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Factors Affecting Schools Teachers Behavioural Intention to Use Gamified Learning Activities in Learning Management Systems (LMS) in Saudi Arabian Schools

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Abstract

The transition from the traditional form of teaching and learning to the information and communication technology-based educational system has aided effective interaction between students and their teachers However, despite the appreciable level of recognition of Learning Management Systems (LMS) as a new innovative educational model in the country, there exist wide research gap as a result of implementation and adoption. The study aims to examine the behavioural intention of teachers towards gamification in the Future Gate platform as it is one of the modern Learning Management Systems (LMS) in Saudi Arabian schools. A total of 328 respondents were conveniently sampled and a structured questionnaire was designed and administered using Google Forms and email the survey link to respondents. The data collected were analysed with SPSS®23 and PLS-SEM software. This study's findings showed significant influence for the effort expectancy, social influence, and hedonic motivation on the teachers' intention to use. Intention to use showed also significant impacts on the actual use of gamification. Both task and technology characteristics showed significant effects on the task technology fit. Intention to use play a significant role as a mediator for the influence of hedonic motivation, social influence, and task technology fit on the gamification actual use.

Disciplinary: Education (Instructional Technology & Multimedia, Learning Management Systems.)

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1 Introduction

The motivation of instructors to teachings can be utilized as a primary predictor of their usage of teaching best practices. Furthermore, numerous prior research has revealed that people's good intentions toward technology are a key influence in their use of technology in various contexts, such as mobile learning (Briz-Ponce et al., 2017; Thong et al., 2006), e-learning systems (Fathema et al., 2015; Siegel et al., 2017), banking (Lu et al., 2015; Susanto et al., 2016), and many more.

Many studies have been undertaken to promote teachers' use of technology (Domingo & Garganté, 2016; Ma et al., 2016) in which it is suggested that when teachers employ innovative technologies and tactics, they may give efficient education to their pupils. Motivating students in online discussion forums necessitates a thorough grasp of technology adoption, which includes teachers' commitments and views about their classroom practices (Brophy, 2017).

The Kingdom of Saudi Arabia has developed a comprehensive study on the ability to provide an integrated electronic services package for its students, teachers, government and private sectors, and all other scientific community members to achieve the planned quality of the education system, as well as learning from other successful trials in other developed countries. The inclusion of 'Future Gate' in the current teaching and learning agenda has caused significant changes in the education industry. Future Gate is a Saudi Arabian government-sponsored online learning portal designed to promote a more inclusive curriculum and learning activities. It allows teachers to communicate, exchange, and debate a variety of learning-related issues both during and outside of class time.

In the context of this study, gamification refers to the process of applying game design aspects to non-game situations (Brigham, 2015). Incorporating game dynamics into the teaching process of a lesson, according to (Zichermann & Cunningham, 2011) can potentially improve learners' abilities. This is because game mechanics can increase learners' commitment and motivation to the learning activity they are working on (Browne et al., 2018). Incorporating gamification tactics into the curriculum design can often result in a more effective teaching environment. This isn't to say that gamification should take the role of face-to-face teaching. Gamification is a term that refers to the use of game-based components and tactics to enhance motivation, engagement, and even solve problems among students. (Brigham, 2015).

Furthermore, there is a really minimal indication that school teachers intend to use the gamified services provided by the Future Gate platform. Teachers' intentions to use gamified services to motivate students in their learning process have yet to be determined. According to Alebaikan (2012), the loss of teacher-student interaction has come from the increase in class numbers. This is why Saudi Arabia's Ministry of Education contemplated employing technological tools to give various gamified learning experiences. (Alghamdi & Higgins, 2015)

This study will be conducted based on these observations to determine the primary factors influencing secondary school teachers' inclination to employ gamified learning activities in the

Future Gate platform. To identify Saudi teachers' intention to adopt gamified learning activities in the Future Gate platform, this study combines TTF with the Unified Theory of Acceptance and Use of Technology or UTAUT2, as described by (Venkatesh et al., 2012) The findings of this study are expected to add to our understanding of teachers' attitudes toward gamification as a problem in the Kingdom of Saudi Arabia.

2 Literature Review

The Kingdom has spent considerably in equipping its educational system to be ready to face the challenges and opportunities that come with the advent of technology. (Alresheed et al., 2017; House, 2013).

The Kingdom of Saudi Arabia's mission is to improve teachers' grasp of technology and ensure that it is used consistently in their teaching and learning. It was hoped that by doing so, students would be able to develop the essential information, skills, and orientations to be able to use the most up-to-date learning technological advancements with ease and comfort. (Maroun, Samman, Moujaes, Abouchakra, & Insight, 2008).

When using the TTF model, it has been suggested that other related concepts be included to provide a more full description of the relationship between technology, task, task-technology, the utilization of the technology UTAUT2 (Dishaw & Strong, 1999).

This finding is consistent with (Vongjaturapat et al., 2015) and Chang (2010) who found that both views can yield more information. Recently, there has been less emphasis on using the TTF model to extend the newer UTAUT2 model. As a result, for the creation of the current study's model, this study will take into account the theoretical frameworks of UTAUT2 and TTF.

3 Conceptual Framework

The Unified Theory of Acceptance and Use of Technology (UTAUT2) and technology features were used in this investigation (TTF). The current study's conceptual framework was developed by combining these two theories, which reveals the relationship between the research variables that were conceptually integrated into the study. The purpose of this study is to look into secondary school teachers' intentions to employ gamified learning activities in the Future Gate platform, which is one of the learning management systems (LMS) used in Saudi Arabian secondary schools.

Figure 1 depicts the study's conceptual framework, which includes eleven independent variable components and eleven primary constructs or dimensions, including performance expectancy (PE), Expected effort (EE), Influence of others (SI), Motivation based on hedonics (HM) facilitating circumstance (FC), habit (H), Behavioural intentions of teachers (TI) Teachers' Technology Characteristics (TTF), Task Characteristics, and Technology Characteristics are all included in the TTF of teachers. The dependent variable is defined as secondary school teachers' behavioural intention (BE) to use gamification in the Learning platform, with three key structures or dimensions: age, gender, and experience.

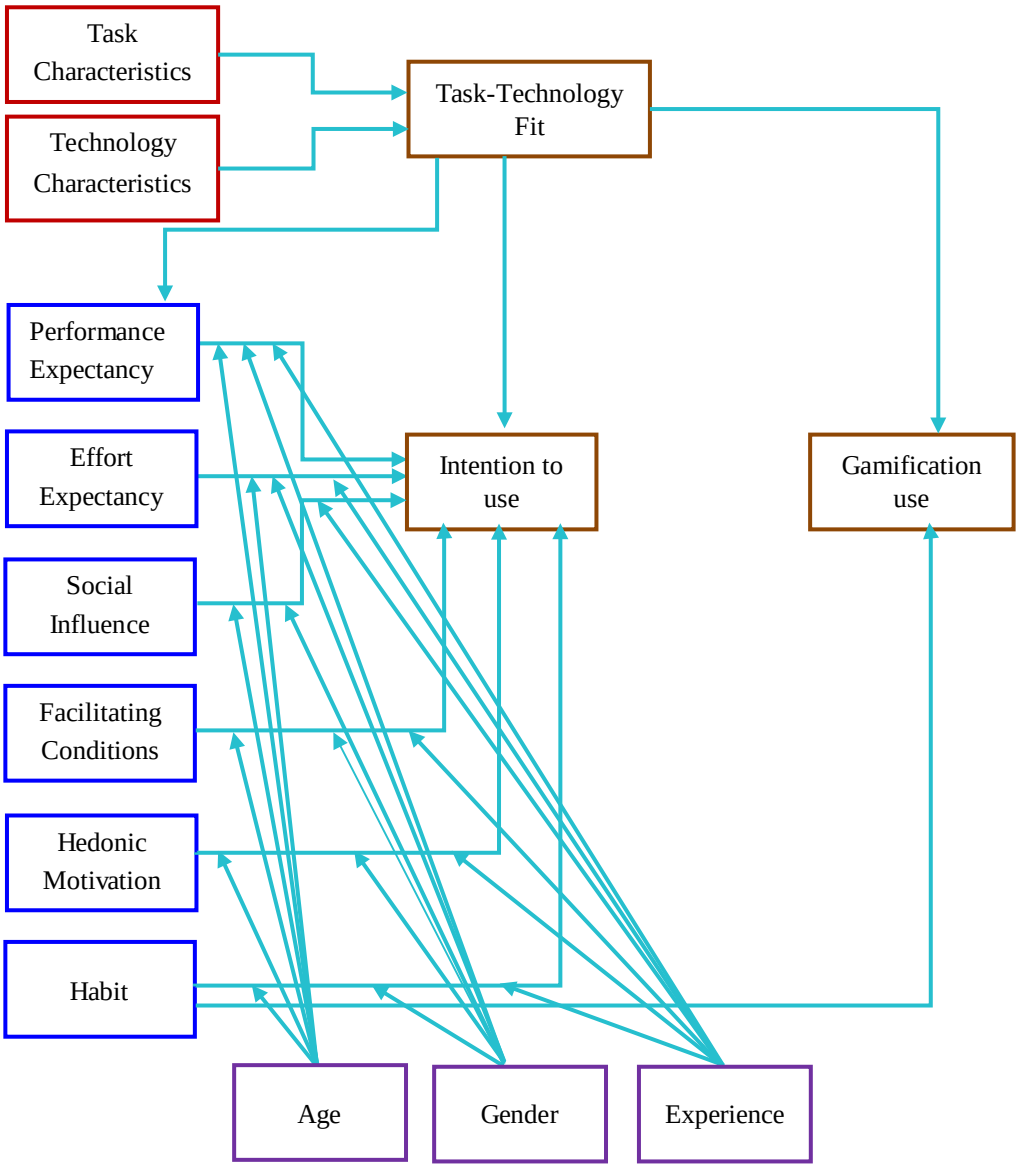

Figure 1: Research model.

4 Method

4.1 Research Design

This study's research design is a quantitative survey with a cross-sectional temporal horizon. Survey research designs refer to a quantitative research method in which researchers survey a sample or the complete population of people to characterize their opinions, attitudes, habits, or traits (Salihu & Metin, 2017). Furthermore, because this study is limited to a specified time frame, a cross-sectional time horizon was used.

4.2 Population and Sampling

Tatweer Educational Technologies Company created Future Gate as a Learning Management System (LMS) platform for students in grades 7 through 12. This platform provides a cutting-edge environment where teachers and students can improve their teaching and learning skills. (Masmali, 2020).

As a result, the Future Gate project is being implemented in 300 schools across the Kingdom, with all administrative and teaching responsibilities being assigned to the education districts of

Riyadh, Jeddah, Dammam, Alahsa, Alqassim, Onaizah, and Aseer. A total of 7692 teachers are employed by the project, with 3789 male teachers and 3903 female teachers. The project's third phase began in 2019-2020, at which time all of the Kingdom's schools are expected to adopt the system. (Hadi, 2018).

Most SEM research emphasizes the relevance of determining sample size based on the number of variables and model complexity, according to the literature. The sample size for an SEM study might range from 10 to 20 respondents per variable, according to (Schumacker & Lomax, 2004). With 11 factors, including age and gender, and the largest number of cases per variable, the total number of participants was calculated to be 328.

The cluster sampling approach will be utilized in this study to pick teachers from various places, as stated in. The teachers' monitoring agency in Jeddah provided information on the number of enrolled teachers. As a result, the researcher will be able to locate the appropriate sample. The teachers were chosen based on their use of the Future Gate platform in the classroom. This was accomplished by merely asking the teachers' monitoring department about the instructors in each district that are registered in the Future Gate project. Teachers will also be requested to participate until the required number of students has been attained. Many past studies have used this method, and it has proven to be effective in attaining the appropriate sample size. (Rao & Abegaz, 2017).

4.3 Data Collection and Analysis

The questionnaire's reliability is a crucial feature that most researchers need to confirm before beginning the main study. To ensure that the questionnaire items were reliable, the researcher delivered them to 23 teachers in this study. The respondents were chosen using convenience sampling, which took into account their proximity to the researcher's location, as well as their interest and availability to participate. The researcher gave the responders a brief description of the study's goal and how it could help them improve their usage of technology in the classroom. After that, each teacher received a printed version of the questionnaire (Arabic version). The researcher had to wait for the teachers to return the replies, which took about 10-15 minutes. The researcher next entered the information into SPSS and ran a reliability test. The acceptable dependability of the responses was estimated using Cronbach's Alpha. The Cronbach's Alpha score is greater than 0.7, indicating sufficient reliability, according to the results (Nunnally, 1994).

5 Result and Discussion

5.1 Demographic Characteristics

In most quantitative research, a research instrument is a tool that allows a researcher to collect the data needed to answer specific questions or hypotheses. When using the quantitative design, several instruments are typically utilized, such as surveys and questionnaires, which can obtain more numerical results. In addition, a questionnaire is a quantitative tool that is used to collect statistical data from a research sample. Based on these considerations, the researcher assessed the feasibility of employing a questionnaire, which allows the researcher to quantitatively

collect information from various participants in an organized manner. The first component of the research instrument in this study questions respondents about their demographic information, such as gender, age, and familiarity with the Future Gate platform. The age of the responders will be calculated in years. The gender of the respondents will be determined by coding it as a 0 or 1 dummy variable, with 0 being female and 1 denoting male. Because the Future Gate platform is still new, the experience will be measured in months. The second section of the instrument asks respondents to complete a set of questions for each variable explored in this study. The total number of people who took part in this study was 328. Gender, age, and experience are three variables in the demographic characteristics of the Future Gate platform.

5.1.1 Gender

In this study, males had a larger rate of participation than females (55.49% vs. 44.51%), as shown in Table 2.

Table 1: Gender percentages of study.

Gender	Male	Female
Percentage	55.49%	44.51%

5.1.2 Age

The current study includes four age groups: 20-25, 26-30, 31-35, and over 36 years. As indicated in Table 2, individuals aged 31-35 years had the highest proportion of involvement (35.06%), followed by those aged 20-25 years (27.74%), and others.

Table 2. Age groups of study participants.

Age	20-25	26-30	31-35	Equal or more than 36
Percentage	27.74%	20.43%	35.06%	16.77%

5.1.3 Experience in Future Gate Platform Groups

In this study, four groups are involved, each with their own experience with the Future Gate platform. These are divided into four groups: six months, twelve months, eighteen months, and twenty-four months. As indicated in Figure 2, those who had a 6-month experience had the highest proportion of involvement (28.96%), followed by 18-month experience (28.35%), and others.

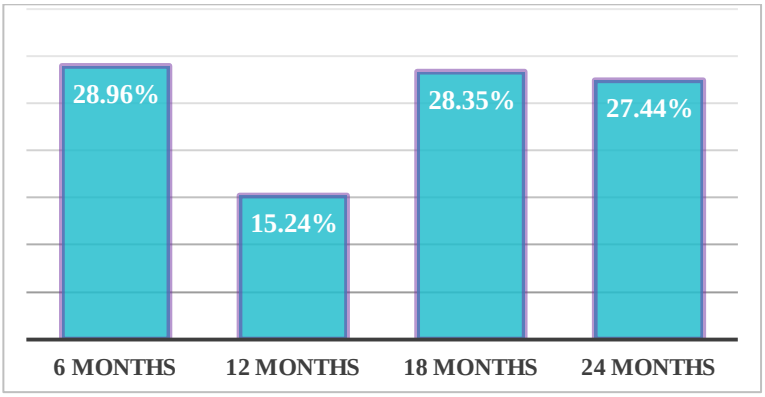

Figure 2: Percentage of experience in Future Gate platform groups.

5.2 Multiple Regression Analyses

5.2.1 Mediation Relationship

Several hypotheses have been proposed to help us better understand the role of mediators. In this study, the only mediators proposed are intended to utilize and task technology fit the overall effect, direct and indirect effects of a variable all influence its mediating effect.

Table 3. Impact of mediators between dependent and independent variables.

	Total effect		Direct effect			Indirect effect					
	ß	*p-value*	ß	*p-value*		ß	SD	T	*p*	BI	
										2.50%	97.50%
Hedonic Motivation ➔ Gamification use	**0.120**	**0.024**	0.357	0.196	Hedonic Motivation ➔ Intention to use ➔ Gamification use	**0.120**	0.053	2.257	**0.024**	-0.021	0.146
Social Influence ➔ Gamification use	**0.121**	**0.014**	0.159	0.066	Social Influence ➔ Intention to use ➔ Gamification use	**0.121**	0.049	2.472	**0.014**	-0.057	0.185
Task-Technology Fit ➔ Gamification use	0.066	0.087	0.001	0.993	Task-Technology Fit ➔ Intention to use ➔ Gamification use	**0.083**	0.040	2.055	**0.040**	-0.084	0.137
Task-Technology Fit ➔Gamification use	0.066	0.087	0.001	0.993	Technology Characteristics ➔ Task-Technology Fit ➔ Intention to use ➔ Gamification use	**0.032**	0.016	2.065	**0.039**	-0.036	0.050
Task Characteristics ➔ Intention to use	**0.051**	**0.043**	**0.173**	**0.008**	Task Characteristics ➔ Task-Technology Fit➔ Intention to use	**0.064**	0.024	2.642	**0.008**	0.025	0.119
Technology Characteristics ➔ Intention to use	**0.058**	**0.014**	**-0.224**	**0.000**	Technology Characteristics ➔ Task-Technology Fit ➔ Intention to use	**0.073**	0.023	3.234	**0.001**	0.030	0.124
Task Characteristics ➔ Performance Expectancy	**0.115**	**0.000**	0.186	0.210	Task Characteristics ➔ Task-Technology Fit ➔ Performance Expectancy	**0.115**	0.030	3.842	**0.000**	0.062	0.174
Technology Characteristics ➔ Performance Expectancy	**0.131**	**0.000**	0.472	0.065	Technology Characteristics ➔ Task-Technology Fit ➔ Performance Expectancy	**0.131**	0.029	4.460	**0.000**	0.083	0.190

The full mediation effect was observed in the current study for the intention to use in the following hypotheses: The use of hedonic motivation and gamification (ß = 0.120, T value = 2.257, p-value = 0.024), Social Influence and Gamification use (ß = 0.121, T value = 2.472, p-value = 0.014), Task-Technology Fit and Gamification use (ß = 0.083, T value = 2.055, p-value = 0.040), and the Technology Characteristics within the Task-Technology on the Gamification use (ß = 0.032, T value = 2.065, p-value = 0.039). The full mediation effect observed for the Task-Technology Fit in the following hypotheses: Task Characteristics and Performance Expectancy (ß = 0.115, T value = 3.842, p-value <0.001), and Technology Characteristics and Performance Expectancy (ß = 0.131, T value = 4.460, p-value < 0.001.

The Task-Technology Fit contributed to the complementary partial mediation in the relationships of; Task Characteristics -> Task-Technology Fit -> Intention to use (ß = 0.064, T value = 2.642, p-value = 0.008) and Technology Characteristics and Intention to use (ß = 0.073, T value = 3.234, p-value = 0.001). Although both mediations were significant, but both showed partial contribution (Table 3).

5.2.2 Moderators Effects

Variable moderation should be noticed between two variables, the dependent and independent, which influence outcomes favorably or negatively. The moderation alluded to the interactions that were being played by the third variable, which had a considerable impact on the dependent variable (Henseler & Fassott, 2010). In structural equational modelling, the moderator is either a categorical variable (such as gender) or a quantitative variable (like age and experience).

Gender had no significant moderating relationship between the independent factors and intention to use, according to the findings of this study. Only age seems to have a substantial moderating effect on the habit and intention to use. There was a negative moderation effect for the age between the habit and intention to use (ß = - 0.365, T value = 4.690, p-value <0.001), i.e., advanced age reduce the impact of habit on the intention to use. Experience in the future gate platform showed significant moderation effect with the performance expectancy and social influence on the intention to use. The experience showed negative moderating for the effect of performance expectancy on the intention to use (ß = -0.129, T value = 2.165, p-value = 0.031), i.e., the high level of experience in the future gate platform reduce the strength of impact for the performance expectancy on the intention to use. The experience showed positive moderating for the social influence on the intention to use (ß = 0.242, T value = 4.644, p-value <0.001), i.e. the effect of social influence on the intention to use the future gate platform is amplified by the high level of experience in the future gate platform, as shown in Table 4.

Table 4: Moderators for the model of this study.

Moderator	Hypotheses of moderators	Std coefficient	T Statistics	P-value
Gender	Gender*Hedonic Motivation ➔ Intention to use	-0.093	1.503	0.133
	Gender*Performance expectancy➔ Intention to use	-0.005	0.066	0.948
	Gender*Social Influence ➔ Intention to use	0.048	0.654	0.513
	Gender*Effort Expectancy ➔ Intention to use	0.087	1.020	0.308
	Gender*Habit ➔ Intention to use	0.206	1.021	0.308
Age	Age*Effort Expectancy ➔ Intention to use	0.109	1.482	0.139
	Age*Habit ➔ Intention to use	-0.365	4.690	0.000
	Age*Hedonic Motivation ➔ Intention to use	0.381	1.49	0.137
	Age*Performance expectancy ➔ Intention to use	-0.132	1.692	0.091
	Age*Social Influence ➔ Intention to use	0.148	1.448	0.148
Experience	Experience*Effort Expectancy ➔ Intention to use	0.106	1.377	0.169
	Experience*Habit ➔ Intention to use	-0.151	1.925	0.055
	Experience*Hedonic Motivation ➔ Intention to use	0.022	0.319	0.750
	Experience*Performance expectancy➔ Intention to use	-0.129	2.165	0.031
	Experience*Social Influence ➔ Intention to use	0.242	4.644	0.000

5.2.3 Hypotheses and Decisions

Based on prior findings, the supported hypotheses and proposed moderators and mediators (Table 5) were the only ones that were relevant to the current study's model. More, over 61 percent of the hypotheses were supported, which was an exceptional result. Numbers 1, 4, 6, 10, and 13 failed to support the hypotheses with the outcomes, as indicated in Table 3. The only significant mediators identified from the study's findings were found to be supported. In this study, the

important mediators were the intention to utilize and task technology fit. The gender total failed to have a moderator effect on all independent factors' effects on the dependent variable when it came to moderators. The habit effect on the intention to use was found to have a moderating effect with age. The hypothesized moderating effect for performance expectancy and social influence on the intention to use was supported by experience with the future gate platform.

Table 5: Study hypotheses and decisions

no.	Hypotheses	P value	Decision
H1	Performance Expectancy ➔ Intention to use	0.023 (negative)	Not supported
H2	Effort Expectancy ➔ Intention to use	0.012	Supported
H3	Social Influence ➔ Intention to use	0.000	Supported
H4	Facilitating Conditions ➔ Intention to use	0.987	Not supported
H5	Hedonic Motivation ➔ Intention to use	0.000	Supported
H6	Habit ➔ Intention to use	0.316	Not supported
H7	Intention to use ➔ Gamification use	0.010	Supported
H8	Task Characteristics ➔ Task-Technology Fit	0.000	Supported
H9	Technology Characteristics ➔ Task-Technology Fit	0.000	Supported
H10	Task-Technology Fit ➔ Gamification use	0.993	Not supported
H11	Task-Technology Fit ➔ Intention to use	0.001	Supported
H12	Task-Technology Fit ➔ Performance Expectancy	0.000	Supported
H13	Habit ➔ Gamification use	0.023 (negative)	Not supported
	Mediators		
	Hedonic Motivation ➔ Intention to use ➔ Gamification use	0.024	Supported
	Social Influence ➔ Intention to use ➔ Gamification use	0.014	Supported
	Task-Technology Fit ➔ Intention to use ➔ Gamification use	0.040	Supported
	Technology Characteristics ➔ Task-Technology Fit ➔ Intention to use -> Gamification use	0.039	Supported
	Task Characteristics ➔ Task-Technology Fit ➔ Intention to use	0.008	Supported
	Technology Characteristics ➔ Task-Technology Fit ➔ Intention to use	0.001	Supported
	Task Characteristics ➔ Task-Technology Fit ➔ Performance Expectancy	0.000	Supported
	Technology Characteristics ➔ Task-Technology Fit ➔ Performance Expectancy	0.000	Supported
	Moderators		
	Gender*Hedonic Motivation ➔ Intention to use	0.133	Not supported
	Gender*Performance expectancy➔ Intention to use	0.948	Not supported
	Gender*Social Influence ➔ Intention to use	0.513	Not supported
	Gender*Effort Expectancy ➔ Intention to use	0.308	Not supported
	Gender*Habit ➔ Intention to use	0.308	Not supported
	Age*Effort Expectancy ➔ Intention to use	0.139	Not supported
	Age*Habit ➔ Intention to use	0.000	Supported
	Age*Hedonic Motivation ➔ Intention to use	0.137	Not supported
	Age*Performance expectancy ➔ Intention to use	0.091	Not supported
	Age*Social Influence ➔ Intention to use	0.148	Not supported
	Experience*Effort Expectancy ➔ Intention to use	0.169	Not supported
	Experience*Habit ➔ Intention to use	0.055	Not supported
	Experience*Hedonic Motivation ➔ Intention to use	0.750	Not supported
	Experience*Performance expectancy➔ Intention to use	0.031	Supported
	Experience*Social Influence ➔ Intention to use	0.000	Supported

6 Conclusion and Policy Implication

The study found that effort anticipation, social influence, and hedonic incentive all had a substantial impact on teachers' intention to utilize. The intention to employ gamification has a big impact on its actual implementation. The task technology fit was significantly influenced by both task and technology parameters. The influence of hedonic incentive, social influence, and task

technology fit on gamification actual use is mediated by the intention to use. Teachers' demographics (gender, age, and experience) were examined as modifiers of the UTAUT2 model in this study. The teachers' intention to use has a significant detrimental impact due to their age and habit. The intention to use was negatively influenced by previous experience with performance expectancy. The impact of social influence on the intention to use was shown to be significant.

The current investigation was successful in rejecting eight of the thirteen null hypotheses. Others, on the other hand, reject notions about mediation and moderation analysis. As a result, the current model met the study's objectives by producing significant findings. This study's approach looked at novel outcomes that had never been looked into before, particularly in Saudi Arabia. Future research should focus on improving and developing the model, target population, and technology applications.

7 Availability of Data and Material

Data can be made available by contacting the corresponding author.

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