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ORIGINAL ARTICLE

A framework for adopting gamified learning systems in smart schools during COVID-19

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Abstract
The outbreak of COVID 19 has increased the anxiety and stress among teachers and students. This has increased the need for gamified learning systems (GLS) to make the educational process more attractive and increase the engagement as well as the participation of all stakeholders. The use of GLS in teaching and learning has not been deployed effectively in the educational systems in developing countries. The purpose of this study was to examine the predictors of using GLS in Iraqi smart schools. Building on the literature, a framework of GLS is proposed. Data used in this study were collected from 394 teachers and managerial staff in Iraqi smart schools and analysed using Partial Least Square. The findings showed that individuals and organizations are important predictors of using GLS, and their effects on BI are mediated by satisfaction. Readiness and performance expectancy are critical for adopting and using GLS by smart schools. In addition, the findings showed that gamification and self-efficacy are moderating variables. Important implications of the predictability of GLS using a combination of theories as well as the practical suggestions for decision makers to enhance the adoption of GLS among smart schools in Iraq are discussed. In the time of COVID-19, decision makers have suggested increasing gamification features of teaching and learning to reduce anxiety and achieve a better learning process.

Keywords Gamification · Gamified learning system · Games · Improving classroom teaching · Media in education

Introduction

The outbreak of COVID-19 has massively increased anxiety among all people. In particular, educational systems around the world were affected by the pandemic. This has increased the need for entertainment and joyful teaching and learning processes (Leclercq et al. 2020). Gamification is a new technological innovation that helps in increasing the engagement of users (Noorbehbahani et al. 2019; Rodrigues et al. 2013, 2019a, b). Gamification is defined as "the use of game design elements in non-game contexts" (Deterding et al. 2011; Al Hayani and Ilhan 2020; Alhayani and Abdallah 2020. It adds elements of joy and enjoyment to applications so that it attempts to activate individual motives via game design (Sailer et al. 2017; Takashima 2020; Vasser and Aru 2020). Gameful experience is similar to those created by playing a game and it has mysterious characteristics as well as intrinsic motivation (Koivisto and Hamari 2014). This is because a gamified system uses techniques such as rewarding points and badges to increase the participation and engagement of individuals and achieve the desired behaviour (Kuo and Chuang 2016). It also helps to increase traffic to a website and attract new users (Li et al. 2013).

Gamification has been proven to be beneficial in increasing user engagement, loyalty enhancement, problem solving, and increases the sales of businesses (Noorbehbahani et al. 2019; Al Hayani and Ilhan 2020; Alhayani and Abdallah 2020). For instance, gamified systems have been widely adopted in banking to increase the usage of online banking applications (Baptista and Oliveira 2017; Rahi and Abd. Ghani 2018; Rodrigues et al. 2013, 2016; Samar and Mazuri 2019); it has been also deployed in the sport domain (Hamari and Sjöblom 2017; Koivisto and Hamari 2014), and to increase the continuous use of exercise (Hamari and Koivisto 2015a, b; Huang and Ren 2020; Lunney et al. 2016), as well as in marketing (Jang et al. 2018; Jin 2016; Yang et al. 2017), healthcare (Li

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et al. 2020; Tanouri et al. 2019), and tourism (la Cuadra et al. 2019). Comparatively, the number of studies pertaining to educational learning using gamified systems is less than other fields.

Recently, gamification has been applied in educational settings and it is characterized as a new educational technology that if effectively applied and implemented, will result in better learning (Toda 2019). Gamification has the potential to enhance the learning and performance of teachers as well as schools (Rodrigues et al. 2019a, b; Al Hayani and Ilhan 2020; Alhayani and Abdallah 2020). It can increase students' understanding and participation, because it helps in developing problem-solving abilities, enhances the motivation of students, as well as their curiosity, enjoyment, and academic performance (da Silva et al. 2019; Jabbar et al. 2016; Toda et al. 2019; Vanduhe et al. 2018).

Against this background, a theoretical model for gamification with an appropriate empirical validity is missing (Herzig et al. 2012; Leclercq et al. 2020). Prior literature is dominated by the use of the Technology Acceptance Model (TAM) (Aydin 2015; Herzig et al. 2012; Höllig et al. 2020; Jipa and Marin 2014; Koivisto and Hamari 2014; Köse et al. 2019; Rodrigues et al. 2013; Yang et al. 2017) which was developed by Davis (1989), Al Hayani and Ilhan (2021), Alhayani et al. (2021) and includes individually based variables such as ease of use, usefulness, and attitude to predict the behavioural intention (BI) of the user. The self-determination theory is also widely used in the context of gamification (Nacke and Deterding 2017; Sailer et al. 2017).

The other dominant theory is the Unified Theory of Acceptance and Use of Technology (UTAUT), which was developed by Venkatesh et al. (2003). UTAUT was developed by combining eight theoretical adoption theories and it includes variables such as performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) to predict the BI of users. Recently, UATAT and TAM were criticized for being simple and individual based while neglecting other aspects such as the organizational aspect (Shachak et al. 2019). Top management support (TMS) and organizational readiness are important organizational variables, yet they are not included in many studies of GLS (Ikumoro and Jawad 2019; Pillai and Sivathanu 2020).

To account for the organizational context, researchers deploy the technology–organization–environment (TOE) framework, which is a multi-perspectives framework that includes technological factors as well as organizational and environmental factors. Researchers have deployed TOE to categorize the predictors of a technology adoption. However, researchers also included new constructs to suit the contexts of their studies. For instance, Rosli et al. (2012) and Ikumoro and Jawad (2019) incorporated individual factors while Lian et al. (2014) included human factors. Alkharusi and Al-badi (2016) included system-related and human-related factors.

Low et al. (2011) pointed out that TOE differs from other theoretical models, i.e., TAM and UTAUT because TOE has no major constructs. However, researchers modified the TOE framework and new variables that do not exist in TOE were included. The authors also criticized TOE stating that it has a weak explanatory power as shown in the case of Electronic Data Interchange (EDI) where more than half of the variance of EDI adoption remained unexplained (Musawa and Wahab 2012). For this reason, researchers suggested combining more than one theoretical model to increase the explanatory power of adopting a new technology. For example, Sharma et al. (2016) suggested the combination of TOE and UTAUT to enhance the explanatory power of cloud computing adoption. Gangwar et al. (2015) combined TOE and TAM to explain technology adoption.

In the context of gamification, Susanto et al. (2017) combined several theories to explain the effect of gamification on using e-government applications. Rahi and Abd. Ghani (2018) also combined UTAUT and diffusion of innovation (DOI) to explain gamification in banking applications while few examined a combination of theories in the context of GLS.

Majority of the studies on the adoption of gamified systems were conducted in developed regions and there is a lack of studies in developing countries. However, it is argued that gamified systems are used in less developed countries and can be effective in enhancing learning and education in these countries (Adukaite et al. 2017). In Iraq and everywhere around the world, the outbreak of COVID-19 has increased the anxiety and stress among teachers and students due to the move to online learning and the general atmosphere of social distancing as well as the need to stay home to keep safe from the outbreak (Hussein et al. 2020). Smart schools were a response to this environment where students attend classes online. A gamified online learning system was introduced in several smart schools. However, it is not known to what degree the management of the schools and the teachers can cope with the new technology. Accordingly, the purpose of this study was to examine the adoption of GLS by smart schools in Iraq.

The study combines the theories of UTAUT, TOE, and Information system success (IS success) due to the notion that there is a need to establish a theoretical framework that can help in explaining the variation of adopting GLS. The study includes individual context variables of UTAUT, namely PE, EE, and SI. Since the study examines the school adoption of GLS, organizational context variables such as TMS and organizational readiness (OR) are included as organizational factors. The gamification is operationalized to include playfulness and enjoyment and it is deployed as a moderating variable between individual context and BI to use GLS. Since the cost of adoption is more related to management, it is expected to moderate the effect of

organizational context on BI to use GLS. The self-efficacy of teachers who will be using the system to design the content and explain it to students is critical for their BI and use behaviour (UB). Self-efficacy is deployed as a moderating variable in this study. The following sections discuss the literature review, methodology, findings, implications, and conclusion.

Literature review

Theoretical framework

In technology adoption, several theories are deployed by researchers. One of the most widely used theories is TAM. However, TAM is simple and the literature has intensively confirmed its validity for individual-based adoption. Building on TAM and other theories, UTAUT was developed to also examine the individual-based adoption of technology. UTAUT is more advantageous compared with other theories because it can explain a large portion (up to 70%) of the variation in the adoption of a new technology (Rahi and Abd. Ghani 2018; Venkatesh et al. 2003). Venkatesh et al. (2003) pointed out that variables of UTAUT were extracted from previous models in which ease of use is equivalent to effort expectancy and usefulness is equivalent to performance expectancy.

Re-investigated UTAUT and developed the second version of the model by including variables that are consumer context-oriented. The newly developed model was called UTAUT2 and the major difference between the two models is that added variables such as hedonic motivation, price, and habit, which are variables related to the consumer context and specific to that purpose. Lian et al. (2014) in an e-government adoption study concluded that UTAUT1 is more preferable for technology adoption because it allows adding variables that are suitable for the context of technology adoption. In this study, the original UTAUT is deployed by adding additional variables that are more into the organizational context.

Among the theories is the IS success model which was developed by DeLone and McLean (1992) who conducted a taxonomy including 180 studies that examine technology adoption. The model proposed that the information quality, system quality, and service quality have an impact on intention to use and user satisfaction and in turn, the intention to use and user satisfaction affect the net benefits of using an IS (DeLone and McLean 1992, 2003). The authors highlighted the importance of user satisfaction with electronic services to adopt the technology. In 2016, DeLone and McLean (2016) analysed studies that have used the IS success model and pointed out that the model is receiving attention from researchers and being used in an increasing number of articles in refereed journals. Researchers have implemented the IS success model and confirmed the importance of user satisfaction for technology acceptance (Flack et al. 2015; Tam and Oliveira 2016). Nevertheless, few studies in the context of GLS have included user satisfaction (Aparicio et al. 2019) and examined its mediating effect on BI toward using GLS. Thus, in this study, user satisfaction is examined as a mediator.

The TOE framework was developed by Tornatzky and Fletscher (1990) to determine the organizational level adoption of IT and Information System (IS) products and services. Since then, TOE has emerged as a widely used theoretical adoption framework for the acceptance and use of IT products and services (Zhu et al. 2004). TOE is a multi-perspective framework and allows for the inclusion of organizational, technology, and environmental aspects of technology adoption (Oliveira and Martins 2010). TOE was adopted by many researchers and they alter the model to include a variety of factors. Several factors were incorporated in the organizational dimensions of TOE. Researchers incorporated factors such as TMS, support for innovation and adoption of technology, human capital quality, organizational readiness, expertise and infrastructure, and organizational knowledge accumulation (Musawa and Wahab 2012). Researchers have used the framework to categorize the factors of the studies according to their specific contexts. In this study, the variables are categorized under individual context and organizational context.

Critical factors for gamified learning systems

Several studies examine the adoption of gamified systems either in commercial or educational settings. The commercial usage of gamified systems outperforms the educational one. TAM has been used in almost all commercial studies of gamified systems. Important variables that have been examined in the literature include the perceived ease of use (PEOU) and perceived usefulness (PU). These two variables have been established as important predictors of adopting gamified systems in several studies (e.g. Koivisto and Hamari 2014; Lunney et al. 2016; Rodrigues et al. 2013, 2016). Similarly, in adopting GLS, PEOU and PU were found to be essential predictors of BI (e.g. Lin et al. 2017; Sanchez-Mena et al. 2016). Another important variable is the social influence which is equivalent to subjective norms (e.g. Baptista and Oliveira 2017; Hamari and Koivisto 2015a; Yang et al. 2017).

Elements of gamification such as playfulness and enjoyment were proven to have direct and intervening effects on BI toward using a gamified system (Adukaite et al. 2017; Aydin 2015; Karimi 2016; Koivisto and Hamari 2014; Lin et al. 2017; Rodrigues et al. 2013). The cost of adopting the technology is a critical factor and can determine the

decision of the management (Ikumoro and Jawad 2019; Pillai and Sivathanu 2020). In addition, the self-efficacy of an instructor is an important factor. High self-efficacy will encourage users to use the gamified system and vice versa (Adukaite et al. 2017; da Silva et al. 2019; Huang and Ren 2020; Susanto et al. 2017). Table 1 shows a summary of the literature pertaining to the adoption of gamified systems in banking, learning, sport, and exercise.

It can be seen from Table 1 that individual-related factors have received much attention from previous studies due to the wide use of TAM and UTAUT. The organizational factors such as TMS, cost, and organizational readiness are less mentioned. Further, self-efficacy and satisfaction of users need further examination in the context of gamification. Table 1 also shows that gamification's dimensions are either the enjoyment or the playfulness or both together. In the next section, the conceptual model is discussed.

Conceptual model and hypotheses development

The conceptual model of this study was developed based on TOE, UTAUT, IS success, and the review of previous studies presented in Table 1. Based on the review, this study proposes that individual context (PE, EE, and SI) and organizational context (TMS and OR) will have a direct effect on BI to adopt GLS. These effects are expected to be mediated by satisfaction with GLS. The effect of individual context is expected to be moderated by gamification, while the effect of organizational context is expected to be moderated by the cost of adoption. BI is proposed to affect UB while self-efficacy is expected to moderate this effect. Figure 1 shows the conceptual model of this study.

Individual context and BI

Individual context is defined as factors that are related to the individual perspective of adopting a new technology (Kayali et al. 2019). Venkatesh et al. (2003) considered EE, PE, and SI as individual-related variables and proposed that they can have a significant effect on the BI of adopting a new technology. In the context of a gamified system, Ikumoro and Jawad (2019) examined the adoption of gamified systems by SMEs in Malaysia and found that individual context is an important predictor of technology adoption. Aparicio et al. (2019) also found that individual impact is critical for the adoption of a gamified system. Thus, we proposed that individual context will have a direct positive effect on BI to use GLS in smart schools in Iraq.

H1: Individual context positively affects the behavioural intention to use a gamified learning system.

Performance expectancy and BI Performance expectancy is the benefit that a user can gain from using a system. Users will utilize GLS if they perceived that there are benefits from using the system. The benefit could be enhancing teaching and learning as well as the joy and happiness in using the system. Several previous studies examined the effect of PE on BI to use gamified systems. For instance, in the banking industry, researchers (Baptista and Oliveira 2017; Rahi and Abd. Ghani 2018; Samar and Mazuri 2019; Siluk et al. 2018) found that PE has a significant effect on BI to use a gamified system. In the educational context, the study of Karimi (2016) found that PE is an important predictor of m-learning gamified adoption. GLS is beneficial for teachers, schools, and students. Thus, we propose that PE will have a significant effect on BI to use GLS in Iraqi schools.

H1a: PE positively affects the BI to use GLS.

Effort expectancy and BI Effort expectancy is the physical and mental effort that is needed to use GLS. Users will deploy GLS if the use of the system is easy and requires minimal effort. Baptista and Oliveira (2017) found that EE is an important predictor of BI of customers in the banking sector to use a gamified system. In the same vein, Siluk et al. (2018) indicate that EE is critical for the use of gamified systems. Samar and Mazuri (2019) also derived similar a result by indicating the importance of EE. Teachers in Iraqi smart schools will use GLS if they perceived the system to be easy to use. Thus, it is hypothesized:

H1b: EE positively affects BI to use GLS.

Social influence and BI Social influence refers to the effect of relatives, friends, co-workers, experts, and surrounding people on the decision of teachers to use GLS. High SI and the wide usage of the system among individuals and the community will eventually lead to using the system (Venkatesh et al. 2003). In the exercise context, Hamari and Koivisto (2015a) found that SI has a significant effect on BI and continued use of exercise. In banking, Rodrigues et al. (2016), Samar and Mazuri (2019) and Baptista and Oliveira (2017) found that SI is critical for the intention to use a gamified system. Yang et al. (2017) also found that SI affected the attitude toward using a gamified system. Thus, it is expected in this study that SI will positively affect BI of teachers in Iraqi schools to use GLS. It is hypothesized:

H1c: SI will have a positive effect on BI to use GLS.

Organizational context and BI

Organizational context is mainly related to the organizational characteristic and support of using a gamified system. It is one of the constructs of TOE and it reflects on the management perception and action toward adopting a new technology. Researchers who deployed TOE found that organizational context is important for technology adoption. For instance, in the study of Rahi and Abd. Ghani

Table 1 Critical analysis of existing models in gamified systems

Author/year	Country	Industry	Theory	PE[a]	EE[a]	SI[a]	TMS	OR	CO	SE	SA	EN	PL	Results
Rodrigues et al. (2013)	Portugal	E-banking	TAM	√	√							√		Perceived socialness has significant effect on PEOU, PU, perceived enjoyment and perceived intention. PEOU affects the perceived enjoyment and perceived intention
Koivisto and Hamari (2014)	Finland	Sport	TAM		√							√	√	Variables of TAM has a critical effect on the adoption
Aydin (2015)	Turkey	Learning	TAM	√	√							√	√	PEOU affected PU, perceived enjoyment and playfulness. PU, perceived enjoyment and playfulness mediated the effect of PEOU on attitude. Attitude mediated the effect of playfulness and subjective norms on continued use intention gamified system
Hamari and Koivisto (2015b)	Finland	Exercise	TPB			√								Network exposure affected subjective norms, recognition, and reciprocal benefits which in turn affected attitude. Attitude affected the word of mouth and continued use. Continued use affected the continued exercise
Hamari and Koivisto (2015a)	Finland	Exercise	TAM	√		√							√	Usefulness, recognition, and social influence affected attitude. Ease of use, enjoyment, and attitude affected continued use. Attitude mediated the effect of usefulness and playfulness on continued use
Sanchez-Mena et al. (2016)	Spain	Learning	TAM	√	√									Perceived ease of use and usefulness are the main predictors of using gamified system
Karimi (2016)	UK	Learning	UTAUT	√									√	Performance expectancy, playfulness, and learning style affect the m-learning adoption in formal learning. Personal innovativeness, perceived playfulness, and learning style affect the informal learning
Lunney et al. (2016)	US	Fitness	TAM	√	√	√								Ease of use, usefulness, and subjective norms affected the WFT use. Only usefulness affected the attitude toward WFT
Rodrigues et al. (2016)	Portugal	Banking	TAM	√	√							√		Gamification affected socialness which in turn affected the usefulness, ease of use, and intention to use. Ease of use affected usefulness, enjoyment, and intention to use. Intention to use affected the business impact
Lin et al. (2017)	Taiwan	Learning	TAM	√	√								√	Learner-instructor and learner-system interaction affect the ease of use, usefulness and playfulness. Ease of use, usefulness, and playfulness affected satisfaction which in turn affected the continued use
Yang et al. (2017)	UK	Marketing	TAM	√	√	√						√		Perceived usefulness affected intention of engagement and brand loyalty. While ease of use has insignificant effect. Perceived social influence affected only the brand attitude. Perceived enjoyment affected the brand attitude and intention of engagement. Intention of engagement affected brand attitude

Table 1 (continued)

Author/year	Country	Industry	Theory	PE[a]	EE[a]	SI[a]	TMS	OR	CO	SE	SA	EN	PL	Results
Adukaite et al. (2017)	South Africa	Learning	Nil							√			√	Self-efficacy, computer anxiety, challenge, and learning opportunity affect the behavioural intention to accept gamified system through playfulness and perceived curriculum fit
Baptista and Oliveira (2017)	Brazil	Banking	UTAUT 2	√	√	√			√				√	Performance expectancy, effort expectancy, social influence, hedonic motivation, price value, habit and gamification affect the behavioural intention. Habit affects use behaviour
Siluk et al. (2018)	Brazil	Banking	UTAUT	√	√									Facilitating condition affected familiarity. Performance expectancy and effort expectancy affect behavioural intention
Rahi and Abd. Ghani (2018)	Malaysia	Banking	UTAUT and DOI	√	√	√						√	√	Innovativeness and perceived technology security are the most important variable. Gamification moderated positively the effect of intention to adopt to intention to recommend
Samar and Mazuri (2019)	Malaysia	Banking	UTAUT	√	√	√				√	√	√	√	Performance expectancy, effort expectancy, facilitating condition, general self-confidence, and social influence affected intention to adopt internet banking. General self-confidence affected performance expectancy. Gamification moderated the effect of intention to adopt internet banking on intention to recommend
Aparicio et al. (2019)	Portugal	Learning	IS success								√	√	√	Information quality and satisfaction affect the use of gamified system. Use and user satisfaction affect the individual impact. Gamification moderate the effect of individual impact on organizational impact
Vanduhe et al. (2020)	Cyprus	Learning	TAM and TTF	√	√									TTF affected ease of use. SI, social recognition affect PU. PU and PEOU affected attitude. PEOU affect PU and ATT affected the continuance intentions
Huang and Ren (2020)	China	Exercise	TAM	√						√				Perceived usefulness mediated the effect of technological function on continuance usage intention. exercise self-efficacy moderated the effect of usefulness on continuance
Pillai and Sivathanu (2020)	India	Talent	TOE				√	√	√					TOE context are important for the adoption of AL. Task and technology characteristics influence the TTF of AI technology. Stickiness to traditional talent acquisition negatively moderates the association between adoption and actual usage of A
Ikumoro and Jawad (2019)	Malaysia	SMEs	UTAUT and TOE			√	√		√					This paper proposed that UTAUT and TOE can explain the use of intelligent conversational agents in e-commerce

CO cost, *EE* effort expectancy, *EN* enjoyment, *OR* organizational readiness, *PE* performance expectancy, *PL* playfulness, *SE* self-efficacy, *SI* social influence, *SA* satisfaction, *TMS* top management support, *UB* use behaviour

[a]PE is similar to perceived usefulness, EE is similar to perceived ease of use, SI is similar to subjective norms

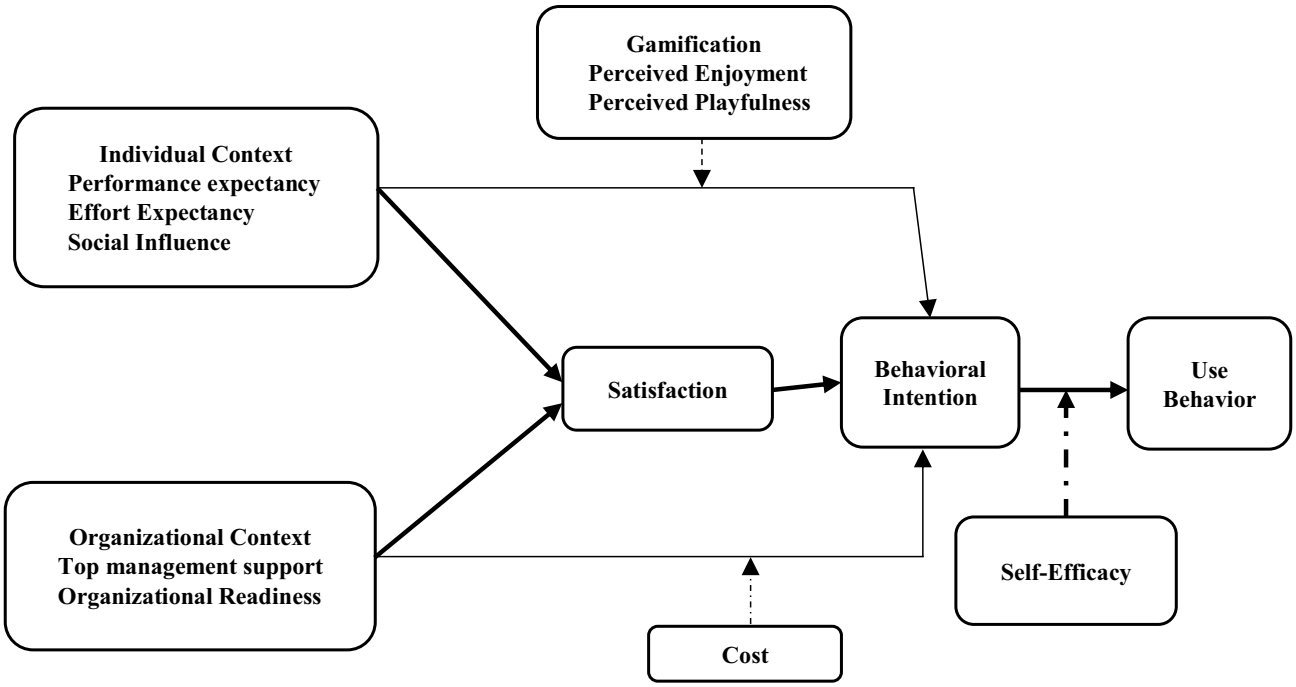

Fig. 1 Conceptual model

(2018), organizational dimension has a significant effect on the adoption of a gamified system by SMEs. Similarly, the study of Pillai and Sivathanu (2020) found that organizational construct is important for using a gamified system to acquire talent in India. Accordingly, this study proposes that organizational context is important for the management of Iraqi schools to use GLS.

H2: Organizational context will positively affect BI toward using GLS.

Top management support and BI Top management support is essential for any organizational action. It provides the financial and non-financial support to proceed with a project or an action. Several studies found that the support of management is critical for adopting a new system such as cloud computing (Low et al. 2011; Sasmita and Mohd Suki 2015; Yang et al. 2015). In the gamified system context, Ikumoro and Jawad (2019) proposed that TMS is an essential factor for gamified technology adoption among SMEs. Pillai and Sivathanu (2020) found that TMS is a critical factor for the use of a gamified system in the acquisition of talent. Accordingly, TMS is proposed to have a significant effect on BI of schools in Iraq to use GLS.

H2a: TMS affects positively the BI to use GLS.

Organizational readiness and BI Organizational readiness includes the infrastructure readiness to operate and use GLS. Organizational readiness is one of the important organizational TOE factors as pointed out by researchers (Alamgir Hossain and Quaddus 2011; Musawa and Wahab 2012; Oliveira and Martins 2011). It is a combination of readiness from organizational and technological perspectives (Oliveira and Martins 2011). Yang et al. (2015) indicate that organizational readiness is critical for the adoption of a new technology. In the study of Pillai and Sivathanu (2020), it refers to the importance of readiness for adopting a gamified system for talent acquisition. Organizational readiness is one of the most important enablers of blockchain adoption (Clohessy and Acton 2019). In this study, it is expected that a school that has high readiness will be more successful in utilizing GLS and will have higher BI to use the system. Thus, it is hypothesized:

H2b: Organizational readiness has a significant effect on BI to use GLS.

Mediating role of satisfaction

IS success suggested that satisfaction with the system is a critical factor for the usage. Satisfaction is defined as "a positive or enjoyable emotional state resulting from the appreciation of oneself or the appreciation of a personal experience" (Yousef 2017). Lin et al. (2017) found that satisfaction with the gamified system is an important predictor of continued use of the system. Aparicio et al. (2019) also found that satisfaction with the gamified system affected the usage of the system. Based on our review, the mediating role of satisfaction in the context of a gamified system has not been investigated. User satisfaction mediated the effect

of PU and PEOU on BI to use an online learning system (Joo et al. 2018). Satisfaction was also found to be a full mediator between experiential value drives and the actual use of advanced mobile services (Tojib and Tsarenko 2012). Further, user satisfaction also mediated the effect of website usability on the use intention of a website (Belanche et al. 2012). Accordingly, this study proposes that satisfaction with GLS will mediate the effect of individual context and organizational context on BI to use GLS among Iraqi schools.

H3: satisfaction will mediate the effect of individual context on BI to use GLS.

H4: satisfaction will mediate the effect of organizational context on BI to GLS.

Moderating role of gamification

Gamification is a new tool that is added to non-game content to increase attention and motivation. Components of gamification include playfulness and enjoyment. Few studies examined the moderating role of this variable. For instance, the moderating role of gamification was examined in the study of Aparicio et al. (2019) and it was found that gamification moderated the individual impact on organizational impact. Gamification also moderated the effect of intention to use on intention to recommend (Rahi and Abd. Ghani 2018). Similarly, in the study of Samar and Mazuri (2019), gamification moderated the effect of intention to adopt a gamified system in banking with the intention to recommend. Thus, in this study, it is expected that the effect of individual context on BI to use GLS will increase with a high level of gamification and vice versa. Therefore, it is hypothesized:

H5: Gamification will moderate the effect of individual context on BI to GLS.

Moderating role of cost

The cost is an important predictor and is an essential criterion for the decision of management to use or not to use a technology. Financial cost in the form of installing, repairing, maintaining, and training staff as well as designing content is critical for decision makers when it comes to using a gamified system (Pillai and Sivathanu 2020). Ikumoro and Jawad (2019) indicated that the cost of adopting a gamified system affects the adoption of the technology negatively. Cost was examined in few studies as a moderating variable. In the study of Adnan et al. (2019), cost moderated the effect of BI on green fertilizer technology (GFT). In this study, it is expected that high cost will lead management of smart schools to refrain from adopting GLS and vice versa. Accordingly, it is hypothesized:

H6: Cost negatively moderates the effect of organizational context on BI to use GLS.

BI and UB

Established theories in the literature such as TAM, UTAUT, theory of reasoned action (TRA), and theory of planned behaviour (TPB) indicate that the level of BI is a determinant of UB or actual behaviour (Ajzen 1991; Davis 1989; Fishbein and Ajzen 1980; Venkatesh et al. 2003). In line with this conceptualization, the majority of studies that deployed these theories linked BI to UB and found a positive relationship between the two variables (Baptista and Oliveira 2017). Thus, in this study, it is expected that BI will positively affect UB toward using GLS by Iraqi schools.

H7: BI positively affects UB of GLS.

Moderating role of self-efficacy

Self-efficacy (SE) is the ability of teachers to use GLS (Saghafi-Asl et al. 2020). SE differs among teachers and this creates differences in their perception of using the technology (Zeng 2020). It is one of the most important variables when it comes to assessing the willingness of teachers to use a technology (Harmandaoğlu Baz et al. 2019). It is argued that low self-efficacy is the reason behind not using technology among teachers (Liza and Andriyanti 2019). This is because the level of Information and Communication Technology (ICT) is a determining factor for using technology among teachers (Etcuban et al. 2016). SE was found also to be an essential factor for using the gamified system (Adukaite et al. 2017; Susanto et al. 2017). A review study found that SE is a driving variable of gamification (da Silva et al. 2019).

Few studies examine the moderating effect of SE. For example, in the study of Huang and Ren (2020), SE moderated the effect of PU on continuance intention to use the technology. In this study, SE is expected to moderate the effect of BI on UB of GLS. Accordingly, it is hypothesized:

H8: SE moderates the effect of BI on UB of GLS.

Research methodology

This study is quantitative in nature. It follows a deductive approach to develop a conceptual framework using existing theories and frameworks. The study deploys a population of smart schools in Iraq. Based on statistics, there are 250 smart classes in Iraq. These classes are scattered across Iraq and use a digitalized environment where a smart board and tablets are used for teaching. Teachers in the class teach all subjects from maths, literature, geography, history, and languages. These 250 smart classes are

the population of this study. The proxies of this study are the teachers and the managerial staff in the Iraqi smart schools. The sample of this study consists of teachers and managerial staff at the Iraqi schools. The respondents were selected randomly.

To test the hypotheses of this study, a questionnaire was adopted from previous studies. Table 2 shows the variables, number of items, and source of measurements as well as the Cronbach's Alpha (CA) of the pilot study.

A back-to-back translation was deployed to translate the questionnaire into Arabic. The translated and English versions were validated by three experts in technology adoption. Feedbacks from the experts were considered for refining the measurement. A pilot study was conducted by inviting 37 teachers to answer the questionnaire. The CA of the measurements as shown in Table 2 indicates that all the measurements are reliable. CA greater than 0.70 is an indicator of the reliability of the measurement as suggested by Sekaran and Bougie (2016) and Hair et al. (2017). Random selection and network referral were used to collect the data. As a result, a total of 412 questionnaires were collected from teachers and managerial staff. These responses are sufficient for the use of Smart Partial Least Square (PLS) and meet the rule of the thumb (Hair et al. 2017).

Data analysis and findings

The data of this study was analysed using Statistical Package for Social Science (SPSS) version 23.0 and PLS. version 3.3.1. In the next section, data screening as well as the descriptive analysis and the analyses of structural equation modeling (SEM) are conducted.

Data screening

Missing value and outliers

Missing values are checked using SPSS. According to Hair et al. (2017), a response that misses more than 15% of the answers should be removed while missing answers of less than 15% can be replaced by the mean score value. In this study, seven responses were identified to have a large number of missing values and they were removed. Other responses miss less than 7% and they were replaced by the mean score value. The outliers were also checked by examining the boxplot of the variables. A total of 11 responses were considered outliers and they were removed from the dataset. This makes the usable responses 394.

Normality

Hair et al. (2017) suggested checking the normality by examining the values of Skewness and Kurtosis. A value of skewness and kurtosis less than absolute one is an indicator of normal distribution. Table 3 shows that the value of Skewness and Kurtosis are less than one indicating that the data are normally distributed.

Multicollinearity

Collinearity is an issue that occurs when there is a high correlation between two or more independent variables. To examine this issue, Hair et al. (2017) suggested that the value of tolerance should be greater than 0.20 while the value of variation inflation factor (VIF) should be less than five. Table 3 shows the value of tolerance and VIF. It shows that the values are within the suggested range indicating that the variables of this study are free from collinearity issues.

Table 2 Reliability of pilot study of the variables

Variable	No. of items	Source of measurement	CA > 0.70	Reliable
Performance expectancy	4	Dečman (2015)	0.934	YES
Effort expectancy	4	Dečman (2015)	0.932	YES
Social influence	4	Dečman (2015)	0.897	YES
Playfulness	4	Lin et al. (2017)	0.905	YES
Enjoyment	5	Morschheuser et al. (2019)	0.901	YES
Cost	5	Karahoca et al. (2018), Mashal and Shuhaiber (2019)	0.898	YES
Satisfaction	3	Lin et al. (2017)	0.888	YES
Organizational readiness	4	Pillai and Sivathanu (2020)	0.904	YES
Top management support	3	Pillai and Sivathanu (2020)	0.900	YES
Self-efficacy	5	Adukaite et al. (2017)	0.912	YES
Behavioural intention	3	Dečman (2015)	0.819	YES
Use Behaviour	4	Pillai and Sivathanu (2020)	0.877	YES

Table 3 Normality and multicollinearity analysis

Variables	Normality analysis		Multicollinearity analysis	
	Skewness < 1	Kurtosis < 1	Tolerance > 0.20	VIF < 5
Performance expectancy	−0.679	0.108	0.507	1.973
Effort expectancy	−0.674	−0.067	0.515	1.941
Social influence	−0.538	−0.067	0.509	1.965
Satisfaction	−0.312	−0.531	0.646	1.547
Playfulness	−0.008	−0.474	0.750	1.333
Enjoyment	−0.322	−0.572	0.728	1.374
Top management support	−0.741	0.182	0.650	1.538
Cost	−0.749	−0.152	0.876	1.141
Organizational readiness	−0.544	−0.618	0.813	1.230
Self-efficacy	−0.291	−0.440	0.911	1.098
Behavioural intention	−0.391	−0.138	0.754	1.326
Use behaviour	−0.289	−0.818	Dependent variable	

Descriptive information

Table 4 presents the demographic information of the respondents. The age of the respondents ranged between 25 and 54 with a mean score of 38.23 and standard deviation (Std.) of 7.348, which shows that there is high variation in the age of the respondents. The respondents are males (214 or 54.3%) teaching subjects such as maths, literature, science, and languages. A total of 17.8% or 70 of the respondents stated "others" for their major indicating that they are managerial staff of the schools. They all have used or accessed a gamified system and they have experience of more than 11 years with a mean score between 8 and 10 years.

Measurement model

To examine and evaluate the measurement model, Hair et al. (2017) suggested examining the determinant coefficient (factor loading), reliabilities, and validities. Nevertheless, in this study, there are first-order and second-order models. Consequently, there are measurement models for both the first-order and second-order models. Thus, the factor loading for the first-order model includes the items examined

Table 4 Descriptive information of respondents ($N = 394$)

Variable	Label	Frequency	Percent	Mean	Std
Age	25–30	82	20.8	38.23	7.348
	31–35	80	20.2		
	36–40	57	14.6		
	41–45	112	28.5		
	46–50	42	10.8		
	51 and above	21	5.4		
Gender	Male	214	54.3	1.46	.499
	Female	180	45.7		
Major	Language	96	24.4	2.78	1.404
	Math	82	20.8		
	Literature	98	24.9		
	Science	48	12.2		
	Others	70	17.8		
Use of gamified system	Yes	394	100.0	1.00	.000
Experience	0–2 years	54	13.7	3.65	1.445
	2–4 years	46	11.7		
	5–7 years	42	10.7		
	8–10 years	94	23.9		
	11 years or more	158	40.1		

N: 394

while the factor loading of the second-order model includes the loading of the first-order on the second-order model. Similarly, the validities and the reliabilities for both models are examined. Models of this study are reflective because the removal of one item does not change the variable. In other words, the items are interchangeable.

To check for FL, some items were having low FL. Item SI1 from social influence (SI), item CO1 from cost (CO), and item SE1 from self-efficacy (SE) were removed due to low FL. Other items loaded well on their respective variables. Table 5 shows the FL of the first-order model. The CA scored higher than 0.70 and the composite reliability (CR) is also larger than 0.70 supporting the reliabilities of the first-order measurement model. For the convergent validities, the average variance extracted (AVE) is greater than 0.50, indicating that the measurements have convergent validity.

For the discriminant validity of the first-order model, Hair et al. (2017) suggested that the square root of AVE should be larger than the cross-loading to conclude that the measurement has discriminant validity. Table 6 shows the square root of AVE in bold and underlined. It shows the value is greater than the cross-loading supporting the notion that the measurement achieved discriminant validity.

Table 7 shows the results of evaluating the second-order measurement model. It shows the FL of the first-order on the second-order model is larger than 0.70, supporting that the individual context includes three components that are PE, EE, and SI. In addition, it confirms that the organizational context consists of two components that are TMS and OR. It also shows that playfulness and enjoyment are the components of gamification. Further, Table 7 shows that the reliabilities and the validities of the second-order measurement model are achieved.

Measurement model of this study is given in Fig. 2. It can be seen that all the criteria of evaluating the measurement model have been achieved.

Structural model

To evaluate the structural model, Hair et al. (2017) suggested examining the *R*-square, predictive relevance (*Q*-square), effect size (*F*-square), and the path coefficient. The *R*-square (R^2) of the direct effect model is 0.432, indicating that 43.2% of the variation can be explained by the individual and organizational context variables. This percentage is considered as moderate because Hair et al. (2017) indicate that R^2 between 0.25 and 0.50 is moderate. The predictive relevance or Q^2 for the dependent variables satisfaction ($Q^2=0.235$), BI ($Q^2=0.363$), UB ($Q^2=0.158$) was greater than zero, indicating that the independent variables can predict the dependent variables. For the effect size, the value of f^2 according to Hair et al. ranged between 0.02 and above 0.35. Values less than 0.02 are indicators that the effect size does not exist. While values greater than 0.02 and less than 0.15 indicate a weak effect size, values between 0.15 and 0.35 indicate medium effect size, and values above 0.35 indicate a strong effect size. Table 8 shows the effect sizes. It shows that the effect size of some paths is less than 0.02 and this could be due to the weak path coefficient.

Hypotheses testing and discussion

The hypotheses of this study are examined using bootstrapping of 5000 as suggested by Hair et al. (2017). Table 8 shows the results of testing the hypotheses of this study. It shows the direct effect hypotheses, mediating hypotheses, and moderating hypotheses. It shows the hypothesis (H), path, path coefficient (*B*), standard deviation (Std.), *T*-value (*T*), *P*-value (*P*), *F*-square (f^2), and conclusion.

The findings in Table 8 show that individual context significantly affects BI toward using GLS ($B=0.39$, $T=8.41$, $P<0.001$). Thus, H1 is supported. For the components of individual context, the effect of PE ($B=0.19$, $T=3.77$, $P<0.001$), EE ($B=0.14$, $T=2.95$, $P<0.001$), and SI ($B=0.14$, $T=2.92$, $P<0.001$) are significant as shown in Table 8. Therefore, H1a, H1b, and H1c are supported. Accordingly, the increase in the individual context and its components will lead to improvement in BI toward using GLS. These findings are consistent with the findings of other researchers who found that PE, EE, and SI are essential predictors of using a gamified system (e.g. Baptista and Oliveira 2017; Samar and Mazuri 2019; Siluk et al. 2018).

The second main hypothesis proposed that organizational context and its components TMS and OR have a significant effect on BI toward using GLS. The findings confirmed that the hypotheses are significant. The effect of organizational context on BI is significant ($B=0.36$, $T=9.20$, $P<0.001$) supporting H2. For the components, the effect of TMS on BI is significant ($B=0.10$, $T=2.29$, $P=0.02$). Therefore, H2a is supported as shown in Table 8. The effect of OR on BI is also significant ($B=0.31$, $T=7.46$, $P<0.001$). Hence, H2b is supported. This indicates that TMS and OR can predict BI and schools have to ensure that the readiness level is high to facilitate smooth adoption and usage of GLS. These findings are in line with the findings of other researchers such as Pillai and Sivathanu (2020) and Yang et al. (2015) who found that TMS and OR are critical for adopting a new technology.

The third and fourth hypotheses proposed that satisfaction will mediate the effect of individual and organizational context on BI toward GLS. Hair et al. (2017) suggested testing the direct effect without the mediator, then including the mediator and test again the direct effect. If the direct effect is reduced and remain significant, a partial mediation is assumed. However, if the direct effect is reduced and turned insignificant, a full mediator is assumed. No mediation is

Table 5 Result of evaluating the measurement model (first order)

Second order	First order	Items	FL > .70	CA > .70	CR > .70	AVE > .50
Individual context	Performance expectancy	PE1	0.906	0.923	0.945	0.812
		PE2	0.894			
		PE3	0.889			
		PE4	0.915			
	Effort expectancy	EE1	0.921	0.937	0.955	0.842
		EE2	0.903			
		EE3	0.918			
		EE4	0.929			
	Social influence	SI2	0.855	0.841	0.904	0.759
		SI3	0.858			
		SI4	0.900			
Organizational context	Top management support	TMS1	0.901	0.800	0.884	0.718
		TMS2	0.896			
		TMS3	0.736			
	Organizational readiness	OR1	0.912	0.888	0.924	0.755
		OR2	0.926			
		OR3	0.721			
		OR4	0.899			
Gamification	Enjoyment	EN1	0.895	0.934	0.950	0.792
		EN2	0.879			
		EN3	0.889			
		EN4	0.884			
		EN5	0.903			
	Playfulness	PL1	0.842	0.883	0.920	0.741
		PL2	0.873			
		PL3	0.854			
		PL4	0.874			
Satisfaction		SA1	0.907	0.890	0.932	0.820
		SA2	0.896			
		SA3	0.913			
Cost		CO2	0.749	0.851	0.900	0.692
		CO3	0.858			
		CO4	0.852			
		CO5	0.862			
Self-efficacy		SE2	0.944	0.918	0.936	0.785
		SE3	0.880			
		SE4	0.840			
		SE5	0.877			
Behavioural intention		BI1	0.894	0.886	0.929	0.814
		BI2	0.893			
		BI3	0.920			
Use behavioural		UB1	0.882	0.911	0.938	0.790
		UB2	0.872			
		UB3	0.895			
		UB4	0.906			

assumed if the indirect effect is not significant. Table 9 shows a summary of the mediation test.

For H3, it is predicted that satisfaction with GLS will mediate the effect of individual context on BI. The prediction is true. Before entering satisfaction into the equation, the direct effect is significant at 0.39*** and reduced to 0.34*** after including satisfaction. The indirect effect (Individual context → Satisfaction → BI) is significant as

Table 6 Discriminant validity (First order)

	BI	CO	EE	EN	OR	PE	PL	SE	SI	SA	TMS	UB
BI	**0.902**											
CO	− 0.110	**0.832**										
EE	0.482	− 0.019	**0.918**									
EN	0.256	0.094	0.201	**0.890**								
OR	0.370	− 0.038	0.264	0.073	**0.869**							
PE	0.497	− 0.029	0.621	0.069	0.275	**0.901**						
PL	0.253	0.073	0.127	0.487	0.151	0.085	**0.861**					
SE	0.041	0.213	− 0.009	0.065	− 0.049	0.046	0.065	**0.886**				
SI	0.481	0.036	0.575	0.272	0.302	0.578	0.222	0.048	**0.871**			
SA	0.514	− 0.046	0.423	0.236	0.223	0.440	0.341	− 0.054	0.450	**0.905**		
TMS	0.398	0.109	0.407	0.152	0.331	0.371	0.184	− 0.003	0.388	0.457	**0.848**	
UB	0.448	0.175	0.356	0.172	0.201	0.290	0.209	− 0.041	0.365	0.428	0.485	**0.889**

BI behavioural intention, *CO* cost, *EE* effort expectancy, *EN* enjoyment, *OR* organizational readiness, *PE* performance expectancy, *PL* playfulness, *SE* self-efficacy, *SI* social influence, *SA* satisfaction, *TMS* top management support, *UB* use behaviour

Table 7 Results of evaluating the measurement model (second order)

Second order	First order	FL	CA	CR	AVE			
Gamification	Playfulness	0.810	0.907	0.924	0.578	**0.760**		
	Enjoyment	0.906						
Individual context	Performance expectancy	0.875	0.931	0.941	0.594	0.210	**0.771**	
	Effort expectancy	0.879						
	Social influence	0.796						
Organizational context	Top management support	0.750	0.830	0.874	0.504	0.191	0.468	**0.707**
	Organizational readiness	0.892						

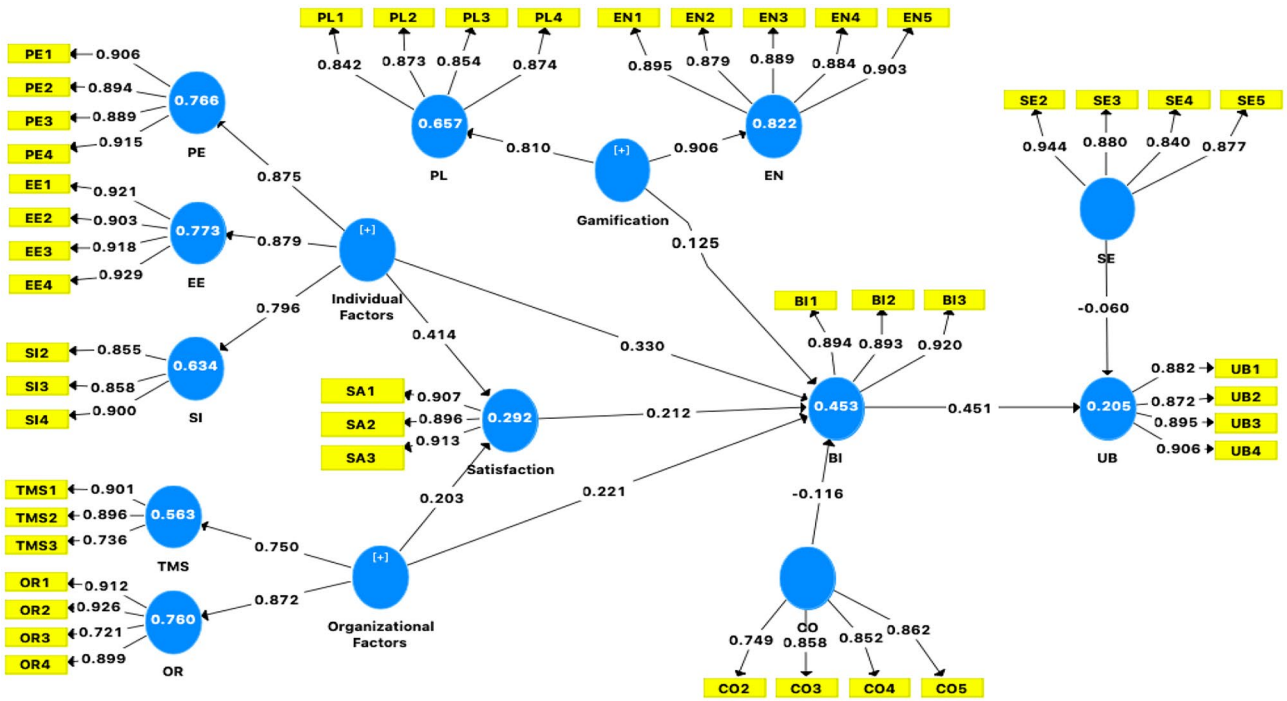

Fig. 2 Measurement model

Table 8 Results of hypotheses testing

H	Path	*B*	Std	*T*	*P*	f^2	Significant
H1	Individual context → BI	0.39	0.05	8.41	0.00	0.20	Yes
H1a	PE → BI	0.19	0.05	3.77	0.00	0.03	Yes
H1b	EE → BI	0.14	0.05	2.95	0.00	0.02	Yes
H1c	SI → BI	0.14	0.05	2.92	0.00	0.02	Yes
H2	Organizational context → BI	0.36	0.04	9.20	0.00	0.17	Yes
H2a	TMS → BI	0.10	0.04	2.29	0.02	0.01	Yes
H2b	OR → BI	0.31	0.04	7.46	0.00	0.14	Yes
H3	Individual context → Satisfaction → BI	0.11	0.02	4.83	0.00	–	Yes
H4	Organizational context → satisfaction → BI	0.05	0.02	3.18	0.00	–	Yes
H5	Gamification * individual context → BI	0.07	0.03	1.97	0.05	0.01	Yes
H6	Cost * organizational factor → BI	0.03	0.04	0.85	0.40	0.00	No
H7	BI → UB	0.45	0.04	11.14	0.00	0.25	Yes
H8	Self-efficacy * BI	0.08	0.03	2.61	0.01	0.01	Yes

Table 9 Result of mediation analysis

H	Path	Direct effect		Indirect effect	Mediator?	Type
		without mediator	with mediator			
H3	Individual context → satisfaction → BI	0.39***	0.34***	0.11***	Yes	Partial
H4	Organizational context → satisfaction → BI	0.36***	0.22***	0.05***	Yes	Partial

*Significant at 0.1, **significant at 0.05, ***significant at 0.001

shown in Table 8. Therefore, it is concluded that the mediator is partial. For H4, the mediator is also partial as the direct effect of organizational context on BI reduced and stayed significant after including satisfaction. The indirect effect (Organizational context → Satisfaction → BI) as shown in Table 8 is significant, supporting H4 partially. These findings indicate that part of the relationship between individual and organizational contexts with BI can be explained by user satisfaction with GLS. These findings of satisfaction as a mediator are in line with the findings of previous studies (Belanche et al. 2012; Tojib and Tsarenko 2012).

Gamification was proposed to moderate the effect of individual context on BI. To create the moderating or interaction effect, a two-stage calculation method was used due to the use of a second-order variable. As a result, an interaction effect (gamification * individual context) was created. The findings in Table 8 show that gamification positively moderated the effect of individual context on BI ($B = 0.07$, $T = 1.97$, $P = 0.049$). Therefore, H5 is supported. In addition, the findings also show that gamification has a significant direct effect on BI. The increase in gamification in GLS will increase the positive effect of individual context on BI. This finding is supported by previous studies which found that gamification is a moderator (Rahi and Abd. Ghani 2018; Samar and Mazuri 2019).

The sixth hypothesis assumed that cost will moderate the effect of organizational context on BI. The interaction effect was created using the product indicator approach. The finding in Table 8 shows that cost did not moderate the effect of organizational context on BI. Thus, H6 is rejected. However, additional findings showed that cost is an essential predictor of BI toward adopting GLS. The cost has a direct negative effect on BI. This finding is inconsistent with the findings of previous studies such as Adnan et al. (2019) who found that cost is a moderating variable. However, the finding of the direct negative effect is in line with previous studies that support the notion that cost is essential for the decision of management to adopt a new system (e.g. Ikumoro and Jawad 2019; Pillai and Sivathanu 2020).

For the seventh hypothesis, BI significantly affected UB of GLS ($B = 0.45$, $T = 11.14$, $P < 0.001$). Hence, H7 is supported. For the last hypothesis (H8), self-efficacy positively moderated the effect of BI on UB. Thus, H8 is supported. The increase in self-efficacy as a moderator will increase the positive relationship between BI and UB toward using GLS. This finding is in line with the findings of previous studies such as Huang and Ren (2020) who found that self-efficacy is a moderating variable for the use of a gamified system.

Implications

This study was conducted to examine the predictors of adopting GLS. The study developed a framework and examined the hypotheses. The theoretical and practical implications of this study are discussed as follows:

Theoretical implications

Theoretically, studies that are pertaining to the adoption of GLS in general and in developing countries, in particular, are limited. Therefore, this study contributed to the body of knowledge regarding GLS. Further, the use of TAM dominated the field of GLS. However, a combination of theories was suggested by researchers and this study responded to these suggestions and combined three theories that include UTAUT, TOE. IS success. The three theories complemented each other in explaining the behaviour of teachers in the context of Iraqi smart schools to use GLS for teaching. The study confirms that UTAUT is valid to predict BI toward GLS. This is because the variables of UTAUT were significant predictors of BI. Grouping factors under two categories was efficient in predicting the usage of GLS. This is in line with the TOE framework. Satisfaction was confirmed to be an important mediating variable supporting the validity of IS success. This indicates that user satisfaction with GLS is important and can along with other variables predict the behaviour of users of the system.

This study contributed to the literature by examining cost and self-efficacy as moderating variables. The findings did not support the moderating role of cost but did support the moderating role of self-efficacy. Gamification is also supported as a moderating and direct effect variable. Thus, schools that wish to enhance learning and teaching processes have to include gamified features. Being under stress and anxiety for long hours staying at home, teachers and students can find the gamified system as entertaining and pleasurable. The study managed to predict more than 43% of the variation in BI toward using GLS. This percentage is considered moderate. However, it opens the road for future studies to include more variables and combine more theories to enhance the explanatory power of adopting GLS. Last, the study contributes to the gamification in the educational context as most previous studies were conducted in banking and other commercial sectors.

Practical implications

The findings showed that individual context is critical for the adoption of GLS and it is more important than the organizational context. Therefore, it is suggested that decision makers in Iraqi schools should focus on the individual context and, in particular, PE because increasing the benefits of using GLS will lead more schools and teachers to use the system. Having fun while teaching is a trait that all teachers want to have during the time of COVID-19. Thus, the usage of a GLS system will help in enhancing the learning environment and reduce stress and anxiety. This benefit among others should encourage decision makers to shift toward GLS in education. PE, EE, and SI are also critical factors that if combined together will measure individual behaviours toward GLS. Having an easy to use GLS and a positive social influence from the community will lead more schools to use GLS and contribute to educational learning and teaching.

The findings also showed that organizational context is important and the most important component is organizational readiness followed by top management support. In the context of Iraq, infrastructure and electricity as well as the speed of the internet must be well established and be prepared for using the technology. High-speed internet and well-established infrastructure will contribute to the quality of teaching and learning and have the potential to play a positive role in the time of COVID 19 and vice versa. In addition, the managements of schools should support financially and non-financially the effort to use GLS in Iraqi smart schools. For the success of any project, management support is essential.

Satisfaction with GLS is important and can explain the relationship of individual and organizational contexts with BI to use GLS. Thus, having satisfied users will enhance their motivation to use GLS. Decision makers have to enhance satisfaction. This can be done by administering a survey of satisfaction to the users and identify the areas that drive satisfaction and dissatisfaction and deal with the issues that cause dissatisfaction. Adding gamification to the content of teaching is critical and can enhance the individual context's relationship with BI. Decision makers are recommended to add elements of playfulness and enjoyment to all subjects. Reward can be assigned for students and high-performing teachers in the form of badges and points to differentiate them from others. Particularly, in the time of COVID-19 and with the emergence of new series, smart schools in Iraq should be prepared to face upcoming challenges and focus on the psychological part of education by adding fun and joy to the learning process. GLS can be the solution to traditional learning and can be an effective tool to face the pandemic as well as to reduce the risk and cost of face-to-face education.

The cost of adopting and using GLS is vital for managements of schools. Cost has an insignificant moderating effect but it has a significant negative direct effect. This is particularly important for self-funded schools and private schools. It also important for public schools as Iraqi schools

are supported partially by the United Nations organizations and the cost of establishing a gamified environment from software to hardware and networking could significantly affect the decision of managements. Nevertheless, the negative direct effect of cost indicates that increase in cost will lead to lower BI toward GLS. Using GLS effectively might be costly in the short run. However, in the long run, GLS is able to pay off the cost and reduce the operational cost of smart schools in Iraq.

Self-efficacy of teachers is critical for the use of GLS. High self-efficacy of Iraqi teachers will increase their BI toward using GLS. Decision makers in Iraqi smart schools are advised to initiate training courses to increase self-efficacy of teachers. Training need analysis (TNA) can be conducted to identify areas where teachers need to strengthen their skills and capabilities of teaching, designing content, and dealing with GLS. Teachers understand the content of the course but their capabilities in designing courses using GLS might reduce BI toward the system. Having specially designed courses in all subjects will lead to more usage of GLS systems and give the teachers the ability to modify and edit the content of the courses to be more joyful. The findings of this study can be utilized by decision makers to understand the predictors of GLS and improve the utilization of this technology to improve the performance of students, teachers, and the schools. Adopting GLS is the solution that can reduce the negative effect of COVID-19 and enhance the process of learning and teaching.

Conclusion, limitation and future work

This study examined the predictors of using GLS in Iraqi schools. Data were collected from 394 teachers and managerial staff in 250 smart schools in Iraq. The data analysis was conducted using SEM-PLS. The findings showed that both individual ($B=0.39$) and organizational contexts ($B=0.36$) are critical, with the individual context outperforming the organizational context in terms of importance. Organizational readiness ($B=0.31$) is the most important component of the organizational context while performance expectancy ($B=0.19$) is the most critical variable in the individual context. Satisfaction mediated partially the effect of individual and organizational contexts on BI toward using GLS. Gamification has a dual role. It is a moderating variable between the individual context and BI, and it has a direct effect on BI toward using GLS. Cost did not moderate the effect but it has a direct negative effect on BI. Further, self-efficacy is a critical moderating variable between BI and UB.

The findings are limited to smart schools that are using a gamified system fully or partially. Generalization of the findings can be on schools of developing countries that share similar characteristics with the Iraqi smart schools in terms of infrastructure, background, and education. As a way forward, future studies are suggested to examine BI of students to use GLS. Further studies are also suggested to examine the adoption of GLS among non-adopters. The explanatory power of this study was moderate and to overcome this issue, future studies are suggested to include more variables such as the interaction between students and GLS and the interaction between teachers and students in a GLS environment. More studies are needed in GLS in developing and emerging economies especially during this high tension time of COVID-19 where online learning has become the new normal for almost all nations.

Decision makers have to pay attention to the individual characteristics and perceptions regarding GLS. The benefits, easiness, as well as positive perceptions of the community, are critical for using GLS in smart schools. Organizational factors and, in particular, in the context of Iraq, the readiness in terms of infrastructure, internet connection, and hardware and software can contribute strongly to the adoption of GLS. Self-efficacy of teachers in designing content and dealing with the courses in a GLS environment is critical and decision makers have to focus on providing specialized courses to strengthen the capabilities of teachers.

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Declarations

Conflicts of interest All authors declare that they have no conflict of interest.

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