

The Impact of Personality Traits and Technology Acceptance Models on Egyptian University Students' Intention to Use Gamification in E-Learning

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Gamification has been rapidly growing as a solution in e-learning to improve students' engagement and motivation. Despite numerous studies examining the technology acceptance model as a crucial component of e-learning, there has been a dearth of research examining the influence of various student personality traits on their acceptance of gamification. Therefore, this research develops a framework to investigate the impact of the technology acceptance model, the Big Five personality traits, and students' attitude on their intention to use gamification in e-learning in Egypt. The study employs quantitative analysis, utilizing a 451 online survey tool to collect data from Egyptian undergraduate students enrolled in public, private, and national universities. Additionally, AMOS software is utilized for structural equation model analyses (SEM). The study's findings, The most influential factor is the students' attitude toward the intention to use gamification; at the same time, results supported all relations. This study sheds light on the importance of managing students with different personality traits in order to continue using gamified learning environments.

Key words: TAM, Personality Traits, attitude, Gamification, Technology acceptance model, and E-Learning

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INTRODUCTION

Recently, the boundary between games and other systems and services has become increasingly blurred. This development can be observed to be reciprocal: Within games, users are increasingly confronted with decision-making scenarios related to external issues, particularly with the emergence of Free-to-play games that explore real-life financial matters (Hamari et al., 2015; Paavilainen et al., 2013). In non-game settings, game design is progressively employed to guide individuals' motivations towards intrinsically driven, gameful experiences and behaviour (Deterding et al., 2011; McGonigal, 2011). Gamification is the widely used term for this phenomena (Deterding et al., 2011; Hamari et al., 2015; Huotari & Hamari, 2012).

Popular positive belief in the effectiveness of gamification has often been based on the anecdotal conception that because most games are 'fun' and intrinsically motivating, then any service that uses the same mechanics should also prove to be 'fun' and effective in invoking positive further behavioral outcomes. Undoubtedly, gamification has garnered much attention and interpretation, despite the limited understanding of its concepts and the lack of a comprehensive body of empirical data on its efficacy. Furthermore, meta-analyses have shown that the area is highly disparate and frequently plagued by inadequate study designs in terms of controls, sample sizes, and experiment durations (Kiselichki & Josimovski, 2022 ; Kusumawardani & Soegihono, 2024). Hence, it is unsurprising that the discourse around gamification today remains rather polarized.

Within the sphere of education, the implementation of widening participation policies and practices has resulted in a higher education student population that is increasingly diverse and heterogeneous. This has posed challenges to the traditional methods and approaches used within the sector. Many educators are now prioritizing the engagement of students in the learning process (Alsadoon, 2023 ; Gibbs, 2014). This has led to the development of various approaches, such as student-centered learning (Rodrigues et al., 2019; Kumar et al., 2018; Tsay et al., 2018), flipped classroom (Gilboy et al., 2015; McLaughlin et al., 2014), and technology-mediated learning (Dumford & Miller, 2018; Hepplestone et al., 2011; Price & Kirkwood, 2011). Although these approaches appear to be centered around enhancing teaching and learning, a crucial inquiry arises regarding the successful implementation of these approaches, as they appear to be in conflict with the prevailing push for uniformity in higher education (Wood & Reiniers, 2012).

The motivational qualities of games must be incorporated into teaching and learning in an information technology (IT)-based gamified course design, taking into account people's natural desire to communicate and celebrate successes as a means of inspiring students to learn. If effective, this kind of approach might lead to students' long-term and deeper engagement (Huseinović, 2024; Nicholson, 2012).

In the context of higher education, empirical studies have demonstrated positive-leaning but mixed results in the implementation of IT-based gamification (Dicheva et al., 2015; Seaborn & Fels, 2015). Contextual factors, including an analysis of the gamified system's design, player characteristics, and the congruence between the motivational features included in the system and the general objectives, interests, and requirements of users, have been suggested by researchers as potential explanations for these mixed results (Hamari & Koivisto, 2015; Hamari et al., 2014). Educators are in accord that the learning process and outcomes are influenced by student background (Rodrigues et al., 2019) and that a learning environment cannot operate in a vacuum (Tsay et al., 2018). The aim of this research is to gain a deeper insight into the field of interest by examining the relation between the TAM, the Big Five Personality Traits, Students' Attitude and Intention to Use Gamification in E-Learning in Egypt.

RESEARCH PROBLEM AND QUESTIONS

Initial acceptance and use of a gamified learning environment are essential for its success in motivating and engaging students in higher education (Topal & Karaca, 2022 ; Rahman et al., 2018). Therefore, several previous studies in the related literature focused on the acceptance of gamified learning environments (Ab Rahman et al., 2019, Rahman et al., 2018; Panagiotarou et al., 2020). For example, Rahman et al. (2018) introduced a gamification acceptance model derived from the TAM to examine students' willingness to adopt gamification and its impact on their level of involvement in training sessions. Study findings indicated that the level of students' acceptance of gamification directly impacts their level of involvement during the learning process. Particularly, some studies employed TAM and its expansions, such as TAM-2, to assess students' willingness to adopt gamified learning settings. TAM has introduced by Davis (1989), is a conceptual framework that elucidates the acceptance of technology by users across several domains. Prior meta-studies have shown that TAM is widely employed in empirical research to investigate users' desire to participate (Nayanajith et al., 2019; Wang et al., 2021). This paper is a trail to cover two main research gaps as follows:

The diverse personalities of students might lead to varying behaviors, thereby resulting in the manifestation of distinct technology acceptance behavior (Sindermann et al., 2020). Within this particular framework, (Osei et al., 2022 ; Svendsen et al., 2013) emphasized the correlation between personality traits and the acceptance of technology. Hence, with respect to the initial research deficiency, it is unsurprising that numerous recent studies have examined the impact of personality characteristics on the adoption of technology, including smartphones (Sindermann et al., 2020), social networking platforms (Mouakket & Sun, 2019), business intelligence tools (Harb & Alhayajneh, 2019), e-Learning (Punnoose, 2012), and digital library systems (Kaya et al. Nevertheless, based on the recent literature analysis conducted by Panagiotarou et al. (2020), it is evident that no previous study has examined the impact of personality traits on students' integration of gamified learning settings.

Contrary to the acknowledged beneficial influence of gamification on education, several research have documented adverse consequences associated with its adoption (Andrade et al., 2018; Mekler et al., 2013). A study by Andrade et al. (2018) found that the inclusion of competitive game features, such badges and leaderboards, can adversely affect less academically successful pupils. Therefore, the second gap pertains to the aspects of implementation. The study conducted by Mert and Samur (2018) revealed that inadequate implementation and improper use of the gamification system can have adverse effects on student behaviors and involvement. The studies cited above validate the findings of Kapp (2012) and Werbach and Hunter (2012), who emphasised that the effectiveness of gamification may vary across different systems and that learning experiences can be influenced by several aspects. The main research question of this paper could be stated as: how TAM, Personality Traits Personality Traits and Attitude impact the Egyptian University Students' Intention to Use Gamification in E-Learning?

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

TAM and the Big Five Personality Traits are considered the independent variable, mediator variable (Students' Attitude) and dependent variable (Intention to Use Gamification in E-Learning).

Technology Acceptance Model (TAM)

TAM was initially proposed by Davis in 1989 and has since been the predominant paradigm for comprehending the adoption and acceptance of technology (Mehta et al., 2019). The approach relies on two crucial variables: PU and PEOU. PU represents the practical aspect of technology usage, while PEOU is associated with the pleasurable experience (Tarhini et al., 2017). Many researchers have successfully applied TAM to information systems applications to predict behavioral intent toward the usage of technology (e.g., Wandira et al., 2024 ; Yang et al., 2017). The theory known as TAM has gained the most traction in the world of information systems. According to Granić (2022), TAM is said to be able to explain between 40% and 50% of user acceptance. Li (2014) argued that TAM, which established hypothesis in the area of IS acceptance examines online consumer behavior in relation to an individual's acceptance or rejection of a technology.

Due to its weak explanatory and predictive power and absence of specific factors in specific situations, the original Theory of TAM was questioned by later scholars. TAM suggested that perceived usefulness and perceived ease of use determine system acceptance. In game studies, social aspects are suggested to predict players' attitudes and intents,

and enjoyment is seen to be the most crucial motivational factor for game play (Li, 2014). The conceptual model for the study of gamification use in this research incorporates enjoyment as extra factors.

- **Perceived Ease of Use (PEOU)** influences students' intention to learn through e-learning, as it also affects PU and perceived enjoyment (Aparicio et al., 2016).
- **Perceived usefulness (PU)** is defined as the level of belief that using a system improves performance (Davis, 1989).
- **Perceived enjoyment (PE)** refers to "the degree to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use," as defined by (Alharbi & Drew, 2014).

The Big Five Personality Traits

The term "student personality" can be used to identify a specific learning style, according to earlier research by Buckley and Doyle (2017a). Alarcon et al., (2018) proposed the Big Five Personality Traits, which is a well-known personality model. Under the acronym OCEAN (Openness, Conscientiousness, Extraversion, Agreeableness, Neuroticism), it classifies five distinct personality traits. A high score in one personality indicates stronger tendencies specific to that particular personality trait (Aidt & Rauh 2018). Scores are measured for each of the five different personalities to determine an individual's personality. The following is an explanation of each personality type:

- **Openness** is associated with intellectual curiosity. Openness personality is usually creative, curious, open-minded, and excited to try out new experiences.
- **Conscientiousness** relates with the adherence to social norms. People who are conscientious usually have a strong sense of work ethic, responsibility, organization, and performance.
- **Extraversion** deals with self-confidence. Extraverted individuals are typically gregarious, outspoken, bold, and don't give a damn what other people think of them.
- **Agreeableness** is associated with sociability. Agreeableness personality is usually cooperative, kindhearted, trusting, forgiving, and flexible.
- **Neuroticism** relates with a person's negative emotions. It measures the scale of negative human emotions such as anxiety, instability, insecurity, and social distress.

Attitude

The role of attitude in e-learning is significant, and it is essential to comprehend the factors that shape attitudes towards e-learning. Hence, it is crucial to employ a multidisciplinary methodology in order to comprehend attitudes towards e-learning (Uyar, 2023 ; Al-Rahmi et al.,2018). There is a requirement to construct a device that assesses attitudes by analyzing many facets of the user (Al-Fraihat et al.,2020).

Furthermore, attitude is an important component of e-learning, and it is critical to understand what influences attitudes toward e-learning. As a result, using a multidisciplinary approach to understand attitudes about e-learning is critical. (Al-Rahmi et al.,2018). There is a need to develop a tool that analyzes attitudes by researching various aspects of the user (Al-Fraihat et al.,2020). TAM highlighted the substantial correlation between behavioral attitudes about using a specific technology and intention to utilise it. The degree to which a student has a positive or negative attitude toward gamified learning environments may be determined by their attitude toward using gamified learning environments.

In the field of educational gamification, it has been noticed that people's behavioral attitudes towards using gamification are a strong indicator of their intention to actually use it. The reference is from Panagiotarou et al., (2020). A recent study conducted by Wang et al., (2021) found that behavioral attitudes have a positive impact on the intention to use online education during disasters.

Intention to use Gamification in E-Learning

The significance of attitude in e-learning and understanding what The effectiveness of an e-learning module is determined by its usage (Sánchez & Karaksha, 2023 ; Esterhuyse et al., 2016; ohammadi, 2015). Studies have examined factors that enhance the user experience of a certain technology in the future. (Chu and Chen, 2016; Cheung and Vogel, 2013). Several factors impact people's intents to use technology, such as the utility of the technology (Barnett et al., 2015), their openness to new experiences, subjective norms (Marangunić & Granić, 2015), and the level of enjoyment they derive from using it (Wang et al., 2012).

Behavioral intention in TAM is a crucial factor to study as it directly influences the utilization of technology and an individual's preparedness to carry out a specific task. Both Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) exert an indirect impact on technology adoption and user behavior. Several research studies in the field of e-learning have confirmed the connections between behavioral intention and usage. The references used are Sahu et al., (2022) ; Granić (2022) ; and Tarhini et al., (2015).

CONCEPTUAL FRAMEWORK

TAM encompass 3 dimensions , as in figure1 namely: (Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment) is measured by De Kok & Klaiber (2022); and Ab Rahman, et al., (2018). The Big Five Personality Traits include 5 dimensions namely: (Extraversion, Agreeableness, Conscientiousness, Neuroticism, Openness to Experience is adapted from John & Srivastava (1999). Students' Attitude is adapted from Hamari & Koivisto (2015); Ab Rahman, et al., (2018). Intention to Use Gamification in E-Learning is adapted from De Kok & Klaiber (2022); Esterhuyse et al., (2016).

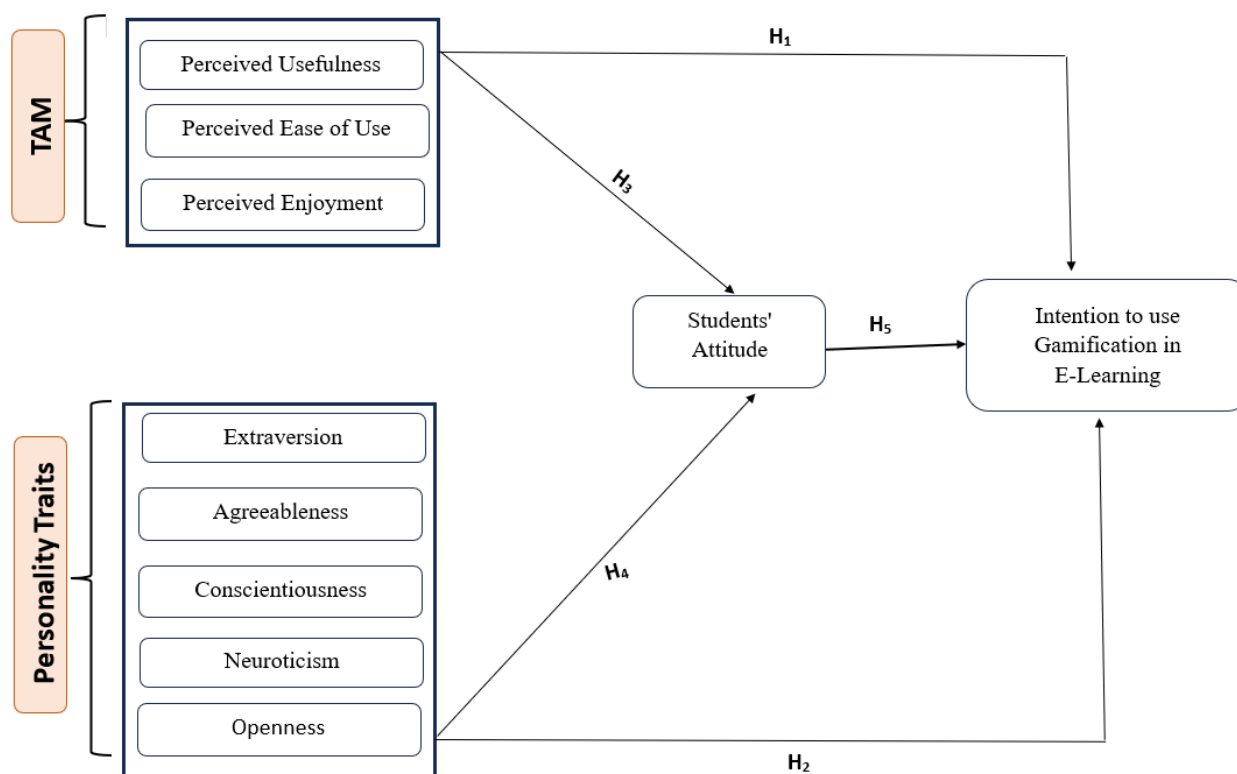


Figure 1: Conceptual framework

RESEARCH OBJECTIVES

- 1- To investigate the relation between TAM and Intention to use Gamification in E-Learning
- 2- To examine how Personality Traits impact Intention to use Gamification in E-Learning
- 3- To identify how TAM impacts Attitude.
- 4- To determine how Personality Traits impact Attitude.
- 5- To examine how Attitude impacts Intention to use Gamification in E-Learning
- 6- To investigate the mediation role of Attitude in the relation between TAM and Intention to use Gamification in E-Learning
- 7- To examine the mediation role of Attitude in the relation between Personality Traits and Intention to use Gamification in E-Learning.

RESEARCH HYPOTHESES

and theories, the study hypotheses were formulated as below:

- H1: TAM has an impact on Intention to use Gamification in E-Learning
 H2: Personality Traits has an impact on Intention to use Gamification in E-Learning
 H3: TAM has an impact on Attitude.
 H4: Personality Traits has an impact on Attitude.
 H5: Attitude has an impact on Intention to use Gamification in E-Learning
 H6: Attitude mediates the relation between TAM and Intention to use Gamification in E-Learning
 H7: Attitude mediates the relation between Personality Traits and Intention to use Gamification in E-Learning

RESEARCH METHODOLOGY

Referred to as the research population in this study. Online questionnaire was distributed on public, private, and national universities in Egypt . The questionnaire was divided in two broad categories. The first category is made up of general information and the second category is the body of the questionnaire that includes four sections: first: Technology Acceptance Model, included three dimensions (Perceived Usefulness, Perceived Ease of Use, Perceived

Enjoyment) and the Big Five Personality Traits included five dimensions (Extraversion, Agreeableness, Conscientiousness, Neuroticism and Openness to Experience) , Second section: Students' Attitude and Third section: Intention to Use Gamification in E-Learning) A Likert-scale was used to measure opinions as follows: Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), Strongly Agree (5).

The research questionnaire was administered to eight hundred (800) respondents, 522 questionnaires representing 65.3% were returned, and 71 questionnaires representing 8.9% were incomplete or ineligible or refusals and 278 (34.7%) were not reached. There were 451 acceptable responses, a response rate 56.4%, which is highly adequate for the nature of this study. The structural equation modelling (SEM) software package was utilized in this Research Paper to investigate the interrelations between the constructs of the hypothesized model. Testing Hypotheses After completing a confirmatory factor analysis, the structural model is valued by evaluating the hypotheses that underpin the research model..

DATA ANALYSIS

Composite Reliability (CR) is used to measure the reliability of a construct in the measurement model. CR is a more presenting way of overall reliability and it determines the consistency of the construct itself (Hair et al., 2019). CR of (Perceived Usefulness = 0.875, Perceived Ease of Use =0.827, Perceived Enjoyment= 0.870, Conscientiousness =0.915, Students' Attitude =0.930, Neuroticism =0.712, Extraversion = 0.897, Agreeableness = 0.847, Openness =0.882 and Intention to Use Gamification in E-Learning =0.945). So, it clearly identified that in measurement model all construct have good reliability.

The Average Variances Extracted (AVE) should always above 0.50 (Hair et al., 2019). AVE of the particular constructs (Perceived Usefulness = 0.583, Perceived Ease of Use =0.561, Perceived Enjoyment= 0.576, Conscientiousness =0.757, Students' Attitude =0.690, Neuroticism =0.566, Extraversion = 0.644, Agreeableness = 0.580, Openness =0.603 and Intention to Use Gamification in E-Learning =0.710) are more than 0.500. Overall, these measurement results are satisfactory and suggest that it is appropriate to proceed with the evaluation of the structural model as in figure 2, and table 1.

Structural Model

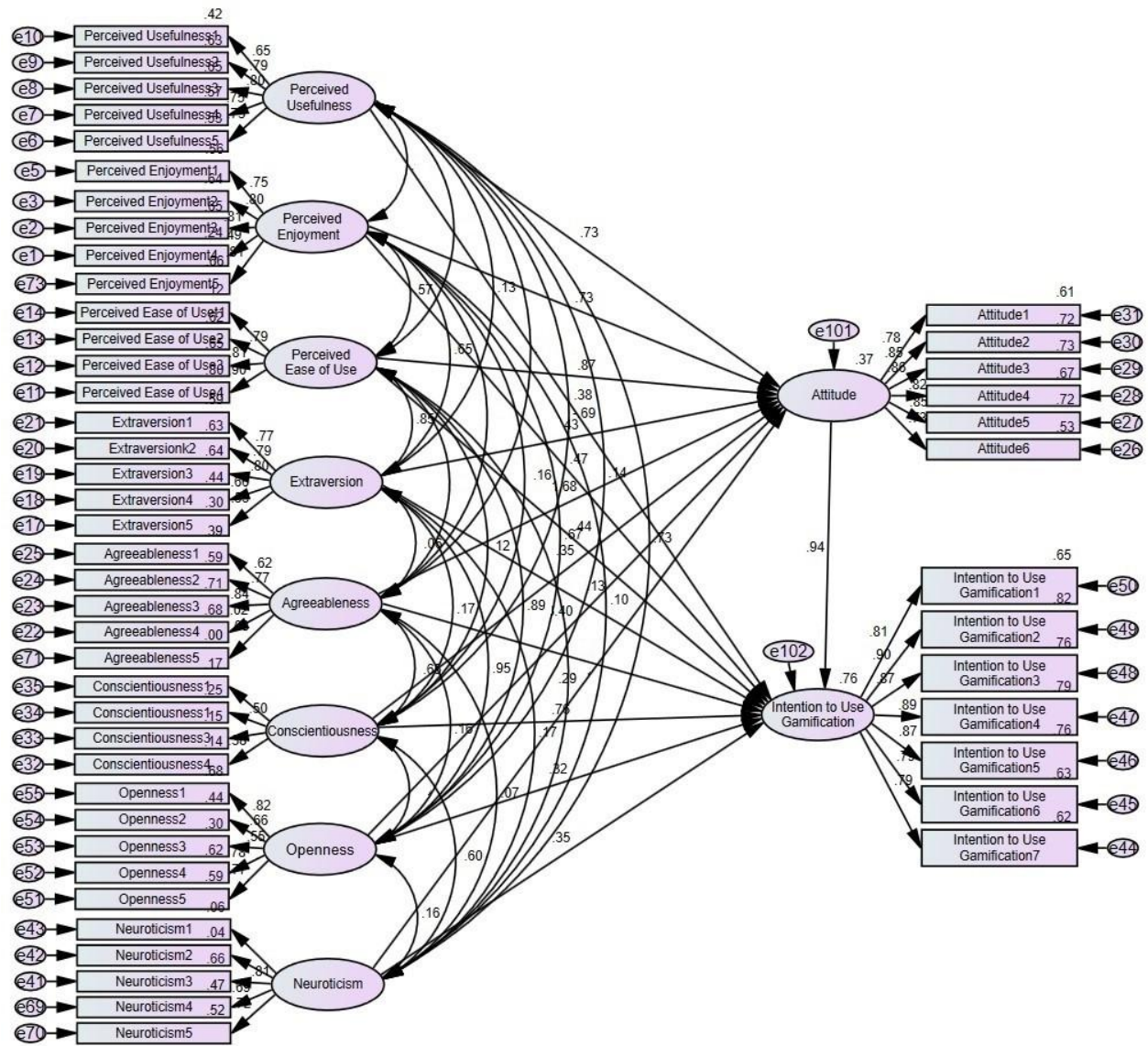


Figure 2: Structure Model

Table 1: Structure Model final results

Goodness of Fit Measures	Name of index	Model Result	Remark
Chi-Square	χ^2	2641.547	accepted
Degrees of Freedom	DF	1176	accepted
Chi-Square/ Degrees of Freedom	χ^2 /DF	2.246	accepted
Comparative Fit' Index	CFI	.913	accepted
Tucker Lewis Index	TLI	.906	accepted
Root Mean' Square Error of Approximation	RMSEA	.051	accepted

Structural model validity:

The findings of structural' model using the AMOS software, shows that DF was 1176 (it should be more than 0), χ^2 /DF has a value of 2.246, that is less than 3.0 (it should be less than or equal 3.0). The RMSEA was .051 (it should be less than 0.08). The TLI index was .906 which is very close to 1.0 (a value of 1.0 indicates perfect fit). The CFI was .913. All indices are close to a value of 1.0 in CFA, indicating that the measurement models provide good support for the factor structure determined through the CFA as in table 2.

Table 2:hypothesied path

<i>Hypothesized path</i>		<i>Estimate</i>	<i>Critical Ratio (C.R)</i>	<i>P-Value</i>
<i>Intention to Use Gamification in E-Learning</i>	<--- Perceived Usefulness	.379	15.203	***
<i>Intention to Use Gamification in E-Learning</i>	<--- Perceived Ease of Use	.437	31.386	***
<i>Intention to Use Gamification in E-Learning</i>	<--- Perceived Enjoyment	.471	24.318	***
<i>Intention to Use Gamification in E-Learning</i>	<--- Conscientiousness	.759	17.233	***
<i>Intention to Use Gamification in E-Learning</i>	<--- Extraversion	.134	13.405	***
<i>Intention to Use Gamification in E-Learning</i>	<--- Agreeableness	.331	14.610	.002
<i>Intention to Use Gamification in E-Learning</i>	<--- Neuroticism	.353	17.369	***
<i>Intention to Use Gamification in E-Learning</i>	<--- Openness	.319	19.190	***
<i>Students' Attitude</i>	<--- Perceived Usefulness	.728	12.269	***
<i>Students' Attitude</i>	<--- Perceived Ease of Use	.873	13.085	***
<i>Students' Attitude</i>	<--- Perceived Enjoyment	.728	15.445	***
<i>Students' Attitude</i>	<--- Conscientiousness	.349	10.164	***
<i>Students' Attitude</i>	<--- Extraversion	.433	10.240	***
<i>Students' Attitude</i>	<--- Agreeableness	.675	10.185	***
<i>Students' Attitude</i>	<--- Neuroticism	.286	12.095	***
<i>Students' Attitude</i>	<--- Openness	.402	13.045	***
<i>Intention to Use Gamification in E-Learning</i>	<--- Students' Attitude	.942	18.176	***

RESULTS

This study explores the analytical part performed to test the hypotheses the researcher is seeking to fulfill the research objectives as the values and Hypothesized path of the final structural equation model presented in table - 2.

A discussion of findings and conclusion could now be presented in the following ways:

First objective: to investigate the relation between TAM and Intention to use Gamification in E-Learning in Egypt. Due to the individual tests of significance of the relation between the variables. It reveals that, “H1: TAM has an impact on Intention to use Gamification in E-Learning” is supported. This result is consistent with (Hafez et al. 2023 ; Subhash & Cudney, 2018; AlMarshedi et al., 2017; and Leaning 2015) , and inconsistent with (Denden et al., 2022 ; Odikpo, C. 2022), Odikpo, C. (2022) who found no significance effect of perceived ease of use and intention to use games and simulations in higher education. This may be explained that perceived ease of use act as moderator in other TAM-researches as in (lin et al. 2017) .

Third objective: to identify how TAM impacts Attitude. Due to the individual tests of significance of the relation between the variables. It reveals that, “H3: TAM has an impact on Students' Attitude” is supported. Games encourage students to display a positive attitude and have an impact on achievement. The fact that games have always been a tool that draws people's attention is also noted (Gibson et al., 2015; Sar and Altun, 2016).

Kashive et al. (2022), through their qualitative study, noted that learners who believe that gamified e-learning is easy to understand, interact and helpful in achieving their learning goals are more likely to have positive attitudes towards it, This result support the research findings.

Also, the research's finding is aligned with study of Ab Rahman et al. (2022) as The study found that students were more likely to use gamification if the technology was easy to use, less considering its usefulness.

Fourth objective: to determine how Personality Traits impact Attitude. Due to the individual tests of significance of the relation between the variables. It reveals that, “H4: Personality Traits has an impact on Students' Attitude” is supported. Previous studies have demonstrated that attitudes towards technology have a crucial role in determining instructors' intention to utilize that technology. Additionally, these attitudes also contribute to explaining the

connection between behavioral intentions and personality traits (Scherer et al., 2019; Krath et al., 2021). Study's finding is supported by previous studies as in Tlili et al.(2016) who highlighted the effect of personality on students' attitude in a gamified learning environment. In addition, recent studies showed that students' personalities can affect their perception of using different game design elements in a gamified learning environment(Denden et al., 2022 ; Almeida et al., 2023).

Fifth objective: examine how Attitude impacts Intention to use Gamification in E-Learning. The result shows that **H5:** Students' Attitude has an impact on Intention to use Gamification in E-Learning. In this study's findings, Students' Attitude is the most influential predictor of behavior intention. the Studies concerning "continuance use intention" in the context of e-learning product use (e.g., Al Amin et al., 2022), Massive Open Online Courses (MOOC) (e.g., Shanshan & Wenfei, 2022), Learning Management Systems (LMS) and m-learning applications (e.g., Ashrafi et al., 2022; Widjaja, 2022).

However, studies on continuance use intention mainly on a gamified e-learning are few (Roslan et al., 2021a; Wirani et al., 2022), but the significance of positive relationship between student's attitude and intention to use gamification is supported by recent scholar studies in (Hafez et al., 2023; Denden et al., 2022; Halim et al., 2021).

Sixth objective: to investigate the mediation role of Attitude in the relation between TAM and Intention to use Gamification in E-Learning. The findings confirmed the hypothesized relation (H6: Students' Attitude acts as a mediator between TAM and Intention to adopt Gamification in E-Learning). These finding supported by the result of the study of Liao et al. (2022) that noted the significance of attitude as mediator in connection between perceived ease of use, perceived usefulness and perceived enjoyment and intention of using e-learning, also These findings align with the study conducted by Hafez et al. (2023) which applied in the same field of education

Seventh objective: to investigate the role of attitude as a mediator in the relation between personality traits and the intention to utilize gamification in online learning. According to the results, students' attitude mediates the relationship between their personality traits and their intention to utilize gamification in online learning (H7). Huang, S., & Zhang, H. (2024). Noted that studies on personality traits and student's attitude toward game-environment learning is scarce making this a critical literature gap and this paper is a serious trial for fulfilling this research gap.

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH

The focus of this research is to investigate the impact of Technology Acceptance Model , the Big Five Personality Traits , Students' Attitude on the Intention to Use Gamification in E-Learning in higher educational institution Egypt including public, private and national universities. The regression analysis reveals that: All hypotheses are supported. Besides, the study found that Students' Attitude mediates the relation between TAM and Intention to use Gamification in E-Learning and contributed to the literature by supporting the hypothesis that, Students' Attitude mediates the relation between Personality Traits and Intention to use Gamification in E-Learning. According to the analysis, At the 5% significance threshold, all are considered significant. The estimated structural model corroborated the seventeen hypotheses, as TAM and Personality Traits constructs explained 37% of Students' Attitude variance ($R^2 = 0.370$), Besides, TAM and Personality Traits constructs through Students' Attitude explained 76.4 % of Intention to Use Gamification in E-Learning variance ($R^2 = 0.764$).

The study filled the existing literature gap by focusing on the different personality traits of students , attitude and perception of students toward intention to use gamification in e-learning , the study's academic and practical contributions support the acceptance to use gamification in e-learning while considered the need of further research .

Recommendation

Due to the results of this paper, the following points are recommended:

- **Fostering Positive Attitudes Towards Gamification:** Since students' attitudes mediate the relation between TAM variables and the intention to use gamification, fostering positive attitudes is crucial. This can be achieved through pilot programs that allow students to engage with gamified learning in a low-stakes environment, helping them to see its benefits in a relaxed context. Moreover, promoting the value of gamification in terms of enhancing learning outcomes and engagement could shift students' attitudes positively.
- **Targeted Training and Support Programs:** Egyptian universities should invest in training programs that help instructors understand how to effectively integrate gamification into their teaching practices. Many instructors may lack familiarity with gamified learning, which could hinder its adoption. Providing ongoing support, professional development, and resources for instructors could increase their confidence and willingness to incorporate gamification into their e-learning strategies
- **Addressing Institutional and Technological Barriers:** Universities should ensure that the necessary technological infrastructure is in place to support gamification. Adequate bandwidth, access to digital tools, and technical support are essential components that need to be addressed. Additionally, institutions should consider the financial and logistical implications of implementing gamified systems, seeking to make these tools as accessible as possible to both students and instructors.
- **Incorporating Feedback Mechanisms:** Effective gamification systems should include regular feedback loops that help students understand their progress and adjust their learning strategies accordingly. This aligns with the

principle of perceived usefulness in TAM and can improve students' engagement with gamified content. Institutions could develop systems that provide real-time feedback on performance, encouraging continuous improvement and sustained motivation.

limitations of the Study

□ Cultural Context: The study's focus on Egyptian universities represents both a strength and a limitation. While it provides valuable localized insights, the cultural and socio-economic factors unique to Egypt may influence the relation between TAM, personality traits, and gamification acceptance in ways that are not applicable to other regions. This cultural specificity may limit the applicability of the findings to non-Egyptian contexts, where educational systems and student attitudes toward e-learning and gamification may differ.

□ Gamification Design Variability: the study may face limitations regarding the variability in gamification design across different e-learning platforms. The effectiveness of gamification can depend heavily on how the game elements are designed and implemented, which can vary significantly from one platform to another. This variability may introduce inconsistencies in how students perceive and engage with gamification, thereby affecting the study's outcomes.

Future research Suggestions

□ First, future research could explore cross-cultural differences in how TAM and personality traits influence the adoption of gamification. Although the present study focuses on Egyptian universities, different cultural settings may exhibit distinct relations between personality traits and technology acceptance. For example, factors such as individualism versus collectivism, power distance, and uncertainty avoidance may moderate the influence of TAM variables and personality traits on the intention to use gamification. Comparative studies between Egypt and other regions, such as Western or East Asian countries, could shed light on these dynamics.

□ Second, there is potential to investigate the role of specific game elements (e.g., badges, leaderboards, challenges) in the adoption of gamification by different personality types. While this study looks at the broad relation between personality traits and gamification intention, future research could delve into which elements of gamification are most appealing to different traits within the Big Five model. For instance, individuals high in openness may prefer exploratory tasks, while those high in conscientiousness might respond better to structured rewards and clear feedback mechanisms.

□ Third, future research involves the integration of additional mediating and moderating variables. For example, self-efficacy, or teacher support could be incorporated into the TAM framework to explore their interactions with gamification and personality traits. Researchers could also study the influence of gender, age, or academic discipline on the effectiveness of gamified e-learning tools, potentially identifying demographic factors that impact the intention to adopt such technologies.

□ Fourth, Future research is to conduct similar study using two different groups of students. One of them has experience in gamification in e-learning and compared with other group that has no experience in gamification in e-learning, this study could provide deep insights whether the expert group skewed their response toward using gamification in future. Subhash and Cudney (2018) observed that earlier studies demonstrated a significant positive correlation between experience with game-based learning and positive attitude toward it. Thus, identifying whether participants' Experience levels with games and simulations may influence attitudes and Intentions regarding the use of games and simulations in higher education contexts.

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