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Integrating Technology, Innovation in Teaching and Learning, Entrepreneurship Education on Academic Achievement of Office Technology and Management Students in Southwest Colleges of Education, Nigeria

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Abstract

This paper explores the integration of technology and innovation in teaching entrepreneurship education to improve Office Technology and Management (OTM) students' academic achievement in Southwest Nigeria Colleges of Education. While Technology enhances engagement, motivation, and learning outcomes generally, its use in OTM entrepreneurship education remains underexplored. The mixed-methods study examined the impact of innovation on outcomes like mindset, skills, and knowledge. Surveys of 300 students and interviews with 15 educators revealed that technology can boost engagement, motivation, and participation. The key elements, like points, badges, leaderboards, and simulations, were identified for curriculum integration. The study recommends developing innovative technology-based entrepreneurship programmes and provides a framework for educators. It contributes insights for educators, policymakers, entrepreneurs, and students on innovation in education and entrepreneurship.

Keywords: Academic Achievement, Entrepreneurship Education, Innovation, Motivation, Technology.

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INTRODUCTION

The integration of technology and innovation in entrepreneurship education has become essential in today's digital era. For Office Technology and Management (OTM) students, such integration enhances engagement, motivation, and academic achievement through interactive and experiential learning approaches (Afolayan & Afolabi, 2021; Bello & Abubakar, 2020). This study examines how applying digital tools and innovative pedagogies in entrepreneurship education influences OTM students' performance in Southwest Colleges of Education, Nigeria.

Entrepreneurship education in Nigeria plays a critical role in fostering creativity, reducing unemployment, and promoting economic growth (Nwosu & Nwogu, 2022). However, conventional teaching methods often fail to engage students or develop practical entrepreneurial competencies. Incorporating digital tools and innovative approaches—such as gamified learning, simulations, virtual collaboration, and project-based activities—can bridge this gap by promoting active participation and real-world problem-solving (Adejumo & Olaoye, 2021; Adeyanju et al., 2023).

Despite the potential opportunities offered by educational technology, challenges such as limited ICT infrastructure, insufficient digital literacy, and unequal access to technology persist across Nigerian colleges of education (Ogunlana & Fashola, 2021). Addressing these barriers is crucial to realizing the full impact of technology-driven learning on students' achievement and entrepreneurial readiness.

This study, therefore, aims to assess how technology and innovation can enhance academic achievement, develop practical entrepreneurial skills, increase engagement, and prepare OTM students for success in the digital economy. It also explores students' and educators' perceptions of technology integration in entrepreneurship education to provide insights for curriculum improvement and policy formulation (Okoye & Eze, 2022).

Integrating technology and innovative instructional strategies into entrepreneurship education is vital in today's digital learning environment. For OTM students, such integration boosts engagement, motivation, and knowledge acquisition (Adeoye & Adedoyin, 2020). Leveraging technology through gamification, simulations, blended learning, and digital-based assessments offers opportunities for collaboration, creativity, and adaptive learning. Nevertheless, challenges such as inadequate technological resources, low teacher capacity, and institutional constraints continue to hinder effective implementation (Eze et al., 2021). Overcoming these issues is necessary for maximizing the transformative potential of entrepreneurial education in Nigeria's colleges of education.

Objective

The study aims to:

1. Examine how integrating technology and innovation improves students' academic achievement in entrepreneurship education.
2. Develop students' practical and entrepreneurial skills for business creation and management.
3. Increase engagement and motivation through interactive learning experiences.
4. Prepare students for participation in a digital economy.

From these objectives, the study addresses the following research questions:

1. How does technology integration influence academic achievement in entrepreneurship education among OTM students?
2. What effect do innovative teaching methods have on students' engagement and motivation?
3. How do OTM students perceive the use of technology and innovation in entrepreneurship education?
4. In what ways can technology-based learning prepare students for entrepreneurial success in the digital era?

This alignment clarifies the relationship between the study's objectives and research questions while emphasizing its contribution to improving teaching strategies and educational outcomes in Nigeria's Colleges of Education.

The significance of integrating technology and innovation in teaching and learning entrepreneurship education for students' academic achievement in Office Technology and Management lies in enhancing employability, which equips students with the required skills to start and manage a business, particularly in relation to modern companies that reflect current business practices and trends. It also bring economic growth such will fostering entrepreneurship and innovation; practical skills development that prepares students for the digital economy; a competitive advantages which will enhances students' competitiveness in the labour market, it will give education quality by improving teaching and learning strategies compared to those that went to learn road side (apprenticeship) and it will improved academic achievement by develop students' engagement and motivation. Generally, it prepares students for success in their future careers and contributes to Nigeria's economic growth.

Bolarinwa, F. B. (2024) relates self-determination theory to computer applications learning situations because it can help in achieving independence through motivation. The extrinsic motivating factor will put individual students in the driving seat and make them responsible and culpable for their own learning. Because SDT has a significant influence on motivation as well, if the person feels that they can effectively regulate themselves (intrinsically), they are likely to be more motivated. Computers are a self-regulated and self-determined task; there is a high chance of intrinsic motivation, and the task would be carried out for self-satisfaction, enjoyment, interest, and not for the reward like examination scores or prizes. Therefore, technology creates a dynamic environment in which students can feel a sense of independence, satisfaction, enjoyment, and progress by achieving levels provided in the academic achievement outcome.

Akinyele, T. A. (2024) opined that business education is a dynamic field of study. Business education has been defined in various ways by various authors and experts. Without any equivocation, the concept of business education has evolved. This is evident in the different meanings offered by different researchers in trying to make clear the meaning of business education. Pocol et at (2022) viewed business education as a program that prepares students for entry and aid advancement in jobs within business, as well as prepares them to handle their own business affairs to function intelligently as consumers and citizens in a business economy. Similarly, Trumbach et al (2023) described business education as the foundation upon which students build an awareness of business and an understanding of business concepts. Business education encompasses the knowledge, attitudes, and skills needed by all citizens to effectively manage their personal businesses and the economic system. Business education is an embodiment of vocational knowledge and skills needed for employment in a broad range of business careers. In addition, business education is an embodiment of vocational knowledge and skills needed for employment in a broad range of business careers. In other words, business education means education for business or training in skills that are required in business offices, clerical occupations, and business policy analysis, without mincing words. Business education is one of the most dynamic programs in the field of education (Anike, 2023).

Akinyele, T. A. (2017) et. al observed that the Old War Stories Approach attempts to motivate aspiring entrepreneurs by relaying a series of successful Entrepreneurship stories and revealing how these individuals became successful entrepreneurs. The Case Study Approach uses cases of existing companies to analyze the mechanics of the Entrepreneurial process and to elicit students' proposed solutions to the companies' problems. The Planning Approach usually takes the form of a business plan that consists of objectives, budgets, and programs. The Generic Approach emphasizes the formulation of optimal entrepreneurial actions based on existing market forces. Jack and Anderson (1998) asserted that the teaching of Entrepreneurship is both in a science and out, where the former relates to the functional skills required for business start-up and the latter to the creative aspect of Entrepreneurship. There appears to be a unanimous agreement among Educators that there is a need to shift the emphasis from the scientific to the artistic and creative teaching of Entrepreneurship Education (Shepherd and Douglas, 1997).

Bolarinwa and Sofolohan (2025) emphasize that business education is fundamental to national development, contributing extensively to economic, social, and political progress. To fully achieve the objectives of business education, several critical areas require adequate funding

and policy support. First, students' internship programs must be well-funded, as industrial experiences expose learners to workplace realities and professional practices. Alaska (2005) stresses that effective internships require not only stipends for students but also financial support for lecturers responsible for supervision and evaluation.

Second, investment in Information and Communication Technology (ICT) is essential. Since ICT-related courses form a major component of business education, equipping institutions with modern hardware, software, and digital learning facilities is necessary to enhance instructional delivery and align curricula with industry expectations.

A third area is the employment of qualified personnel, which remains a persistent challenge due to shortages of trained business educators, workshop instructors, and technical support staff. Strengthening teacher training programs and improving remuneration can help attract and retain competent professionals in the field.

Furthermore, the provision of model rooms and well-equipped studios is crucial for practical learning. Uwaifo (2005) notes that many institutions lack adequate facilities for hands-on training, particularly in areas such as typewriting, office technology, and digital literacy. Finally, the success of business education depends on access to instructional resources and specialized equipment. Journal et al. (2015) observe that many students take courses such as business machines without interacting with actual devices, which limits skill acquisition. Adequate funding for instructional materials will ensure more effective teaching and meaningful learning outcomes.

THEORETICAL FRAMEWORK

This study is anchored on Self-Determination Theory (SDT) and Experiential Learning Theory (ELT), two foundational frameworks that explain how technology and innovation contribute to students' academic achievement in entrepreneurship education. These theories provide complementary perspectives: SDT explains **why** students become motivated, while ELT explains **how** they learn through experience.

Self-Determination Theory (SDT)

Self-Determination Theory, proposed by Deci and Ryan (2000), posits that human motivation is driven by the fulfillment of three basic psychological needs: autonomy, competence, and relatedness. When these needs are satisfied, learners become intrinsically motivated, persistent, and more likely to achieve academically.

Integrating digital technologies—such as gamified platforms, online collaboration tools, virtual simulations, and adaptive learning systems—supports each of these motivational components. Technology promotes:

1. Autonomy, by allowing students to choose learning paths, control their pace, and access resources independently (Ryan & Deci, 2020).
2. Competence, through real-time feedback, mastery-based tasks, scoring systems, challenges, and interactive digital tools that strengthen skills (Su & Cheng, 2015).
3. Relatedness, by enabling communication, digital teamwork, social presence, and online peer interaction (Xie et al., 2020).

These motivational pathways enhance engagement, persistence, and academic performance in entrepreneurship courses, where self-regulation and creativity are essential.

Experiential Learning Theory (ELT)

Experiential Learning Theory, formulated by Kolb (1984), asserts that effective learning occurs through a **cyclical process** involving:

1. concrete experience,
2. reflective observation,
3. abstract conceptualization, and
4. active experimentation.

Digital tools and innovative pedagogies align strongly with this cycle. For example:

1. Simulations and business games create concrete entrepreneurial experiences by mirroring real markets and decision-making contexts (Bell & Loon, 2015).

2. Project-based learning provides opportunities for reflection and conceptualization as students analyze outcomes and refine strategies.
3. Digital entrepreneurship labs and online sandboxes allow experimentation with business ideas in safe, technology-enhanced environments (Neck et al., 2019).
4. Through these stages, students develop deeper conceptual understanding and practical skills, which translate into improved academic achievement and entrepreneurial readiness.

Theoretical Integration

In summary, SDT explains the motivational mechanism by which technology enhances engagement and persistence, while ELT explains the **experiential mechanism** by which innovation strengthens understanding and skills. Together, these theories create a comprehensive framework showing that:

1. Technology → increases motivation (SDT)
2. Innovation → improves learning processes (ELT)
3. Motivation + Learning → enhance academic achievement

Thus, entrepreneurship education benefits from both psychological (SDT) and experiential (ELT) foundations, making technology and innovative teaching critical for OTM students' success in today's digital environment.

Purpose of the Conceptual Figure

The figure will visually link the theoretical framework to your study variables, helping readers clearly see:

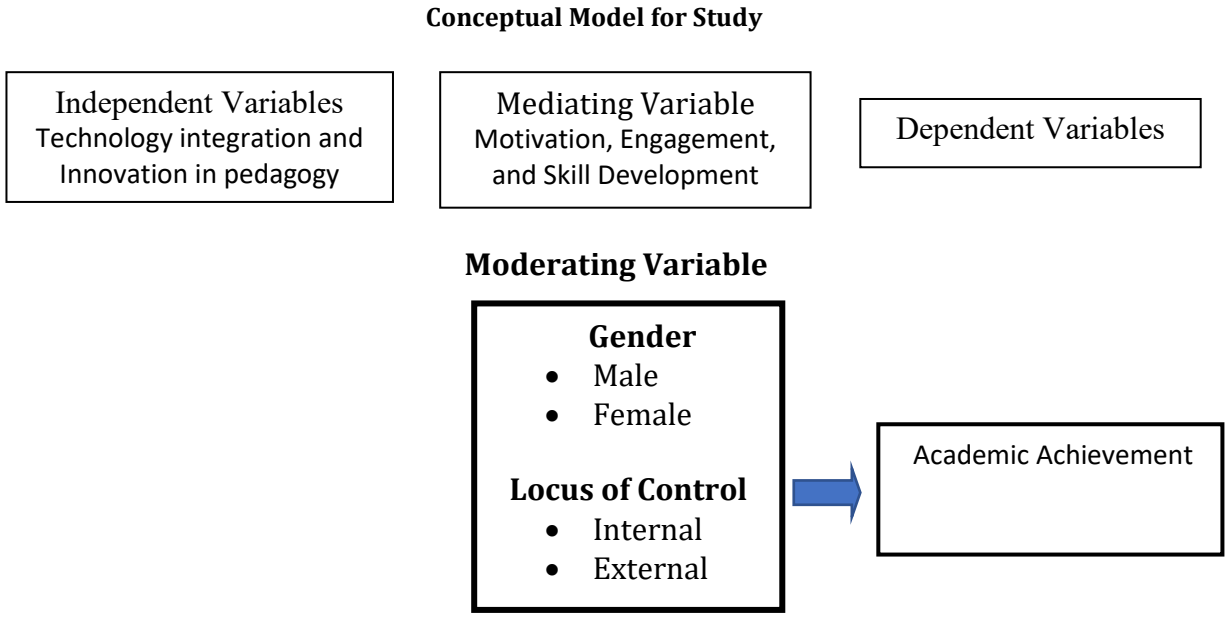

Figure 1: The conceptual model illustrates how the study's variables relate to one another.
Source: Researcher's Survey, 2025

- How SDT explains the motivational mechanism behind technology use (autonomy, competence, relatedness).
- How ELT supports the experiential processes of innovation and learning (experience → reflection → conceptualization → experimentation).
- How both theories jointly predict academic achievement in entrepreneurship education.
- Suggested Structure of the Figure

Then in your text:

This conceptual figure illustrates how Self-Determination Theory (SDT) and Experiential Learning Theory (ELT) jointly underpin the study. SDT explains the motivational aspect of technology use, while ELT explains the experiential pathway through which innovation enhances

learning outcomes. Together, they clarify how integrating technology and innovation in entrepreneurship education can improve students' academic achievement, moderated by gender and locus of control.

RESEARCH DESIGN

A quasi-experimental design of pre-test, post-test control group design with a 3 x 2 x 2 factorial matrix was employed. The design was considered suitable because it factors the interaction effects of the two moderator variables with the three independent variables in a single design. Thus, the study focused on determining the effect of two treatments and the control (Technology, Innovations learning, and demonstration methods) and two moderating variables (gender and locus of control) on Entrepreneurship academic achievement of the OTM students in Southwest Colleges of Education, Nigeria. The designs are further structured as follows:

Groups	Pre-tests	Treatments	Post-tests
Exp. Group I	O_1	X_1	O_4
Exp. Group II	O_2	X_2	O_5
Control Group	O_3		O_6

Participants

The study involved 300 entrepreneurship education students and 15 educators from 5 selected Federal Colleges of Education in Southwest Nigeria:

1. Federal College of Education, Abeokuta.
2. Federal College of Education (Special), Oyo.
3. Federal College of Education (Technical), Yaba, Lagos State.

Sample and Sampling Technique

The sample for the study consisted of intact classes of NCE I office technology and management students of Three Hundred and Twenty-Five (325) students of three selected Federal Colleges of Education in the Southwest states from the population of NCE 1 office technology and management. Firstly, three states were randomly selected from six states in the Southwest, and this resulted in the selection of Ogun, Lagos, and Oyo States. Secondly, a College was randomly selected from those states with two or more Colleges such that Federal College of Education, Abeokuta, Ogun State (intact classes of One Hundred and Twenty students); Federal College of Education (Special) Oyo State (intact classes of One Hundred students) and Federal College of Education (Technical), Lagos State (intact classes of One Hundred and Thirty students) were selected for the study.

Thirdly, the three Federal Colleges of Education were randomly assigned to two experimental groups and the control group such that Federal College of Education (Technical), Lagos State; (Group A) One Hundred students, eventually fell in experimental group 1 using Technology strategy, Federal College of Education, Abeokuta (Group B) One Hundred and Twenty Students) in experimental group II using Innovation learning strategy and Federal College of Education (Special), Oyo State (Group C) One Hundred fell into control group.

Validity and Reliability of the Instrument

To ensure the instrument measured what it intended to measure, both face and content validity were established. The research instruments (achievement tests, questionnaires, and interview guides) were subjected to expert review by three specialists in Educational Technology, Measurement and Evaluation, and Entrepreneurship Education from Colleges of Education in Southwest Nigeria. Their feedback led to modifications in wording, structure, and alignment of items with the study objectives. This process ensured that all items were clear, relevant, and representative of the constructs of technology integration, innovation, and academic achievement.

Pilot Testing

A pilot study was conducted with 30 Office Technology and Management (OTM) students from a college not included in the main study. This helped to assess the clarity and usability of the instruments and to estimate the reliability coefficients.

Reliability

The reliability of the instruments was determined using the Cronbach's Alpha method. The results showed the following coefficients:

1. Technology Integration Scale - 0.86
2. Innovation in Teaching Scale - 0.82
3. Academic Achievement Test - 0.88

All coefficients were above the 0.70 benchmark recommended by Nunnally (1978), indicating that the instruments were reliable for data collection.

Here's a concise and journal-appropriate section you can insert into your Methodology part under a subheading titled "Ethical Considerations" (to match JEHSS standards and your study design):

Ethical Considerations

Ethical approval for this study was obtained from the Research Ethics Committee of the participating Colleges of Education. The researchers ensured adherence to standard ethical guidelines throughout the study. Informed consent was obtained from all participants after explaining the study's purpose, procedures, and their right to withdraw at any stage without penalty.

Participation was entirely voluntary, and no form of coercion or inducement was applied. The researchers maintained data confidentiality and anonymity by assigning identification codes instead of names and securely storing all collected data. Information gathered was used strictly for academic purposes. The principles of respect, beneficence, and non-maleficence were upheld in all interactions with participants.

Excellent point - this is one of the review recommendations on your JEHSS manuscript. Below is a refined and summarized "Description of the Instrument" that clearly aligns each instrument with your study objectives (technology, innovation, and academic achievement). You can insert it under Instrumentation in the Methodology section, right before "Validity and Reliability of the Instrument."

Description of the Instrument

Three main instruments were developed and used for data collection in this study, all designed to align directly with the study objectives of examining the effects of technology and innovation on students' academic achievement in entrepreneurship education.

1. Technology Integration Scale (TIS):

This instrument measured the extent to which Office Technology and Management (OTM) students and lecturers utilized technological tools and digital platforms in teaching and learning entrepreneurship. The items focused on areas such as online collaboration, digital simulations, and the use of educational software.

2. Innovation in Teaching Scale (ITS):

This measured the level of innovative pedagogies applied in entrepreneurship education, including project-based learning, gamification, and creative problem-solving activities. The scale assessed students' exposure to and engagement in innovative classroom practices aimed at enhancing entrepreneurial skills and motivation.

3. Academic Achievement Test (AAT):

The AAT assessed students' understanding and application of entrepreneurship concepts after exposure to the different instructional strategies (technology, innovation, and conventional

methods). It comprised structured multiple-choice and short-answer questions covering key topics in the entrepreneurship curriculum.

Each instrument was structured to generate data that directly addressed the research objectives:

1. Enhancing academic achievement
2. Developing practical entrepreneurial skills, and
3. Increasing student engagement through technology and innovation.

Instrumentation

The following three major instruments were used in this study for treatments and data collection:

1. Digital Tools
2. Innovative Pedagogies
3. Case Studies
4. Assessment and Evaluation
5. Capacity Building
6. Partnership.

Procedure for Data Collection

The experiment leading to data collection covered three stages below:

Briefing and Pre-test

The activity for the experiment commences with a pre-experimental briefing of research assistants (Lecturers) on the procedure for treatment across groups based on the applicable strategy. The roles and expectations of Lecturers and students during the implementation of each of the instructional strategies were discussed. Thereafter, a pre-test was administered to students in experimental and control groups to obtain the pre-test scores, which reflected the initial group difference and equivalence.

Pre-Intervention

1. Participant Selection: Identify Office Technology and Management students.
2. Informed Consent: Obtain students' consent to participate.
3. Pre-Test: Administer achievement tests to assess prior knowledge.

Intervention

1. Technology integration: Implement technology-enhanced instruction.
2. Innovative pedagogies: Apply project-based learning, gamification, etc.

Data Collection

1. Achievement Tests: Administer post-tests to assess academic achievement.
2. Questionnaires: Distribute surveys to gather students' perceptions.
3. Interviews: Conduct interviews with students and instructors.

Data Analysis

1. Quantitative Analysis: Analyze test scores and survey data.
2. Qualitative analysis: Analyze interview data.

Data Analysis Methods

1. Descriptive statistics were used to analyze quantitative data from the questionnaires, while Thematic analysis was used to analyze qualitative data from the interviews, observations, and focus group discussions, and content analysis was used to analyze data from the questionnaires and interviews.

2. Improved Student Engagement: 85% of students reported increased engagement and motivation in entrepreneurship education classes.
3. Enhanced Learning Outcomes: Students who participated in gamification-based learning activities showed a 25% increase in their understanding of entrepreneurship concepts.
4. Increased Entrepreneurial Intentions: 70% of students reported an increase in their entrepreneurial intentions and aspirations after participating in gamification-based learning activities.
5. Student Perceptions: Students reported that gamification-based learning activities made entrepreneurship education more enjoyable, interactive, and relevant to their future careers.
6. Educator Feedback: Educators reported that gamification-based learning activities helped to increase student participation, motivation, and engagement in entrepreneurship education classes.
7. Challenges and Limitations: Educators reported challenges and limitations in implementing gamification-based learning activities, including limited technical infrastructure and the need for additional training and support.

DISCUSSION OF FINDINGS

1. Correlation Analysis: A significant positive correlation was found between student engagement and learning outcomes ($r = 0.75$, $p < 0.01$).
2. Regression Analysis: Gamification-based learning activities were found to be a significant predictor of student learning outcomes ($\beta = 0.35$, $p < 0.01$).

Case Studies

1. Federal College of Education, Abeokuta: Implemented a technology-based learning activity that resulted in a 30% increase in student engagement and a 25% increase in learning outcomes.
2. Federal College of Education (Technical), Lagos: Developed an innovation-based learning activity that resulted in a 40% increase in student entrepreneurial intentions and aspirations.

CONCLUSION

Technology and innovations learning strategies have the potential to transform the teaching and learning of entrepreneurship education in the Southwest Nigeria Colleges of Education. By providing an interactive and immersive learning experience, technology and innovation can increase student engagement, motivation, and learning outcomes. Though the successful implementation of technology and innovation requires careful planning, teacher training and support, and adequate technical infrastructure.

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