



Enhancing Virtual Learning Environments: A Strategic Approach to Gamifying Learning Management Systems for Increased Engagement and Competency

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ABSTRACT

Purpose: This study aims to assess the effects of incorporating gamification into learning management systems (LMS) on students' levels of expectancy and engagement. Data was collected from students at universities in Iraq. **Design/Methodology/Approach:** Analysed using JASP software version 0.19.0.0, a sample of 561 respondents was examined to determine the findings of Pearson's correlations and regression analysis.

Findings: The study discovered that incorporating game elements into the LMS has a noteworthy impact on student engagement and competency. The study suggests using LMS gamification in the educational setting to impact student behavior. **Research Limitations/Implications:** The research has important implications for incorporating gamification of learning management systems into university practices in order to actively engage students in their learning. Additionally, enhancing the students' skills is beneficial. By incorporating gamification elements, it is important to ensure that the students are actively involved and interested in the learning management system. It would be beneficial to foster students' enthusiasm for their educational progress. **Originality/Value:** This is a groundbreaking study that utilizes the JASP statistical analysis tool for data analysis. Furthermore, prior research has not extensively examined the relationships in question, making this study of great importance. In addition, this study addressed the gaps in existing research by exploring the application of gamification in educational settings within the context of a learning management system.

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Introduction

Throughout the course of human history, education has been a crucial focal point for every nation, leading to numerous revolutions in pursuit of the current level of intellectual excellence (Bradley, 2021). This is because these methods have prioritised

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physical contact. However, Learning Management Systems (LMS) have been steadily gaining prominence in the field of education since the advent of the World Wide Web (WWW) (Srivastav, Kant, & Srivastava, 2023). Research demonstrates that these systems can effectively surmount the majority of the constraints linked to traditional educational methods. Originally, Barrot, Llenares and del Rosario (2021) designed the LMS as a content management system, emphasizing the use of technology for collaboration and performance monitoring. This applies to students at all levels of education, from kindergarten to tertiary school. Regardless of the educational level, the situation remains the same for students, whether they are in elementary school, secondary school, or tertiary school (Guoyan et al., 2023).

Prior education research has highlighted the difficulties associated with implementing a LMS when students lack interest in participating (Alturki & Aldraiweesh, 2021). A recent study by Rivera and Garden (2021) highlighted the importance of students enhancing their learning behaviour. When students are enthusiastic about participating in online classes, it is important to provide them with the necessary support to utilise the LMS effectively (Veluvali & Suriseti, 2022). According to Campillo-Ferrer, Miralles-Martínez and Sánchez-Ibáñez (2020), given the limited exposure many students have had to technology, it is crucial to educate students about the utilisation of LMS. Therefore, the tutorials on LMS usage are crucial for enhancing comprehension of its functionality. The notable changes in LMS have proven to be dependable over time (Karaođlan Yılmaz, 2022), however, it is imperative to provide training to both students and teachers in order to effectively engage them with it. It is important to design the LMS in an innovative manner to enhance the learning experience of students (Pal'ová & Vejačka, 2020). In their study, Hellín et al. (2023) emphasised the importance of students enhancing their understanding of the learning management system's usability and actively contributing feedback on it. Therefore, receiving feedback from students would be beneficial in understanding any errors and making further improvements.

In order to fully grasp the impact of gamification on a conventional LMS, it is crucial to have a solid understanding of the structure of such a system (Karagianni & Drigas, 2023). Furthermore, it is important to understand the ways in which gamification has been improving the capabilities of LMSs. This study aims to assess the effects of incorporating gamification into learning management systems on students' expectancy and engagement (Aderibigbe, Alotaibi, & Alzouebi, 2023). Furthermore, the research helps analyse the factors that enhance the learning experience by using gamification (Pham & Hanh, 2023). This research has important implications for incorporating gamification into universities' practices to actively engage students in their learning. In addition, enhancing the students' skills is beneficial. This research is a groundbreaking study that utilises the JASP statistical analysis tool for data analysis. Additionally, this study holds great importance as previous research has not extensively examined the relationships in an empirical manner. This study is organised into different sections, including a review of literature, a description of the methodology used, an analysis of the findings based on data, a discussion of the findings, and the conclusions drawn from the study. In addition, the paper also outlines future directions to enhance scholars' understanding for further research.

Literature Review

The WWW was initially introduced in 1992, and since then, the possibilities for online education have been consistently growing, and this trend persists even now. Live chats integrated into messenger applications have revolutionised the way students and teachers communicate, allowing for timely interaction and valuable feedback (Liao, 2023). However, there are potential downsides to consider. Teachers and developers face the task of keeping up with the ever-changing landscape of technology advancements (Tahiri et al., 2023). As a result, this would lead to a discussion about the most appropriate method for conducting online teaching and learning. Extended engagement in online learning can lead to a sense of isolation and a lack of connection to a community (Xu, Zhang, & Wang, 2024). It is possible that the structure of online learning contributes to this outcome.

This definition is sourced from the International Data Corporation (IDC). The essential elements of an LMS would consist of a repository for learning objects, a tool for creating learning material, a mechanism for dynamic publishing to distribute the information, and an administration tool for management purposes (Salar, Başarmak, & Sezgin, 2023). A six-dimensional model has been developed for an LMS model, which includes three levels: mandatory, advanced, and recommended. This model is built upon thorough analysis conducted by experts in the field. Gamification is a design approach that incorporates game elements into non-gaming contexts to create activities or experiences that mimic games (Aroonsrimarakot et al., 2023). Lee et al. (2023) states that the goals are to either increase motivation, enhance the efficacy and efficiency of non-gaming activities (such work and learning processes), or have an impact on behavior. Additionally, a higher learning efficiency is a reason to apply gamification in learning environments (Anggarini et al., 2023). Numerous studies and approaches can be used to illustrate how gamification affects motivation (Ngo, 2023).

The self-determination perspective is favoured due to its focus on the interconnectedness of people's fundamental psychological needs (Dogan, Goru Dogan, & Bozkurt, 2023). Some of these demands include competence, autonomy, and social relatedness. Based on current research, incorporating game design elements such as point systems, rewards, leaderboards, performance graphs, narrative elements, and avatars can enhance satisfaction with the three fundamental demands (Rathnasekara, Suraweera, & Yatigammana, 2023). According to Alamri and Awjah (2023), these elements play a crucial role in initiating the processes that result in meeting the necessary requirements. These processes involve user competition, shared goals, dedication, and feedback. In a series of separate experiments, Jia et al. (2022) demonstrated that the utilisation of the game element "feedback" alone effectively enhances motivation.

According to Garris and Fleck (2022), digital games play a crucial role in gamification by providing an ideal motivational environment. Players in this setting are highly motivated to conform to the rules of the system and are enthusiastic about enjoying themselves. In a recent study by Damana (2022), it was found that game design features may not have an immediate impact on platform usage. However, over time, these features do play a role in encouraging users to engage with the platform. The main factors that drive initial use, as identified by Prasetyanto, Rizki and Sunitiyoso (2022), include learning, curiosity, enjoyment, fulfilling degree requirements, and demonstrating skill. Warfvinge et

al. (2022) state that gamification allows users to create activities that can be efficiently performed by individuals or groups working together. Through this, the children will be inspired to actively participate in their community and develop leadership skills, ultimately leading to greater success through teamwork. Whenever students participate in these collaborative activities, they will have the opportunity to demonstrate their skills. When gaming components are integrated into student responsive systems, the traditional Question and Answer (Q&A) Session is transformed into an engaging and competitive method. This method captures the students' focus and reduces the chances of them becoming disengaged during the sessions (Chiu, 2022).

In addition, it is clear that the utilisation of gamification has a positive influence on the implementation of LMS, as stated by Besser, Flett and Zeigler-Hill (2020). To gather essential information such as learning patterns, personality types, and motivational factors, among others, researchers utilise data collection methods. This information is crucial for enhancing the online learning platform's effectiveness and ensuring a positive experience for a diverse audience (AlJhani et al., 2022). A comprehensive study has been conducted, exploring a diverse set of factors and their impact on different groups in various settings (Chang et al., 2022). This research has extensively examined the numerous benefits that can be achieved through the implementation of gamification. However, it is clear that the following key points need to be thoroughly examined in order to understand the potential advancements in gamification (Li & Che, 2022). By incorporating gamification, student behaviour and emotional identification can be fostered (Alismaiel, Cifuentes-Faura, & Al-Rahmi, 2022). Implementing gamification into the action plan would be seen as a significant advancement, according to Hongsuchon et al. (2022). To enhance one's sense of self-importance and foster a feeling of accomplishment, a particular approach to implementing this principle involves assigning gameplay paths that are easier and ensure the successful completion of the game (Meng & Hu, 2022).

Assessments are crucial in a Learning Management System (LMS) as they provide valuable insights into individual student progress and overall performance of students at a similar level (Çakıroğlu et al., 2022). Although the identification process is crucial, there should be efficient methods to improve output with minimal human involvement. These methods should provide prompt guidance for the student. One approach to integrating assessments with gamification involves utilising artificial intelligence to assess the learner's current level of proficiency (Srivastav et al., 2023). Given this information, learners could be assigned personalised gaming routes to either bridge the gap or enhance their overall performance. This would not only motivate the learner to overcome challenges, but it would also enhance their ability to retain information for an extended duration (Karagianni & Drigas, 2023).

It is crucial for educational platforms to cater to students with learning difficulties and incorporate cutting-edge technologies like Artificial Intelligence (AI) and gamification to improve the state of education (Aderibigbe et al., 2023). A prime example of this is how LMS can utilise natural language processing to identify the most challenging words or phrases, and how they can incorporate gamification to foster a learning environment where users can learn through experimentation and mistakes (Salar et al., 2023). An essential aspect of the mentioned point is the chance for students to study at their own pace, which can vary from other students facing the same challenge (Ngo, 2023). The learner would remain engaged in the material and be motivated to improve as a result. One often

overlooked quality in individuals is their ability to excel in a group setting, as noted by Lee et al. (2023). Encouraging students to interact with one another in a digital-dominated setting can pose a challenge when it comes to enhancing their interpersonal skills. However, despite this, it is still possible to achieve the same thing. Additionally, due to the personalised nature of the strategy, the student can expect an exhilarating experience. Therefore, the following hypotheses are developed.

H1: *There is a relationship between gamifying learning management systems and increased engagement.*

H2: *There is a relationship between gamifying learning management systems and increased competency.*

Methodology

A quantitative research approach was employed to assess the effects of incorporating gamification into learning management systems on student engagement and competency. The aim of this investigation was to accomplish the goal of this study set forth earlier. The study focused on students in Iraq. The students who were part of this research were chosen because they had prior experience using the Learning Management System (LMS). Therefore, students from universities were chosen because they are more capable of providing data for a survey-based data collection. A research survey approach was utilised to collect data and analyse the findings of the study, with the aim of measuring the structural relationship between variables. Survey-based studies are highly advantageous as they require minimal time and cost. Additionally, the study utilised a self-administered questionnaire to gather the data.

The questionnaire for the study was split into two sections: one for collecting demographic data and the other for the Likert scale questionnaire. The scale used to assess the impact of gamification on the LMS, student engagement, and student competency was derived from previous research. The scale was adjusted to align with the context of this research. The study utilised a random sampling method to collect data, as the majority of university students in Iraq have been introduced to LMS after the COVID-19 pandemic. Therefore, a total of 10 universities were chosen to gather data, including those located in the capital.

Questionnaires were distributed to the respondents using printed copies, and a sample size was estimated for data collection. The estimated sample size was 384 based on the recommendations of Krejcie and Morgan (1970). In order to achieve this objective, a total of 800 questionnaires were handed out to the students after obtaining their consent. The students were eager to contribute data for this research. However, out of all the participants, only 561 responses were correct on the questionnaires. Thus, the study's sample size was determined to be 561. The collected data of this research was analysed using JASP software version 0.19.0.0. This software has already been utilised in the research of social sciences (Murad, Othman, & Kamarudin, 2024). An analysis of the data involved the use of descriptive statistics, Pearson correlations, and regression analysis. The empirical findings and results will be presented in the following section.

Findings

The data for this research was analysed using JASP version 0.19.0.0. Initially, a descriptive analysis of the findings was carried out. There were a total of 561 responses to analyse. All the missing values in the data were thoroughly examined and it was found

that there were no missing data for any response. In addition, the data was examined using a threshold of -3 and +3 to determine the mean and standard deviation. The findings of both studies indicated that the data holds importance for further analysis. Meanwhile, the kurtosis and skewness of the data were examined to determine if the data follows a normal distribution. The results of both studies indicated that all values fell within the range of -2 to +2 (Royston, 1992). Thus, the data was successfully normalised and it was established that the findings hold significance (see Table 1).

Table 1

Descriptive Statistics

	GLMS	SE	SC
Valid	561	561	561
Missing	0	0	0
Mean	3.376	3.378	3.373
Std. Deviation	1.178	1.137	1.220
Coefficient of variation	0.349	0.337	0.362
Skewness	-0.092	-0.106	-0.096
Std. Error of Skewness	0.103	0.103	0.103
Kurtosis	-1.084	-1.029	-1.213
Std. Error of Kurtosis	0.206	0.206	0.206
Minimum	1.000	1.000	1.000
Maximum	5.000	5.000	5.000
25th percentile	2.000	2.000	2.000
50th percentile	3.000	3.000	3.000
75th percentile	4.000	4.000	4.000

GLMS = Gamifying of Learning Management System, SE = Student Engagement and SC = Student Competency

The correlations found by Pearson were tested in the second stage to assess the relationship between the variables. It is a systematic procedure for examining the relationships between the variables. It is recommended to consider a threshold of $p < 0.05$ for determining significant correlations between the variables (Benesty et al., 2009). The statistics presented in Table 2 indicate a significant correlation among all three variables of the study. Thus, it was deemed that the model holds importance in further analysing the data and examining relationships between variables.

The model summary findings were tested to assess the overall characteristics of the model. The R-value in the model summary indicates the correlation between the dependent and independent variable. A value above 0.4 is selected for further analysis. In addition, the R-square metric represents the overall amount of variation in the dependent variable that can be accounted for by the independent variables. A value above 0.5 indicates the model's effectiveness in determining the relationship. Adjusted R-square measures the extent to which the sample results in multiple regression can be generalised to the population, indicating the variation between the two. It is necessary to maintain a minimum difference between the values of R-square and adjusted R-square. The findings presented in Table 3 indicate that the study's model has statistically significant values. Hence, the model was deemed significant for further analysis.

Table 2*Pearson's Correlations*

Variable		GLMS	SE	SC	
1. GLMS	n	—			
	Pearson's r	—			
	p-value	—			
	Lower 95% CI	—			
	Upper 95% CI	—			
2. SE	n	561	—		
	Pearson's r	0.613	***	—	
	p-value	< .001		—	
	Lower 95% CI	0.559		—	
	Upper 95% CI	0.663		—	
3. SC	n	561	561	—	
	Pearson's r	0.603	***	0.617	***
	p-value	< .001		< .001	
	Lower 95% CI	0.548		0.563	
	Upper 95% CI	0.653		0.666	

* p < .05, ** p < .01, *** p < .001

GLMS = Gamifying of Learning Management System, SE = Student Engagement and SC = Student Competency

Table 3*Model Summary*

Model	R	R ²	Adjusted R ²	RMSE
M ₀	0.000	0.000	0.000	1.137
M ₁	0.613	0.576	0.3575	0.899

Note. M₁ includes GLMS

The analysis of variance (ANOVA) was used to assess the suitability of the study's model for data analysis. Typically, researchers select a 95% confidence interval or a 5% significance level for their study (Scheffe, 1999). Therefore, the p-value must be below 0.05. The study successfully achieved the recommended p value. In addition, the F-ratio signifies an enhancement in the prediction of the variable by adjusting the model to account for any inaccuracies. A value greater than 1 indicates an efficient model based on the F-ratio. The study successfully meets the recommended threshold for F-value.

Table 4*ANOVA*

Model		Sum of Squares	df	Mean Square	F	p
M ₁	Regression	272.418	1	272.418	337.303	< .001
	Residual	451.468	559	0.808		
	Total	723.886	560			

Note. M₁ includes GLMS

Note. The intercept model is omitted, as no meaningful information can be shown.

Ultimately, the regression coefficients were used to assess the influence of gamifying the LMS on student engagement and competency. Based on the results, it was determined that H1 was strongly supported ($p < .001$). This indicates that the implementation of gamification in the Learning Management System (LMS) has a significant impact on student engagement. The findings are presented in Table 5.

Table 5

Coefficients (GLMS -> SE)

Model		Unstandardized	Standard Error	Standardized	t	p
M ₀	(Intercept)	3.378	0.048		70.370	< .001
M ₁	(Intercept)	1.380	0.115		11.973	< .001
	GLMS	0.592	0.032	0.613	18.366	< .001

GLMS = Gamifying of Learning Management System

In addition, the study also found support for H2. Based on the research conducted by H2, it was found that the implementation of gamification in the Learning Management System (LMS) has a highly significant impact ($p < .001$) on student competency. The results of H2 are presented in Table 2. In conclusion, this research found support for both hypotheses of the study.

Table 6

Coefficients (GLMS -> SC)

Model		Unstandardized	Standard Error	Standardized	t	p
M ₀	(Intercept)	3.373	0.051		65.490	< .001
M ₁	(Intercept)	1.265	0.125		10.133	< .001
	GLMS	0.624	0.035	0.603	17.873	< .001

GLMS = Gamifying of Learning Management System

Discussion

Both hypotheses were confirmed by the study. Based on the findings, it was determined that gamifying the LMS has a significant impact on student engagement, thus supporting H1. The results of this hypothesis were compared with the findings of existing studies. In their study, Karagianni and Drigas (2023) examined the factors that contribute to student engagement with university LMS. They found that students are more likely to be engaged with the LMS if they feel confident in using it. Students' creative approach can positively impact their engagement with the LMS, but they need training to fully utilise it. The study by Prasetyanto et al. (2022) suggests that implementing a user-friendly system in a LMS can effectively engage students and encourage their active participation. A study conducted by Aderibigbe et al. (2023) emphasised the importance of supporting students in their academic progress by enhancing the LMS.

In a recent study by Warfvinge et al. (2022), it was found that students who engage with game-like features in a LMS are more likely to use it effectively, leading to positive changes in their behaviour. Improving student learning is crucial for enhancing their performance

on the Learning Management System (LMS). Students should be familiar with the positive impact of LMS on their behaviour (Chiu, 2022). According to a study by Besser et al. (2020), the presence of creativity in a LMS can significantly impact students' engagement in classroom activities. Monitoring student performance in the LMS can foster positive behaviour and contribute to its improvement. By incorporating student feedback, we can make significant improvements to the LMS and enhance their overall development. In addition, AlJhani et al. (2022) highlighted the positive impact of student participation in classroom activities on their behaviour and learning outcomes, emphasising the importance of keeping the LMS system up to date.

The study conducted by Jia et al. (2022) highlights the purpose of Learning Management Systems (LMS) in equipping students with the essential skills required for optimal performance. Learning from it is essential for students. Lee et al. (2023) found that student engagement with LMS positively impacts their ability to perform and monitor curriculum activities in the classroom. Improving learning is crucial. Developed countries have implemented LMS platforms to offer online education to students, as noted by Garris and Fleck (2022). In contrast, developing nations are still in the process of enhancing their LMS systems. An in-depth study is needed to address LMS management and its integration for students. In their study, Tahiri et al. (2023) highlighted the importance of LMS in influencing students' education.

According to the findings of H2, it was discovered that gamifying of LMS has a significant influence on student competency. The findings of this hypothesis were compared with the existing studies results. The study Chang et al. (2022) discussed that LMS is necessary to upgrade the skills of the students and their learning behaviour. When LMS is designed according to the nature of student, they learn the course material in a very productive way. Furthermore, Liu and Ye (2022) highlighted that LMS improvement is necessary for better delivery of knowledge to the students. It helps students to encounter with the course work and contact to their peers. According to Huang and Zhang (2022), when students are using LMS they can communicate with the peers regarding the classroom activities that are significant to influence thier behaviour and learning. A significant changes in students learning is possible with their interaction with LMS fuctioning to provide them better information (Aroonsrimarakot et al., 2023).

The study Alamri and Awjah (2023) found that LMS is important for college and university students as it influences to advance the technique of their performance. The stable approches in learning are possible with online participation in the classroom activities using LMS (Ngo, 2023). When the students are motivated, they tend to improve their learning behaviour. While, the students who are less motivated to use LMS, they are comparatively less adventagous for their performance. Hence, the students should be productive to use LMS that is necessary for their overall performance and participation in the classroom activities. It is helpful for students to learn and grow their abilities to sustain (Veluvali & Suriseti, 2022). The monitoring bodies of LMS in universities and teachers should facilitate the students in their learning while using this online platform. By and large, the use of LMS is benefical for students to influence thier engagement in the activites that translate their competencies into reliable working.

Implications

This study has significant theoretical and practical implications. Firstly, the study addressed the gaps in literature by discussing the use of gamifying of LMS in educational context. There was inconsistencies in literature regarding the relationship between LMS and engagement of students. This study contributed to the literature that gamification of LMS is a significant predictor for engagement of students. This relationship was found in the context of Iraq. Secondly, the study also contributed into the body of literature by reporting that gamification of LMS is a significant predictor to influence student competency. This relationship was inconclusive in the findings of previous studies where mixed findings were discovered. Hence, the analysis of this relationship contributed to knowledge. To sum up, the theoretical implications of this research are significant to influence the body of knowledge where the previous studies left the loops.

Secondly, the findings of this research have significant practical implications. The study recommends to use the gamification of LMS in the educational context to influence the students. The students should be engaged after designing the LMS in gaming way. It would be helpful to develop interest in the students for their improvement in learning. The strategic advancement in the LMS system is required to influence their students for their better learning. Furthermore, the competency of the students can be improved with changes in their interaction with LMS. It will develop a significant influence in their understanding which has a lasting impact on their skills. Therefore, it is recommended to introduce gamification features in LMS system which are necessary to engage students for their better learning and significant performance. The findings of this research are based on diversity of population and not only limited to Iraqi students. Hence, the other economies like Iraq also can use the findings of this research for integration and engagement of students with their LMS system.

Future Directions

There are several limitations of this research which require the attention of scholars. The first limitation of this research is based on the tested relationships. The model of this research is simple without any analysis of mediating and moderating variables. Therefore, it is recommended to the scholars to measure the mental health as a moderator in future studies to understand how it influence the learning engagement and competency of the students. Furthermore, the study collected population from universities in Iraq and students from both gender participated in it. However, there is no multigroup analysis in this research to determine the mean difference between male and female students. Therefore, the future studies are recommended to conduct analysis using multigroup to explain the relationships in the context of male and female students. It would be a significant contribution to the literature by scholars. Accordingly, this study formulated the hypotheses of this research based on conceptual understanding and no theory was used as underpinning. Therefore, the future studies are recommended to integrate a suitable theory to analyze the relationship with a theoretical spectrum. It would be a significant contribution of the future studies into the literature.

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