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Gamified Learning for Entrepreneurial Decision-Making: A Study Using Business Adventure - The Entrepreneur's Quest

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ABSTRACT

The increasing demand for practical, non-theory-based educational resources highlights the importance of fostering entrepreneurial thinking and skills, which are vital for national innovation and economic competitiveness. Aligned with the Entrepreneurship Development Policy, this study aimed to measure the impact of gamified learning on developing entrepreneurial competencies among diploma students at Malaysian polytechnics. We implemented a gamified learning activity, "Business Adventure – The Entrepreneur's Quest," using a Design-Based Research (DBR) methodology involving 32 respondents. Data were collected via pre- and post-intervention questionnaires focusing on decision-making confidence, strategic thinking, collaboration, and motivation. A paired sample t-test revealed a significant improvement ($p < 0.05$) in students' entrepreneurial decision-making skills, strategic thinking, risk analysis, and teamwork. Students reported increased confidence and enhanced financial literacy. These findings validate game-based learning as an effective pedagogical approach for enhancing both cognitive and behavioural entrepreneurial competencies, addressing the needs of 21st-century education.

1.0 Introduction

As education landscape continues to change, traditional teaching approaches are increasingly being supplemented with innovative and interactive learning tools. This is due to keep pace with the digital generation's learning preferences. One approach that can be used is gamification, which refers to the integration of game-based mechanics and thinking into non-game contexts such as education. This method has demonstrated significant effectiveness in enhancing student motivation, engagement, and gaining knowledge. In business and entrepreneurship education, experiential learning plays a crucial role. Therefore, gamification has the potential to bridge theoretical concepts with practical application.

Business Adventure - The Entrepreneur's Quest is an educational board game designed to simulate real-world entrepreneurial experiences and strategic business decision-making in a structured and engaging environment. The game illustrates the journey of entrepreneurs as they build and manage businesses, starting from a small startup to a succeeding corporate empire. Players must navigate financial constraints, market dynamics, and strategic investments while responding to unexpected events such as cybersecurity breaches, viral trends, or market crashes. Through this experiential learning platform, students not only revise their theoretical knowledge but also enhance essential 21st-century skills such as critical thinking, leadership, financial management, and adaptability.

The game employs a distinctive combination of structured question cards that progress systematically from easy to hard categories, facilitating a gradual increase in cognitive challenge. It also consists of business sectors, and scenario-based event cards (Entrepreneur's Luck and Business Challenges) which offers players a well-rounded business simulation. What sets this game apart from traditional board games like Monopoly is its academic foundation. Players must correctly answer questions in business management, marketing, strategy, and entrepreneurship before purchasing assets. This mechanism ensures that knowledge acquisition is directly linked to game progress, transforming passive learning into an active cognitive process. According to Maratou, Ennami, Luz, Abdullahi, Medeisiene, Sciukauske & Rye (2023), game-based learning transforms teachers into active facilitators, enabling them to better identify students' actual learning needs by allowing learners the freedom to explore concepts through play. This approach also helps educators recognize students' genuine abilities and supports personalized skill development by bridging theoretical knowledge with practical applications, ultimately promoting differentiated learning.

This innovation presents the design, implementation, and evaluation of Business Adventure - The Entrepreneur's Quest as an educational intervention for diploma-level business students. The study explores how the game impacts learners' understanding of entrepreneurial concepts, their ability to apply theoretical knowledge and their strategic thinking in dynamic business environments. The results indicate promising outcomes in both cognitive engagement and conceptual understanding, positioning the game as a valuable tool for modern business education.

The objectives of this research are:

i. To describe the demographic profile of participants involved in the study.

ii. To measure changes in students' entrepreneurial decision-making and strategic thinking following participation in the gamified learning activity Business Adventure – The Entrepreneur's Quest.

iii. To evaluate changes in students' ability to apply business management concepts through participation in the gamified learning activity.

iv. To assess changes in students' motivation, engagement, and collaborative learning experiences during the gamified learning activity.

2.0 Literature review

Recent studies have emphasized the transformative potential of gamification in education, particularly in domains requiring strategic thinking and real-world application such as business and entrepreneurship. Ferri, Grifoni & Guzzo (2020) assert that gamification helps bridge the gap between abstract knowledge and practical experience, especially when students are allowed to experiment within simulated environments. Similarly, García- García-Holgado, García-Peñalvo & Rodríguez-Conde (2021) demonstrate that serious games promote learner autonomy, creativity,

and entrepreneurial confidence by placing learners in decision-making roles. It also been supported by Silitonga, Dharmawan, & Murti (2024) when they evaluated a business simulation game (Marketplace Simulation) with business diploma students, comparing it to case study teaching. They found that the simulation significantly enhanced students' entrepreneurial competencies, including their decision-making and strategic thinking processes, as evidenced by improved performance in strategy development and business planning tasks.

Entrepreneurship education benefits significantly from tools that simulate uncertainty, competition, and innovation. According to Ab Rahman, Yaacob & Mohd Yusoff (2022), gamified entrepreneurship learning allows students to take calculated risks and understand the consequences of their business decisions without facing real-world penalties. Mahmood, Salleh & Abdullah (2023) further argue that serious play increases entrepreneurial intention and strengthens business acumen when aligned with curriculum goals. This approach resonates with Sánchez-Mena and Martí-Parreño's (2019) findings, which indicate that engagement and motivation are heightened when learners perceive challenges as meaningful and the learning environment as immersive.

Lafortune, Pugatch, Tessada & Ubfal (2024) conducted a randomized controlled trial in Rwanda and showed that a six-week gamified online entrepreneurship training increased participants' entrepreneurial activities and intentional decision-making shortly after the intervention. Jack, Alexander, & Jones (2024) explored classroom gamification in a flipped statistics course and found that students perceived the gamified elements (points, leaderboards) as improving their conceptual understanding and application of statistical concepts which parallel to how business concepts might be internalized through similar gamified simulations.

The integration of digital economy elements such as e-commerce growth, technology disruption, and globalization is also critical in preparing students for current market realities. Business Adventure - The Entrepreneur's Quest incorporates these themes through scenario cards and interactive gameplay, aligning well with emerging trends in digital entrepreneurship education. Tomé Klock, Santana & Hamari (2023) highlighted in their umbrella review that, despite some risks, well-designed gamified educational activities effectively promote motivation, engagement, autonomy, and social interaction, all key components of collaborative learning.

This study is supported by Experiential Learning Theory (Kolb, 1984), which asserts that learning is a process whereby knowledge is created through the transformation of experience. The theory consists of four stages: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. Students may enter the cycle at any stage; however, effective learning involves engaging with all four stages.

3.0 Methodology

This study adopts a quantitative research design using a survey questionnaire to collect data from Diploma students of Politeknik Port Dickson, Politeknik Sultan Azlan Shah and Politeknik Kota Bharu. The study adopts a descriptive and quasi-experimental research design with one-group pre-test and post-test (Cohen, Manion, & Morrison, 2007) was used in this study, as illustrated in Table 1.

Table 1: One-Group Pre-test and Post-test Design

Group	Pre-test	Treatment	Post-test
Experimental	O_1	X	O_2

Note: O_1 = pre-test, O_2 = post-test, and X = Learning activity using the Business Adventure - The Entrepreneur's Quest

Over the past few decades, Roscoe's (1975) set of guidelines has become a common choice in determining sample size. He stated that in comparative analyses, data should be divided into subgroups, such as male and female, with at least 30 participants in each category. Moreover, he

suggested that a suitable sample size for most behavioural research typically ranges from over 30 to under 500, as going beyond 500 could heighten the likelihood of Type II errors. Sample sizes greater than 500 can lead to Type II Error (Sekaran & Bougie, 2016).

The study focuses on students enrolled in Diploma programmes from Politeknik Port Dickson, Politeknik Sultan Azlan Shah and Politeknik Kota Bharu. The sample was selected using the Simple Random Sampling technique, resulting in a total of 32 students. According to Sugiyono (2017), Simple Random Sampling is a sampling method in which all members of the population have an equal opportunity to be selected, regardless of any specific characteristics. Therefore, the students were randomly selected without inclusion criteria. Data were collected through a Google Form, which was distributed to respondents. The questionnaire consists of demographic questions (e.g., age, gender, programme), the pre and post-test consisted of 20 items. It was adapted from previous studies (Ab Rahman et al., 2022; Mahmood et al., 2023; Silitonga et al., 2024) and modified to suit the gamified learning context of this study. The items were measured using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

Data for pre and post-test will be measured using a Likert scale. The Likert scale will range from strongly disagree (scale 1) to strongly agree (scale 5), allowing for the assessment of different levels of agreement among respondents. A Paired Sample t-test was used to analyse the pre-test and post-test results, utilizing SPSS version 29.

Generally, this methodology ensures a rigorous and structured approach to measure the effect of gamified learning on students' entrepreneurial decision-making, strategic thinking and perceptions of applying business management concepts through a gamified simulation. Business Adventure - The Entrepreneur's Quest offers significant educational impact and practical benefits in entrepreneurship and management learning. It promotes timesaving by consolidating multiple business concepts such as finance, marketing, strategy, and innovation into a single, engaging session.

4.0 Discussion of analysis and findings

Data analysis was performed using SPSS software. Descriptive measures, including frequency distribution and percentage were employed to examine the respondents' profiles and present a summary of their demographic attributes.

Table 2 presents the descriptive statistical analysis of the demographic characteristics of the respondents, based on data collected from a sample of 32 individuals. The variables analysed include gender, age group, educational level, program of study, and participation in a business simulation of educational game before.

The descriptive analysis of the respondent demographics (n=32) shows that a significant proportion are female (90.6%) predominantly aged 21-23 years (68.8%), with a smaller group aged 18-20 years (31.3%), indicating a young and fresh student population. All respondents (100%, n=32) reported that their highest level of education was at the Diploma level, with none having attained a Bachelor's, Master's, or PhD qualification. This aligns with the target group of the study, which focuses on diploma-level polytechnic students.

Among the respondents, 75% (n=24) were enrolled in Business Administration, making it the dominant program represented in the study. This was followed by Entrepreneurship (12.5%, n=4), Marketing (6.3%, n=2), and Others (6.3%, n=2). Notably, zero participants were from the Accounting and Finance program. The high representation from Business Administration suggests that students from this background may have a stronger interest or curriculum alignment with the theme of the study.

Table 2: Demographic Information of Respondents (n=32)

Respondent	Frequency	Percentage (%)
Gender		
Male	3	9.4
Female	29	90.6
Age		
Below 18	0	0.0
18-20 years	10	31.3
21-23 years	22	68.8
24-26 years	0	0.0
Above 26	0	0.0
Highest Level of Education		
Diploma	32	100.0
Bachelor's degree	0	0.0
Master's degree	0	0.0
PhD	0	0.0
Program of Study		
Business Administration	24	75.0
Marketing	2	6.3
Entrepreneurship	4	12.5
Account & Finance	0	0.0
Others	2	6.3
Participation in a Business Simulation of Educational Game Before		
Yes	21	65.6
No	11	34.4

Regarding prior exposure to business simulation or educational games, 65.6% (n=21) indicated that they had participated in such activities before, while 34.4% (n=11) had not. The data reveals that a substantial share of the participants was familiar with gamified learning methods, which may influence their perception and engagement with the study intervention or related tools.

Initially, the questionnaire consisted of 20 items. However, two items (Items 8 and 11) were excluded from the final analysis. These items were more aligned with evaluating students' perceptions of learning rather than measuring changes in skills or abilities targeted in the pre- and post-test comparison. As the focus of this study was on assessing measurable changes in entrepreneurial decision-making, application of business concepts, and engagement, items 8 and 11 were deemed unsuitable for inclusion in the paired-sample t-test. The final instrument therefore comprised 18 items. Table 3 shows paired sample t-test that assess pre- and post-intervention differences across 18 self-reported learning and engagement outcomes related to business education. Each pair corresponds to an identical question asked before and after a specific educational intervention, likely involving game-based or simulation-based learning. Analysis of the differences of the mean scores showed that the students' scientific analytical thinking post-test mean scores were higher than pretest mean scores at a statistically significant level .01 as detailed in Table 3.

Table 3: Paired Samples Test

		Paired Differences					t	df	Sig.(2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	I understand the key stages of growing a business from startup to corporation.	-1.15625	1.58845	.28080	-1.72895	-.58355	-4.118	31	.000
Pair 2	I can apply business management concepts (e.g., planning, organizing, leading, controlling) to real-life situations.	-1.18750	1.61520	.28553	-1.76984	-.60516	-4.159	31	.000
Pair 3	I am confident in making strategic decisions in a simulated business environment.	-1.34375	1.61863	.28614	-1.92733	-.76017	-4.696	31	.000
Pair 4	I understand how to analyse business opportunities using SWOT analysis or similar tools.	-1.25000	1.68485	.29784	-1.85745	-.64255	-4.197	31	.000
Pair 5	I know the importance of financial management, including budgeting and cash flow.	-1.21875	1.71773	.30366	-1.83806	-.59944	-4.014	31	.000
Pair 6	I can evaluate the risks and rewards of different business strategies.	-1.21875	1.75489	.31022	-1.85146	-.58604	-3.929	31	.000
Pair 7	I understand how marketing and operations work together to build a successful business.	-1.25000	1.75977	.31109	-1.88446	-.61554	-4.018	31	.000
Pair 8	I felt motivated to participate actively in learning when business scenarios were presented as a game.	-1.25000	1.81392	.32066	-1.90399	-.59601	-3.898	31	.000
Pair 9	I stayed focused and attentive throughout the business simulation/game.	-1.18750	1.57475	.27838	-1.75526	-.61974	-4.266	31	.000
Pair 10	I collaborated effectively with others while playing the game.	-1.34375	1.65801	.29310	-1.94153	-.74597	-4.585	31	.000
Pair 11	I found the game experience more engaging than traditional classroom lectures.	-1.21875	1.77318	.31346	-1.85805	-.57945	-3.888	31	.000
Pair 12	I understand the challenges entrepreneurs face when building a business.	-1.21875	1.69885	.30032	-1.83125	-.60625	-4.058	31	.000
Pair 13	I am more confident in taking risks and dealing with uncertainty.	-1.25000	1.64611	.29099	-1.84349	-.65651	-4.296	31	.000
Pair 14	I can think creatively to solve business problems.	-1.21875	1.69885	.30032	-1.83125	-.60625	-4.058	31	.000
Pair 15	I can adapt quickly when faced with unexpected business events or disruptions.	-1.28125	1.68933	.29863	-1.89032	-.67218	-4.290	31	.000
Pair 16	I am able to identify opportunities in a competitive market.	-1.15625	1.54731	.27353	-1.71411	-.59839	-4.227	31	.000
Pair 17	I see myself applying entrepreneurial thinking in future academic or professional settings.	-1.28125	1.74567	.30859	-1.91063	-.65187	-4.152	31	.000
Pair 18	I am inspired to explore entrepreneurship as a possible career path. - I am inspired to explore entrepreneurship as a possible career path.	-1.18750	1.63505	.28904	-1.77700	-.59800	-4.108	31	.000

A paired-sample t-test was conducted to evaluate the effect of participating in Business Adventure – The Entrepreneur's Quest on students' entrepreneurial decision-making, strategic thinking, application of business concepts, and engagement in learning. The results indicate

statistically significant improvements across all measured items, with p-values less than .001 for each pair.

Items related to understanding business growth stages, applying management concepts, making strategic decisions, analysing opportunities, evaluating risks, and integrating marketing with operations (Pairs 1–7, 12–17) showed significant increases from pre-test to post-test. This suggests that the gamified learning activity enhanced students' ability to make informed entrepreneurial decisions and improved their strategic thinking skills. These findings align with Kolb's (1984) Experiential Learning Theory, where active experimentation and reflective observation contribute to skill development.

The paired-sample results for items on applying management concepts, financial literacy, opportunity recognition, and problem-solving (Pairs 2, 5, 14, 16) demonstrate significant gains. The improvement supports the view that experiential, game-based simulations can provide a context for students to integrate theoretical knowledge into practical scenarios (Sanchez, Young & Jouneau-Sion, 2017).

Items measuring motivation, focus, collaboration, and engagement (Pairs 8–11, 18) also indicated significant positive changes. Students reported higher motivation, attentiveness, and collaboration levels during the game compared to traditional learning methods. This outcome resonates with the motivational principles in game-based learning (Pho & Dinscore, 2015), where interactive challenges promote sustained engagement.

Across all 18 analysed items, mean differences ranged from -1.16 to -1.34, reflecting a consistent upward shift in post-test scores. This suggests that Business Adventure – The Entrepreneur's Quest effectively promoted learning gains in entrepreneurial knowledge, decision-making, and collaborative engagement. The consistency of improvement across all domains reinforces the potential of gamified learning as an innovative teaching tool in polytechnic entrepreneurship education.

Hence, the adoption of game-based learning is projected to offer implementation flexibility, allowing it to be applied both online and offline. Additionally, this approach is anticipated to enhance student engagement and promote critical thinking skills, ultimately supporting students in achieving better learning outcomes (Maulida, Sukardi & Rahayu, 2022).

5.0 Conclusion and Future Research

Business Adventure - The Entrepreneur's Quest offers significant educational impact and practical benefits in entrepreneurship and management learning. It promotes timesaving by consolidating multiple business concepts such as finance, marketing, strategy, and innovation into a single, engaging session. Students recognize more content in less time through active participation, making it an efficient revision and learning tool. It is cost-effectiveness stems especially from its reusability. Unlike traditional consumables or external learning programs, the board game can be used repeatedly across classes and academic years. These factors can reduce the requirement for additional teaching aids, field trips, or visitor lecturers as it can result in long-term institutional savings. The game also contributes to quality improvement in teaching and learning by adopting deep understanding through experiential and scenario-based play. It enhances both cognitive and behavioural skills such as strategic thinking, decision-making, financial literacy and teamwork as key attributes for aspiring new entrepreneurs and managers. Moreover, sustainability can be addressed by using eco-friendly materials in production and through game content that develops awareness of green business practices, environmental challenges, and ethical entrepreneurship. Thus, the game not only enriches the learning experience but also aligns with institutional goals for sustainable development in innovation and education.

In conclusion, Business Adventure - The Entrepreneur's Quest innovation can become a practical and engaging educational tool that supports the learning of entrepreneurship and management concepts through immersive and gamified simulation. At the same time, these games align with academic content, combined with its experiential format and it can contribute to cognitive and behavioural learning outcomes that traditional teaching and learning may not fully achieve. Recommendations for future innovation incorporate with integrating the game as a recurrent formative assessment tool across business modules, customizing game content to reflect specific industry trends or local business contexts, developing a digital version to support blended learning or remote education and exploring cross-disciplinary applications. As an example, future research can integrate accounting, technology, and ethics scenarios for holistic business education. By embracing gamified learning tools like Business Adventure, educators can empower students with the skills and mindset necessary to thrive in the modern business landscape.

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Author Contributions

Muhd Ariff S. H: Conceptualization, Statistical Analysis, Data Collection, Supervision, Writing - Original Draft Preparation, Project Administration; **Rosli N.:** Data Curation, Methodology Design, Writing - Review and Editing, Validation; **Ghazali N.:** Problem Statement, Literature Review, Writing - Review and Editing.

Conflicts of Interest

The manuscript has not been published elsewhere and is not being considered by other journals. All authors have approved the review, agree with its Submission and declare no conflict of interest in the manuscript.

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