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A Framework for Gamified E-Learning Systems Acceptance in Saudi Arabian Universities

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Abstract: This paper presents a study to investigate critical factors that affect the acceptance of gamified e-learning systems at the universities of Saudi Arabia. This study was conducted using a triangulation method that consists of three major techniques, which are literature review, experts' interview, and students' questionnaire. The literature review helped identifying the most effective factors that influence student intention to accept e-learning systems. This was followed by experts' interviews, which helped confirming the critical factors, which were used to construct the student questionnaires, and then this was followed by students' questionnaires, which was the final step of factor confirmation. This resulted in having twelve factors that affect students' acceptance of e-learning systems The twelve factors construct the Gamified E-Learning Systems Acceptance Framework (GELSAF). In this research paper, detailed information about the framework, results that followed the expert interviews and students' questionnaire were presented.

Keywords: E-Learning, E-Learning Systems, Gamification, Gamified E-Learning Systems Acceptance.

1. INTRODUCTION

Over the last few decades, many international commitments towards universal education and training have been instituted and ratified by national governments. At the center of these commitments is the need to have education as a human right accessible to everyone regardless of gender, socio-economic status, location among others. This has conferred significant responsibilities upon countries to address the barriers to access to education. Moreover, there is an increasing desire to make learning more flexible than before [1].

Technology is being viewed as an enhancer of education for all. Currently various platforms have been established to aid access to learning. Blended learning is also emerging as a trend to improve access to education without being limited by geography. Nonetheless, not all technology platforms have enabled learning to take place [2]. It has been hinted that technology aided learning needs careful planning for it to achieve the intended goals. Foremost, technology aided learning needs to be interesting and able to motivate the user to want to learn more given that it sometimes entail individualized learning which mainly depends on intrinsic motivation of the user [3].

Gamified e-learning systems are emerging as a consequence of the failure for most of the e-learning systems to adequately motivate and engage users to learn. According to Kapp [4], gamification of learning is an approach used to motivate students to learn particularly by using video game designs and game elements in learning environments. This is the backdrop to learning taking place when it is enjoyable and fun. To this end, Gamified learning environments tend to maximize enjoyment and engagement by capturing the interest of learners and inspiring them to continue learning [5].

Nonetheless, this area being quite an emerging trend particularly in the Kingdom of Saudi Arabia, there is a call for empirical studies as the basis for designing appropriate gamified products and platforms to aid learning. This study is partly responding to this call by causing an understanding of the factors that are likely to affect the acceptance of a framework for Gamified E-Learning Systems in Saudi Arabian Universities.

2. BACKGROUND OF FACTORS AFFECTING THE ACCEPTANCE OF E LEARNING SYSTEMS

The acceptance of e-learning systems has received serious attention from many universities. Indeed, students have different opinions on e-learning systems. Moreover, several factors have been deemed to have an effect on students' behavioral intention to accept e-learning systems. This section focuses on reviewing several models and theories, which contribute to the acceptance of e-learning systems and which, in return, can be used to investigate the acceptance of gamified e-learning systems. Based on these models, several factors which affect the intention to accept gamified e-learning systems will be identified. Additionally, studies conducted at different universities reviewed in order to understand students' perceptions of, and attitudes towards e-learning systems. Based on these studies and reviews, a research gap was identified which requires research.

3. MODELS AND THEORIES OF IT ACCEPTANCE

There are numerous models and theories which seek to explain people's varying reactions to new technologies. With regard to the purpose behind these models and theories, examining them thoroughly will help to understand why there may be different reactions among students at the universities of Saudi Arabia when a gamified e-learning system is implemented. Descriptions of the relevant models and theories are provided in the subsequent sections.

3.1 THEORY OF REASONED ACTION (TRA)

The Theory of Reasoned Action, formulated by Fishbein and Ajzen [6], is a fundamental theory of human behavior that is inspired by social psychology. This theory has been used by Davis, et al. [7] to study behavior towards technology and the results match those of other studies which have analyzed behavior in other contexts [8]. This theory has two core constructs, namely, attitudes towards behavior and subjective norm. The attitudes towards behavior factor is defined as a person's feelings about performing a behavior, which are likely to be either positive or negative [6]. The term subjective norm is defined as the perception of a person considering the thoughts of the people most important to him or her when deciding whether or not to perform the behavior [6].

3.2 TECHNOLOGY ACCEPTANCE MODEL (TAM)

TAM has been applied in various research studies and is widely used to predict information technology acceptance. TAM was constructed to serve the IS context [8, 9]. Eke [10] indicated that TAM was the first model to discuss psychological factors affecting computer acceptance. This model has been developed by Davis, et al. [7], with improved versions including TAM2 [11] and TAM3 [12].

The original TAM started with two core constructs or predictors, namely, perceived usefulness and perceived ease of use. TAM2 includes subjective norm, image, job relevance, output quality, result demonstrability, experience and voluntariness as other predictors. TAM3 noticeably includes more predictors or determinants such as computer self-efficiency, perceptions of external control, computer anxiety, computer playfulness, perceived enjoyment, and objective usability. Many studies have agreed that TAM is able to predict individual intention to accept technology completely or partly [e.g. 13, 14]. However, Legris, et al. [15] stated that TAM and TAM2 are not as useful as when they are integrated into a wider model, such as the theory of planned behavior (TPB), task-technology fit or any other model that includes human and social change process variables. The Technology Acceptance Model has been used to explain the use of several information systems and technologies, such as the use of emails, the World Wide Web, broadband and online shopping, among others. TAM was designed to explain computer usage behavior and predict individual adoption, as well as the use of information systems or information technologies [16].

3.3 THEORY OF PLANNED BEHAVIOR (TPB)

TPB has extended the TRA by adding one construct, namely perceived behavior control. Ajzen [17] alluded to several studies which used the TPB to investigate individuals' behavior and attitudes towards different types of technologies [14, 18]. TPB has three core constructs, namely, perceived usefulness, perceived ease of use, which are adopted from the TRA, and perceived behavior control. These constructs have been used together to describe users' perceptions of behavioral intention to use e-learning systems [18].

3.4 THE UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT)

The unified theory of acceptance and use of technology (UTAUT) has been employed in various research studies as a framework to measure technology use and adoption. The UTAUT is based on four constructs, namely, social influence, facilitating conditions, effort expectancy and performance expectancy, as well as the constructs of hedonic motivation and habit as the antecedents of behavioral intention and user behavior [19]. Researchers have used the UTAUT model to examine the influence of the aforementioned constructs on electronic systems acceptance, adoption of broadband Internet, e-prescribing technology acceptance, e-governance, social network adoptions, and e-learning systems [19].

UTAUT is considered a recent instrument and is believed to synthesize eight known models of acceptance, including the Theory Acceptance Model, Combined Theory Acceptance and Theory of Planned Behavior, Innovation Diffusion Theory, the Motivation Model, the Model of PC Utilization, and the Social Cognition Model [8, 20]. UTAUT is driven by eight constructs, namely, self-efficacy, social influence, anxiety, effort expectancy, facilitating conditions, performance expectancy, behavioral intention to use, and attitudes towards using technology [20].

4. MODEL OF E-LEARNING UPTAKE AND CONTINUANCE OF E-LEARNING IN HIGHER EDUCATION INSTITUTIONS

Pinpathomrat [21] applied five different grounded theories to construct a model, which helps to investigate the uptake and continuance of e-learning in higher educational institutions. This model was implemented at a Thai university. It was seen that e-learning is not beneficial if it is not used by students [21]. Two diverse groups of factors were used to indicate two different scenarios – the uptake of e-learning and its continuity. For the uptake scenario, the factors used included performance expectancy, effort expectancy, social encouragement expectancy, facilitating condition expectancy, and learning consistency expectancy [21]. For continuity, the factors used included performance expectancy confirmation, effort expectancy likely to affect the continued use of e-learning, confirmation, social encouragement expectancy confirmation, facilitating condition expectancy confirmation, and learning consistency expectancy confirmation [21].

To sum up, Ain, et al. [19] indicated that TAM and UTAUT have been applied extensively to study acceptance behavior in relation to technology use. The studies used these models to discuss factors such as facilitating conditions, perceived usefulness, social influence and ease of use [e.g. 22, 23-26].

5. DISCUSSION OF RELATED WORK ON STUDENTS' ATTITUDES TOWARDS E-LEARNING

Preferences and interests vary from one student to another. Similarly, their perceptions of e-learning systems are likely to differ, as do their attitudes towards this new education approach. However, examining several case studies provides some insights into this issue.

Adewole-Odeshi [27] conducted a study concerning students' attitudes towards the adoption of e-learning systems in South Western Nigerian Universities. The study focused on examining whether the factors of attitude, perceived usefulness, and perceived ease of use have positive effects on behavioral intention to use e-learning systems. The study found a significant relationship between the stated factors and behavioral intention to use e-learning systems [27].

In addition to this, Tagoe [28] conducted a study to assess students' perceptions of using e-learning systems to learn at the University of Ghana. The variables used in the study included: access to computers, perceived ease of use, perceived usefulness, prior computer experience, frequency of Internet use, and attitude. The significant factors for behavioral intention to use were identified as: access to computers, perceived ease of use, prior experience and perceived usefulness [28].

A study conducted by Almarabeh, et al. [29] focused on examining students' perceptions of e-learning as well as its acceptance at the University of Jordan. The factors studied included: perceived ease of use, perceived usefulness, attitudes towards using and the behavioral intention to use e-learning systems. The study confirmed that perceived usefulness, perceived ease of use and attitudes are the factors which have a positive influence on intention to use e-learning systems [29].

A study conducted by Park [30] focused on the behavioral intention to use e-learning systems among students at Konkuk University's Seoul Campus. The factors identified included: system accessibility, self-efficacy, subjective norms, attitude, perceived ease of use and perceived usefulness. The study identified a number of factors which influence behavioral intention to use e-learning systems, such as attitude, self-efficacy, and subjective norm [30].

Zabadi and Al-Alawi [31] investigated students' attitudes towards e-learning at a university based in Saudi Arabia. Over 300 students participated and a questionnaire was used for the data collection. In general, the learners displayed a positive attitude towards e-learning. Gender and technology skills were also found to influence their attitudes. This study was similar to previous research by Rhema and Miliszewska [32], who used a sample of engineering students in Libya to investigate attitudes towards e-learning. The participants portrayed a positive attitude towards e-learning, and acknowledged its benefits. However, unlike Zabadi and Al-Alawi [31], the researchers found no significant gender differences in the learners' attitudes.

Based on the results of these studies, it is evident that many students view e-learning in a positive light. They recognize its benefits and are willing to use it in the completion of their studies. It also emerged that gender and the students' experience in the use of technology have a minimal impact on their attitudes towards e-learning.

6. THE RESEARCH FRAMEWORK

In the previous section, the literature review highlighted a number of factors influencing student behaviors towards acceptance of e-learning systems. In this section, a description of the construction of a framework for gamified e-learning systems using the factors identified in the previous section will be presented. The construction of the proposed framework was divided into four stages. The first stage was a review of models and theories related to technology acceptance, which will make it possible to collect affecting factors.

TAM and UTAUT were chosen as the main sources of the factors. These two models were chosen because they have been applied to study acceptance behavior related to technology use [19]. Many studies have utilized TAM and UTAUT to investigate students' acceptance of e-learning and there is agreement that these two models are very effective when it comes to investigating e-learning acceptance by students [e.g. 28, 33, 34-36]. This is followed by the extraction of factors from previous studies, which have been investigated in the e-learning domain in Saudi Arabia and worldwide [e.g. 28, 33, 34-36]. Afterwards, the identified factors are filtered to include only the related factors that affect students' acceptance of gamified e-learning in Saudi context. The unrelated factors were excluded and the repeated factors were removed. The final stage involved grouping the synthesized factors into categories.

7. CONSTRUCTION OF THE FRAMEWORK

A framework is defined as a network of linked concepts or items that can be modified based on certain requirements. The strength of a framework is that it is used to understand phenomena rather than to predict them [37]. The main purpose of conducting the literature review of secondary research was to develop a framework by which factors affecting the intention of students to accept gamified e-learning systems in the Saudi Arabian context are identified. The study identified the factors based on related work, theories and models published in journals, books and conference papers. The construction of the framework involved four steps which are elaborated as follows:

Stage 1: At this stage, many of the models used to study people's acceptance of IT were reviewed. This involves reviewing models and theories related to technology adoption to collect affecting factors. The focus was on reviewing widely-used models and theories describing the acceptance of information technology. Technology Acceptance Model (TAM) was one of the models that were reviewed in order to collect factors which influence people's acceptance of technology. Since this model has been developed into multiple versions, the researcher has studied all the versions which are TAM, TAM2, and TAM3.The review of TAM, TAM2, and closely TAM3 resulted in identifying essential factors that influence the acceptance of IT. Based on the review of models and theories, it was possible to identify affecting factors which contribute to the acceptance of technology with respect to e-learning systems [e.g. 7, 8, 17, 28, 33, 34, 38].

Stage 2: This involves extracting the factors identified in the reviewed literature and analyzing their significant influence on the acceptance of e-learning systems. The sources of the extracted factors were studied, while discussion was focused on students' perceptions of, and attitudes towards, e-learning systems in different universities. The studies were sourced from articles on students' perceptions of, and attitudes towards, the actual usage of e-learning systems at different universities. For example, the review of TAM3 resulted in extracting thirteen factors from which eight factors have been used lately to construct the framework. The eight factors which have been extracted are subjective norms, perceived usefulness, perceived ease of use, image, experience in IT, perceived enjoyment, computer playfulness, and computer self-efficacy.

Stage 3: In this stage, the factors collected during the previous two stages were filtered by removing repeated factors and excluding factors that shared the same concept, such as effort expectancy and social influence. For instance, effort expectancy was replaced by perceived ease of use, since both represent the same concept. The effort expectancy gives the same meaning of perceived ease of use but in reverse. Therefore, effort expectancy was removed whereas perceived ease of use was kept.

Stage 4: This stage involves the final representation of the construction process of the framework comprising the factors, which affect the acceptance of e-learning systems according to students in Saudi Arabian universities. This stage also involved grouping the synthesized factors into components and sub-components (affecting factors). The grouping process was conducted based on the meaning of the factors and their scope regarding the acceptance of e-learning systems. For instance, image and subjective norm were grouped in one category called culture and social factors. This gathering was based on the extent to which the two factors are related to each other in terms of their relationship to a person's relationship with those around him/ her.

8. PROPOSED GAMIFIED E-LEARNING SYSTEMS ACCEPTANCE FRAMEWORK (GELSAF)

This section describes the meanings of the proposed framework's categories and the factors that affect students' intentions to accept gamified e learning systems. The proposed framework is organized into three main categories, as shown in Figure 1, namely, individual, system, and social factors. Each of these categories and its factors is discussed in the following sections.

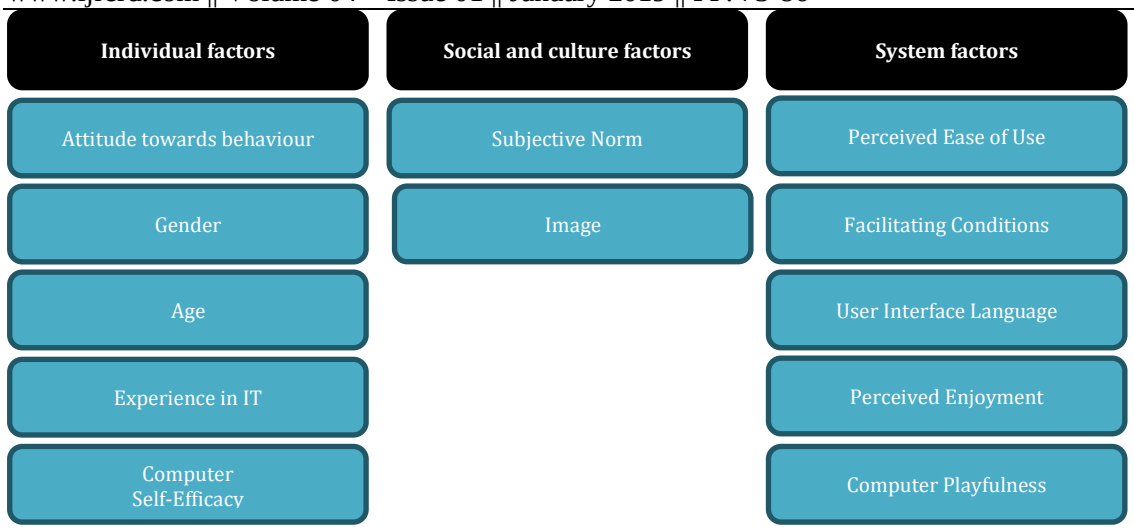

Figure 1 Proposed Gamified E-Learning Systems Acceptance Framework (GELSAF1)

8.1 INDIVIDUAL FACTORS

This category includes factors related to the individuals. It is believed that students' attitudes towards gamified e-learning, their experience in IT, gender, age, self-efficacy towards computers, and level of enjoyment while using the system, affect the adoption of gamified e-learning systems.

Attitudes towards behavior

This factor is defined as a person's feelings about performing a behavior, be these positive or negative feelings [6]. Yoo and Han [20] indicated that attitudes towards behavior represent the degree to which a user adopts a positive perspective, which in turn, affects the intention to accept e-learning systems. All previously-reviewed studies revealed that attitudes towards e-learning influence the intention to accept e-learning systems [31, 39].

Experience in IT

This is defined as skills acquired through the use of computers and the Internet [31]. The growth of ICT plays a critical role in students being able to gain more skills through the habitual use of computers and the Internet [31]. The use of computers and the Internet equips students with the skills necessary to use e-learning systems easily [31].

Mason and Weller [40]experimented a Web-based course, "Your computer and the Net", on a large scale. Students in this course were required to construct their assignments as HTML documents and submit them electronically. They found that Web-creation skills, previous computing experience, group collaboration and input of time are important factors affecting students' acceptance of the long distance education system. In this particular study, it is clear that having more experience in general web surfing was increasingly influential in e-learning uptake. This is because more experienced learners tend to be more familiar with various e-learning technologies which create more interest in such learners to engage in the practice compared to those which limited IT experience.

Gender

In their paper Venkatesh, et al. [8], the attitude towards behavior factor was found to be more salient for men, whereas subjective norm was more salient for women. Following their study, Gefen and Straub [9] indicated that women and men have different perceptions of technology. Gender, as the results suggested, should be included as a factor when studying students' perceptions of IT acceptance [9].

Within the context of Saudi Arabia, Al-Harbi [24] in the study "e-Learning in the Saudi tertiary education: Potential and challenges" examined the differences between the students based on their demographics to see if there is difference between male and female students regarding their intention to use e-learning. The results showed that male students were significantly different from female students on their intention to use e-learning. Male students demonstrated greater intentions to use e-learning than female students. Some of the reasons for the difference emanates from the fact that Men are masculine individuals who tend to be assertive and would love to display higher technical skills particularly in technology fields compared to women. Other studies on gender and technology adoption indicate that the effect of gender on technology adoption is

highly moderated by age of the users. Studies by Morris, et al. [41], and Wang, et al. [42] confirm that the gender effect on technology adoption is moderated by age. In fact, the results indicate that gender effect was more pronounced between young men and women. The effect becomes smaller as age advances. The literature therefore is inconclusive on the effect of gender on technology adoption.

Age

Age has a considerable influence on the acceptance of e-learning. It is said that Younger students show a higher level of acceptance of e-learning than older students [43].

Many studies postulate that the reason why age is negatively correlated with new technology adoption is explained by the fact that older people tend to have higher computer anxiety which lowers the interest to adopt new technologies[9]. Moreover, further arguments on the age effect on technology systems' adoption are based on the belief that older people are less open to change compared to young persons[44]. On the other hand Venkatesh, et al. [45]found that young persons place greater importance on technologies as one of the strategies to be more employable which may not be a motivation factor for older people who may either be tending to their retirement or already retired.

It is however critical to note that there are inconsistencies in the literature on the effect of age on technology adoption. For instance, a study conducted at the University of Ghana by Tagoe [28] showed that age has no relationship with perceived ease of use. This reinforces the need to study it further.

Computer Self-efficacy

Self-efficacy, or confidence, is an individual's judgement about whether he or she is capable of doing or performing a task at a specific level [46]. Students who believe that they are capable of performing tasks are likely to display adaptive behavior. This is confirmed in the study of [47]. In their survey Madorin and Iwasiw found that computer self-efficacy plays a critical role in technology adoption.

Bandura and Wessels [48] argues that those who perceive themselves as capable of using IT equipment tend to base such perception on their mastery of computers skills which creates a positive outlook towards adoption of new technological systems. Nonetheless, in the study conducted by Al-Harbi [24] in the Kingdom of Saudi Arabia, it was concluded that in as much as computer efficacy impacts e-learning, the effect was small. These points to contextual difference in the effect of computer efficacy. This inconsistence reinforces the need to further study this factor.

Therefore, in the current study, self-efficacy is used to further investigate the extent to which this factor can affect students' acceptance of gamified e-learning systems. It is as well anticipated that computer self-efficacy might be affected by the user's experience in IT. Users with more experience in IT, and specifically with computers, are more likely to have higher computer capability than users with limited experience.

8.2 SYSTEM FACTORS

This category includes all factors that are related to the system itself, where students assess the usefulness, easiness, and playfulness that they experience when using the system.

Perceived Usefulness

Perceived usefulness is defined as the level of enhancement of job performance that the individual believes he or she will achieve [6]. It arises out of the belief that learning systems change a person's intention to accept the e-learning systems and also have a positive impact on their job performance [7].

Catteddu and Hogben [49] postulate that individuals and organizations consider the benefits and utility of the technology system before deciding to adopt it. Accordingly, Hsu, et al. [50] observes that there is a higher likelihood for individuals and organizations to adopt technology systems that promise more benefits compared to the costs involved in adopting such technology.

Perceived Ease of Use

This is defined as the degree to which an individual believes that using a particular system would require no effort [7]. Similarly, Mtebe and Raisamo [51] indicate that effort expectancy, also referred to as perceived ease of use, is the degree of ease related to the use of a system. Individuals perceive less complex systems as easy to use, and thus, these systems have a high chance of being accepted. This is corroborated by the findings of Venkatesh [52] where it was discovered that technologies that require less physical and mental efforts to use, are always perceived to be easy to use and users are more likely to adopt them than those that require more efforts to use.

It is however critical to note that perceived ease of use is affected by the level of preparation given to the intended users. For instance, with better preparation, users are more likely to perceive technology systems as

easy to use even when they are complex. Similarly, without proper preparation and training, users are likely to perceive even easy technologies are difficult to use. This therefore implies that there is a strong correlation between perceived ease of use and training. For example Hackbarth, et al. [53] found a strong correlation between ease of use and level of training users had received. On the other hand, ease of learning moderates the effect of perceived use of technologies on adoption of technologies. For instance, Davis [54] found that users who were able to learn with ease were as well able to perceive technologies as easy to use. This finding is critical for policy makers and institutional users of technologies as it reinforces the need to adequately prepare learners, or employees before new technologies or learning systems can be adopted to improve on their perceptions with regards to ease of use of the technologies. Moreover, such prior preparation creates the motivation and the enthusiasm to regard e-learning and technology systems as easy to use.[55].

Perceived Enjoyment

This factor is defined as the extent to which using a system is perceived as being enjoyable, regardless of the performance consequences that result from the use of the system [52]. This factor is an indicator which makes it possible to establish whether or not the individual finds using the system to be enjoyable; this factor also indicates the actual usage process of the system, and whether it is fun to use the system [12].

The theory of learning emphasizes the need for motivation and particularly intrinsic motivation. Perceived enjoyment is a form of intrinsic motivation which has been found to impact individual decisions to adopt new technologies. To this end, systems including gamified learning models that add an entertainment orientation during learning or performance of a task increase the likelihood of adoption of such system [56].

This factor, though critical to adoption of new technologies, has not been widely studied. Moreover, given that the current study is about a framework for gamified e-learning systems, makes this factor even more critical and the need to investigate it more in the context of Saudi Arabia.

Computer Playfulness

According to Venkatesh and Bala [12], "Computer playfulness represents the intrinsic motivation associated with using any new system". Playfulness has been used to study the motivational characteristics of human-computer interactions [57].

According to Kangas [58]playfulness as applied in education is an approach to teaching and learning processes that entail the use playful and physical activities that take place in a playful learning environment. Nørgård, et al. [59]indicate that there is growing disengagement and loss of motivation amongst students in institutions of higher learning due to poor pedagogy, stressful learning environment and disconnection between higher education curricular and reality among others. To this end, computer gameful approaches and techniques are increasingly being adopted to counter the challenges aforementioned. This therefore implies that where e-learning systems incorporate computer playful games, the likelihood for adoption of such a system will increase. Nonetheless, Deci, et al. [3], Boyle, et al. [60]warn that the benefits of playfulness to learning and teaching tend to be short term in nature and that the approach focuses mainly on extrinsic motivation through manipulation of the external environment which may actually diminish intrinsic motivation in the long run. To this end, caution needs to be taken particularly in the design of compute play activities to ensure that they impact both intrinsic and extrinsic motivation of learners and engagement for long-term benefits to be realized.

Facilitating conditions

This refers to the degree to which an individual believes that the existence of an organizational and technical infrastructure will support the utilization of the system [33]. Yoo, et al. [61] indicated that facilitating conditions denote the amount of support students feel they are receiving in the organization to successfully adopt technology for work. Users adopting a new technology have a strong belief that technical, organizational resources and managerial support facilitate the adoption of technology. Previous studies demonstrated that management support is one of the crucial and imperative factors contributing to the success of a complicated system [62].

In the case of gamified e-learning systems, facilitating conditions refer to the existence of an organization's infrastructure support as well as an organization's support of gamified e-learning systems where game elements and the game design context are fully adopted and built within the system.

It is imperative to understand that infrastructure needed to establish technology systems such as the gamified e-learning systems tends to be costly in terms of initial capital and maintenance. This is why some studies Connor, et al. [63] have found cost to be negatively associated with new technology adoption. This therefore implies that organizations should first ascertain the infrastructural support required before adopting a new system.

8.3 SOCIAL AND CULTURE FACTORS

This category includes factors relate to tensions and forces within cultures and societies that shape attitudes and feelings of the students. In this study, two socio-cultural factors are studied, that is, subjective norm and image.

Subjective Norm

According to Fishbein and Ajzen [6] this factor is defined as the perception of a person considering the thoughts of the people most important to them when deciding whether or not to perform the behavior. In other words, it is "the perceived social pressure to perform or not to perform the behavior" [17]. Moreover, social influence, also referred to as subjective norm, was found to be the degree to which an individual perceives the importance of other people believing that they have the ability to use a new system [33]. Many people consider the importance of others' opinions when shaping their behaviors. Research studies have found mixed results regarding the impact of social influence on users' intention to accept and use e-learning systems. In their study investigating the adoption of internet banking, Shih and Fang [64] found that subjective norms have multiple effects on ones intention to adopt particular behavior. Foremost, subjective norms shape the attitudes of users towards adopting new behavior.

The effects of subjective norms tend to be more significant in peer groups where the need to conform to conventional norms and behaviors is great. This therefore implies that if new systems such as gamified e-learning systems are to be introduced in a particular society, it is critical to understand the prevailing socio-cultural tensions that would enhance or limit its adoption. In the case of Saudi Arabia, the gamified e-learning systems have to fit into the cultural and religious fabrique of society for them to be acceptable.

Image

This factor is defined as "the degree to which use of an innovation is perceived to enhance one's image or status in one's social system" [65]. Rogers [66] emphasized that the desire to gain social status is an important factor in terms of whether individuals adopt innovations. In their study of the factors that affect older persons' to adopt assistive technologies, Mitzner, et al. [67] it was found that users tend to resist adopting technologies which stereotypes their image. For instance, old persons were found to resist technologies that create stereotypes and misconception about them in order to preserve their self-image.

This factor is still critical to be studied given that young persons (students) are very sensitive about their image and are more likely to associate with technologies and e-learning systems that elevate their image and social status inside and outside the university.

9. RESEARCH METHODOLOGY

As an essential part of any research, researchers propose research methods that they use to perform the data collection, analysis, and interpretation of the results obtained. Among the commonly used research methods are qualitative, quantitative, and mixed methods. For studies that deal with text or image data, qualitative methods are usually used; meanwhile, quantitative methods are usually used for studies that collect numeric data [68]. Some researchers use mixed methods, which involve both qualitative and quantitative methods [69].

9.1 RESEARCH METHODS EMPLOYED IN THE CONFIRMATORY STUDY OF GELSAF

Triangulation Technique

Triangulation is a metaphor for using multiple reference points for locating an object. This term is used in navigation and military strategies. In the world of research, however, triangulation is defined as using multiple methodologies to study the same phenomenon. This technique is usually used to ensure the accuracy of the results by collecting the data from multiple sources including investigators, methods, time and data to ensure its validity and credibility [70].

The research objectives of the confirmatory study are achieved by addressing the research questions through the use of the triangulation research method, which is "philosophical positioning in the mixed methods community"[71]. Indeed, mixed methods such as the explanatory sequential mixed method, and the exploratory sequential mixed method are widely used by researchers to analyse data qualitatively and quantitatively[68]. These methods are used to interpret and analyse data collected through interviews, observations, surveys, or questionnaires to arrive at certain conclusions. In this research, both qualitative and quantitative methods are used. After a critical literature review that identified different critical factors, which affect students' acceptance of gamified e-learning systems, expert interviews are performed, followed by a student questionnaire, as illustrated in Figure 2. The triangulation process entails developing an investigation into groups of people, specifically two groups. The first group consists of educationalists such as e learning experts, distance learning, and lecturers, while the second group includes students from different Saudi universities. The aim of the

interviews was to assess whether the identified factors actually contribute to the acceptance of gamified e-learning systems and to discover factors not mentioned in the study. Open-ended questions were developed to assess the proposed factors, and all responses were recorded using a Sound Recording mobile application. The interviews were designed to collect as much information as possible from the identified experts, which were followed by a questionnaire designed for students to confirm the reviewed factors in the interviews conducted earlier.

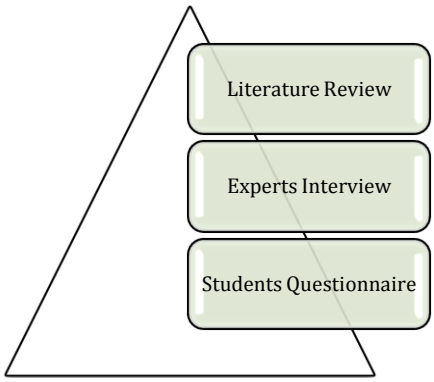

Figure 2 Triangulation confirmation of the proposed framework [72]

Expert Interview

The reason behind using the qualitative research method in the form of interviewing experts is to validate the framework categories and their factors. The qualitative data interpretation and analysis results helped with the modification of the framework, e.g., removing, re-locating, and adding new factors. A total of 13 experts were interviewed. They all have experience in e-learning and distance learning. Each expert has more than four years of experience in using e-learning systems. The criteria used to classify the experts depended on the number of years of experience they have. Five years of experience and more was the standard that was used in selecting the sample of experts. The experts interviewed were from different universities in different regions in Saudi Arabia.

Student Questionnaire

Following the expert interviews, the framework was re-designed based on the expert suggestions and all the modifications recommended by them were applied to the student questionnaire. After the completion of the questionnaire development, it was distributed to students studying in different Saudi universities. The questionnaire was sent to students in order to confirm the reviewed framework. Questionnaires, according to Recker [69], have the ability to confirm and quantify the results of quantitative research. In the questionnaire, the respondents were directed to answer questions based on a set of pre-specified answers. The student questionnaire was used in this study to collect data that was not detected or discovered such as the opinions of students and unobservable large population data. The questionnaire allowed students to answer the questionnaire's questions at their own convenience[73].

9.2 FINDINGS AND DISCUSSION

Findings of the Interviews

The experts suggested that the framework needs to be re-categorised as the factor, computer playfulness, needs to be moved from the system factors category to the individual factors category. In addition, they emphasised that age is not important and should be omitted from the framework. Table 1 presents the construction of the modified framework. The age factor was removed as suggested by the experts, since most students in Saudi universities are within the same age range, which is between 18 to 25 years old. The playfulness factor was moved from the system factors category to the individual factors category.

Table 1 Comparison of the framework before and after expert reviews

GELSAF1		GELSAF2
Individual factors		**Individual factors**
Age		~~Age~~
Attitude towards behaviour		Attitude towards behavior
Gender		Gender
Experience in IT		Experience in IT
Computer Self-Efficacy		Computer Self-Efficacy

		Computer Playfulness
Social factors		**Social factors**
Subjective Norm		Subjective Norm
Image		Image
System factors		**System factors**
Perceived Usefulness		Perceived Usefulness
Perceived Ease of Use		Perceived Ease of Use
Perceived Enjoyment		Perceived Enjoyment
~~Computer Playfulness~~		Facilitating Conditions
Facilitating Conditions		
New factors	+	User Interface Language
	+	Game-Elements

Findings of the Questionnaire

In this research, the questionnaire was used to complement the two dimensions used in the triangulation methods used in this confirmatory study, which are literature review and expert reviews. The analysis results of the quantitative data showed that all the three categories and their constructs influence the acceptance of gamified e-learning systems by students in Saudi Universities. After the statistical analysis, the following factors were confirmed: attitude towards behavior, experience in IT, computer self-efficacy, computer playfulness, subjective norms, image, perceived usefulness, perceived ease of use, perceived enjoyment, facilitating conditions, user interface language, and game-elements. All the confirmed factors are used to construct GELSAF3 as shown on Table 2. The mean score of the results of the data analysis indicated that all the factors have a substantial effect on students' acceptance of gamified e-learning systems.

Table 2 Comparison of the framework before and after students' questionnaire

GELSAF2	GELSAF3
Individual factors	**Individual factors**
Attitude towards behaviour	Attitude towards behavior
Gender	~~Gender~~
Experience in IT	Experience in IT
Computer Self-Efficacy	Computer Self-Efficacy
Computer Playfulness	Computer Playfulness
Social factors	**Social factors**
Subjective Norm	Subjective Norm
Image	Image
System factors	**System factors**
Perceived Usefulness	Perceived Usefulness
Perceived Ease of Use	Perceived Ease of Use
Perceived Enjoyment	Perceived Enjoyment
Facilitating Conditions	Facilitating Conditions
User Interface Language	User Interface Language
Game-Elements	Game-Elements

Game Elements

Experts in gamification highlight that only games that espouse particular elements or components or elements can result into better engagement and hence learning. de-Marcos, et al. [74] hints that games that cause learning should have specific elements that include fun and reward. Jackson [75] gives examples of game elements to include: achievement or progression, rewards, story, time, personalization, and micro interactions.

Achievement is a critical game element because game players derive satisfaction from the level of accomplishment and skills developed. To this end, Jackson [75] suggests that games should provide for points, badges, levelling, leaderboards, progression bars and certificates to users. Rewards such as equipment, tools, collectibles, bonuses and power-ups are a critical element in gamification as they provide extrinsic motivation and recognition for the time, effort and skilled gained. Further, Jackson [75] suggests that a story is another critical game element in that there is need to put a learning experience into a compelling narrative setting, add characters, create conflicts amongst them and draw the learner into the storyline. Time is another key element

and according to Jackson [75], games used for learning purposes should have a time element to create a sense of urgency and focus among the learners. Personalization is also a game element that requires that effective games should have options for learners to personalize them either by changing look of the interface or by using a nickname during play. Finally, micro interactions matter in games for learning. Interactions can be in terms of animated rollovers, sound, subtle and cool transition screens among others. These increase on the engagement of the learner.

User Interface Language

Language is a critical element in any learning process. In most cases, learners learn better if the content they are being exposed to is in the language they fully understand. In other words, language aids understanding completes the communication cycle. Equally, in the e-learning systems, empirical research has proven that the user interface language and general user interface design of a particular system or application plays a nexus role in enhancing or barring adoption of e-learning systems. Cho, et al. [76] in their study found that user-interface design positively impacts intention to use a new technology system, perceived ease of use and perceived system support. This implies that where the system's interface is in a language that is understandable, the users will be attracted to adopt it because they will think of it being easy to use particularly in individualized learning environments. Conversely, if the interface is in a language that is not understandable by the user, it will be most likely be perceived as difficult to use and not useful to the user and hence will be rejected.

10. CONCLUSION

The study presented a study aimed at investigating the critical factors that affect the acceptance of gamified e-learning systems at the universities of Saudi Arabia. In this paper, the preliminary findings about the gamified e-learning framework and some of the results that followed the expert interviews have been presented. From the analysis, all the three categories as earlier conceived in the conceptual framework and their constructs were found to influence the acceptance of gamified e-learning systems in Saudi Universities. Specifically, the factors that influence acceptance include: attitude towards behaviour, experience in IT, computer self-efficacy, computer playfulness, subjective norms, image, perceived usefulness, perceived ease of use, perceived enjoyment, facilitating conditions, user interface language, and game-elements. These have been used to construct GELSAF3. Nonetheless, from the opinions of the experts, there is need to re-categorize computer playfulness from system factors category to the individual factors category. In addition, age was not viewed as important and this has been omitted from the framework.

The findings to a greater extent confirm the earlier acceptance frameworks within the literature reviewed that hinted on the significance of the same factors. These findings are of significance to any efforts geared towards the design of gamified e-learning systems to guarantee their success. It is therefore hoped that this work draws additional attention to the universities, policy makers and designers of e-learning systems. It is only those who understand the critical factors that impact acceptance of such systems that will take the necessary precaution in designing, implementation and evaluation of such systems.

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