagement has a mediating impact on the teacher's autonomy, gamification-based pedagogical and academic performance. Does the teacher's self-efficacy has moderating impact on student engagement and academic performance.

LITERATURE REVIEW

Social Cognitive Theory

The ability of an individual to engage in a targeted behavior is estimated by social cognitive theory based on internal and external characteristics and their interactions, according to Gupta and Goyal (2022). The interaction of an individual, the environment, and attitudes, forms the core of this theory. It functions as a controller and influences a person's attitude (Schunk & DiBenedetto, 2020). According to Thomas and Gupta (2021), ethical and other psycho-social factors, such as the state of the job, the weather, etc., demonstrate how ethical behavior is governed by ethical analysis. social cognitive theory adopts a cooperative viewpoint on right issues as a result, and it suggests a system in which "personal factors, such as moral thought and affective self-reactions, moral conduct, and environmental factors all operate as interacting determinants that influence each other in determining outcomes" (Schunk & DiBenedetto, 2020). The social cognitive theory holds that a teacher's autonomy is determined by their confidence in their ability to make decisions and take appropriate action in the classroom. High self-efficacy teachers are more likely to have faith in their capacity to run their classes, use cutting-edge teaching techniques, and modify their approaches to suit the requirements of their pupils (Thomas & Gupta, 2021). Additionally, young teachers can learn a great deal from and find inspiration from more seasoned and effective teachers.

According to Thomas and Gupta (2021), observational learning is crucial for shaping student behavior. The attitudes and behaviors that students see in their teachers and peers can have an impact on how engaged they are. Students are more likely to be inspired and encouraged to engage in learning at greater levels by teachers who exhibit excitement, passion for the subject, and genuine interest in their students' learning. Teachers can further increase student involvement in the learning process by giving students the chance to watch and learn from the active participation of their classmates (Schunk & DiBenedetto, 2020). To motivate and engage students,

gamification in education entails integrating game-like aspects into the learning process, such as prizes, challenges, and contests. Gamification can be useful in the Social Cognitive Theory environment because it offers distinct examples of good behavior and incentives, which can strengthen students' self-efficacy views. Through gamified activities, students can experience success and positive reinforcement, which can boost their self-efficacy and result in better learning outcomes and a greater willingness to take on difficult tasks. Self-efficacy beliefs, goal-setting, and self-regulation all have an impact on academic success. Students who are confident in their ability to succeed academically are more inclined to set hard objectives and keep working towards them. By offering helpful criticism, promoting goal-setting, and building a pleasant and encouraging learning environment that strengthens students' self-efficacy, teachers can support students' academic performance. Teachers' self-efficacy beliefs are extremely important to their success as educators (Ketonen et al., 2019). High self-efficacy teachers are more likely to set challenging goals, create engaging classes, and persevere in the face of difficulties. The self-efficacy of teachers can be raised through professional development programs that include peer observation, supportive feedback, and modeling of good teaching practices. Schools can also foster a supportive and empowering work climate that encourages teacher autonomy and offers chances for professional development (Wang & Hofkens, 2020).

Teachers' Autonomy and Student Engagement

To identify, develop, and create students' intrinsic motivating resources, teachers adopt an approach known as teachers' autonomy (Zhao & Qin, 2021). According to Peng, Zhou, Wang, Zhang, and Hu (2020), the following behaviors are promoted by teachers' autonomy support: conveying the meaning of learning content, defining students' perceptions of themselves by utilizing autonomy speech, offering voluntary decisions, and developing students' internal incentive system. In particular, teacher autonomy support takes the form of three different things: organizational autonomy support, which primarily focuses on the convenience and joy of the setting in the classroom; program autonomy support, which primarily promotes students to take an active role in educational events; and cognitive autonomy assistance, which primarily focuses on urging students to think more deeply about the content of learning and to have longer-lasting psychological engagement (Students cannot feel coerced by teachers in this environment of autonomy support, and their voluntary learning behaviors are supported as they proceed to complete educational tasks. The level of support or comprehension of the student's knowledge by the teachers is referred to as perceived teacher autonomy support in the social cognitive theory. Kengatharan (2020) found that teachers who perceived higher levels of autonomy in their classrooms reported greater job satisfaction and commitment to their profession. Fong, Dillard, and Hatcher (2019) examined how teachers' autonomy impacted their instructional practices and student outcomes. The results indicated that teachers who had more autonomy in selecting teaching methods and materials tended to employ more student-centered and innovative approaches, leading to increased student engagement and academic achievement.

H1: Teachers' Autonomy has a significant impact on student engagement.

Gamification-based Pedagogical and Student Engagement

According to Rather et al. (2023), gamification is a design strategy that aims to provide practically identical pleasant experiences to those found in games in order to influence users' cognitive processes and behaviors. Gamification definitions typically focus on either the experiential aspect or game design (i.e., what design aspects can be used in gamification). The three primary groups of game development and game mechanisms related to gaming causes, including interpersonal interaction-related; immersion-related; and achievement-related parameters, are typically distinguished in studies regarding gamification, game development, and respondents classifications (Bilro et al., 2021). The characteristics of gamification design, such as features that promote social interaction, immersion, and/or achievement-related behavior, are also covered. The interpersonal-interaction-related features, which include gaming mechanics like making comments, rivalry, category, likes, and groups Segura-Robles et al. (2020), are primarily used to support player social interactions. As a result, users/consumers could easily obtain and share knowledge about the brand with other peers once more encounters with socially relevant gamification elements/features emerge (Abusa'aleek & Baniabdelrahman, 2020). Achievement-related characteristics are goal-driven behaviors that primarily aim to boost the user's sense of success. According to Gupta and Goyal (2022), ARF incorporates game components like tasks, difficulties, objectives, certificates, advancement measures,

or rankings, among others, and optimizes customer behavior while requiring more information processing. In general, optimal/flow experiences and/or experiences of expressive freedom are associated with immersion-related characteristics, which are more emotive and emotional aspects. The International Rescue Force typically makes an effort to submerge the user in self-directed curious activity, which may involve role-playing elements, telling stories, models, or story structures. It gives users the chance to virtually interact with the company selling the destination (Nair, 2022). In a college-level classroom, (Segura-Robles et al., 2020) studied the effects of gamification on student participation. In comparison to students in a conventional, non-gamified setting, individuals who experienced a gamified learning environment reported better levels of engagement, enjoyment, and drive to study. The effect of gamification on student participation in online learning settings was examined by Bilro et al. (2021). The results demonstrated that gamification components, like badges, leaderboards, and points, favorably encouraged students' motivation to take part in discussions, finish assignments, and maintain more concentration on their academic responsibilities.

H2: Gamification-based pedagogical has a significant impact on student engagement.

Mediating Role of Students Engagement

According to Al-Khresheh (2023), student engagement is seen as a crucial element that positively impacts outcomes for both students and teachers. The relationship between student behavior and teacher job satisfaction through student engagement has not yet been explored, even though student engagement has frequently been linked to various student-related outcomes such as student performance, learning, student motivation, and dropout rates (Ketonen et al., 2019; Rather et al., 2023). The current study anticipates that student misbehavior will reduce their participation in class by interfering with their ability to learn. Kengatharan (2020) shows a correlation between the prevalence of teasing and bullying and decreased student participation. In other words, students who exhibit acceptable behavior are self-regulatory and succeed academically (Bilro et al., 2021; Fong et al., 2019). As a result, teachers feel proud of their pupils and credit the pupils' success to their teaching efforts, which makes them happy.

It has been suggested that Schunk and DiBenedetto (2020) theory of student involvement explains the connection between student behavior, engagement, and teacher job satisfaction. The theory is very concerned with the behavioral mechanisms that correspond to the psychological concept of "motivation" for enhancing students' growth. One of the most crucial components of the theory, student-faculty communication, explains how students who frequently interact with faculty members are more engaged in class, feel satisfied with the institutional rewards they receive for their strong academic performance, and enjoy school life in general more generally (Rather et al., 2023). When the theoretical perspective on student involvement is combined with actual data, it is anticipated that students accepted behaviors will create a favorable environment for their engagement in their learning, which will satisfy teachers. However, it is still unclear how much student conduct affects teachers' work satisfaction by way of student engagement. Therefore, it is possible to hypothesize that the relationship between student behavior and teacher satisfaction in work is mediated by student involvement (Al-Khresheh, 2023; Fong et al., 2019; Bilro et al., 2021).

H3: Student engagement has a mediating impact on teachers' autonomy and academic performance.

H4: Student engagement has a mediating impact on gamification-based pedagogical and academic performance.

Students Engagement and Academic Performance

Students in middle and high school were the subjects of an investigation by Zhu, Chen, Chen, and Chern (2011) into the relationship between student engagement and academic success. It was discovered that students who were more involved in their studies performed better academically and had lower dropout rates. Alameri, Masadeh, Hamadallah, Ismail, and Fakhouri (2020) suggested that the interaction between student engagement and academic success in this long-term study. High levels of involvement were found to predict later academic performance, while academic success was found to affect students' future engagement. This reciprocal link emphasizes how crucial it is to encourage involvement in order to improve academic success. According to Alameri et al. (2020), academic performance was higher among students who were motivated, actively involved in their studies, and had a favourable attitude towards education. Fong et al. (2019) concentrated on the connection between student engagement and

academic success. Higher levels of involvement were discovered to be linked to greater academic success across all nations, indicating the universal importance of student engagement in academic success. Academic accomplishment and student engagement have a favorable link. The study also discovered that the strength of this link held across a range of topic areas and educational levels. Students who actively participated in their education by being involved in coursework, interacting with faculty, and participating in co-curricular activities demonstrated higher levels of academic achievement and satisfaction with their college experience, according to Gupta and Goyal (2022).

H5: Student engagement has a significant impact on academic performance.

Moderating Role of Teachers' Self-Efficacy

Self-efficacy is a term used by Bandura to describe a person's confidence in their ability to exert control over their surroundings and complete a desired goal (De Feyter, Caers, Vigna, & Berings, 2012). Self-efficacy in the classroom refers to learners' assessments of their capacities to master academic information and skills and achieve academic goals in the academic context (Zhu et al., 2011). Numerous empirical studies have shown that self-efficacy consistently predicts academic success across a range of student demographics (Alameri et al., 2020; Gupta & Goyal, 2022). The strongest association between self-efficacy and academic performance was found in a meta-analysis of the major factors affecting the academic performance of both primary and secondary school pupils. According to Alameri et al. (2020), it seems that higher self-efficacy levels are associated with more inspiration and greater study effort, both of which improve academic success. The term refers to a student's assessment of his or her capacity to execute an academic task, according to Fong et al. (2019). According to Alameri et al. (2020), academic self-efficacy predicted academic success and represented students' cognitive proficiency in their academic subjects. Teachers' self-efficacy has been linked to student's academic involvement in numerous research (Fong et al., 2019; Gupta & Goyal, 2022) Educational diligence and perseverance among students are both impacted by teacher's self-efficacy, on the one hand. Students with high levels of teacher self-efficacy commit to higher goals and academic standards, have stronger tolerance to dissatisfaction, and show more determination when facing challenges than students with low levels of teacher self-efficacy. Students' belief in their academic abilities might affect how engaged they are in class and how well they perform in educational activities (Alameri et al., 2020). While students who lack confidence in themselves will be less involved in their studies and are more likely to give up, those who are secure in their academic talents will put more effort into their educational tasks (Fong et al., 2019).

H6: Teachers' self-efficacy has moderating impact on student's engagement and academic performance.

METHODOLOGY

Research Design

The conceptual framework of every study is important, which is determined by the sort of investigation (Ghauri, Grønhaug, & Strange, 2020). Based on the topic to be solved in the research, it can be quantitative, qualitative, or mixed; all strategies come with different types of data. It entails the use of questionnaires as the primary method of data gathering for data analysis. In terms of approach, the cross-sectional strategy is applied, in which data is gathered just once to answer the study objectives. The quantitative research technique that will be used in this survey is based on explanations and will be explained in the next sections. Furthermore, the current study's sampling unit is teachers, whereas the population is currently teachers in Jordan schools. The minds of both the present and future generations are being shaped by Jordanian educators, who are essential pillars of the country's educational system. Jordanian school teachers help students develop critical morals, social skills, and values that aid in their development as kind and compassionate adults in addition to academic knowledge. Due to their commitment to ensuring that Jordan's youth have the tools they need to succeed, they play a crucial role in the country's educational progress and societal advancement. The descriptive approach, according to Sekaran (2016), is a method used to characterize the qualities of the item under investigation, which can be people, events, or specific conditions. Furthermore, the verification method is a technique used to examine the impact of one variable on another, according to Sekaran (2016) (2016). Through testing the previously formulated hypotheses, the verification approach utilized in this study aims to be able to demonstrate empirical facts connected to the influence of the factors studied. The information will be gathered from Jordanian school teachers. The measurement model, as well

as the validity and reliability of the study items, will then be determined by using structural equation modeling with covariance as the basis for data analysis.

Participants

The classification of the population is the first step in data collection. As explained by Sekaran (2016) "population refers to the entire group of individuals or organizations that may be of interest to the researcher". The current study looks at how teachers autonomy affect academic performance. The researchers collect data from school teachers in Jordan.

Data collection and analysis

Primary and secondary data are the two categories of data used in this study. A collection of questions/questionnaires for teacher's autonomy, gamification-based pedagogy, and academic performance, as well as for the mediating function of students' involvement and the moderating role of teachers' self-efficacy, are provided by the primary data gathered through interviews. In addition, a literature review was conducted in the form of data collection to obtain secondary data. It involved examining various data/information reference materials as well as the findings of prior studies that were deemed pertinent in order to identify a theoretical underpinning for the research that was being conducted.

Ethical considerations

Ethical considerations are of utmost importance in any research study, particularly when involving human participants. Prior to data collection, it's essential to obtain informed consent from the participating teachers. The confidentiality of participants' information should be maintained at all stages of the research.

Measurements

The directions and information were the only topics covered in the first section of the questionnaire, while the demographic information was requested in the second. Among the demographic characteristics were gender, age, experience, education, kind, designation, and information source. The second half of the instrument has specific parts that are used to measure specific structures. The pieces, which have been modified from many sources, were chosen because they might be applied to particular constructions. The amount of items for each build is as follows: The four items from (Kengatharan, 2020) were modified to measure the teacher's autonomy. Nair (2022) measured the 3 elements of another gamification-based approach, and (Ketonen et al., 2019) measured the 5 elements of student engagement. By modifying the six questions from the scale, the self-efficacy of the teachers was assessed. To assess academic performance, the four items from Zhu et al. (2011) were adjusted. The 5-point Likert Scale was used to modify each item, with 1 denoting strongly disagree and 5 denoting strongly agree. The directions and information were the only topics covered in the first section of the questionnaire, while the demographic information was requested in the second.

RESULTS

Demographics

The structural and measurement models were assessed using SmartPLS3 based on a preliminary evaluation of respondent data. The demographic data and descriptive statistics of the sample for the current study are shown in Table 1 (N=433). The relationship between teachers' autonomy, gamification-based pedagogical, students' engagement, teachers' self-efficacy, and academic performance in Jordan. The analysis of the model showed teachers' age, gender, education, type, experience, and designation.

Table 1: Demographic profile

Demography	Description	No. of Responses	%
Gender	Male	250	58
	Female	183	42
Age	20-30	210	48
	30-40	140	32
	Above 40	83	19
Education	BA/BSC	190	44
	MA/MSC	177	41
	Others	66	15
Type	Government	289	67
	Private	144	33
Experience	1-2 Years	110	25
	2-3 Years	210	49
	More than 3 Years	113	26
Designation	Senior teachers	274	63
	Junior teachers	159	37

In-school teachers in Jordan was male 58%, and 42% was female, according to table 1. School teachers in Jordan age 20-30 was 48%, 30-40 was 32%, and above 40 was 19%. School teachers in Jordan who were complete BA/BSC was 44% education and MA/ MSC was 41% education and others was 15%. School teachers in Jordan working in Government was 67% and private was 33%. School teachers in Jordan's experience of 1-2 years was 25%, the experience of 2-4 years was 49%, and the experience of more than 4 years was 26%. School teachers in Jordan designated of senior teachers was 63% and junior teachers was 37% involved.

Measurement model

A "measurement model" is a statistical or mathematical representation that depicts the connections between observable variables and underlying constructs or latent variables. This term is used in a variety of professions. These models are frequently employed by researchers who want to quantify abstract ideas that are difficult to test directly in the domains of psychometrics, social sciences, education, and other fields. A measurement model is used to determine how effectively observable variables reflect the hidden construct that they are meant to measure. It enables researchers to comprehend the construct's structure and the degree to which the observable variables adequately represent the underlying concept (Hair, Risher, Sarstedt, & Ringle, 2019).

Composite Reliability, Cronbach's Alpha

A measure of a latent construct's internal consistency dependability is called composite reliability. It evaluates how accurately the underlying latent trait is measured by the observed variables (indicators) of a construct. A traditional indicator of internal consistency reliability that is frequently employed in the social and behavioral sciences is Cronbach's Alpha. Variance on average in confirmatory factor analysis, extracted is a metric of convergent validity. It evaluates the degree to which measurement error outweighs the variation shared by a latent construct's indicators (Ramayah, Cheah, Chuah, Ting, & Memon, 2018). Table 3 displays the composite reliability, Cronbach's alpha, and AVE results.

Table 2: Composite Reliability, Cronbach Alpha, and AVE

Construct	Item	Loadings	CA	CR	AVE
Teachers Autonomy	TA1	0.842	0.864	0.908	0.711
	TA2	0.859			
	TA3	0.874			
	TA4	0.796			
Gamification-Based Pedagogical	GBP1	0.853	0.826	0.896	0.741
	GBP2	0.872			
	GBP3	0.857			
Students Engagement	SE1	0.86	0.902	0.927	0.718
	SE2	0.859			
	SE3	0.8			
	SE4	0.869			
	SE5	0.848			
Teachers Self-Efficacy	TSE1	0.791	0.849	0.888	0.572
	TSE2	0.767			
	TSE3	0.733			
	TSE4	0.711			
	TSE5	0.842			
	TSE6	0.776			
Academic Performance	AP1	0.753	0.869	0.806	0.543
	AP2	0.716			
	AP3	0.91			
	AP4	0.876			

Discriminant Validity (HTMT)

Discriminant validity is a concept in the context of Structural Equation Modeling (SEM), specifically when dealing with multiple latent constructs. It refers to the degree to which the constructs in a measurement model are distinct from each other, meaning that they measure different underlying concepts and are not highly correlated with each other. The importance of discriminant validity lies in ensuring that the constructs being studied are unique and not redundant with one another. If two constructs are not distinct and highly correlated, it becomes challenging to interpret their individual effects on other variables accurately (Purwanto, Asbari, & Santoso, 2021). Table 4 demonstrated how helpful HTMT is.

Table 3: Discriminant validity

	AP	GBP	SE	TA	TSE
Academic Performance	0.737				
Gamification-based Pedagogical	0.305	0.861			
Student's Engagement	0.353	0.716	0.847		
Teachers Autonomy	0.334	0.751	0.834	0.843	
Teachers self-Efficacy	0.78	0.075	0.13	0.11	0.756

R Square

The statistic known as *R*-squared (R2) measures how much variance in the dependent variable in a regression model is explained by the independent variables (Hair et al., 2019). It is widely used to evaluate the goodness of fit of a regression model and ascertain how well the independent variables forecast results. In a regression analysis, the dependent variable is predicted using one or more independent variables. The *R*-square statistic demonstrates how well the independent variables can explain the variability of the dependent variable. Its range is 0 to 1, with 0 indicating no explanatory power for the independent variables and 1 indicating total explanatory power for the independent factors' influence on the variability of the dependent variable. The academic performance value of R

square was 0.673, and the students engagement value of R square was 0.714 respectively.

Table 4: Assessment of R square

	R2
Academic Performance	0.673
Student's Engagement	0.714

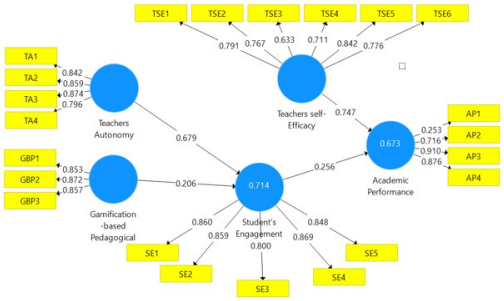

Figure 1. Assessment of Algorithm]

Structural Equation Model

A statistical modeling method called a structural equation model is used to examine intricate interactions between several observable and latent (unobserved) variables. The structural equation model offers a complete framework for examining the interactions between variables and putting sophisticated theoretical models to the test by combining elements of factor analysis, multiple regression, and path analysis (Becker, Cheah, Gholamzade, Ringle, & Sarstedt, 2023).

Direct Relation

The PLS-SEM analysis between teacher's autonomy, gamification-based pedagogical, academic performance, and teachers' self-efficacy as moderators and students' engagement as mediators. Instead of mediating or indirect effects through intermediary factors, it concentrates on the direct impacts of independent variables on dependent variables (Purwanto et al., 2021). The results show that the relationship between teachers' autonomy and student engagement is significant (= 0.679, t = 19.225, p = 0.000). The results show that the relationship between gamification-based pedagogical and student engagement is significant (= 0.206, t = 5.230, p = 0.000). The relationship between student engagement and academic performance has a significant impact on each other (= 0.255, t = 5.615, p = 0.000). Hence all hypothesis was accepted.

Table 5: Direct Relation

	Original Sample	T Statistics	P Values	Decision
Teachers Autonomy -> Student Engagement	0.679	19.225	0	Supported
Gamification-based Pedagogical -> Student Engagement	0.206	5.23	0	Supported
Student's Engagement -> Academic Performance	0.255	5.615	0	Supported

Mediating Effect

When a mediator or intermediary variable affects or mediates the relationship between an independent variable and a dependent variable, it is known as a mediating effect or an indirect impact. In other words, the mediating factor contributes to the understanding of how or why the independent variable influences the dependent factor (Hair Jr et al., 2021). Table 7 shows that student engagement as a mediating variable, the association between teachers' autonomy and academic performance remained significant (= 0. 173, t = 5.386, p = 0.000, respectively). Table 7 shows that student engagement as a mediating variable, the association between gamification-based pedagogical and academic performance remained significant (= 0. 052, t = 3.670, p = 0.000). Hence both hypotheses was accepted.

Mediating Effect

Table 6: Related Case Studies

	Original Sample (O)	T Statistics	P Values	Decision
Teachers' Autonomy -> Student's Engagement -> Academic Performance	0.173	5.386	0	Supported
Gamification-based Pedagogical -> Student's Engagement -> Academic Performance	0.052	3.67	0	Supported

Moderating Effect

A moderator variable is typically utilized "when there is an inconsistent or weak link between the independent and dependent variables. The data in the table below provides evidence in favor of the idea. The relationship between an independent variable and a dependent variable is changed by a moderator third variable, which is also known as a moderation effect or an interaction effect. Table 8 shows that the moderating role of teachers' self-efficacy between students' engagement and academic performance is significant (= -0.082, t = 3.026, p = 0.003). Hence H4 is accepted.

Moderating Effect

Table 7: Related Case Studies

	B-value	(STDEV)	T-value	P value
Students Engagement* Teachers Self-Efficacy -> Academic Performance	-0.082	0.027	3.026	0.003

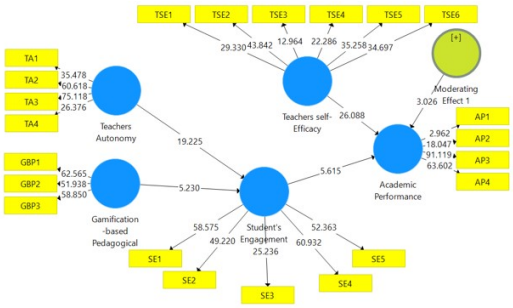

Figure 2. Assessment of Bootstrapping]asswords

Although the slopes of the correlations are influenced by the moderation effect, the slopes in graph 1 show significance for low, moderate, and high levels of findings. In other words, teachers' self-efficacy is low when low student engagement and academic performance. On the other side, teachers' self-efficacy is high when low student engagement and academic performance. The graph shows that more improvement in the association between student engagement and academic performance through teacher's self-efficacy.

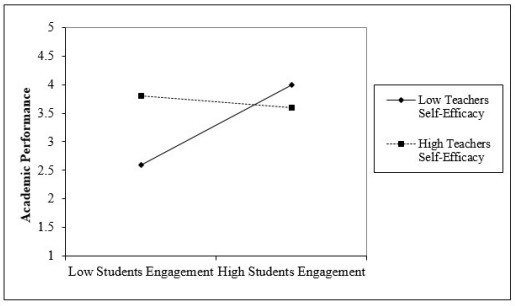

Figure 3. Moderation Graph]asswords

DISCUSSION

The study investigating the impact of gamification-based pedagogical approaches on academic performance and student engagement from the perspective of Jordanian school teachers holds considerable importance for various stakeholders in the education system. The present study established social cognitive theory. The relationship between teacher's autonomy, gamification-based pedagogical, academic performance, and teachers' self-efficacy as moderator and students' engagement as mediator.

The results show that the relationship between teachers' autonomy and student engagement is significant. When teachers are given more freedom, they can modify their lesson plans and subject matter to better suit the interests, learning preferences, and aptitudes of their pupils. This individualized method of teaching can help students feel more invested in their education and more connected to it, which will boost their interest in what they are learning. Autonomous teachers frequently demonstrate greater enthusiasm and commitment in their instruction, which can be contagious and motivate students to invest more time in their studies (Peng et al., 2020). Furthermore, teacher autonomy gives instructors the freedom to try out cutting-edge teaching methods and incorporate engaging, hands-on activities that might enhance learning. Teachers may foster a positive learning environment in the classroom where students feel valued, driven to engage actively, and encouraged to explore new ideas by incorporating creativity and adaptability into their lessons.

The results show that the relationship between gamification-based pedagogical and student engagement is significant. By incorporating gamification into pedagogy, educators can create a more dynamic and immersive learning environment that captivates students' attention and sustains their interest. Games often provide immediate feedback, allowing students to track their progress and experience a sense of achievement, which can be highly motivating. This instant feedback loop enhances the learning experience and encourages students to persist in their efforts to overcome challenges and improve their performance (Abusa'aleek & Baniabdelrahman, 2020). Furthermore, gamification taps into students' intrinsic motivation by making learning enjoyable. When students perceive their educational journey as an exciting and interactive experience, they become more enthusiastic about exploring new concepts and content. The element of competition and the opportunity to earn rewards or recognition also stimulate healthy peer-to-peer engagement, fostering collaboration and a positive classroom atmosphere.

The relationship between student engagement and academic performance has a significant impact on each other. When students experience success and see the positive outcomes of their efforts reflected in their grades and academic achievements, they feel a sense of accomplishment and validation. This positive reinforcement reinforces their engagement in the learning process, creating a cycle of continuous improvement (De Feyter et al., 2012). Conversely, struggling academically or receiving poor grades can demotivate students and lead to disengagement. Students might lose interest in their studies if they perceive that their efforts are not yielding the desired results, or they may feel discouraged and develop a negative attitude toward learning.

Student engagement as a mediating variable, the association between teachers' autonomy and academic performance remained significant. Effective autonomy use by teachers can help students feel more invested in, relevant to, and enthusiastic about their education. Student involvement is increased as a result of these beneficial learning opportunities. Students that are actively interested in their education are more eager to study and more committed to their academics (Ketonen et al., 2019)). Students are more likely to put time and effort into their academic endeavors as they become more involved in the learning process. This more determined effort results in better academic success. Students who are more engaged are better able to learn and retain information, comprehend difficult topics, and use their knowledge in tests and exams.

Student engagement as a mediating variable, the association between gamification-based pedagogical and academic performance remained significant. Gamification increases student engagement because it makes learning more interesting, interactive, and goal-oriented. Immediate feedback, specific goals, and a sense of accomplishment are all aspects of the gamified method that help kids develop intrinsic drive (Aljaraıdeh, 2020). This increased involvement motivates students to work harder on their studies, which results in a better knowledge of the material and better academic success. Students actively engage in problem-solving, critical thinking, and decision-making within the setting of the games as their involvement in the gamified learning process increases.

Moderating the role of teacher self-efficacy between student engagement and academic performance is

significant. Teachers are more likely to be proactive, resourceful, and persistent in their teaching methods when they have a high sense of their efficacy. They are more capable of establishing a supportive learning environment that encourages student participation because they are more confident in their ability to instruct (Bilro et al., 2021). Because they are confident in their abilities to mentor and support their students in accomplishing these goals, teachers with high self-efficacy prefer to set demanding targets for their pupils. As a result, teachers can successfully encourage student engagement by utilizing a range of tactics that take into account each student's unique learning requirements and interests.

Practical and Theoretical Implication

The investigation of the effects of gamification-based instructional strategies on student engagement and academic achievement in the setting of Jordanian schools advances the Social Cognitive Theory. The study offers empirical support for the theoretical framework put forward by the Social Cognitive Theory by evaluating the interactions between teacher autonomy, gamification, academic performance, student engagement, and teacher self-efficacy as a moderator. The study emphasizes the significance of teacher autonomy in the adoption of gamification-based pedagogical techniques. It illustrates how giving teachers greater authority can have an impact on their instructional strategies, resulting in more stimulating learning environments and better student outcomes. This knowledge can aid in the creation of policies that support and encourage teacher autonomy in Jordan and elsewhere, improving the quality of education as a whole. The study's investigation of student involvement as a mediating variable offers insightful information about the mechanisms through which gamification-based instructional techniques affect academic performance. The study improves our knowledge of the relationship between teaching strategies and student learning outcomes by illuminating the significance of student participation in this setting. By showing the beneficial effects of gamification-based pedagogical techniques on student engagement and academic performance, the study's findings emphasize practical implications for Jordanian school teachers. To give their pupils more engaging and inspiring learning opportunities, teachers might add game components like challenges, rewards, and interactive activities into their lesson plans. The study emphasizes the significance of teacher autonomy in implementing successful gamification-based education. These insights can be used by educational policymakers and school administrators to create professional development programs and policies that give teachers more discretionary power, enabling them to adapt their lesson plans and subject matter to the various learning styles and interests of their students. The study emphasizes the importance of boosting instructors' self-confidence in their ability to deliver instruction while also highlighting the moderating influence of teacher self-efficacy. The effectiveness of gamification-based instructional approaches can be increased by school leaders implementing supportive mentoring programs, peer collaborations, and chances for ongoing professional development. The study provides a strategy to enhance overall educational results in Jordanian schools by highlighting the beneficial relationship between gamification, student engagement, and academic performance. Higher student motivation, improved academic performance, and a more positive learning environment are all possible outcomes of implementing gamification-based pedagogical practices.

Limitations and Future Research

The current study may have a few drawbacks in addition to these important findings, which need to be acknowledged. First off, this study's cross-sectional design makes it impossible to determine if study variables are causally related. Students that have strong social skills, for instance, might express strong support for teacher autonomy. It is strongly advised that future studies use a longitudinal design to look at the reciprocal or opposite relationships between these study variables. While quantitative research is useful for determining statistical correlations between variables, it could miss the subtle and contextual elements that could affect the effectiveness of gamification-based pedagogical techniques. A mixed-methods approach, which incorporates both quantitative data and qualitative insights, might offer a more thorough grasp of the intricate interactions being studied. This study's cross-sectional methodology, which looks at data at a single moment in time, may make it more difficult to determine the causes of various variables. To prove causation and capture changes in teacher autonomy, gamification-based educational practices, and student engagement over time, longitudinal studies or experimental designs with control groups would be more suited. Future studies should carry out longitudinal studies to examine the long-term effects

of gamification-based instructional approaches on student engagement and academic performance. Insights into the long-lasting impacts of such therapies and how they could change over time can be gained using longitudinal approaches. A mixed-methods research strategy can provide a more thorough grasp of how different factors relate to one another. The experiences and opinions of instructors and students on gamification-based teaching might be better understood by combining quantitative data with qualitative insights from interviews or focus groups. It would be useful to evaluate the effectiveness of gamification-based teaching approaches in various educational contexts and cultural backgrounds. Comparative research could provide insight into how well these methods work in various learning situations and point to the optimal implementation strategies. Future studies should go more deeply into the fundamental principles underpinning the connections between teacher autonomy, gamified pedagogy, student engagement, and academic achievement. A more in-depth understanding of how teacher self-efficacy moderates the relationship between gamification and student engagement and how student engagement mediates the relationship between gamification and academic achievement can be gained through mediation and moderation analyses. Last but not least, the generalizability of the research findings is constrained by some features of our sample. For instance, because participants were chosen using a convenience sampling technique, volunteer bias may have had some influence on the current results. In other words, pupils who choose to participate voluntarily may be distinguished from those who do not. Accordingly, the current sample might not be representative of some innate and illogical characteristics. It is strongly advised that subsequent initiatives strengthen the representativeness of the sample by using probability sampling techniques.

CONCLUSION

In conclusion, the study investigating the impact of gamification-based pedagogical approaches on academic performance and student engagement, from the perspective of Jordanian school teachers, holds significant importance for various stakeholders in the education system. This study has shed light on the intricate relationships between teachers' autonomy, gamification-based pedagogy, academic performance, teachers' self-efficacy as a moderator, and student engagement as a mediator, all within the framework of the Social Cognitive Theory. Furthermore, recognizing the moderating role of teachers' self-efficacy emphasizes the importance of empowering teachers and building their confidence in their instructional abilities. Providing professional development opportunities and supportive environments can enhance teacher efficacy, leading to more successful implementation of gamification-based pedagogical approaches. The study also highlights the importance of considering student engagement as a crucial mediator in the relationship between gamification and academic performance. Student engagement serves as a key link in the learning process, enhancing students' motivation and facilitating deeper understanding and application of knowledge. Ultimately, by fostering a greater understanding of the impact of gamification-based pedagogical approaches, this research enriches the educational landscape and lays the foundation for more effective and engaging teaching practices in the future.

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