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Article

Students' and faculty continuous intention to use gamification in higher education: A structural analysis

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Abstract: Over the past decade, the integration of technology, particularly gamification, has initiated a substantial transformation within the field of education. However, educators frequently confront the challenge of identifying suitable competitive game-based learning platforms amidst the growing emphasis on cultivating creativity within the classroom and effectively integrating technology into pedagogical practices. The current study examines students and faculty continuous intention to use gamification in higher education. The data was collected through an online survey with a sample size of 763 Pakistani respondents from various universities around Pakistan. The structural equation modeling was used to analyze the data and to investigate how continuous intention to use gamification is influenced by, extended TAM model with inclusion of variables such as task technology fit, social influence, social recognition and hedonic motivation. The results have shown that task technology has no significant influence on perceived usefulness (PU) where as it has a significant influence on perceived ease of use (PEOU). Social influence (SI) indicates no significant influence on perceived ease of use. Social recognition (SR) indicates positive influence on perceived usefulness, perceived ease of use, and continuous intention. The dimensional analysis indicated that perceived ease of use has insignificant influence on perceived usefulness. Both PEOU and PU exhibit positive influence on attitude. Hedonic motivation (HM) and attitude were observed to have a positive influence on continuous intention (CI). Moreover, gamification is found to efficiently and effectively achieve meaningful goals by tapping intrinsic motivation of the users through engaging them in playful experiences.

Keywords: gamification in Pakistan; higher education; technology acceptance model; hedonic motivation; task technology fit; social influence; social recognition

1. Introduction

The landscape of learning and teaching in higher education institutions has undergone significant transformations, with the inclusion of gamified learning applications that include fun and play elements (Ishaq et al., 2021). In Pakistan, popular gamified learning applications such as Quizizz, Kahoot etc. have been employed to motivate learners and enhance their learning experiences (Campillo-Ferrer et al., 2020). These applications have been particularly effective in reinforcing knowledge and improving retention among learners in Higher Education Institution (Campillo-Ferrer et al., 2020; Mahfuzah Mohamad et al., 2019). Initially gaining acceptance for new technologies is relatively easier however, sustaining users' interest and ensuring continuous use pose challenges (Vanduhe et al., 2020).

Learning methods such as gamification has created a successful learning process and gamification software like Classcraft, Kahoot, and Gimkit are used extensively in higher education (Zainuddin et al., 2020). Higher education institutions are putting in efforts to get away from the status quo and adapt the curriculum which is absorbent to change. Educational trends are modified and technology is incorporated to ensure better engagement and experience in the classroom (Smiderle et al., 2020). Gamification offers online learning to students and provides them with knowledge, skills and learning without being physically present as a substitute for a conventional learning framework (Hassan and Hamari, 2019). Gamification aims to enhance the classroom experience for students (Ab Rahman et al., 2019). The increased use of internet has led to the widespread popularity of e-learning in the education sector (Karagozlu, 2018). There is rapidly increasing interest in gamified learning and its acceptance in recent years which has shown positive outcomes in educational scenarios (Toda et al., 2019). In classrooms, incentive schemes are commonly employed with the aim of fostering motivated learning among students (Kyewski and Krämer, 2018). The word "game" is defined as a system comprises of several interacting set of mechanisms and systematic conditions in which at least one individual is involved actively (Huotari and Hamari, 2017). There is a broad consensus regarding the concept of gamification, which involves integrating elements from the world of games into non-game contexts with the aim of capturing attention and influencing users' behavior (Deterding et al., 2011). Gamification involves the use of game-like experiences and mechanisms to enhance user engagement (Huotari and Hamari, 2017). Given the increasing popularity of gamification, mixed outcomes are observed in educational contexts. By emphasizing empirical evidence on potentialities, beliefs, or preferences an unbiased perspective can be established regarding gamification (Kabilan et al., 2023). Tertiary education is categorized by diverse student needs, profiles, and learning methods, making the impact of each game element, and its combinations of elements, unique for each student. The growing prevalence of interdisciplinary and multidisciplinary programs adds complexity to the implementation of gamification in higher education (Khaldi et al., 2023; Shafait et al., 2021). Gamification is an instructional design strategy that merges educational content with gaming elements, offering interactive and engaging formats to users (Chans and Portuguez Castro, 2021). This approach combines experiential learning, intrinsic motivation, and the use of game mechanics to facilitate learning with clear educational objectives. By engaging tasks and activities that simulate real-world scenarios, users' are able to advance their abilities and knowledge in a meaningful way (Ting et al., 2019). The COVID-19 pandemic has threatened the world for almost 4 years. Due to COVID-19 crisis, higher education institutions have had to make a transition from conventional teaching methods to online teaching in order to facilitate continued learning for students. The government needed to adopt virtual learning programs or online learning to continue learning process. With the pandemic, different kinds of technical expansions took place; which has assisted the task of faculty in online education. The world went online, and software and applications like google classroom, google meet, zoom, etc. made it easy for students and teachers to do synchronous online learning (Irwanto et al., 2023). Learning management system was used extensively for learning embedded with gamification apps like gimkit, Quizziz,

Kahoot and many more for making the virtual class more attractive and fun (Groening and Binnewies, 2019).

Gamification in an educational context is considered as a set of processes and activities to resolve learning and education-related problems by using game mechanics (Kim and Song, 2022). So, the entertainment module of the game is incorporated in educational perspective to solve the problem of corporeality in gaming environs (Uz Bilgin and Gul, 2020). Although the definition in different contexts may vary, however it always has two components: systematic component and experiential component. Systematic components explain how the game is constructed (game mechanism usage) and an experiential component explains human participation and outputs within the game. The efficacy of gamification not only depends upon its game design but also on other facets like users' characteristics or the framework in which it is executed (Uz Bilgin and Gul, 2020). Although gamification is a very popular and successful approach, several studies indicate that gamifying systems do not lead to successful outcomes and the main reason is inappropriate design approaches implemented by the organizations (Hamari et al., 2014). The foremost goal of gamification in education is to improve the learning skills of the users when they are engaged in learning activities (Huotari and Hamari, 2017). Considering the above discussion, the current research explores on answer following question:

RQ1: Does gamification fits the utility of students and faculty in higher education?

RQ2: What are the probable relationships amongst the antecedents (task-technology fit, hedonic motivation, social influence and social recognition) with TAM which may affect continuous intention towards the use of gamification?

RQ3: Does perceived ease of use determine the perceived usefulness of gamification in higher education?

RQ4: How does social recognition influence acceptance/ continuous intention of gamification?

RQ5: Does users' attitude towards gamification enhance continuous intention to use it?

This research aims to comprehensively address objectives to investigate the alignment of gamification with the utility of students and faculty in higher education. Secondly, the study aims to analyze the relationships among Task-technology fit, hedonic motivation, social influence, and social recognition with the technology acceptance model (TAM), aiming to identify the antecedents influencing continuous intention towards gamification. It endeavors to assess the role of PEOU in determining the PU of gamification, examining user-friendliness and its impact on overall acceptance. Furthermore, the research aims to explore the influence of social recognition on continuous intention, investigating how acknowledgment and rewards contribute to sustained engagement. Lastly, it seeks to examine the relationship between users' attitudes towards gamification and their continuous intention to use, exploring motivational and perceptual factors that drive long-term acceptance in higher education settings.

1.1. Literature review and research hypotheses

The foundation of Technology Acceptance Model (TAM) is rooted in the Theory

of Reasoned Action (TRA), which falls under the category of Social Psychological Theory. The TAM stands out as one of the most renowned frameworks for forecasting the adoption and usage behavior of technology (Granić and Marangunić, 2019). TAM, being a prominent model in the field of information systems, has made a valuable contribution in understanding human behavior towards technology. It is widely used to assess the usage of new technologies and acceptance (Davis, 1989). Specifically, TAM has experienced a surge in its application within academic circles to forecast learners' acceptance for educational technologies (Adwan et al., 2018).

According to TAM, when users are introduced to innovative technology, external elements exert an influence on their decision to embrace that technology (Davis, 1989). Additionally, TAM underscores that political, cultural, and societal factor can impact the perception regarding ease of use and perceived usefulness, which serve as fundamental determinants of attitude (Venkatesh, 2000). Numerous studies have been conducted to validate and enhance TAM, resulting in its extension with the inclusion of additional variables such as subjective norms, image, voluntariness, and experience. TAM provides only general insights into users' willingness to embrace technology. Therefore, it becomes imperative to explore additional factors that can impact a user's decision to adopt a particular technology, considering the contextual nuances. This extended model has provided more comprehensive explanatory power, explaining user acceptance of technology in greater detail (Venkatesh et al., 2012).

1.2. Task technology fit (TTF)

The Task-Technology Fit is an extensively implemented framework and measures how technologies enhance performance, evaluate usage and how these features work together with each other (Parkes, 2013). The concept of Technology Task Fit (TTF), addresses the issue of adopting technology based on its suitability for specific tasks and its potential to improve performance (Gebauer and Ginsburg, 2009). TTF is the degree to which technology support users to perform a certain task as well as the extent to which technology fits the work requirement or corresponding task (Liu et al., 2023). Several researches state that when the degree of the gamification task utility is greater, users' perceive gamification to be more useful and easier (Vanduhe et al., 2020). The amalgamation of TAM and TTF explains the utilization of gamification in the various contexts. It shows how TTF directly affects forecasting users' PU and PEOU (Kao et al., 2018). A positive influence is shown when technology is used to perform a certain requirements and coordination (Alamri et al., 2020). TTF has been extensively applied in different research contexts over the past decade, providing insights into technological use and its impact (Isaac et al., 2019; Wang et al., 2020).

H^1: The TTF has a significant positive effect on the perceived usefulness of using gamification in higher education.

H^2: The TTF has a significant positive effect on the perceived ease of use of using gamification in higher education.

1.3. Social influence (SI)

Social influence is defined as "the degree to which an individual perceives that

important others believe he or she should use the new system" (Venkatesh et al., 2003). The perception of others has a significant impact on the intention to use a specific technology and influences its acceptance and continued use. The perception of usefulness from others and the influence of social factors are key determinants of users' attitudes towards using gamified learning applications (Roslan et al., 2023). Social gamification, such as students playing in groups and sharing their performance on social networking platforms, positively influences the experience of social relatedness (Baabdullah, 2018). When individuals witness others using a technological application and recognize its benefits, they become more inclined to adopt and use the application themselves. It leads to increased current and future usage of technology (Wu and Chen, 2017). In the context of gamification, when users see their peers using gamification and recognizing its advantages, they are inspired to incorporate gamification in their own practices and activities (Vanduhe et al., 2020).

H^3: Social influence has a significant positive effect on the perceived usefulness of using gamification in higher education.

H^4: Social Influence has a significant positive effect on perceived ease of use for gamification in higher education.

1.4. Social recognition (SR)

Social Recognition is explained as a reward given to an individual for his achievement or success. The recognition is given in monetary or non-monetary terms for a behavior that is desirable to the organization and society. In the presence of recognition (growth opportunities or rewards), individuals are more motivated (Danish and Usman, 2010). There is a statistically positive relationship between social recognition and motivation (Fragoso et al., 2020). Consequently, individuals who value social rewards, including social recognition, exhibit a greater inclination to empathize with others' feelings and experiences (Lee et al., 2022). Elements of the game like certificates or badges aspire and motivate a user as it is recognition of a person's achievement and an honor (Vanduhe et al., 2020). Those who consider social recognition significant feel empowered to overcome future failures or setbacks, as it bolsters their confidence and determination in goal-setting (Lee et al., 2022). Users will alter their behaviors and attitude for recognition which will lead to continuous intention to use technology and work dedicatedly. Social recognition and TAM have a direct positive effect on Perceived Ease of use, Perceived usefulness, and attitudes to the gamified platform. Recognition is an important construct that provides empirical evidence that how it impacts users' behavior regarding gamification (Vanduhe et al., 2020). User's behavior and attitude keep changing, when they receive acknowledgement and recognition, this leads to continuous intention to use technology and provides motivation and commitment (Gauri et al., 2021).

H^5: Social recognition has a significant positive effect on perceived usefulness for gamification in higher education.

H^6: Social recognition has a significant positive effect on perceived ease of use for gamification in higher education.

H^7: Social recognition has a significant positive effect on the continuous intention for gamification in higher education.

1.5. Perceived ease of use (PEU)

PEU is the degree to which "the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use" (Shen et al., 2022; Venkatesh, 2000). Perceived ease of use, also known as effort expectancy, refers to an individual's belief that usage of a specific technology will require minimal effort (Davis, 1989). While practicality may be perceived positively, users may also view it as challenging to use, which can create a perception that the advantages of using the application are outweighed by the effort required (Leong and Chaichi, 2021). Previous research has shown that perceived ease of use has a positive effect on users' attitudes and perceived usefulness (Rauniar et al., 2014). Ease of use is particularly important for participants with specific needs or users who may not easily familiarize themselves with technology (Aldosemani, 2023)

H^8: Perceived ease of use has a significant positive effect on perceived usefulness for gamification in higher education.

H^9: Perceived ease of use has a significant positive effect on attitude towards gamification in higher education.

1.6. Perceived usefulness (PU)

Perceived usefulness is critical factor that is often examined to assess the usability of products and their impact on user satisfaction and intention to use them continuously (Beldad and Hegner, 2018). In the context of gamified learning applications, perceived usefulness reflects users' subjective assessment of how the application can assist them in achieving their academic tasks more efficiently (Adwan et al., 2018). Perceived Usefulness also known as performance expectancy represents an individual's belief in the extent to which a specific system can enhance their job performance (Davis, 1989). TAM, which has gained acceptance over time, has been tested in various organizations with longitudinal data, revealing that perceived usefulness is a stable construct, while perceived ease of use tends to be less stable (Venkatesh, 2000). In the context of gamified learning applications, perceived usefulness reflects users' subjective assessment of how the application can assist them in achieving their academic tasks more efficiently (Roslan et al., 2023). When users perceive a gamified learning application as useful, especially when they can access it regardless of their physical location, it stimulates their interest in continuously utilizing the technology (Roslan et al., 2023).

H^{10}: Perceived usefulness has a significant positive effect on attitude towards gamification in higher education.

1.7. Hedonic motivation

Hedonic motivation, also referred to as perceived enjoyment, is considered a type of internal motivation that stems from the fun and emotional arousal experienced while using a technology (Akdim et al., 2022; Sharifi Fard et al., 2019). Numerous studies have shown that enjoyment plays an important role in predicting the use of decisions for various technologies (Maghrour Zefreh et al., 2023). Hedonic motivation is a construct of enjoyment, engagement, fun or intrinsic motivation (Baptista and Oliveira, 2015). Studies revealed that users' hedonic motivation affects users' acceptance which

influences enjoyable experiences and social fundamentals (Wang et al., 2020). Therefore, hedonic motivation emerges as a stronger predictor of user behavior than extrinsic motivation (Kumar and Bervell, 2019). Previous studies have explored the direct impact of hedonic motivation on technology acceptance, confirming its significance as a contributing factor (Maghrour Zefreh et al., 2023). Hedonic motivation is a reliable predictor of users' intentions towards technology acceptance (Sharif and Raza, 2017).

H^{11}: Hedonic motivation has a significant positive effect on attitude towards gamification in higher education.

H^{12}: Hedonic motivation has a significant positive effect on the continuous intention for gamification in higher education.

1.8. Attitude

Attitude is considered as an evaluative predisposition to behavior and a most powerful antecedent in technological acceptance (Rauniar et al., 2014). An Individual's behavior is guided by an attitude that shapes the perception and filters the information (Fazio et al., 1986). Several studies suggest that attitudes can be predicted by corresponding behaviors, either weakly or strongly they can be anticipated (Vanduhe et al., 2020). In terms of gamification, an attitude refers to the general perception and judgment of how well a system performs. It reflects whether individuals view the system favorably or unfavorably in terms of its overall effectiveness (Ajzen and Fishbein, 1973). Previous research has indicated that the implementation of gamification for marketing purposes can lead to increased customer engagement and an optimistic attitude concerning the product. Furthermore, the perceived usefulness of gamification and its social influence can contribute to the development of a favorable attitude towards the system (Lu and Yang, 2014). Many studies have consistently found a resilient correlation between attitude and intention to use, highlighting the link between one's attitude towards a system and their willingness to actively participate (Koivisto and Hamari, 2019). To enhance user attitudes and encourage ongoing usage, gamification mechanisms are frequently employed on websites, influencing the intention to share positive recommendations (Lin et al., 2017). Precisely, when individuals perceive the consequences of their actions as helpful, they are more likely to develop a positive attitude. In summary, a gamification platform has the potential to shape a specific attitude among users, which subsequently influences behaviors such as continued usage and the spread of positive recommendations.

H^{13}: Attitude has a significant positive effect on the continuous intention for gamification in higher education.

Considering all the relationships and hypotheses of the research **Figure 1** has been used to show all the relationships.

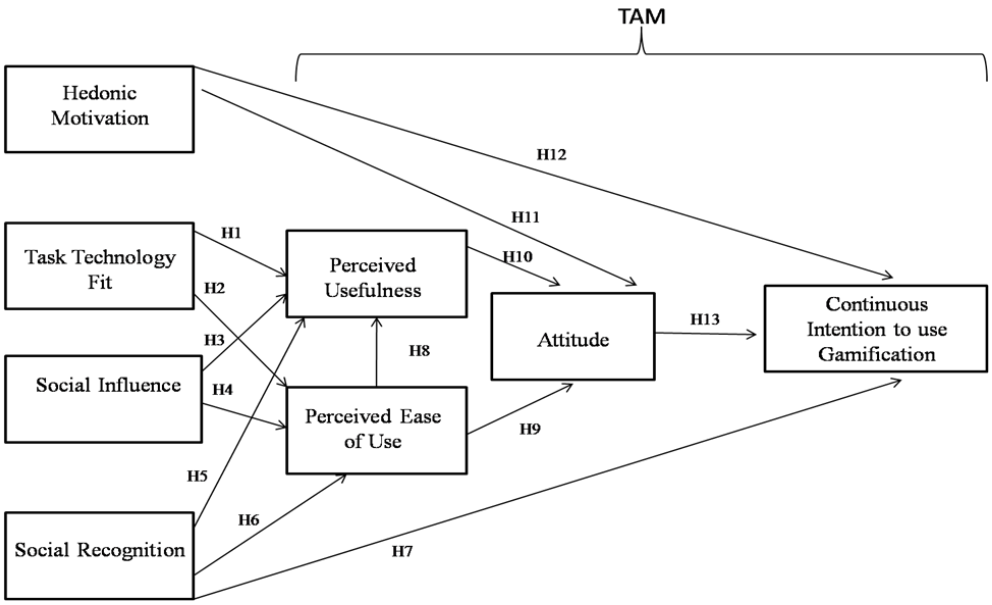

Figure 1. Research model.

2. Materials and methods

The target population for this study is the faculty and students from universities of Pakistan. The researcher collected the data from three big cities of Pakistan, namely Islamabad, Lahore and Karachi as gamification. Non-probability sampling technique was used to gather sample data. The researcher approached the faculty and students through e-mails and personal visits. Questionnaire has been used for data collection (See Appendix). The data was only collected from students and faculty who has already used gamified courses via Quizizz platform. The data was collected between March, 2022 and September, 2022. Out of 763 valid responses 660 were from students and 103 were from faculty members. Furthermore, 484 respondents were male and 279 were female. The demographic information of respondents is given in (**Table 1**).

Table 1. Demographic characteristics.

Items	Category	Frequency	Percentage
Gender	Male	484	63.40%
	Female	279	36.60%
Age Group	18–25 years	105	13.80%
	26–35 years	547	71.70%
	36–45 years	88	11.50%
	46–55 years	21	2.80%
	Above 56 years	2	0.30%
University Position	Student	660	86.50%
	Faculty	103	13.50%
Qualification	Undergraduate	522	68.40%
	Master's	179	23.40%
	Doctorate	45	6%
	Post Doctorate	17	2.2%

3. Results and discussion

The questionnaire developed is divided into two sections. The first section refers to demographics of the respondents and second section contains 39 items related to task technology fit, social influence, social recognition, hedonic motivation and TAM. A pilot study was conducted in universities of Islamabad with 80 respondents which include 19 faculty members and 51 students. The value of internal consistency was between 0.72–0.84 which fulfils the criteria (Hair et al., 2019).

3.1. Measurement model

The measurement models are evaluated by convergent and discriminant validity. The reliability test and validity test are done to assess the adequacy of the proposed model (Hair et al., 2019).

The indicator reliability is evaluated by using factor loadings. The related indicators indicate a mutual base, in which the condition is captured within the variables and further inferred by the high loadings observed on each construct. A value above 0.70 demonstrates significant factor loading (Hair et al., 2019). An outer loading 0.7 or higher are considered highly satisfactory. However, in an exploratory research with new scales and dimensions, an outer loading above of 0.5 is regarded as acceptable (Hulland, 1999). Convergent validity is assessed by Average Variance Extract values (AVE) which shows the degree to which the measures correlate positively with corresponding alternative measures of the identical construct. The value for every AVE is in the range of 0.513 to 0.642, which exceeds the suggested value of 0.50 (Hair et al., 2019). Hence, all antecedents have satisfied the convergent validity, as demonstrated in (**Table 2**).

Table 2. Measurement model results.

Constructs	Constructs Code	Items loading	Rho_A	Composite Reliability (CR)	Average variance Extracted (AVE)
Attitude	q14ATG	0.592	0.819	0.864	0.517
	q15ATG	0.784			
	q16ATG	0.779			
	q17ATG	0.792			
	q18ATG	0.633			
	q19ATG	0.711			
Continuance Intention	q20CIUG	0.746	0.787	0.857	0.600
	q21CIUG	0.800			
	q22CIUG	0.753			
	q23CITG	0.800			
Hedonic motivation	q38HM	0.752	0.758	0.781	0.642
	q39HM	0.847			
Perceived Ease of Use	q8PEU	0.744	0.821	0.863	0.513
	q9PEU	0.824			
	q10PEU	0.718			
	q11PEU	0.655			
	q12PEU	0.681			
	q13PEU	0.661			

Table 2. (*Continued*).

Constructs	Constructs Code	Items loading	Rho_A	Composite Reliability (CR)	Average variance Extracted (AVE)
Perceived Usefulness	q1PU	0.606	0.859	0.881	0.521
	q2PU	0.754			
	q3PU	0.765			
	q4PU	0.855			
	q5PU	0.592			
	q6PU	0.574			
	q7PU	0.844			
Social Influence	q33SI	0.778	0.812	0.851	0.538
	q34SI	0.833			
	q35SI	0.807			
	q36SI	0.677			
	q37SI	0.532			
Social Recognition	q29SR	0.741	0.761	0.846	0.578
	q30SR	0.731			
	q31SR	0.767			
	q32SR	0.802			
Task Technology Fit	q24TTF	0.729	0.803	0.840	0.521
	q25TTF	0.748			
	q26TTF	0.796			
	q27TTF	0.821			
	q28TTF	0.453			

3.2. Measurement of discriminant validity

For the appropriateness of discriminant validity (Fornell and Larcker, 1981), criterion is measured. Fornell Lacker is considered a better method to analyze discriminant validity than Heterotrait-Monotrait ratio (HTMT). When applying the HTMT criterion, concerns about discriminant validity arise, indicating potential multicollinearity among the studied latent variables. This underscores the stringency of the HTMT criterion in detecting possible indiscriminate relationships among latent

Table 3. Fornell-Larcker criterion.

Constructs	Attitude	Continuance Intention	Hedonic motivation	Perceived Ease of Use	Perceived Usefulness	Social Influence	Social Recognition	Task Technology Fit
Attitude	**0.719**							
Continuance Intention	0.374	**0.775**						
Hedonic motivation	0.054	0.189	**0.801**					
Perceived Ease of Use	0.953	0.343	0.066	**0.716**				
Perceived Usefulness	0.008	0.178	0.590	0.039	**0.722**			
Social Influence	0.116	0.293	0.669	0.137	0.879	**0.734**		
Social Recognition	0.675	0.333	0.107	0.664	0.017	0.157	**0.761**	
Task Technology Fit	0.212	0.237	0.107	0.222	0.104	0.161	0.183	**0.722**

The off-diagonal values are the correlations between latent variables, and the diagonal is the square root of AVE.

variables, necessitating closer examination to better understand this issue (Ab Hamid et al., 2017). The criterion requires the squared root of AVEs should be greater than

the correlations between the latent constructs. In **Table 3**, all constructs demonstrate discriminant validity less than 0.90 which fulfills the given criteria.

3.3. Measurement of structural model

Figure 2 and **Table 4** given below show structural modeling assessments that present the findings of the hypotheses tests, with each hypothesis confirmed. The task technology fit does not predict perceived usefulness, therefore (H^{1}) is not accepted given that (β = −0.019, t = 0.618, p = 0.537). However, ($H^{2)}$ has shown a strong significant relationship between Task Technology Fit and perceived ease of use which is confirmed with (β = 0.101, t = 2.457, p = 0.014). The findings of social influence are similar to task technology fit as hypothesis (H^{3}) (β = 0.901, t = 4.653, p = 0.000) shows a significant relationship between social influence and perceived usefulness however, the relationship between social influence and perceived ease of use is not significant as represented by (H^{4}) (β = 0.020, t = 0.705, p = 0.481). Overall social recognition meaningfully predicts perceived usefulness, hence (H^{5}) is confirmed with (β = −0.121, t = 3.414, p = 0.001), similarly, (H^{6}) shows social recognition has shown a positive influence on perceived ease of use which is confirmed with (β = 0.643, t = 4.007, p = 0.000). Hypothesis (H^{7}) shows social recognition meaningfully predicts continuance intention which is established with (β = 0.126, t = 2.624, p = 0.009). The relationship effect between perceived ease of use and perceived usefulness has no significant influence which is established with (β = −0.000, t = 0.005, p = 0.005), hence,

Table 4. Results of hypothesis testing.

Hypothesis	(β)	*t*-value	*p*-value	Decision
H1 = Task Technology Fit → Perceived Usefulness	−0.019	0.618	0.537	Not significant
H2 = Task Technology Fit → Perceived Ease of Use	0.101	2.457	0.014*	Significant
H3 = Social Influence → Perceived Usefulness	0.901	4.653	0.000**	Significant
H4 = Social Influence → Perceived Ease of Use	0.020	0.705	0.481	Not significant
H5 = Social Recognition → Perceived Usefulness	−0.121	3.414	0.001**	Significant
H6 = Social Recognition → Perceived Ease of Use	0.643	4.007	0.000**	Significant
H7 = Social Recognition → Continuance Intention	0.126	2.624	0.009*	Significant
H8 = Perceived Ease of Use → Perceived Usefulness	0.000	0.005	0.996	Not significant
H9 = Perceived Usefulness → Attitude	−0.040	2.013	0.045*	Significant
H10 = Perceived Ease of Use → Attitude	0.953	2.120	0.000**	Significant
H11 = Hedonic motivation → Attitude	0.018	0.942	0.346	Not significant
H12 = Hedonic motivation → Continuance Intention	0.158	4.471	0.000**	Significant
H13 = Attitude → Continuance Intention	0.281	5.454	0.000**	Significant

(H^{8}) is not accepted. The perceived ease of use and perceived usefulness has a positive significant influence on attitude which is confirmed by (H^{9}) (β = −0.040, t = 2.013, p = 0.045) and (H^{10}) (β = 0.953, t = 2.120, p = 0.000) for both the hypothesis respectively. The result for hypothesis (H^{11}) (β = 0.018, t = 0.942, p = 0.346) confirms hedonic motivation has no significant relationship with attitude and, (H^{12}) demonstrates attitude exhibits a strong significant path with the continuous intention to use gamification which is confirmed with (β = 0.158, t = 4.471, p = 0.000). (H^{13}) illustrates

a significant positive influence between attitude and continuance intention. It is confirmed with (β = 0.281, t = 5.454, p = 0.000).

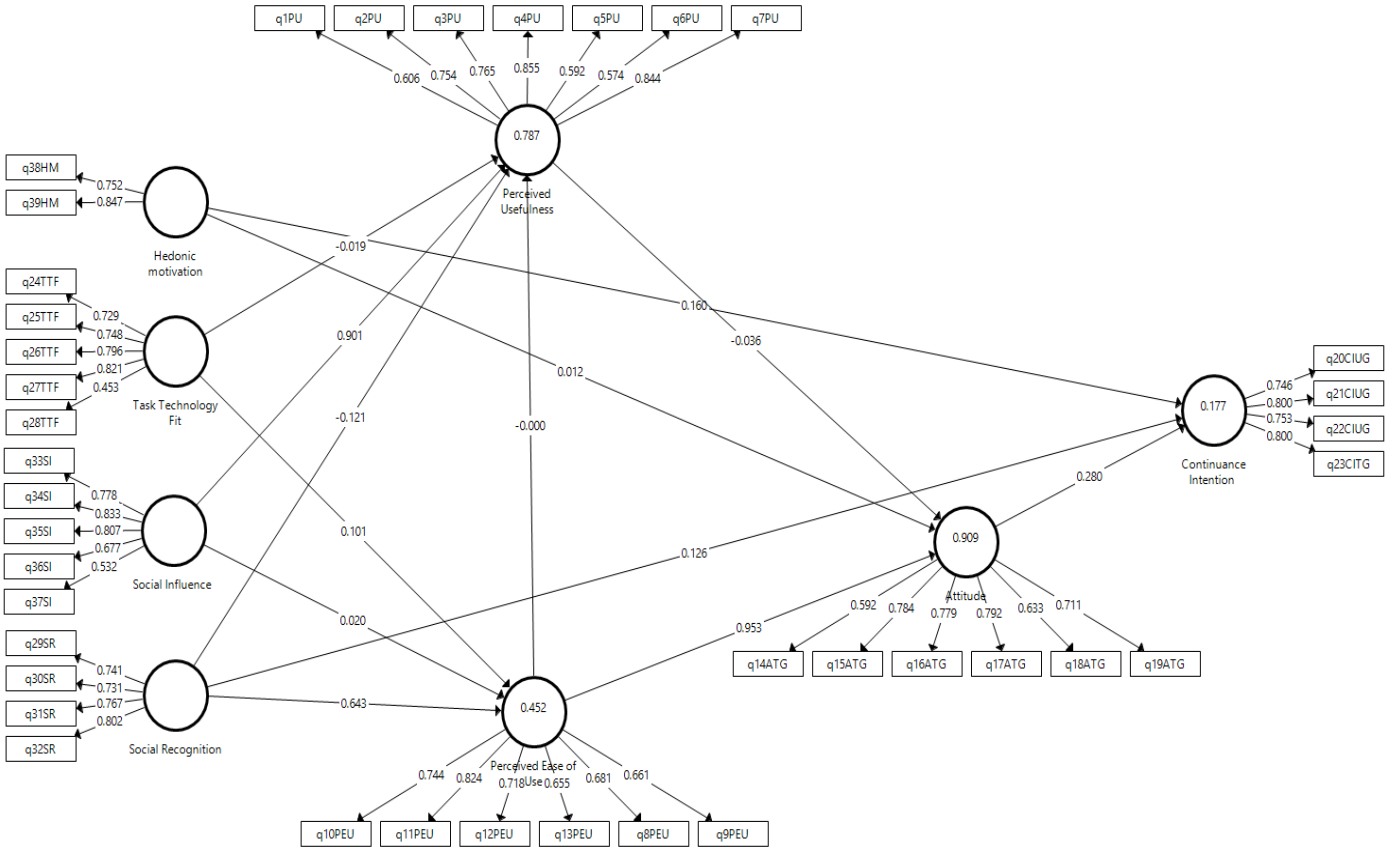

Figure 2. The factor loadings of each item calculated through the PLS-Algorithm.

4. Discussion

Out of 13 hypotheses, 9 are accepted and 4 are rejected. Task Technology Fits does not significantly influence perceived usefulness (H^1). The same findings are being determined in the previous studies (Vanduhe et al., 2020; Wu and Chen, 2017). (H^1) is rejected to be accepted as students and teachers have to increase more understanding of the use of gamification in the higher education and understand its usefulness to meet the requirements of the future. Task Technology Fit (TTF) has a significant positive effect on PEOU (H^2) that shows if gamification is easy to use and fulfil the requirement of learning and teaching; user has an intention to use it continuously. The aspects that impact the usage and examine the capabilities of technology usefulness and task needs are determined by the TTF model (Scherer et al., 2019; Wu and Chen, 2017). The effectiveness of technology acceptance relies on user reception and how seamlessly the task is supported by the use of it. The efficacy of the technology and task essentially should be accepted by the user. The technology must match the task of the user and it should be easy to use in the user's perception. So, a gamification platform or software used by users is said to be useful only if it is perceived easy to use (Hassan and Hamari, 2019).

The second determinant of Perceived Usefulness is Social Influence which is discussed in hypothesis (H^3). Social Influence (SI) has a significant positive effect on

PU (H^3) according to the data analysis. SI exerts social pressure or impact upon the user to use a particular technology. It acts as an extrinsic motivational factor that contributes to users' attitude and continuous intention towards using gamification. Justifiably, the more social influence is exerted to perform a task, the more there are chances to use a particular technology (Hamari et al., 2014). Hence, the influence can stem from quality, frequency, and connection within the circle you are moving in. The interpersonal social influence that is a word of mouth from your peers and colleagues encourage the use of gamification platforms or social media (Asiri, 2019). In the context of gamification continuance, the researcher presumes that apprentices are expected to progress positive intentions toward gamification if social influence encourages them. It is hypothesized that an individual trust shows a certain behavior towards something and when supported and recognized, the individual will perceive it to be useful. Therefore (H^4) illustrates the perceptions of your friends; family, etc. which cannot make the use of technology easy for users. They cannot provide learning and experience to determine the ease of use of gamification for students and teachers. This has appeared to be a non-significant construct in this study in defining the acceptance and use of technology. Earlier studies have proved this in the same way (Vanduhe et al., 2020). The outcome suggests that external social aspects have no direct influence on users' continuous intention toward the use of gamified learning. In this research, SI is perceived as how peers, coworkers, or family influence users to join in gamification learning. Also, when a user perceives that his social group is using gamification and perceive the benefits of its use, they do not start to use it.

Social Recognition (H^5) is found to have a significant positive influence on perceived usefulness. If the users will approve and support the use of gamification in universities, more beneficial it is considered. (H^6) shows social recognition has a significant positive influence on perceived ease of use. The students and faculty members realize their aptitudes and expertise through social recognition. In gamification, awarding of badges, certificates, and leaderboards provide recognition which facilitates social interaction. The development of insightfulness and awareness builds self-confidence and self-recognition in them. The hypothesis supports that the establishment of recognition helps in perceived ease of use as well. Existing literature also supports social recognition patterns and forms (Hassan and Hamari, 2019), but there is little research on the gamification perspective. The research proves that social recognition has a strong influence on the use of gamification in higher education (H^7). In gamification, social recognition is gaining popularity in past decades. These persuasive technologies permit and afford continuous social streams and connections to gratify a sense of belonging. With the power of social features such as social recognition, systems, and services more motivation and engagement are shown by the users'. Social Recognition from related groups enhances positive attitudes towards gamification in the learning context (Chung et al., 2019; Vanduhe et al., 2020; Wu and Chen, 2017). When a constructive response is observed, users feel grateful for the social recognition, thus reciprocating benefits with interactions, acceptance, and continuous intention.

In this research, (H^8) hypothesizes that perceived ease of use has a significant effect on perceived ease of use. The hypothesis was not accepted as the beta coefficient of perceived ease of use to perceived usefulness is ($\beta = 0.000$) which proves that this

relationship is highly insignificant. Users' have judged that perceived ease of use cannot make technology like gamification useful. Amongst all constructs, perceived ease of use to perceived usefulness shows the lowest level of significance which is (p = 0.996). Users' adoption of a new system like gamification is difficult as they have to understand the usefulness and necessity to incorporate new technology (Vanduhe et al., 2020).

Hypothesis (H^9 and H^{10}) hypothesize the influence of perceived ease of use on attitude (ATT) and perceived usefulness towards using gamification. The statistical analysis supported a positive significant influence with the value (p = 0.045 and p = 0.000). Students and teachers supported both the hypothesis. The sample for this research refers to technological use or the expected utility of technology which shapes the behavior towards a particular system. These outcomes are steady with earlier studies that integrated the attitude construct ((Adwan et al., 2018). If gamification is perceived as easy to use, it may promote a sense of competence and experiences of an obstacle-free use of the system. This will produce a positive attitude to continue using gamification in an educational framework.

The research hypothesizes (H^{11}, H^{12}) shows a relationship between hedonic motivation with attitude and continuous intention. The statistical result proves a not significant relationship between hedonic motivation and attitude, and a significant positive relationship between hedonic motivation and continuous intention. A hedonic facet in gamification includes the induction of gamified experiences and content to attain a fun experience. The sample response suggests games are usually associated with pleasant and pleasing experiences. Former studies proposed that users play games to gain satisfying experiences that are amusing, playfulness, and flow while engaging and motivating them (Tamilmani et al., 2019). Hedonic Motivation deems a less significant influence on attitude with a value (β = 0.018, p = 0.46). Yet, when probing the user acceptance of hedonic adoption of technology, the predicting relationships have proved to be no or less significant in former researches. Gamification theoretically suggests a novel, creative method of approaching a particular assignment (Oluwajana et al., 2019; Tamilmani et al., 2019). The chalk and board lecture is transformed into "work" with "play" which format attitude toward the activity (Oluwajana et al., 2019). Moreover, games deliver objectives and evaluation, which provide focus to students' and teachers continuous intention to use gamification.

Attitude is measured as a factor of the readiness to use/accept technology in TAM literature. The result of this study concluded a strong positive relationship between attitude and continuous intention towards gamification in higher education. The attitude of students and teachers in the gamification context refers to the overall positive evaluation of the system's usage. The strong significance is evident in the statistical result as well as with the value (β = 0.281, t = 5.454, p = 0.000). A strong association between attitude and continuous intention has been confirmed in many studies in gamification literature. The main aim of gamification is mostly to motivate and engage our users (Murillo-Zamorano et al., 2023; Vanduhe et al., 2020). Hypothesis (H^{13}) reflects the relationship between attitude and continuous intention towards gamification in higher education. Users' positive attitude is associated with the use of gamification. The sample shows acceptance and willingness towards the incorporation of gamification for learning.

4.1. Theoretical significance

This research underscores the utilization of gamification as a strategy to address utilitarian tasks and hedonic objectives, thereby establishing the influence of hedonic benefits on user intentions. We have integrated and rigorously tested exogenous constructs, including task technology fit, social influence, social recognition, and hedonic motivation, confirming their validity. Notably, our findings reveal that Attitude does not wield significant influence within the proposed model. We also ascertain that social recognition plays a pertinent role in fostering continuous intention toward gamification. Consequently, our model, enriched by these variables, not only exhibits superior model fit but also enhances its explanatory power. The central focus of our study lies in gauging the perceptions, attitudes, acceptance, and continuous intention of both faculty and students. The extended technology acceptance model emerges as an apt and robust model in the context of gamification. It is imperative to highlight that this research endeavors to address a notable gap in the literature by exploring and enhancing the continuous intention to employ gamification in the realm of higher education in Pakistan, where gamified learning research is a nascent endeavor.

4.2. Practical significance

The practical implications derived from this research underscore the significance of employing game designs and elements to efficiently and effectively achieve meaningful goals by tapping into intrinsic motivation through engaging, playful experiences. Our findings highlight that the extended TAM exerts substantial explanatory power in the context of gamification in education. Moreover, social influence and social recognition serve as catalysts for interaction, thereby fostering social engagement, which, in turn, exerts a potent positive influence on the continuous intention to utilize gamification.

5. Conclusion

This study acknowledges certain limitations that merit consideration. The concept of gamification is a burgeoning and novel phenomenon in a developing country like Pakistan. Potential users in this context have limited awareness, training, and knowledge regarding gamification, especially given its recent introduction by the Higher Education Commission of Pakistan. Consequently, the results obtained through statistical analysis may not comprehensively address all facets of gamification due to the relatively limited number of external variables considered.

Furthermore, it is worth noting that the attitudes and perceptions of students and faculty can be more comprehensively explored through qualitative research methods, as they offer a distinct dimension of insight into acceptance and continuous intention towards a system. Additionally, different academic departments and disciplines may possess unique requirements that may or may not align with the capabilities of gamified learning. Despite the respondents in our study having prior exposure to gamification in the higher education context, the applicability and future utility of this approach remain areas warranting further investigation and exploration.

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Appendix

Constructs	Items	Measures
Perceived usefulness (PU)	PU1	I believe gamification improves my learning performance
	PU2	Using gamification enhances my learning effectiveness
	PU3	Using gamification easily translates learning material
	PU4	PU will contribute to my professional development
	PU5	Among my peers, I'm usually the first to try new technology
	PU6	When a new technology is launched, I seek experience
	PU7	I like to experiment with new technologies
Perceived ease of use (PEU)	PEOU1	Learning to use gamification is easy
	PEOU2	It's easy to become proficient in using gamification
	PEOU3	Interaction with gamification is clear and understandable
	PEOU4	I can obtain good interaction with gamification
	PEOU5	It would be easy for me to acquire skills for gamification
	PEOU6	I don't need to acquire skills to use gamification
Attitude toward using Gamification (ATU)	ATU1	I believe using gamification is a good idea
	ATU2	I believe using gamification is advisable
	ATU3	I'm satisfied with using gamification
	ATU4	Using this system is a good way to pass the time
	ATU5	I feel absorbed in using this system
	ATU6	I get so involved in this system that I lose track of time
Continuance intention to use (CITU)	CIIU1	I intend to continue using gamification in the future
	CITU2	I will continue using gamification increasingly
	CITU3	I would use gamification for future training
	CITU4	I'm willing to participate in gamified learning
Task-technology fit (TTF)	TTF1	Gamification is fit for my learning requirements
	TTF2	Gamification fits with my educational practice
	TTF3	It's easy to understand which tool to use in gamification
	TTF4	Gamification is suitable for helping me complete online courses
	TTF5	Gamification increases engagement, motivation, and participation
Social recognition (SR)	SR1	I feel happy when I gain more points than others
	SR2	Viewing my points on a leaderboard encourages improvement
	SR3	Gamification quality should be appreciated by others
	SR4	Gamification credits should be confirmed by universities
Social influence (SI)	SI1	Other participants believe gamification encourages me
	SI2	Other participants believe gamification influences my usage
	SI3	Other participants' beliefs condition me to use gamification
	SI4	People who influence my behavior think I should use the system
	SI5	People whose opinion I value prefer that I use the system
Hedonic Motivation (HM)	HM1	Using this system is enjoyable
	HM2	While using this system, I experience pleasure