

Game-based Learning and Students' Entrepreneurial Orientation at Higher Education Institutions in Nigeria

Shukurat M. Bello, PhD¹

&

Muazu H. Muazu, PhD²

^{1,2}Department of Business Administration and Entrepreneurship,
Bayero University Kano, Nigeria
smbello.bus@buk.edu.ng

Abstract

Higher education institutions have assumed a prominent role in entrepreneurship education and economic development. Entrepreneurship learning through game-based (simulation) may promote education for sustainable development. Several theoretical perspectives, argue that entrepreneurship education influences the entrepreneurial orientation of students, as it inspires them to pursue their entrepreneurial ambitions and gives them the necessary knowledge and abilities. This study aimed to measure the influence of game-based learning on entrepreneurial orientation. Specifically, this study focused on understanding Entrepreneurial Orientation (EO) dimensions of autonomy, proactiveness, innovativeness, competitive aggressiveness and risk-taking, across students of higher education institutions in Kano state, Nigeria. This study uses survey-based data collection from colleges of education, polytechnics and universities. The findings of this study suggest that game-based learning has positive influence on entrepreneurial orientation of students in higher education institutions. However, if higher institutions want optimal impact of game-based learning on entrepreneurial skills, the game-based (simulation) should be tailored to capture the technicality of each discipline or course of study. Hence, the findings suggest that institutions of higher learning should include structured game-based learning in their entrepreneurship training and entrepreneurship education programs. This will enhance entrepreneurial mindset, which will foster venture creation and self-employment.

Keywords: Entrepreneurship Education; Entrepreneurial Orientation, Game-based learning, Higher institutions, Nigeria, Students.

1. Introduction

Entrepreneurship education is a subject that must be taken in all disciplines in the Nigerian higher education institutions with the aim of providing business understanding to students (Anorue & Madu, 2020; Iwu et

al., 2021). Bello and Kofarmata (2017) argues that, the occupational success of individuals and subsequent upgrading of their technical skills are closely linked to the possession of basic formal education. The focal objective of Entrepreneurship

Education Program (EEP) is to cultivate entrepreneurial attitude and competencies in students regardless of their disciplines. However, the current module contents and delivery methods are out of relevance for 21st-century entrepreneurship teaching (Bello et al., 2022). The class size is in the range of 200 -1000 students; issues of non-continuous facilitators training is prevalent (Otache, 2019); method of teaching is mostly the conventional classroom teaching, as there are rarely any augmenting out-of-class activities to further support building student entrepreneurial orientation and business start-up skills (Bello et al., 2022). Games, simulations and gamification have been suggested as the innovative approaches for teaching entrepreneurship (Fellnhöfer, 2018; Fox et al., 2018; Tasnim & Yahya, 2013).

Games in entrepreneurship education represent a dynamic area of research and practice, leveraging technology to engage learners and enhance educational outcomes across various domains. Business simulation games are becoming more prevalent in academic and business settings as experiential learning tools aimed at fostering entrepreneurial skills such as decision-making, risk management, communication, and teamwork (Heyworth-Thomas, 2023; Silitonga et al., 2024). Simulations provide immediate feedback offering timely and relevant feedback to students (Thanasi-Boçe, 2020). Emphasizing how students' decisions affect business outcomes is anticipated to lower uncertainty levels.

Games-based learning involves participants interacting either within a single team or across multiple teams, fostering the development of both hard and soft skills. Within the realm of higher education business training, games enable students to gain experiential learning through virtual business simulations (Rahayu et al., 2022). Studies (Azisah et al., 2021; Joella et al., 2020) found that game-based learning could create a learning environment that motivates, is fun, and enhances creativity. In relation to the venture creation, game-based learning could improve concentration in learning business processes so that it would be likely to have an effect on the ability to think creatively, cooperate, and expertise in entrepreneurship (Jääskä et al., 2021; Wardoyo et al., 2020).

Entrepreneurs need to exhibit proactive behavior, take risks, innovate, and effectively manage their businesses (Bismala et al., 2022). This set of skills, known as entrepreneurial orientation, is essential for gaining a competitive edge, sustaining initiatives, identifying new opportunities based on future needs, and introducing new products and services to the market (Cho & Lee, 2018). Consequently, there is a need for engaging entrepreneurship learning methods to inspire students to consider entrepreneurship. It is on this note that many studies were conducted to propose solutions to these problems. Unfortunately, the problem persists. It is against this backdrop that this study is motivated by two key factors: the necessity for entrepreneurship learning models tailored to the digital age and the

scarcity of prior research on games as educational tools. Hence, this study examines the perceived effect of game-based learning on entrepreneurial orientation of tertiary institutions (universities, polytechnics, colleges of education) students in Kano State, Nigeria. Therefore, the hypothesis of this research is “Game-based learning does not significantly influence entrepreneurial orientation (measured by autonomy, competitive aggressiveness, innovativeness, proactiveness, risk-taking and networking) of tertiary students.”

2. Literature Review

2.1 Entrepreneurship Orientation

Entrepreneurial Orientation (EO) refers to the strategic decision-making process adopted by organizations (Yatu et al., 2018), enhancing individuals' acquisition of entrepreneurial knowledge, awareness, and overall understanding of entrepreneurship (Ikpesu, 2016). At the individual level, EO encompasses dimensions such as competitive aggressiveness, autonomy, innovativeness, proactiveness, and risk-taking willingness (Gelaidan & Abdullateef, 2017). EO has been linked to high-performing firms (Valerio et al., 2014) and access to startup capital, business information, and social networks (Sahoo & Panda, 2019).

Entrepreneurial orientation fosters a mindset conducive to innovative value creation and the pursuit of new opportunities. Miller (1983) originally conceptualized this mindset, emphasizing traits like innovativeness, proactiveness, and risk-taking propensity. Businesses demonstrating

entrepreneurial orientation continuously identify and exploit new opportunities, innovate, and aim to lead in their markets. Recent research, such as that by Cho and Lee (2018), underscores how entrepreneurial orientation correlates with successful new product development, strong financial and non-financial performance, and high social impact.

2.2 Game-based Learning

Game-based learning encompasses various types and formats, including simulations, educational games, serious games, gamified learning, role-playing games, escape room games, Virtual Reality (VR) and Augmented Reality (AR) games (Weerasinghe et al., 2024). Simulations replicate real-world scenarios, allowing learners to practice decision-making and problem-solving skills in a risk-free environment (Ahuja, 2024). Educational games integrate learning objectives with game mechanics, covering subjects like mathematics, science, languages, and history. Serious games focus on educational, training, or behavioral change goals, while gamified learning incorporates game elements into non-game contexts. Escape room games are designed to promote teamwork, and critical thinking. VR and AR technologies, offers realistic simulations and interactive experiences, particularly for fields requiring hands-on training, such as medicine and engineering. The game approach in entrepreneurship education leverages gamification principles and simulations to immerse learners in practical, experiential learning environments. Through interactive gameplay, students engage in simulated

entrepreneurial challenges where they apply theoretical knowledge to real-world scenarios (Faisal et al., 2022; Huang et al., 2023). This approach enhances motivation and engagement by making learning dynamic and interactive. Games in entrepreneurship education facilitate the development of crucial entrepreneurial skills such as problem-solving, decision-making under uncertainty, risk management, and collaboration (Jääskä et al., 2021; Mathushan, 2020; Takemoto & Oe, 2021). They provide immediate feedback on actions, fostering reflection and iterative learning processes. Moreover, entrepreneurship games encourage creativity and innovation by prompting students to develop novel solutions to complex problems (Tang et al., 2020). By integrating games into the curriculum, educators not only enhance learning outcomes but also prepare students for the complexities and challenges of entrepreneurial endeavors in diverse industries and contexts.

2.3 Theoretical framework: The game approach

Games as a pedagogical tool have gained increasing attention in educational research and practice due to their potential to engage learners and enhance educational outcomes. The game-based learning approach is developed from Kolb's learning model. The model consists of four connected steps: experience, reflect, conceptualize, and apply. During the first half of the cycle, learners test existing concepts and observe what happens through experience, gaining 'know-how.' In the second half of the cycle, learners reflect on their observations and

construct new concepts - learning 'know-why' (double-loop learning). Then, learners develop 'mental models,' which are the assumptions and hypotheses about the world that they use to learn.

Games operate by adhering to rules that enable the identification and resolution of challenges (Adipat et al., 2021; Haurie et al., 2012; Hainley & Henderson, 2006; Mariais et al., 2012). Studies have increasingly focused on educational applications, offering opportunities to enhance contemporary teaching materials (Bennett et al., 2008; Haleem et al., 2022; Lei, 2009; Margaryan et al., 2011). Due to increasing interest and attention from stakeholder's game technologies are becoming increasingly significant in educational contexts (Lamrani & Abdelwahed, 2020; Naul & Liu, 2020). Utilizing a game-based approach offers benefits. Games are effective in engaging learners because they provide immediate feedback, encourage active participation, and allow for experiential learning (Adipat et al., 2021; Huang et al., 2022). In addition, games often create a state of flow, where learners are fully immersed and focused on the task at hand (Laine & Lindberg, 2020; Zou et al., 2021). This state of flow enhances motivation and can lead to deeper learning experiences.

Similarly, a well-designed educational game can facilitate the transfer of skills and knowledge from the game context to real-world applications (Laine & Lindberg, 2020; Zeng et al., 2020). This transferability is crucial for ensuring that learning outcomes

are meaningful and applicable beyond the game environment. Games can promote critical thinking, problem-solving skills, and collaboration among learners (Duncan, 2020; Qibtiyah et al., 2023). These cognitive benefits are particularly valuable in preparing learners for complex and dynamic real-world challenges. Educational games are used across various disciplines and age groups, from elementary education to professional training (Liu et al., 2020; Yu et al., 2021). They can simulate realistic scenarios, such as medical simulations or business strategy games, allowing learners to practice decision-making in a safe environment.

2.4 Game-Based Learning and Entrepreneurial Orientation

Researchers have explored how Game-based learning (GBL) can be leveraged to cultivate entrepreneurial orientation (EO) among learners. EO encompasses the entrepreneurial mindset, skills, and behaviors crucial for identifying and pursuing opportunities in diverse contexts. Game-based learning provides a platform for experiential learning, allowing learners to engage in simulated entrepreneurial activities and decision-making processes. According to Kolb's experiential learning theory (1984), learners acquire knowledge and skills through concrete experiences, reflective observation, abstract conceptualization, and active experimentation. GBL simulations of entrepreneurial scenarios enable learners to practice skills such as opportunity recognition, risk assessment, innovation, and

resource management in a controlled environment (Herbert, 2017; Li, 2019).

Similarly, games are inherently motivating due to their interactive nature, clear goals, and immediate feedback mechanisms (Ryan & Deci, 2000). This motivational aspect of GBL encourages learners to actively participate in entrepreneurial challenges and persist in problem-solving tasks. Engagement in entrepreneurial activities within game environments may positively influence learners' attitudes towards entrepreneurship and their willingness to explore entrepreneurial opportunities (Zhang et al., 2018).

Studies suggest that skills learned through GBL can transfer to real-world entrepreneurial context. Smith et al. (2016) and Jones (2018) demonstrate that participants who engaged in GBL simulations of business ventures exhibited improved decision-making abilities and entrepreneurial behaviors when faced with similar challenges in actual business settings. In addition, various GBL interventions have been implemented to foster EO among different learner groups. For instance, Li (2020) conducted a meta-analysis of GBL studies in entrepreneurship education, highlighting the effectiveness of game mechanics such as simulations, role-playing games, and gamified learning environments in enhancing entrepreneurial skills and mindset. The study identified significant improvements in creativity, problem-solving, and risk-taking behaviors among participants exposed to GBL interventions.

In the academic settings, educators and trainers can capitalize on GBL's potential to enhance EO by integrating game mechanics with entrepreneurship curricula. By designing GBL activities that simulate entrepreneurial challenges and encourage innovative thinking, educators can create engaging learning experiences that prepare learners for the complexities of entrepreneurship (Johnson & Smith, 2019). Furthermore, the adaptability of GBL to diverse educational settings allows for customized learning experiences that cater to different learning styles and cultural contexts (Lee & Kim, 2017).

3. Methodology

To explore the perceived effect of game-based learning in enhancing entrepreneurial orientation across disciplines in higher education institutions in Kano state, a quantitative research approach was employed to gather empirical data through a survey. Convenience sampling was used to select participants from undergraduate students in Kano State tertiary institutions. A structured questionnaire was developed and administered using Google forms. The questionnaire consisted of demographic information (age, gender, and academic program), game-based learning (indicators of flow and indicators of curiosity) and entrepreneurial orientation (autonomy, competitive aggressiveness, innovativeness, proactiveness, risk taking, networking). The items for 'indicators of flow' was adapted from Wu et al. (2013) and 'indicators of curiosity' from Qin et al. (2009).

The survey questionnaire was distributed online to undergraduate and postgraduate students during December 2023. The survey remained open for four weeks to maximize participation. Google forms facilitated the collection of responses, which were automatically compiled into a spreadsheet for analysis. Inferential statistics with the aid of SPSS and Smart PLS software was used to analyze the data.

4. Results

Demographic Characteristics

The demographic profile of the respondents reveals critical insights into the characteristics and backgrounds of tertiary institution students in Kano State, Nigeria, particularly concerning their entrepreneurial orientation and familiarity with game-based learning. A total of 422 participants completed the survey, representing diverse academic disciplines and educational levels. Participants were from various disciplines including agriculture, art and humanity, management and social sciences, life and physical sciences, health sciences, engineering and law, ensuring a broad representation of the students. The gender distribution is markedly skewed, with 90% of the respondents being male, while females constitute only 10%. This disparity may reflect broader societal and educational trends in the region, where male students are more predominant in tertiary education settings. The age distribution further delineates the demographic makeup, with a significant majority (73%) falling within the 20-30 years age group. These age demographics highlight a concentration of

youthful energy and potential for entrepreneurial development.

The data also reveals a high level of exposure to games-based learning on entrepreneurship, with an overwhelming 93% having engaged with such games. This suggests that game-based learning is potentially an effective tool among students. Furthermore, 71% have participated in some form of entrepreneurship education,

indicating a substantial foundation upon which game-based learning initiatives can be built. The combination of high engagement in entrepreneurial games and significant participation in entrepreneurship education suggests that these students are well-positioned to benefit from enhanced game-based learning strategies aimed at fostering entrepreneurial mindsets.

Structural Equation Model (SEM)

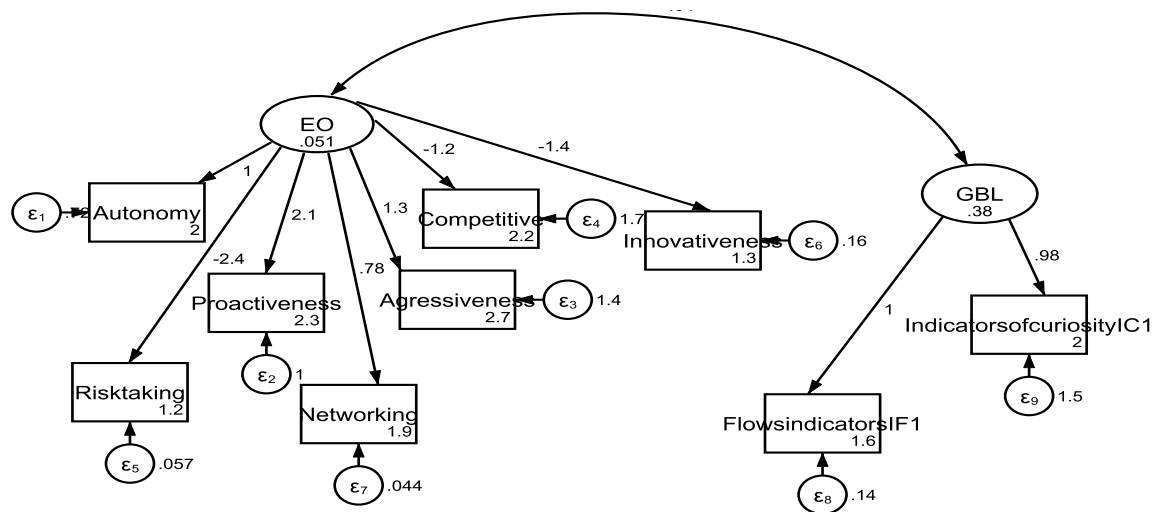


Figure 1: Path Diagram (SEM)

The path diagram, enhanced with coefficients from the Structural Equation Model (SEM) analysis, illustrates the relationships between dimensions of Entrepreneurial Orientation (EO) and Game-Based Learning (GBL) among tertiary students in Kano State, Nigeria. Each dimension of EO—Autonomy, Proactiveness, Competitive Aggressiveness, Risk Taking, Innovativeness, and

Networking—along with GBL's Indicators of Flow and Indicators of Curiosity, is quantified by specific coefficients indicating their strength and impact. Notably, Proactiveness (.72), Competitive Aggressiveness (1.0), and Risk Taking (1.7) exhibit strong positive correlations with GBL, signifying that engaging and interactive game-based learning experiences substantially foster these entrepreneurial traits. In contrast, Autonomy (.051) and

Innovativeness (.057) have smaller coefficients, suggesting a more modest influence, while networking (.16) and Indicators of Flow (.38) show moderate positive effects.

This SEM analysis highlights the potential of GBL to enhance key entrepreneurial skills among students. The strong positive relationships between GBL and Proactiveness, Competitive Aggressiveness, and Risk Taking suggest that game-based learning environments effectively cultivate these critical entrepreneurial attributes, likely due to their interactive and immersive nature. Meanwhile, the moderate and smaller positive impacts on Autonomy, Innovativeness, and Networking indicate that while GBL contributes to these traits, additional factors may be essential in their development. Overall, the path diagram emphasizes the value of incorporating game-based learning methodologies in educational settings to bolster entrepreneurial orientation, thereby preparing students for entrepreneurial ventures and fostering a proactive, competitive, and risk-taking mindset essential for success in today's dynamic business environment.

4.1 Test of Hypothesis

The hypothesis of this study stated that, game-based learning does not significantly influence entrepreneurial orientation (measured by autonomy, competitiveness aggressiveness, innovativeness, proactiveness, risk-taking and networking) of tertiary students.

The P-value results of the influence of GBL and EO dimensions are: autonomy (0.0078), competitiveness (0.0003), aggressiveness (0.0047), innovativeness (0.02), proactiveness (0.000001), risk-taking (0.05) and networking (0.20). The results indicate that game-based learning significantly influences autonomy competitiveness aggressiveness, innovativeness, proactiveness of tertiary institution students in Kano State, Nigeria. However, this result suggests that there is no statistically significant difference in risk-taking behavior and networking due to Game-based Learning among the students surveyed.

5. Discussion of Findings

The analysis underscores the potential of GBL to strengthen critical entrepreneurial skills among students. The robust relationships observed between GBL and Proactiveness, Competitive Aggressiveness, and Risk Taking highlight the effectiveness of interactive and immersive learning environments in fostering these attributes essential for entrepreneurial success. While GBL also contributes to Autonomy, Innovativeness, and Networking, the smaller coefficients suggest that additional factors beyond GBL may play significant roles in developing these traits.

Integrating games into education requires careful consideration of factors such as alignment with learning objectives, accessibility for diverse learners, and assessment of learning outcomes (Dimitriadou et al., 2021; Romero & Kalmpourtzis, 2020). The analysis emphasizes the value of integrating game-

based learning methodologies in educational settings to enhance entrepreneurial orientation. This approach not only prepares students for entrepreneurial ventures but also cultivates a proactive, competitive, and risk-taking mindset crucial for navigating today's dynamic business landscape.

6. Conclusion and Recommendations

The study aims to provide insights into the potential of game-based learning to enhance entrepreneurial orientation among students in higher education institutions. Results will inform educational practices and curriculum development aimed at fostering entrepreneurial skills through innovative pedagogical approaches. Hence, the findings suggest that institutions of higher learning should include structured game-based learning in their entrepreneurship training and entrepreneurship education programs. This will enhance students' entrepreneurial mindset, which will foster venture creation and self-employment.

As future research continues to explore innovative applications of GBL in entrepreneurship education, educators and policymakers are encouraged to leverage these insights to design effective learning experiences that nurture the entrepreneurial mindset and capabilities essential for economic growth and innovation.

6.1 Limitations and Suggestion for Future Research

Convenience sampling may limit generalizability to the broader student population. Responses are based on self-reported data, which may also introduce bias. Future research could explore the

long-term effects of game-based learning on entrepreneurial outcomes. Comparative studies across different educational settings or cultures could provide deeper insights into the effectiveness of game-based learning.

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