Predicting Gamified Apps Adoption: The Influence of Student Optimism and Innovativeness

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ABSTRACT

In higher education, gamification holds significant potential as it engages students in interactive and immersive learning experiences that stimulate critical thinking, active participation, and problem-solving capabilities. The interactive nature of gamified environments enables learners to apply theoretical concepts in practical contexts, thereby enhancing their understanding and supporting better knowledge retention. This study aims to examine the extent to which Malaysian university students' optimism and innovativeness contribute to their intention to adopt gamified applications in learning. Using a survey approach, data was collected through questionnaires distributed to 137 accounting students at Universiti Teknologi MARA (UiTM), Tapah, Perak. The analysis reveals that optimism has a significant and positive influence on students' willingness to use gamified apps. These insights offer practical implications for educators, game developers, and policymakers in promoting the effective integration of gamification into higher education settings.

Keywords: Gamification, Innovativeness, Optimism, Student Engagement, Learning

INTRODUCTION

Gaming is important for students in higher education because it provides interactive and engaging environments that support active learning, critical thinking, and the development of problem-solving skills. Through gameplay, students are able to apply theoretical knowledge in practice, which helps deepen their understanding and improve retention of course materials (Calza-Perez et al., 2024). Furthermore, adding elements such as competition, rewards, and progress tracking in gamification can encourage students to set and achieve academic goals (Liu et al., 2024), and can also influence their intention to use educational gaming tools (Rohan et al., 2021; Dehghanzadeh et al., 2024).

Understanding students' intention to use gaming in learning is important for effectively introducing these tools into higher education. Behavioral intention, which can predict a person's actions, reflects their willingness to engage in activities like using gamified apps (Lin et al., 2020). By studying factors such as innovativeness and optimism along with the benefits of gaming, educators can better understand students' attitudes and motivations. This can help in designing strategies to increase the acceptance and success of gamified learning in education.

This study aims to explore accounting students' readiness to use gamified apps in their learning. It focuses on their behavioral intention, looking specifically at the roles of optimism and innovativeness. This is important for improving teaching methods and the future development of gamified apps, especially in accounting education.

The paper is organized as follows: Section 2 reviews the literature related to students' behavioral intention to use gamified apps. Section 3 explains the research method. Section 4 presents the findings and results. Finally, Section 5 concludes the study.

LITERATURE REVIEW

The Technology Readiness Index (TRI), introduced by Parasuraman (2000), provides useful insights into how individuals are prepared to adopt new technologies. The index, as shown in Figure 1, includes both positive and negative dimensions, namely optimism, innovativeness, discomfort, and insecurity. Optimism and innovativeness are positive traits that reflect favorable attitudes towards technology, encouraging individuals to accept innovation and try new technological solutions. On the other hand, discomfort and insecurity are negative traits that reflect feelings of doubt or uneasiness towards technology, which may discourage individuals from adopting new technologies.

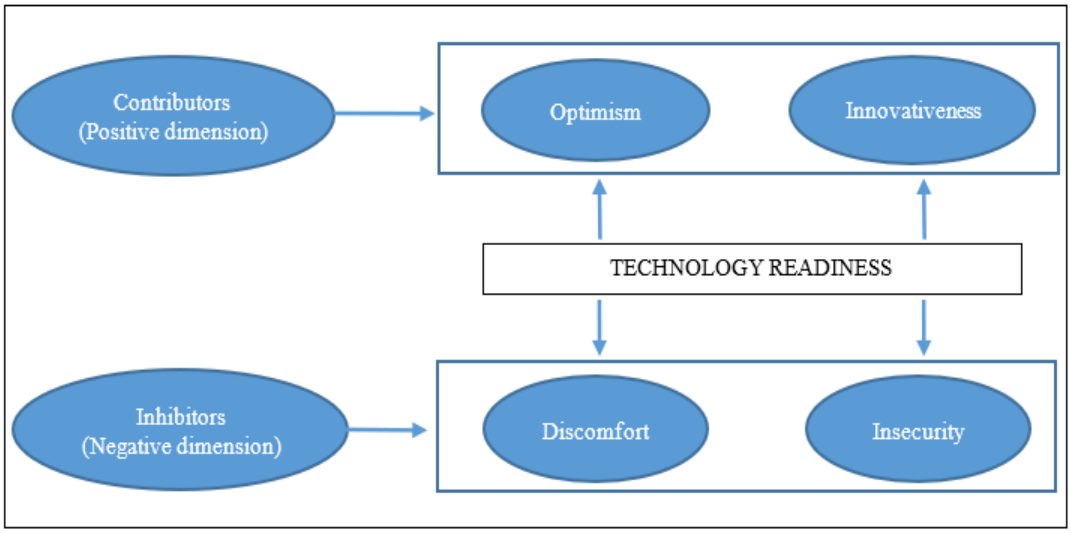

Figure 1. Technology Readiness Index (Parasuraman, 2000)

In the educational context, this index can help explain students' willingness or resistance to adopt gamified learning applications. Gamified apps are increasingly used to enhance student engagement, motivate participation, and improve learning outcomes. However, the effectiveness of these apps largely depends on how ready the users are to accept and utilize such technology.

As positive traits such as optimism and innovativeness have been shown to strongly influence technology adoption behavior (Parasuraman, 2000; Kaushik & Agrawal, 2021; Cruz-Cárdenas et al., 2021), they are likely to have a more direct impact on individuals' intention to adopt technology compared to negative traits. Therefore, this study focuses only on these positive aspects. Understanding these dimensions is important for developing strategies to encourage technology adoption, not only in education but also in other areas. Accordingly, this study investigates the relationship between technology readiness factors (optimism and innovativeness) and the behavioral intention of accounting students, based on the proposed framework shown in Figure 2 below.

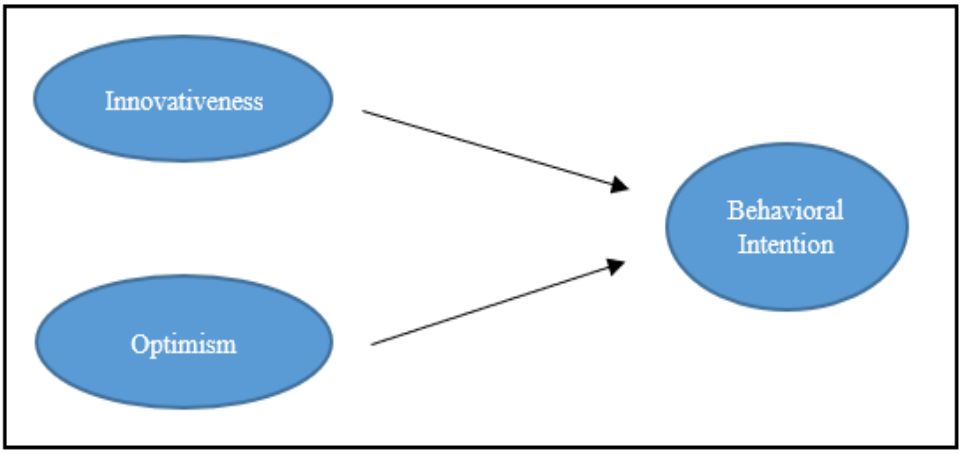

Figure 2. Research Framework

Innovativeness and Behavioral Intention

Innovativeness reflects an individual's tendency and willingness to explore and adopt new technologies (Salavou, 2004). Those exhibiting a high degree of innovativeness are frequently among the early adopters of technological advancements and actively pursue opportunities to integrate these innovations into their daily practices (Cheng, 2014; Chavas & Nauges, 2020). This predisposition towards innovation enables such individuals to perceive gamified applications as novel solutions that address conventional learning challenges, thereby welcoming alternative approaches to education (Alrashed et al., 2023).

Among students, this proactive orientation toward innovation encourages them to investigate the potential benefits of gamification, reinforcing their interest in incorporating these applications into their learning processes. Such a mindset is instrumental in predicting the adoption of innovative technologies, as it influences cognitive absorption and, consequently, the intention to adopt or utilise technology. Students with elevated levels of innovativeness are more likely to possess simplified cognitive schemas concerning new technologies and tend to maintain optimistic perceptions of their utility, even in the face of ambiguity or initially limited advantages. In light of this, the following hypothesis is proposed:

Innovativeness has a positive influence on students' behavioral intention to use gamified applications.

Optimism and Behavioral Intention

Optimism refers to an individual's belief in the potential benefits and favorable outcomes associated with the use of technology (Parasuraman & Colby, 2001; Tsikriktsis, 2004). Individuals with a high level of optimism are generally more open and receptive to adopting new technologies (Kampa, 2023; Buyle et al., 2018; Kim & Chiu, 2019). Such individuals tend to perceive technology as a means of enhancing control, flexibility, and efficiency in achieving desired outcomes in their daily lives (Parasuraman & Colby, 2015). Compared to their more pessimistic counterparts, technology optimists are also more inclined to employ active coping strategies when faced with technological challenges (Zhang et al., 2020; Flavián et al., 2022).

Among contemporary students, often referred to as digital natives (Cimbaljević et al., 2023) due to their exposure to digital technologies from an early age—technology optimism is notably prevalent. Their familiarity with and frequent use of digital tools such as social media and video conferencing platforms reflect their generally positive disposition towards technology. This optimism significantly shapes their learning behaviors and attitudes toward educational technologies, including gamified applications. Consequently, students who exhibit higher levels of optimism are more likely to form favorable perceptions of gamification, which in turn influences their behavioral intention to adopt such applications. Based on this reasoning, the following hypothesis is proposed:

Optimism has a positive influence on students' behavioral intention to use gamified applications.

Research Method

This study adopted a questionnaire-based survey as the primary method of data collection, with the objective of examining the influence of technology readiness dimensions—namely optimism and innovativeness—on students' behavioral intention to adopt gamification in their learning processes. The questionnaires were personally administered to undergraduate accounting students at a public university in Malaysia during the second semester of the 2023 academic year. To promote voluntary participation and ensure the integrity of the responses, participants were assured of the confidentiality of their information and were informed that the data collected would be used solely for academic research purposes. A total of 137 valid responses were obtained and subsequently used for data analysis.

The questionnaire consisted of two sections: demographic information and constructs related to behavioral intention. The first section collected demographic details such as gender, current semester of study, and academic performance, represented by cumulative grade point average (CGPA). The second section was designed to measure students' levels of innovativeness and optimism, along with their behavioral intention to utilize gamification in their learning activities. All items were measured using a five-point Likert scale ranging from 1

("Strongly Disagree") to 5 ("Strongly Agree"). The items measuring Behavioral Intention (BI), Innovativeness (INN), and Optimism (OPT) were adapted from the questionnaire developed by Kampa (2023).

DATA ANALYSIS AND FINDINGS

Demographic Profile of Respondents

Table 1 presents the demographic characteristics of the 137 respondents who participated in the study. All participants were Diploma in Accountancy students from Universiti Teknologi MARA (UiTM), Perak, Malaysia. Of the total respondents, 34 students (24.82%) were male, while the majority, 103 students (75.18%), were female. A substantial proportion of the respondents (84.67%) were in Semester 3 of their studies. With regard to academic performance, the CGPA distribution revealed that 38.69% of students obtained CGPAs between 3.00 and 3.49, whereas 49.64% achieved CGPAs ranging from 3.50 to 4.00.

Table 1. Demographic characteristics of respondents

Characteristics	Items	Frequency	%
Gender	Male	34	24.82%
	Female	103	75.18%
Semester	3	116	84.67%
	4	4	2.92%
	5	17	12.41%
CGPA range	3.50 and above	68	49.64%
	3.00-3.49	53	38.69%
	2.50-2.99	13	9.49%
	2.00-2.49	3	2.19%
	Less than 2.00	0	0%

Assessment of the measurement model

The data collected through the questionnaire were analyzed using SmartPLS, employing a two-stage analytical approach consisting of the assessment of both the measurement model and the structural model. The measurement model examines the relationship between observed items and their underlying constructs, while the structural model investigates the directional relationships between exogenous and endogenous constructs within the research framework. Figure 2 illustrates the path model encompassing both the measurement and structural components. The evaluation of the measurement model was based on three key criteria: internal consistency reliability, convergent validity, and discriminant validity.

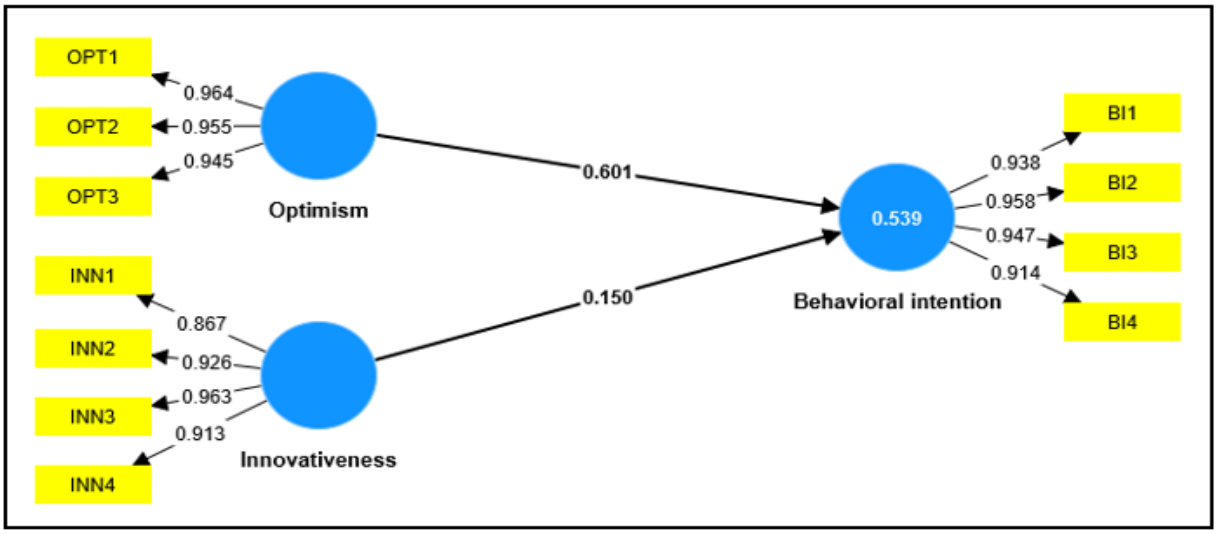

Figure 2. Path Model (measurement and structural model)

Internal consistency reliability assesses the degree to which the items within a construct produce consistent results. Convergent validity ensures that multiple indicators intended to measure the same construct are indeed in agreement. To evaluate both internal consistency and convergent validity, the factor loadings, composite reliability (CR), and average variance extracted (AVE) were examined. According to Hair et al. (2017), acceptable thresholds for these values are: factor loadings ≥ 0.6, AVE ≥ 0.5, and CR ≥ 0.7. As presented in Table 2, all constructs met these criteria. Specifically, factor loadings ranged from 0.867 to 0.964, AVE values ranged from 0.843 to 0.912, and CR values were between 0.955 and 0.969. These results confirm that the measurement model demonstrated satisfactory levels of internal consistency and convergent validity.

Table 2. The measurement model assessment

Constructs	Measurement items	Loadings	Cronbach's α	CR	AVE
Innovativeness	INN1	0.867	0.937	0.955	0.843
	INN2	0.926			
	INN3	0.963			
	INN4	0.913			
Optimism	OPT1	0.964	0.951	0.969	0.912
	OPT2	0.955			
	OPT3	0.945			
Behavioral intention	BI1	0.938	0.956	0.968	0.882
	BI2	0.958			
	BI3	0.947			
	BI4	0.914			

Following the establishment of convergent validity, discriminant validity was assessed to ensure that the constructs were empirically distinct from one another. Discriminant validity was evaluated using the Fornell and Larcker criterion, which compares the square root of the AVE for each construct with the correlations between that construct and others. As shown in Table 3, the square root of each construct's AVE exceeded its correlations with other constructs, thereby confirming the discriminant validity of the measurement model.

Table 3. Discriminant validity of measurement model based on Fornell and Larcker criterion

Constructs	Behavioral intention	Innovativeness	Optimism
Behavioral intention	0.939		
Innovativeness	0.666	0.918	
Optimism	0.73	0.859	0.955

Assessment of the structural model

After validating the measurement model, the structural model was evaluated to test the two proposed hypotheses. Following the guidelines of Hair et al. (2017), the evaluation focused on the direction and strength of the beta coefficients, along with the significance of the corresponding t-values and p-values. A bootstrapping procedure with 5,000 resamples was conducted to assess the direct effect. The structural model is as illustrated in Figure 2, while the hypothesis testing results are presented in Table 4.

For Hypothesis 1 (H1), it was proposed that Innovativeness would positively influence Behavioral Intention. Although the relationship was positive ($\beta = 0.152$), it was not statistically significant ($t = 1.303$, $p < 0.05$), and thus H1 was not supported. In contrast, Hypothesis 2 (H2) posited that Optimism would have a positive effect on Behavioral Intention. The results confirmed a strong and significant positive relationship ($\beta = 0.598$, $t = 5.438$, $p < 0.01$), thereby supporting H2.

Table 4. Structural model assessment and hypothesis testing

Hypothesis	Relationship	Beta	Std Deviation	t value	p value	Decision
H1	Innovativeness -> Behavioral intention	0.152	0.115	1.303	0.193	Rejected
H2	Optimism -> Behavioral intention	0.598	0.111	5.438	0.000	Supported

Table 5 displays the coefficient of determination (R^2) and the effect size (f^2) for the influence of the exogenous variables on the endogenous variable. The R^2 value indicates the proportion of variance in the endogenous construct that is accounted for by all the exogenous constructs in the research model. As shown in the table, the R^2 value is 0.539, suggesting that Innovativeness and Optimism (exogenous variables) together explain 53.9% of the variance in Behavioral Intention (endogenous variable). The effect size (f^2), on the other hand, reflects the change in R^2 when a specific exogenous variable is excluded from the model. According to Cohen's (1988) guidelines, an f^2 value of 0.02 indicates a small effect, 0.15 a medium effect, and 0.35 a large effect. Based on the findings in Table 5, Innovativeness has a small effect size ($f^2 = 0.013$), while Optimism has a medium effect size ($f^2 = 0.206$) on Behavioral Intention.

Table 5. Result of R^2 and f^2

Construct	R^2	f^2	Decision
Behavioral intention	0.539		
Innovativeness		0.013	Small
Optimism		0.206	Medium

CONCLUSION

The present study aimed to examine the influence of optimism and innovativeness on students' behavioral intention to adopt gamified applications in their learning process. The findings indicate a significant and positive relationship between optimism and behavioral intention, suggesting that students who possess a more positive outlook are more likely to embrace gamified learning tools. This result is consistent with previous research (Kampa, 2023; Buyle et al., 2018; Kim & Chiu, 2019), which similarly found that optimistic individuals tend to show favorable attitudes toward adopting new technologies. Such findings highlight the importance of acknowledging students' perceptions and emotional readiness when designing educational interventions that incorporate gamification.

Although innovativeness did not exhibit a statistically significant effect on behavioral intention in this study, its role remains meaningful. As emphasized by Kampa (2023), the influence of innovativeness on technology adoption may depend on factors such as the app's structure, design, and content. This suggests that students who see themselves as innovative may still engage positively with gamified learning if the tools are thoughtfully designed to align with their preferences and learning styles.

In today's evolving educational landscape, where technology is becoming an integral part of teaching and learning, understanding what drives students to adopt gamified applications is both timely and essential. By shedding light on the roles of optimism and innovativeness, this study offers valuable insights for educators, apps' developers, and policymakers seeking to enhance learning through gamification. It underscores the need to cultivate positive attitudes toward technology among students and to create interactive, engaging, and learner-centered environments.

This study is not without its limitations. The sample consisted solely of accounting students from UiTM Tapah, which may limit the generalizability of the findings to other contexts. Future studies are encouraged to involve a more diverse group of students across various academic disciplines and institutions to gain a more holistic understanding of the phenomenon. Additionally, future research may consider exploring other dimensions of technology readiness, as proposed by Parasuraman (2000), such as comfort, confidence, and sense of control, to provide a more comprehensive perspective on students' behavioral intention toward gamified learning tools.

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