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Leveraging virtual reality technology for innovative business education In Nigerian higher institutions

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Abstract
This study investigated the Leveraging Virtual Reality Technology for Innovative Business Education in Nigerian Higher Institutions. The study was guided by two specific objectives: to examine the extent of adoption and utilization of VR in Business Education, and to assess its perceived impact on students' engagement, understanding, and acquisition of practical business skills. A descriptive survey research design was employed, and the population comprised Business Education lecturers, students, ICT/EdTech officers, and Heads of Departments/Deans, across six purposively selected higher institutions in Nigeria. A total of 300 respondents were selected using purposive and stratified random sampling techniques. Data were collected using a 21-item structured questionnaire titled Virtual Reality Integration in Business Education Questionnaire (VRIBEQ). The instrument was validated by experts in Business Education and Educational Technology and yielded a reliability coefficient of 0.82 using Cronbach's Alpha. Responses were measured on a 4-point Likert scale and analyzed using descriptive statistics such as mean and standard deviation. Findings revealed that Virtual Reality technology is adopted and utilized to a moderate extent in Business Education programs, with the highest agreement on investment in VR infrastructure and lecturer training. However, interactive classroom applications, particularly VR simulations of business environments, were found to be less frequently implemented. In terms of perceived impact, respondents agreed that VR significantly enhances student engagement, interest, collaboration, and cognitive skill development. Nonetheless, a relatively lower rating was observed regarding VR's ability to fully bridge theoretical knowledge with real-world practice. The study concludes that while Nigerian higher institutions are making commendable efforts in integrating VR technology into Business Education, more emphasis is needed on its classroom-based interactive application to maximize its potential for practical skill development and real-world business understanding.
Keywords: Business Education, Higher Institutions, Student Engagement, Technology Integration, and Virtual Reality (VR)

Introduction
The global educational landscape is undergoing a profound transformation, largely driven by rapid technological advancements and the urgent need to align teaching methodologies with the digital realities of the 21st century. Among the emerging technologies reshaping education, Virtual Reality (VR) stands out as a powerful tool capable of delivering immersive, experiential learning across a wide array of disciplines. In the realm of higher education—especially within business education VR offers transformative potential by simulating real-world business environments, enhancing practical skill acquisition, and improving student engagement and learning outcomes. As the demand for digital competencies intensifies in today's knowledge-driven economy, Nigerian higher institutions are increasingly expected to reconsider traditional pedagogical models and adopt innovative tools like VR to adequately prepare graduates for the complexities of the modern workforce (Adeusi, Johnson, & John-Dewole, 2023).

Despite this global shift, business education in Nigeria remains predominantly anchored in conventional teaching practices, with limited opportunities for experiential learning. This mode of delivery often constrains students' ability to acquire the hands-on skills necessary for entrepreneurship, financial literacy, marketing, and office management—core competencies essential in today's dynamic business environment. Consequently, graduates frequently enter the labor market without the experiential knowledge and confidence required to thrive. Virtual Reality can effectively address this gap by offering students access to simulated business scenarios where they can explore decision-making, manage virtual enterprises, and engage with business challenges in a risk-free setting (Enang & Okute, 2022).

The growing global trend toward educational innovation reinforces the relevance of integrating VR into business education. In developed countries, VR is already being utilized to support instruction in areas such as financial modeling, marketing strategy, and organizational behavior. Similarly, emerging research in Nigeria indicates increasing awareness and interest in VR among students and educators, with evidence suggesting that its application can significantly enhance comprehension, engagement, and retention of complex business concepts (Amadi-Iwai & Bupo, 2022). For example, VR-enabled simulations of business operations and virtual internships allow students to gain experiential knowledge without the logistical and financial barriers associated with real-world fieldwork.

However, the implementation of VR in Nigerian higher institutions remains limited and fragmented. Several systemic challenges hinder its widespread adoption, including insufficient digital infrastructure, the high cost of VR hardware, limited technical proficiency among educators, and inadequate institutional funding for educational technology (Anioke, 2018; Charles-Odili, 2024). Additionally, curriculum developers and education policymakers have yet to fully integrate VR into national education frameworks, resulting in a disconnect between technological innovation and pedagogical implementation.

A growing body of empirical research further highlights these challenges while reinforcing the potential of VR in educational transformation. Yusuf and Onasanya (2023), for instance, examined VR adoption in Nigerian universities and identified infrastructural constraints and lack of staff training as major barriers. Nonetheless, their findings indicate that both lecturers and students perceive VR as highly beneficial for enhancing teaching and learning. Likewise, Okonkwo and Eze (2022) discovered that although VR tools exist in some Nigerian institutions, their application is largely confined to STEM-related disciplines, with minimal use in business education. This points to an urgent need to broaden VR usage across academic fields, including business education. Adewale and Ibitoye (2021) echoed these concerns, revealing a general lack of readiness among educators due to limited technical skills and pedagogical training necessary for effective VR integration.

At the same time, research assessing the impact of VR on student learning presents compelling evidence of its effectiveness. Oladipo and Ibrahim (2023) found that students in VR-supported business classes demonstrated increased motivation, participation, and attentiveness. Nwankwo and Adebayo (2022) reported that students taught with VR tools performed significantly better in assessments and showed deeper understanding of business concepts compared to those taught through traditional methods. Emeka and Hassan (2021) further highlighted that immersive VR experiences fostered stronger entrepreneurial thinking and decision-making abilities among students, underscoring the technology's potential to enhance practical readiness.

In light of Nigeria's commitment to achieving the Sustainable Development Goals (SDGs) and improving the quality of its tertiary education, the integration of Virtual Reality into business education becomes both timely and necessary. Leveraging VR can not only enhance students' employability and skill development but also stimulate innovation and entrepreneurship within the academic space. It is against this backdrop that this study seeks to explore the integration of VR technology into business education in Nigerian higher institutions, examine its impact on teaching and learning outcomes, and identify the barriers and strategic enablers for its successful implementation. The insights derived from this research will be valuable for policymakers, educators, and institutional leaders committed to the digital transformation of Nigeria's educational sector.

Problem of the Study

In the rapidly evolving digital age, the demand for innovative teaching and learning methods has grown significantly, particularly in higher education. Business education, as a dynamic and practical discipline, requires pedagogical strategies that foster real-world engagement, critical thinking, and hands-on experience. Virtual Reality (VR) technology has emerged globally as a transformative tool capable of creating immersive learning environments that simulate real business scenarios, thereby enhancing learners' understanding, retention, and application of knowledge. However, in Nigerian higher institutions, the integration of VR into business education remains largely underutilized. Despite the increasing global emphasis on technology-driven instruction, many universities and colleges in Nigeria still rely on traditional teaching methods, which often lack interactivity and fail to meet the evolving learning preferences of 21st-century students. Challenges such as inadequate digital infrastructure, limited access to VR tools, lack of skilled personnel, and low awareness of the pedagogical value of VR continue to hinder its adoption. Furthermore, there is a paucity of empirical research that examines the extent to which VR can be leveraged to promote innovation in business education in the Nigerian context. This gap limits informed decision-making by policymakers, educators, and institutional leaders who seek to transform business education for better outcomes. Therefore, it becomes imperative to investigate how VR technology can be effectively harnessed to improve the quality, engagement, and practical relevance of business education in Nigerian higher institutions. This study seeks to address the gap by exploring the potential, challenges, and strategic approaches to leveraging virtual reality for innovative business education delivery in Nigeria's tertiary education system.

Research Objectives

The study investigates the Leveraging Virtual Reality Technology for Innovative Business Education in Nigerian Higher Institutions specifically, the study sought to:

1) To examine the extent of adoption and utilization of Virtual Reality (VR) technology in business education programs across Nigerian higher institutions.

2) To assess the perceived impact of Virtual Reality (VR) technology on students' engagement, understanding, and practical skills acquisition in business education.

Research Questions

Two research questions were formulated to guide the study:

1) To what extent is Virtual Reality (VR) technology adopted and utilized in business education programs in Nigerian higher institutions?
2) What is the perceived impact of Virtual Reality (VR) technology on students' engagement, understanding, and acquisition of practical business skills in Nigerian higher institutions?

Research Methodology

This study employed a descriptive survey design to investigate the adoption and perceived impact of Virtual Reality (VR) technology in Business Education across Nigerian higher

institutions. The focus was on two main objectives: (1) assessing the extent of VR adoption and utilization, and (2) evaluating its perceived impact on student engagement, understanding, and skills acquisition. The study was carried out in six purposively selected higher institutions across various geopolitical zones in Nigeria. The population comprised Business Education lecturers, students, ICT/EdTech officers, and Heads of Departments or Deans. A total of 300 respondents participated, selected through purposive and stratified random sampling techniques. The primary instrument for data collection was a structured questionnaire titled "Leveraging Virtual Reality Technology for Innovative Business Education in Nigerian Higher Institutions Questionnaire (LVRTIBEQ)." The instrument consisted of 21 items structured on a 4-point Likert scale. The instrument underwent expert validation for content and face validity, and a pilot test established its reliability with a Cronbach's Alpha of 0.82. Data collection was conducted through both physical distribution and Google Forms, and analysis was done using descriptive statistics mean, standard deviation, and frequency counts to address the research objectives. This methodology provided a comprehensive and reliable framework for assessing how VR technology is leveraged to enhance innovative teaching and learning in Business Education.

Results of the Findings

Research question 1

To what extent is Virtual Reality (VR) technology adopted and utilized in business education programs in Nigerian higher institutions?

Table 1: Mean rating of respondents' responses on Virtual Reality (VR) technology adopted and utilized in business education

S/N	Items on adoption and utilization of VR Technology	N	Mean	SD	Decision
1	My institution has introduced VR technology in business education.	300	2.97	1.12	Agree
2	Lecturers are trained to use VR tools in teaching business subjects.	300	3.60	0.67	Agree
3	There are adequate VR facilities in my institution for academic use.	300	3.43	1.04	Agree
4	VR is used to teach specific business courses in my department.	300	3.52	0.88	Agree
5	Students have access to VR tools for independent learning.	300	3.22	0.90	Agree
6	The school has invested in VR hardware and software for teaching.	300	3.65	0.62	Agree
7	Curriculum content has been adapted to incorporate VR applications.	300	3.35	0.79	Agree
8	Lecturers use VR to simulate business environments in class.	300	2.87	0.87	Agree
9	Technical support is available for VR tools during academic sessions.	300	3.31	0.93	Agree
10	Management supports the integration of VR in business education.	300	3.04	0.94	Agree
11	School has invested in VR hardware and software for teaching.	300	3.86	0.51	Agree
	Cluster Mean	300	**3.35**	**0.84**	**Agree**

Based on the data presented in Table 1**,** the mean ratings and standard deviations from 300 respondents indicate that Virtual Reality (VR) technology is moderately adopted and utilized in Business Education programs across Nigerian higher institutions. All ten items analyzed received mean scores above the criterion mean of 2.50, showing a general consensus on the presence and use of VR tools. The highest mean score (M = 3.65, SD = 0.62) was for institutional investment in VR hardware and software, followed by strong agreement on lecturer training (M = 3.60) and course-level integration (M = 3.52). However, the use of VR to simulate business environments in classroom teaching (M = 2.87) was relatively lower, highlighting a gap in interactive application. The overall cluster mean of 3.35, with a standard deviation of 0.84, confirms a moderate but consistent level of adoption. These results suggest that while infrastructure and training are improving, more focus is needed on classroom-based implementation to achieve full integration of VR in Business Education.

Research question 2

What is the perceived impact of Virtual Reality (VR) technology on students' engagement, understanding, and acquisition of practical business skills in Nigerian higher institutions?

Table 2: Mean rating of respondents' responses on Virtual Reality (VR) technology on students' engagement, understanding, and acquisition of practical business skills

S/N	Items of Students' Engagement, Understanding, and Practical Skills	N	Mean	SD	Decision
12	VR-based lessons keep me actively engaged in the learning process	300	3.58	0.62	Agree
13	I better understand complex business concepts through VR simulations	300	3.43	0.90	Agree
14	I find VR-enhanced classes more interesting than traditional lectures.	300	3.58	0.55	Agree
15	VR experiences help me relate theory to real-world business scenarios	300	2.97	1.12	Agree
16	VR sessions improve my problem-solving and decision-making skills.	300	3.59	0.69	Agree
17	I am more likely to participate during VR-supported learning activities.	300	3.43	1.04	Agree
18	VR content improves my ability to retain business concepts.	300	3.52	0.88	Agree
19	I feel more prepared for business practice after VR-based training.	300	3.20	0.93	Agree
20	VR encourages collaboration and teamwork among students.	300	3.65	0.62	Agree
21	VR helps me acquire practical business management skills.	300	3.37	0.78	Agree
	Cluster Mean	300	3.43	0.81	Agree

Based on the data presented in Table 2, responses from 300 participants indicate a strong perceived positive impact of Virtual Reality (VR) technology on students' engagement, understanding, and practical skill acquisition in Business Education programs within Nigerian higher institutions. All items recorded mean scores above the benchmark of 2.50, confirming overall agreement among respondents. The highest mean (M = 3.65, SD = 0.62) was attributed to VR's role in fostering student collaboration and teamwork. Other highly rated items included VR's influence on active engagement (M = 3.58), interest in class (M = 3.58), and enhancement of problem-solving and decision-making abilities (M = 3.59). However, the statement on VR helping students relate theory to real-world scenarios received a lower mean of 2.97, suggesting that this connection is not yet fully realized. With an overall cluster mean of 3.43 and a standard deviation of 0.81, the responses reflect consistent perceptions that VR significantly contributes to enriched learning experiences. Nonetheless, there is room for improvement in aligning VR content more effectively with real-world business applications.

Discussion of the Findings

The extent of adoption and utilization of Virtual Reality (VR) technology in business education programs across Nigerian higher institutions

The findings of this study align with existing empirical literature, affirming both the growing adoption of Virtual Reality (VR) in Nigerian higher institutions and its significant impact on business education delivery. The results presented in Table 1 indicate that VR technology is moderately adopted and utilized in business education programs. Specifically, the cluster mean of 3.35 shows that respondents agree VR is being introduced, with investments in infrastructure (M = 3.65) and training (M = 3.60) supporting its adoption. However, relatively lower mean scores on classroom simulations (M = 2.87) suggest that full pedagogical integration is yet to be realized. These results provide partial support and moderate contradiction to the findings of Yusuf and Onasanya (2023), who reported low adoption rates of VR in Nigerian higher education due to infrastructure and training deficits. While the current study acknowledges ongoing limitations, it presents more optimistic data, indicating that higher institutions—particularly in business education—are increasingly investing in VR technologies and training for faculty members. Similarly, Okonkwo and Eze (2022) emphasized that VR usage is often confined to technology departments. This study challenges that view to some extent, as respondents agree that VR is used for specific business courses (M = 3.52) and that curriculum content is being adapted (M = 3.35). These findings imply a gradual shift from exclusivity in VR adoption toward broader academic applications, including business education. Adewale and Ibitoye's (2021) observation that lecturers lack skills to use VR tools effectively is partially contradicted by this study, which reveals that lecturer training is already underway in some institutions. Nonetheless, the relatively lower rating on the actual use of VR to simulate business environments suggests that practical application skills may still need reinforcement, validating Adewale and Ibitoye's emphasis on the need for continued professional development.

Assess the perceived impact of Virtual Reality (VR) technology on students' engagement, understanding, and practical skills acquisition in business education

Regarding students' engagement, understanding, and acquisition of practical business skills, the results from Table 2 strongly support existing literature. The overall cluster mean of 3.43 indicates that students perceive VR as a tool that enhances engagement, boosts comprehension of complex concepts, and improves business-related practical skills. High ratings on items such as VR's impact on collaboration (M = 3.65), interest (M = 3.58), and problem-solving (M = 3.59) affirm findings by Oladipo and Ibrahim (2023), who found that VR increased student participation and interest. Moreover, the improved understanding and concept retention through

VR (M = 3.52) is in line with Nwankwo and Adebayo's (2022) assertion that VR enhances academic performance and comprehension. The study also validates Emeka and Hassan's (2021) conclusion that VR provides realistic simulations that develop entrepreneurial and managerial skills, as seen in the agreement that VR prepares students for practice (M = 3.20) and fosters practical business skills acquisition (M = 3.37). In summary, while infrastructural and pedagogical barriers persist, this study demonstrates a clear trajectory toward increased VR adoption and utilization in Nigerian business education. It supports empirical findings on the positive instructional and experiential impacts of VR, while moderately challenging claims that VR remains underutilized in non-technical disciplines. Therefore, efforts to scale VR integration must continue, especially in capacity building for lecturers and expanding access to students, to fully harness its transformative potential in business education.

Conclusion

The findings of this study reveal that Virtual Reality (VR) technology is gaining traction as a transformative tool in Business Education programs across Nigerian higher institutions. The extent of adoption and utilization was found to be moderate, with notable investments in VR infrastructure and the training of lecturers. However, the actual classroom application of VR, particularly in simulating real-life business scenarios, remains limited, indicating a gap between availability and effective pedagogical use. Furthermore, the study established that VR technology has a significantly positive perceived impact on students' learning experiences. It enhances engagement, promotes interest in business courses, fosters collaboration, and supports the development of problem-solving and decision-making skills. Despite these benefits, VR's effectiveness in helping students relate theoretical knowledge to practical business realities still requires improvement. In conclusion, while Nigerian higher institutions are progressively integrating VR into Business Education, efforts must be intensified to bridge the gap between technological adoption and practical classroom implementation. Stakeholders, including policymakers, institutional leaders, and educators, must collaborate to ensure comprehensive integration, continuous training, curriculum alignment, and content development that fully leverages VR's potential for innovative and experiential learning in business education.

Recommendations

Based on the findings of the study it was recommended that;

1) Institutions should prioritize the active use of Virtual Reality technology in classroom teaching by developing and incorporating more VR-based simulations that replicate real-world business environments.
2) Higher institutions should invest in continuous professional development programs to train Business Education lecturers on the effective use of VR technology in teaching.

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