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Investigating the Impact of Gamification to Encourage Learning Motivation among Undergraduate Accounting Students

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Abstract

Gamification has gained widespread recognition in recent years, representing a dynamic and innovative approach to engaging individuals in various aspects of life including education. This approach can be regarded as a useful tool to motivate users to utilize educational systems. However, motivation differs among individuals, and diverse elements can inspire various people in distinct ways. Therefore, this study aims to discover the significant determinants that explain the use of gamification in motivating students to learn. This study used the survey method of research, and data was gathered through the use of online questionnaires. A total of 137 undergraduate students from UiTM Tapah, a public university in Malaysia participated in the survey. The findings of this study show that the two constructs of ARCS model which are attention (AT) and relevance (RV) factors have a significant relationship with student learning motivation through gamification. All the hypotheses are supported which aligns with the findings of previous studies. Findings of this study have implications for policymakers and university administrators who have a keen interest in enhancing the choice and application of suitable technology to increase students' engagement in learning.

Keywords

Learning Motivation, Gamification, Attention, Relevance and Education

1.0 Introduction

There is a belief that gamification holds substantial transformative potential for education (Nehring et al., 2018). Thurston (2018) supports this notion by stating that gamification enhances students' engagement with their academic pursuits. In seeking to comprehend the influence of games on education, Zirawaga et al. (2017) concentrated on learning theories such as cognitive information processing theory and social activism theory. Their investigation revealed that students are motivated to complete gamified courses. Furthermore, they found that employing games as instructional aids can increase students' confidence due to the inspiring teaching methodologies. Alsawaier (2018) further proposes that integrating gamification into higher education curriculum and course content could yield significant positive effects within university environments.

Motivation plays a crucial role in generating behavior and serves as the primary factor for facilitating meaningful learning (Kriegbaum et al., 2018). Motivation differs among individuals, and diverse elements can inspire various people in distinct ways. As a result, interactions with the game within a gamified environment can affect individuals differently, depending on their individual motivational factors (Botte et al., 2020). A recent investigation conducted by Saleem et al. (2022) proves the significant positive influence

of gamification on motivation within educational settings. Their findings underscore the growing recognition of gamification as a valuable tool for fostering more engaging learning environments. Additionally, findings from previous studies suggest that gamification serves as an effective approach to encourage users to utilize educational systems and enhance their level of interaction and engagement (Bouchrika et al., 2021; Li et al., 2022). However, Ofosu-Ampong et al. (2019) argued that merely incorporating game elements does not inherently improve learning outcomes, regardless of the method employed. To understand how game features can lead to meaningful student involvement, it is essential to establish connections between gamification and students' interactions and behavioral intentions, particularly motivation. Although there have been numerous studies exploring the application of gamification to enhance student motivation in learning, there is a limited amount of research investigating the influence of gamification on the factors that determine motivation. This study aims to discover the primary factors responsible for the influence of gamification on students' motivation to engage in studying.

The remainder of the paper is presented as follows. The following section reviews the relevant literature on students learning motivation through gamification. The third section provides a discussion on the research method. Meanwhile, the fourth section lays out the findings and empirical results. The last section concludes the study.

2.0 Literature Review

This study aims to adapt a research framework based on the two attributes (attention and relevance) of the ARCS motivational model to explain the relationship between gamification and motivation of accounting students and gain a broader point of view. Attention and relevance offer important characteristics that effectively address motivation. Kapp (2012) asserts that employing the motivational model affects the determination of the necessary prerequisites for the implementation of gamification. The proposed model of the determinants of motivation in relation to gamification in learning is illustrated in Figure 1.

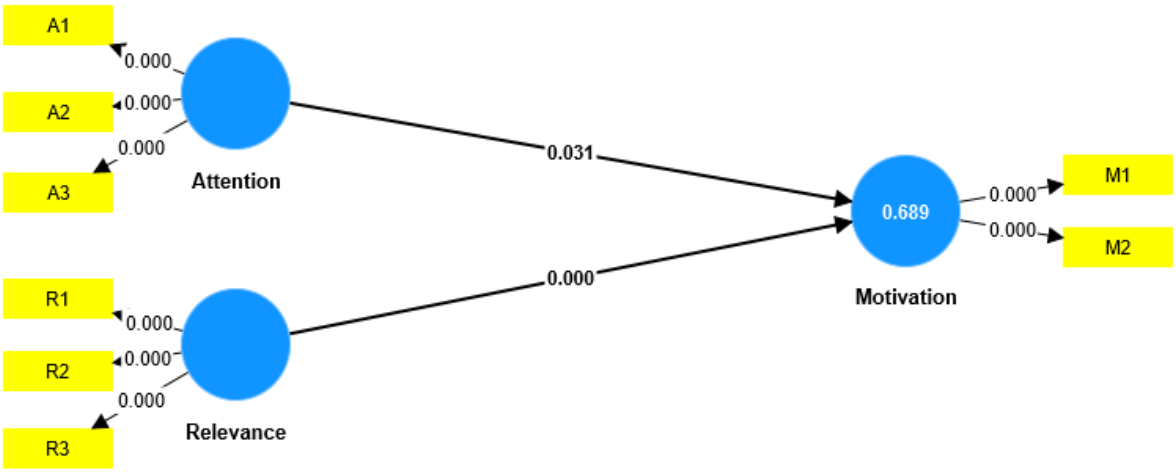

Figure 1. Research Model

2.1 Hypotheses Development

2.1.1 The Influence of Gamification on Attention (AT)

Attention refers to the necessity for students to discover the content they engage with as captivating, guiding their concentration. This objective can be accomplished through a variety of methods, such as fostering active participation, employing visual demonstrations, and promoting role-playing. According to Keller (2010), before learning can occur, it is essential to capture the learner's attention. Regardless of how effective motivational strategies may be, they become ineffective if learners' attention is not maintained to ensure they remain focused and engaged. It is emphasized that when learning materials capture learners' attention, their curiosity and interest are sparked, thereby boosting motivation. To captivate learners' attention, it's important to identify strategies involving perceptual arousal, inquiry arousal, and variability. Perceptual arousal occurs when environments are changed (Cobb, 2013). Inquiry arousal involves encouraging learners to ask questions and solve problems to satisfy their curiosity. Variability is crucial for sustaining attention. Keller (2010) points out that learners might lose attention before they become used to stimulants. Consequently, it is emphasized that after initially grabbing attention, employing variability strategies is essential to maintain learners' focus and prevent a loss of interest. Although the literature reviewed does not directly correlate attention with gamification and motivation, several studies suggest that motivation is a key factor in supporting gamification (Orji et al., 2019; Ozdamli, 2018). Therefore, the following hypothesis was formulated:

H1: Through gamification, attention (AT) positively impacts students' motivation to learn (MO).

2.1.2 The Influence of Gamification on Relevance (RV)

Relevance involves students recognizing the current and future value of a course, ensuring that it resonates with their interests and objectives. Indirectly, relevance entails recognizing learners' expectations, needs and explaining the significance of learning outcomes to them. Once learners grasp why these outcomes matter and how they can apply them, they are more likely to feel motivated (Keller, 2010). Relevance encompasses three aspects: familiarity, aligning motives, and focusing on goals. Familiarity relates to connecting learners' existing knowledge with the information presented in a tangible way; goal orientation entails directing learners towards the objective by defining instructional goals, and the final sub-category, motive matching, encompasses employing strategies that resonate with learners. The concept of relevance in learning refers to providing learning experiences that are meaningful and beneficial to the learner. Research in goal setting, expectancy value, and self-determination theories suggests that students are motivated to participate in learning activities that help them achieve their objectives, emphasizing the importance of perceived value in fostering motivation (Ryan & Deci, 2000; Wigfield & Eccles, 2000). Furthermore, van der Meij et al. (2018), in their investigation utilizing a tool based on the ARCS motivational model to enhance students' appreciation of the relevance of the material being taught, observed a positive impact on students' self-efficacy following the use of the motivational tool. As a result, we formulated the hypothesis that:

H2: Through gamification, relevance (RV) positively impacts students' motivation to learn (MO).

3.0 Methods

3.1 Sample

This study gathered data from questionnaires. The questionnaire attempted to gather information regarding the factors of attention and relevance that affect students' motivation to learn through gamification. The questionnaires were personally administered to undergraduate accounting students from UiTM Tapah during the second semester of 2023 academic year. To ensure voluntary participation and honest responses from the students, the students were assured of confidentiality and that their responses were to be used solely for this research. The study gathered 137 valid responses that are being used for the analysis.

The questionnaire consists of two sections: demographic and antecedents of motivation constructs. In particular, the first section collected demographic characteristics of the respondents including gender, age and academic performance (CGPA). The second section aims to measure attributes of attention and relevance on respondents' motivation to learn through gamification. Likert scale of 1 to 5 is used to measure the responses; 1: Strongly Disagree, 2: Disagree, 3: Moderately Disagree, 4: Agree and 5: Strongly Agree. The attention (AT) and relevance (RV) constructs were adapted from the 12-scale Reduced Instructional Materials Motivation Survey (RIMM) of Keller (1987).

4.0 Results and Discussion

4.1 Descriptive analysis

The respondents were all accounting students from a public university of UiTM Tapah, Malaysia. Table 1 provides the demographic profile of the 137 respondents. The sample consisted of 34 (24.82%) male and 103 (75.18%) female accounting students. 125 (91.24%) of the respondents were aged 20 years old and above. In terms of academic performance, most of the respondents 68 (49.64%) obtained CGPA of 3.50 and above.

Table 1: Demographic Characteristics of Respondents

Characteristics	Items	Frequency	Percentage (%)
Gender	Male	34	24.82%
	Female	103	75.18%
Age	18-19	12	8.76%
	20 and above	125	91.24%
Academic Performance (CGPA)	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%

4.2 Assessment of the Measurement Model

The data from the questionnaire was analyzed using Smart PLS, a two-step approach which involves evaluating both the measurement and structural models. The measurement model examines the relationship between items and constructs, while the structural model explores the relationship between exogenous and endogenous constructs in the research model. Table 2 shows the measurement model, which must meet the criteria for internal consistency reliability, convergent validity and discriminant validity. Internal consistency reliability is to ensure the consistency of results across items, while convergent validity is tested to ensure that multiple items measuring the same concept agree with each other. To assess the internal consistency reliability and convergent validity of the measurement model, the loadings, composite reliability (CR), and average variance explained (AVE) were evaluated. Hair et al. (2017) recommend that the loading, AVE, and CR values should be at least 0.6, 0.5, and 0.7, respectively, to establish convergent

validity. Table 2 demonstrates that the reliability and convergent validity of the construct was satisfactory as the loading, AVE, and CR values exceeded the recommended values. The loading varied from 0.877 to 0.958, AVE ranged from 0.794 to 0.908, and CR ranged from 0.920 to 0.952, indicating that convergent validity was achieved.

Fornell and Larcker's method was used to evaluate discriminant validity by determining whether all the constructs (attention, motivation and relevance) were free from unidimensionality. Table 3 shows that the square value of attention AVE (0.953) was greater than the correlation between the constructs, it is more significant and greater for all the variable, indicating that the model met the recommended requirements, clear distinction, and discriminant validity was confirmed for all the constructs in the study.

Table 2: The Measurement Model Assessment

Constructs	**Measurement items**	**Loadings**	**Cronbach's α**	**CR**	**AVE**
Attention	AT1	0.921	0.912	0.945	0.85
	AT2	0.94			
	AT3	0.906			
Motivation	M1	0.947	0.899	0.952	0.908
	M2	0.958			
Relevance	R1	0.884	0.87	0.920	0.794
	R2	0.912			
	R3	0.877			

Table 3: Discriminant Validity of Measurement Model Using Fornell and Larcker

Constructs	**Attention**	**Motivation**	**Relevance**
Attention	**0.953**	0	0
Motivation	0.774	**0.922**	0
Relevance	0.85	0.816	**0.891**

4.3 Assessment of the Structural Model

After the measurement model had been validated, a structural model analysis was conducted to test the two hypotheses. In the assessment of the structural model, the direction of the beta value, the significance level of the t-values and p-value were examined, as suggested by Hair et al. (2017). A bootstrapping procedure with resampling of 5,000 was performed to test the direct effect. Table 4 depicts the structural model and the results of hypothesis testing of this study. Specifically, in H1 it was hypothesized that attention would have a positive impact on students' motivation to learn by using gamification. The results showed a positive and significant relationship (β= 0.29, t = 2.155, $p < 0.05$). Therefore, H1 was supported. Finally, regarding H2, in which it was hypothesized that relevance would have positive impact on students' motivation to learn by using gamification, the results showed that relevance had a positive influence on the dependent variable (β= 0.568, t = 4.515, $p < 0.05$), and thus H2 was also supported. This discovery suggests that the research model effectively predicted the utilization of gamification to motivate students in their learning endeavors.

Table 5 presents the values of the coefficient of determination (R^2) and effect size (f^2) of the exogenous variables on the endogenous variable. The R^2 value represents the amount of variance in the endogenous construct explained by all the exogenous constructs in the research model. As can be seen from the table, the R^2 was 0.689, which denoted that the exogenous variables (attention and relevance) explained (68.9%) of the variance in the endogenous variable (motivation).

As regards the effect size, f^2, this represents the value of R^2 that is changed when a specific construct is omitted from the model. Following Cohen (1988), the impact of the effect size was judged to be small if the value of f^2, was 0.02, medium if it was 0.15 and large if it was 0.35. The results in Table 5 indicate that the supported exogenous variables (attention), f^2, = 0.074 and (relevance), f^2, = 0.291 had a small and medium effect size, respectively on the endogenous variable.

Table 4: Structural Model Assessment and Hypothesis Testing

Hypothesis	Relationship	Beta	Std Deviation	t value	p value	Decision
H1	Attention -> Motivation	0.29	0.134	2.155	0.031	Supported
H2	Relevance -> Motivation	0.568	0.127	4.515	0.000	Supported

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

Construct	R^2	f^2	Decision
Motivation	0.689		
Attention		0.074	Small
Relevance		0.291	Medium

5. Conclusion

The objective of this study was to discover the significant determinants that explain the impact of gamification on students' motivation to learn. The findings from hypothesis testing suggest that attention (AT) and relevance (RV) do motivate students to learn using gamification. The findings of this study are in line with Keller (2010) who highlighted that, before learning can occur, it is essential to capture the student's attention to direct their focus. Regardless of how effective motivational strategies are, it will become ineffective if students' attention is not maintained to ensure they remain engaged. Like a result presented by van der Meij et al. (2018), this study further indicated that an activity must be relevant, and students must be able to identify the present and future worth of the course in order to motivate them to perform that learning activity. The factors that drive students' motivation to learn can also guide the selection and utilization of appropriate technology to enhance student engagement in the learning process. The significance of each variable explored in this study provides valuable recommendations for administrators and instructors to contemplate when introducing new educational initiatives in their institutions in the future.

Several limitations were identified in this study. Firstly, the sample selection was limited to accounting students at UiTM Tapah, which may restrict the generalizability of the findings. Future research should aim to include a more diverse sample from different higher learning institutions to ensure a representative sample of the overall population. Secondly, it is recommended that future studies explore additional constructs that may contribute to students' motivation, such as confidence and satisfaction influences. This would provide a more comprehensive understanding of this gamification approach.

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Sekian, terima kasih.

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