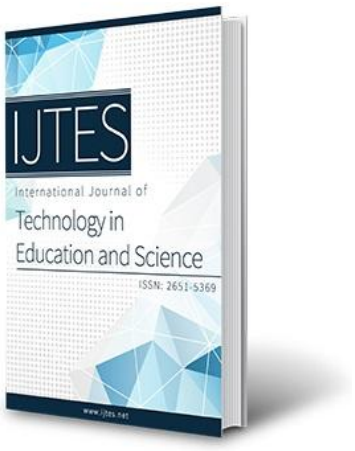

www.ijtes.net

Investigating Enablers for the Adoption of Gamified Immersive Virtual Reality in English and Literary Studies

Azetu Azashi Agyo
Federal University Wukari, Nigeria

Emmanuel John Anagu
Federal University Wukari, Nigeria

To cite this article:

Agyo, A.A. & Anagu, E.J. (2025). Investigating enablers for the adoption of Gamified Immersive Virtual Reality in English and literary studies. *International Journal of Technology in Education and Science (IJTES)*, *9*(1), 87-104. https://doi.org/10.46328/ijtes.611

International Journal of Technology in Education and Science
2025, Vol. 9, No. 1, 87-104 https://doi.org/10.46328/ijtes.611

Investigating Enablers for the Adoption of Gamified Immersive Virtual Reality in English and Literary Studies

Azetu Azashi Agyo, Emmanuel John Anagu

Article Info

Article History

Received:
15 July 2024
Accepted:
28 December 2024

Keywords

Gamified Immersive Virtual Reality (I-VR)
English and literary studies
Technology adoption
Theory of Planned Behavior (TPB)
Cognitive beliefs

Abstract

As educational needs change, gamified immersive virtual reality (I-VR) can enhance learning by making it more interactive. Immersive virtual reality is used more in science than in the humanities. This study uses the Theory of Planned Behavior (TPB) to explore factors that affect students' intentions to use gamified I-VR, particularly in developing regions. It examines how attitudes, social norms, and perceived control affect this intention in English and Literary Studies. The study also looks at students' beliefs about gamified I-VR's effectiveness and their emotional reactions to it. A quantitative survey was conducted at the Federal University Wukari using a TPB-based questionnaire. Results indicate that positive attitudes, social support, and ease of use significantly influence students' willingness to adopt gamified I-VR. Students who find the technology beneficial are more likely to use it in their studies. Challenges such as high costs and limited access highlight the need for institutional support for successful integration. The findings suggest that educational institutions should provide training and resources to build confidence in using I-VR technologies. Future research could include other disciplines and consider different theoretical models like Unified Theory of Acceptance and Use of Technology (UTAUT) for a broader understanding of technology adoption. This study adds to the research on innovative educational technologies and provides insights for improving English and Literary Studies with gamified I-VR.

Introduction

As technology advances, the educational and societal needs continue to change, requiring new teaching methods and technological applications. Moreover, the effective integration of Information and Communication Technologies (ICT) in education must consider students' learning styles as well as ethical, moral, and cultural factors. These considerations ensure that the integration transforms traditional teaching into a more student-centered and interactive process (Hincapie et al., 2021).Virtual reality (VR) is a technology that immerses users in a computer-generated environment, allowing them to interact with a digital world as if they were genuinely present within it. According to TechTarget (2021), VR is defined as a simulated three-dimensional (3D) environment that enables users to explore and interact with virtual surroundings in a way that approximates reality, engaging their senses through specialised hardware like VR headsets and gloves. In the context of English and

literary studies, this immersive technology can transform how students engage with texts and narratives. A more advanced form of this technology, known as Immersive Virtual Reality (I-VR), elevates this experience further by convincingly replacing the user's real surroundings with a richly detailed digital landscape. As noted by Michael A. Gigante (2017), I-VR enhances the illusion of participation in a synthetic environment rather than merely observing it, thus heightening the sense of presence. This ability to suspend disbelief makes I-VR particularly powerful for literary studies, enabling students to explore narratives in a deeply engaging manner. For instance, they can inhabit the settings of classic novels or interact with characters in ways that foster a greater understanding of themes, contexts, and character motivations. While both VR and I-VR offer immersive experiences, I-VR distinguishes itself through its capacity to engage learners on a profound level. I-VR has the potential to revolutionise English and literary studies by creating an interactive learning environment that enhances comprehension and appreciation of literature and English language in ways that traditional methods cannot achieve.

Building on these capabilities, gamified I-VR combines immersive VR with game elements, like points and badges, to boost motivation and engagement. This approach is particularly helpful in higher education, where realistic learning environments support hands-on learning through sensory interactions (Chien, Hwang & Jong, 2020). However, while gamified I-VR is becoming more popular in science and technology, its use in the humanities, especially English and Literary Studies, remains underexplored. Notably, proficiency in English is essential for students across various fields (Zhang & Hasim, 2023). Gamified I-VR can improve language learning and encourage deeper engagement with literary texts by moving from passive to active learning (Makransky et al., 2020). Gamified immersive virtual reality is changing English and literary studies by enhancing engagement and cultural understanding among learners. This fresh approach allows students to experience literature and culture in a more interactive and immersive way, fostering deeper connections with the material.

Furthermore, the successful adoption of gamified I-VR relies on several factors, including student attitudes, social influences, and perceived ease of use. These elements greatly influence students' readiness to adopt the technology and incorporate it into their learning processes. Nevertheless, challenges such as limited access to technology and inadequate institutional support frequently impede adoption, especially in resource-constrained environments (Costan et al., 2021; Radianti et al., 2020). This study looks into these dynamics to support the effective integration of gamified I-VR in humanities education.

Statement of the Problem

The integration of technology, particularly gamified (I-VR), has the potential to change learning in English and Literary Studies by promoting active rather than passive engagement. Nonetheless, its adoption within the humanities is slower compared to science and technical fields (Zeng et al., 2024; Predescu & Mocanu, 2024). Traditional text-based methods often fall short in encouraging critical thinking and interaction (Makransky et al., 2020). Key factors influencing students' willingness to adopt gamified I-VR, such as attitudes, social influences, and perceived control, are important for effective integration (Arpaci, 2023). Despite its promise, research on gamified I-VR adoption in developing contexts like Federal University Wukari is limited, highlighting a

significant gap that this study aims to address by exploring these factors using the Theory of Planned Behavior.

Aim and Objectives

This study aims to investigate the factors influencing students' intentions to adopt gamified (I-VR) learning environments for English and Literary Studies, using the Theory of Planned Behavior (TPB) as the theoretical framework and incorporating modified pedagogical aspects. The following research objectives are proposed to achieve this aim.

Objectives

i. To examine the impact of students' attitudes toward gamified (I-VR) on their intention to adopt the technology, considering both positive and negative evaluations.
ii. To investigate the role of subjective norms, specifically the influence of peers, instructors, and social networks, in shaping students' intentions to adopt gamified I-VR.
iii. To assess the effect of perceived behavioral control, including students' perceived ease of access, technical skills, and resource availability, on their intentions to adopt gamified I-VR.
iv. To evaluate students' cognitive beliefs regarding the perceived benefits and effectiveness of using gamified I-VR, focusing on ease of use and utility in enhancing learning experiences.
v. To investigate the emotional responses of students towards the gamified I-VR environment, and how these emotional reactions influence their intention to adopt the technology.
vi. To determine which of the TPB constructs—attitudes, subjective norms, or perceived behavioral control—has the strongest predictive power in shaping students' intentions to adopt gamified immersive virtual reality.

Literature Review

The teaching perspective has been intriguing, yet the use of gamified (I-VR) significantly supports and improves students' language learning (Xiao & Yi, 2021). UNESCO highlighted that using gamified I-VR has positively impacted educational research, with a projected growth rate of 43% from 2018 to 2022 (UNESCO, 2019). This indicates a growing interest among researchers in incorporating gamified I-VR into language learning. Furthermore, adding gamified I-VR to English education increases students' motivation and desire to learn the language. For example, when used in English language teaching, gamified I-VR provides feedback that is essential for improving learners' language skills (Anggraini, Rusdi, & Kurniawan, 2023). Education that combines I-VR and gamification enhances classroom dynamics, as well as students' spelling performance and English proficiency. Therefore, this integration has been shown to improve various aspects of students' English language learning.

Unlike traditional teaching methods that rely heavily on passive learning approaches, such as lectures and rote memorization, gamified I-VR encourages active learning. Through immersive environments, students can interact with 3D scenarios, simulate real-world experiences, and receive immediate feedback through gamified features

like points and badges. This method significantly improves knowledge retention, as interactive and hands-on learning stimulates both cognitive and sensory engagement (Zeng et al., 2024). For instance, students studying English literature can explore virtual Shakespearean worlds, gaining a deeper understanding of historical contexts and themes. In contrast, traditional methods often struggle to make such content engaging, which can lead to lower retention and comprehension levels.

Traditional methods offer greater accessibility, as they use affordable resources like textbooks and blackboards, unlike gamified I-VR, which requires costly equipment. This makes traditional classrooms more feasible in resource-constrained areas, where the high cost of gamified I-VR technology is often a barrier (Radianti et al., 2020).

Gamification in Education

Gamification in education pertains to the incorporation of game dynamics and mechanics into the process of teaching and learning engagement. In an attempt to support the integration of tablets within the educational environments of rural schools, gamification was employed as one of the foundational strategies to engage and inspire teachers (Botra et al., 2014). Games have the potential to enhance students' intrinsic motivation to learn. Utilizing games in education serves as a promising method to engage and motivate students throughout their learning journey (Martí-Parreño et al., 2016). Rather than relying on elaborate games that demand extensive design and development resources, the "gamification" approach advocates for the application of game thinking and design elements to boost learners' engagement and motivation (Dicheva et al., 2015).

Gamification in education utilizes game design elements to improve student engagement and motivation. By integrating strategies such as point systems, badges, and leaderboards, educators can cultivate interactive learning environments that address various learning needs (Tu et al., 2015). Game-based learning, which melds educational content with game scenarios, further encourages active participation and knowledge retention. Rewards are frequently employed in interventions aimed at behavior modification, yet they can hinder the development of intrinsic motivation, which is crucial for sustaining long-term behavior change. To assess the impact of gamified interventions on motivation, it is essential to comprehend how these interventions operationalize rewards, including point systems (Lewis et al., 2016). Nevertheless, while these gamification components can promote competition and recognition, it is vital to strike a balance to prevent excessive stress among students. Effective gamification not only drives student motivation through rewards but also fosters intrinsic motivation, which is vital for sustained engagement and success in learning. Ultimately, when designed with care, gamification can profoundly enhance the educational experience by rendering learning more enjoyable and effective.

While gamified I-VR offers numerous benefits, it is not universally effective. For example, studies have shown that overly gamified environments can lead to cognitive overload, reducing students' ability to focus on core learning objectives (Makransky et al., 2020). In science education, instances were reported where excessive use of gamification distracted students, as they prioritized earning badges over understanding scientific concepts. Similarly, in language learning, students who are less tech-savvy or unfamiliar with virtual environments often

struggle to navigate the technology, which undermines their learning experience. Additionally, when gamified I-VR content lacks alignment with the curriculum, its potential to improve learning outcomes diminishes significantly (Zhao et al., 2023).

The integration of gamified I-VR into education represents a paradigm shift from traditional learning approaches. By combining the interactivity of virtual reality with motivational gamification elements, gamified I-VR creates highly engaging and interactive learning environments. This dual combination significantly boosts student motivation, engagement, and comprehension of complex subjects, fostering a more dynamic learning experience (Zeng et al., 2024; Lege & Bonner, 2020). Unlike conventional education, which often emphasizes passive learning methods such as lectures and memorization, gamified I-VR promotes active learning by immersing students in virtual 3D environments. Within these settings, students can simulate real-world scenarios, experiment with hypothetical situations, and receive instant feedback through gamified features like points, badges, and leaderboards (Predescu & Mocanu, 2024). Such interactivity transforms the learning process into an enjoyable and rewarding experience.

Research highlights the effectiveness of gamified I-VR, particularly in disciplines that require hands-on engagement. In science education, for instance, gamified I-VR allows students to safely conduct virtual experiments, deepening their understanding of abstract concepts while eliminating risks associated with physical experimentation (Makransky et al., 2020). Beyond science, this technology is gaining recognition for its potential in humanities education. For example, students of English and Literary Studies can explore virtual literary worlds, interact with historical settings, and gain a deeper appreciation of complex texts (Ayanwale et al., 2024). However, despite its transformative potential, the adoption of gamified I-VR faces several challenges. The high cost of equipment, such as head-mounted displays and motion sensors, often limits access, especially in resource-constrained educational institutions. Additionally, the successful implementation of gamified I-VR requires extensive teacher training to ensure educators can effectively incorporate the technology into their teaching practices. Another concern is the risk of cognitive overload for students, as the immersive nature of gamified environments can sometimes overwhelm learners with excessive stimuli (Radianti et al., 2020).

To maximize the educational potential of gamified I-VR, it is essential to address these challenges. The quality of the virtual content must align with curricular objectives, and the technology should be viewed as a complement rather than a replacement for traditional teaching methods. With careful planning and strategic implementation, gamified I-VR can enrich the educational landscape, offering new opportunities for both educators and learners (Zhao et al., 2023).

Review of Related Works

The study of innovative educational technologies, particularly gamified I-VR, has expanded significantly, focusing on their influence on student engagement, learning outcomes, and the factors driving their adoption. This review synthesizes insights on VR, gamification, and technology adoption in education. VR has emerged as a transformative tool in education, offering immersive environments where students can interact directly with 3D

simulations and scenarios, fostering experiential learning that transcends traditional methods (Lege & Bonner, 2020). For example, in science education, VR allows students to visualize abstract concepts like molecular structures and conduct virtual chemistry experiments safely, which enhances both understanding and retention (Makransky et al., 2020). However, challenges such as the high cost of VR hardware and software, as well as the need for rigorously designed educational content, continue to hinder widespread adoption (Radianti et al., 2020).

Gamification, which incorporates game design elements like points, badges, and leaderboards into educational settings, has demonstrated its capacity to boost student motivation and engagement. When integrated with VR, gamification further enhances cognitive involvement, aiding in the development of critical problem-solving skills and collaboration through simulated real-world scenarios (Zhao et al., 2023). For instance, simulations of emergency response scenarios in healthcare training have been shown to improve decision-making skills and team coordination (Makransky et al., 2020). Therefore, the integration of gamified I-VR not only amplifies the benefits of VR but also addresses gaps in engagement and skill development.

However, the successful adoption of VR in education is not solely reliant on technological capabilities. It is also shaped by psychological, social, and institutional factors. According to the Theory of Planned Behavior (Ajzen, 2011), a person's intention to use new technologies depends on their attitudes, social norms, and perceived control over usage. Studies indicate that educators with positive attitudes toward VR and strong institutional support are more likely to integrate it into their teaching (AlMughairin & Bhaskar, 2024). Nevertheless, barriers such as high costs, lack of teacher training, and the steep learning curve associated with VR technology remain significant obstacles (Costan et al., 2021). For example, institutions that fail to align VR content with established curricular goals often see reduced adoption rates and limited educational outcomes (Radianti et al., 2020). This highlights the importance of not only providing the right tools but also addressing institutional and human factors to facilitate effective integration.

While gamified I-VR has primarily been studied in STEM disciplines, its application in English and Literary Studies offers unique opportunities to enhance engagement. Immersive VR can recreate literary settings, allowing students to explore historical contexts or interact with characters from classic texts, thereby fostering deeper analytical skills and critical thinking (Ayanwale et al., 2024). For instance, a virtual recreation of 19th-century England can help students understand the social dynamics in Pride and Prejudice. However, limited research and technical challenges, such as creating authentic and pedagogically sound content, highlight the need for further exploration in this field (Zhao et al., 2023). This underscores the untapped potential of gamified I-VR in non-STEM fields, indicating that while there are promising opportunities, further development and research are essential to fully harness its capabilities in humanities education.

A critical evaluation of the existing studies further reveals some limitations that warrant further exploration. One other significant area of inquiry is the comparison between gamified I-VR and traditional teaching methods, particularly regarding long-term retention and accessibility in underfunded regions. While studies suggest that students retain up to 80% of what they learn through immersive experiences compared to only 20% from traditional lectures (Psico-Smart, 2021), it remains unclear how these findings translate into sustained knowledge

retention over time. Additionally, the accessibility of I-VR in underfunded regions poses a challenge, as the required technology may not be readily available or affordable, potentially widening the educational gap rather than bridging it. Moreover, there are instances where gamified I-VR may not be as effective as anticipated. For example, a systematic review indicated that while I-VR can enhance motivation and engagement, it did not significantly improve immediate declarative knowledge acquisition compared to traditional methods in certain contexts (ResearchGate, 2024). This raises questions about the conditions under which I-VR is most effective and whether it consistently outperforms traditional pedagogical approaches.

Furthermore, some studies have highlighted potential drawbacks of I-VR, such as the novelty effect that may diminish over time, leading to questions about the long-term efficacy of such interventions (PMC, 2020). This suggests that while I-VR can create engaging learning experiences, its impact on sustained motivation and knowledge retention requires further investigation. Despite the aforementioned gaps, this study aims to investigate the factors influencing students' intentions to adopt gamified (I-VR) learning environments for English and Literary Studies, using the Theory of Planned Behavior (TPB) as the theoretical framework and incorporating modified pedagogical aspects.

Challenges and Opportunities in Gamified I-VR Adoption

Despite its advantages, gamified I-VR adoption faces significant hurdles. High costs for VR headsets and associated technologies remain prohibitive, particularly in developing regions (Radianti et al., 2020). Additionally, effective implementation requires extensive teacher training, both in technical proficiency and pedagogical integration, which can be resource-intensive. Educator skepticism, often stemming from concerns about the relevance and practicality of VR tools, further complicates adoption (Costan et al., 2021). However, addressing these challenges—through initiatives like subsidizing equipment costs, providing professional development programs, and ensuring alignment with curricula—can maximize the impact of gamified I-VR in education.

Technology Adoption Theories and Models

Theories and models of technology adoption are essential to understanding how individuals and organizations adopt new technologies. They offer insights into the determinants and processes involved in technology adoption decisions. Several theories and models have been instrumental in scrutinizing technology adoption at the individual and organizational levels. These models have been developed through a continuous process of validation and extension. Notably, the Theory of Reasoned Action (TRA) introduced by Ajzen and Fishbein is a psychological model that has further evolved into the Theory of Planned Behavior (TPB) and, subsequently, the Decomposed Theory of Planned Behavior (DTPB). The Technology Acceptance Model (TAM), derived from the TRA, was introduced in information systems. It has been then expanded into TAM2 and eventually to the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT model is a synthesis of other models, incorporating the aforementioned theories along with Rogers' Diffusion of Innovations (DOI), Bandura's Social Cognitive Theory (SCT), and Deci & Ryan's Motivational Model.

Conceptual Framework

The conceptual framework for this study is based on the Theory of Planned Behavior (TPB), which posits that individuals' behavioral intentions are influenced by three key constructs: attitudes, subjective norms, and perceived behavioral control. The TPB framework is chosen for our research, primarily due to its comprehensive approach to finding students' perspectives on their technology acceptance of gamified I-VR. We adopted the TPB framework and modified it by correlating with pedagogical aspects, namely cognitive and affective aspects. The adaptation and modification make the framework strongly connected to pedagogical aspects. The relationship between each dimension is depicted in Figure 1.

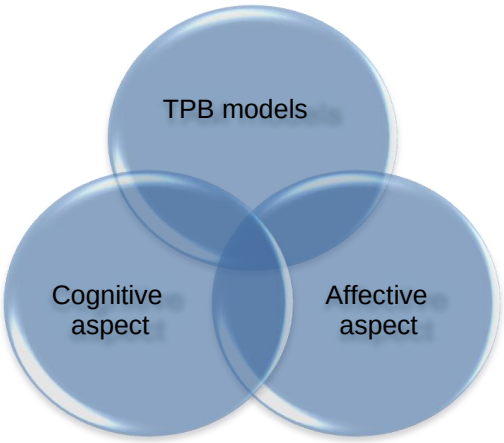

Figure 1. The Adoption of TPB Framework

Figure 1 describes the relationship between the TPB framework and cognitive and affective aspects of English language learning.

The TPB stands out as the most appropriate framework for examining students' intentions to embrace gamified I-VR within educational environments, especially when contrasted with other models like the Technology Acceptance Model (TAM). The subsequent justifications elucidate why TPB is the favored option, highlighting its enhanced predictive capabilities, all-encompassing framework, and empirical support. TPB presents a more holistic framework compared to TAM. While TAM primarily emphasizes perceived usefulness and ease of use, TPB encompasses three essential components—attitude, subjective norms, and perceived behavioral control—which offer a richer insight into the elements driving behavior. The incorporation of subjective norms and perceived behavioral control, which takes into account external influences and an individual's perception of their capability to perform a behavior, enables TPB to capture the intricacies of technology adoption more effectively. In educational scenarios, where social interactions and external obstacles play a crucial role, this comprehensive framework makes TPB especially pertinent for comprehending students' intentions to adopt gamified I-VR.

Moreover, TPB's incorporation of perceived behavioral control distinguishes it as particularly adept at forecasting actual behaviors. Unlike TAM, which predominantly centers around intentions and attitudes, TPB recognizes that not all behaviors fall entirely within an individual's control. For instance, regarding the adoption of gamified

I-VR, factors such as technical proficiency, resource accessibility, and external impediments can greatly impact students' capacity to engage with the technology. By acknowledging these external and internal limitations, TPB provides a more precise prediction of behavior, reflecting the practical realities that TAM tends to overlook (Alhamad & Donyai, 2021).

Psychological and Motivational Factors

Psychological factors encompass the mental and emotional processes that affect human behavior, including beliefs, personality traits, motivations, thoughts, and feelings. These components are essential for comprehending behavior and understanding how individuals interpret and engage with their environment. This research investigates the psychological and motivational conditions that influence students' intentions to utilize gamified I-VR for English and Literary Studies at Federal University Wukari.

Attitudes reflect an individual's positive or negative assessment of a particular behavior. When people view the outcomes of adopting a behavior or technology as advantageous, they are more inclined to form a positive attitude towards it. In the context of this study, attitudes relate to students' overall assessment of gamified I-VR as an educational instrument. A favorable attitude, bolstered by beliefs in its capacity to improve learning results, engagement, and understanding, enhances the likelihood of adoption. Students who perceive gamified I-VR as enjoyable and beneficial for their academic achievements are generally more motivated to embrace the technology (Ajzen, 2011).

Subjective norms concern the perceived social pressure to engage in a particular behavior. This research examines how influential figures—such as peers, educators, and family—affect students' intentions to embrace gamified I-VR. Positive encouragement from these individuals can greatly influence students' choices. For example, strong support from peers or teachers can inspire students to utilize gamified I-VR as a learning resource (Ateş & Garzón, 2023). Moreover, Akour et al. (2022) highlighted perceived usefulness as a critical factor affecting engagement in Metaverse-based learning environments, emphasizing the significance of external influences on adoption behavior.

Perceived behavioral control denotes an individual's belief in their capability to utilize a technology, taking into account both internal abilities and external resources. This includes effort expectancy and ease of use, which are vital for adoption. Regarding gamified I-VR, students' technical proficiency, access to resources, and support networks significantly shape their views on usability. Previous research indicates that ease of use is associated with an increased likelihood of adoption (Alawadhi et al., 2022). This study investigates how perceived control influences students' intentions to adopt gamified I-VR, particularly in addressing potential obstacles.

Perceived self-efficacy refers to an individual's belief in their ability to successfully execute the actions required to achieve specific goals. In the context of this study, it reflects students' confidence in their capability to effectively use gamified I-VR technologies for learning English and Literary Studies. High self-efficacy can lead to greater persistence and a stronger intention to adopt and utilize these tools.

Cognitive beliefs are mental assessments regarding the benefits and effectiveness of an action or technology. This study focuses on students' beliefs about how gamified I-VR enhances their engagement, comprehension, and overall learning outcomes in English and Literary Studies. Affective responses refer to the emotional reaction's individuals experience toward a behavior or technology. Positive emotions such as excitement and enjoyment associated with gamified I-VR are considered key factors in shaping students' intentions to adopt the technology.

Hypotheses

Based on the TPB and aligned with the focus of this study, the following hypotheses are proposed to explore the factors influencing students' intentions to adopt gamified I-VR learning environments for English and Literary Studies at Federal University Wukari:

H1: Students' positive attitudes towards gamified I-VR will significantly influence their intention to adopt the technology.

H2: Subjective norms will positively influence students' intentions to adopt gamified I-VR.

H3: Perceived behavioral control will positively influence students' intentions to adopt gamified I-VR.

H4: Positive cognitive beliefs regarding the benefits and effectiveness of using gamified I-VR for learning will significantly increase students' intentions to adopt these technologies.

H5: Positive affective responses toward gamified I-VR will lead to a stronger intention among students to adopt these learning environments

These hypotheses seek to encapsulate the interaction between intrinsic motivations and external influences that affect adoption behavior. By incorporating attitudes, subjective norms, perceived behavioral control, and both cognitive and emotional responses, this framework offers a solid basis for examining how psychological and social factors propel technology adoption.

Methodology

This study uses a quantitative survey approach to test the research hypotheses, systematically collecting numerical data through a structured research design, ultimately leading to measurable conclusions (Creswell & Creswell, 2023). Based on the TPB, the research also includes teaching elements that influence students' intentions to adopt gamified I-VR technology. The participants were students from the English and Literary Studies department during the 2023/2024 academic year, who were learning about English language, literature, linguistics, and teaching methods. Purposive sampling was used to improve the study's quality and generalizability by selecting individuals likely to provide relevant information. This method ensured the inclusion of only those with relevant knowledge and firsthand experience in virtual reality. Participants were screened for prior VR experience to accurately reflect the specific context under investigation.

Data Collection Instruments

Data were collected from August to September 2024. Participants were recruited via email and social media, completing an online survey available for four weeks. The survey took about 10 minutes to finish. It had two

sections: the first covered socio-demographic characteristics and gamified I-VR adoption intention patterns, while the second measured factors in the proposed model using validated items adapted from previous studies. A 22-item questionnaire used a 5-point Likert scale to assess participants' views on gamified I-VR in their English education.

Measures

The tools for data collection in this study were developed through a carefully structured approach that commenced with an extensive review of the literature surrounding the TPB. Preliminary scale items were designed based on the TPB theory while also incorporating adapted pedagogical elements. The TPB was depicted through attitudes, subjective norms, and perceived behavioral control, while the modified pedagogical aspects were represented through cognitive beliefs and emotional responses, as illustrated in Table 1.

Data Analysis

This research data analysis was executed utilizing SPSS version 21 for descriptive statistics and reliability assessments, along with STATA version 20 for structural equation modeling, thereby establishing a solid statistical framework for evaluating our theoretical model. To begin with, a comprehensive review of descriptive statistics was undertaken, concentrating on the means and standard deviations of the survey responses to identify overarching trends.

Table 1. Sociodemographic and Related Characteristics - (N =357).

Variable	**Levels**	**N (357)**	**Percentage**
Gender	Male	224	62.8
	Female	133	37.2
	Total	357	100
Age	15-20	174	48.8
	21-25	114	31.6
	26-30	63	17.6
	30 above	7	2.00
	Total	357	100
Level	100	115	32.2
	200	102	28.7
	300	66	18.5
	400	57	16. 1
	PG	17	4.5
	Total	357	100

Table 1 shows how the sample is made up in terms of its demographics. More than half of the people who took

part were male. In terms of age, the majority of respondents were between the ages of 15 and 20. After that, those between the ages of 21 to 25 are 31.6%, of sample size, the people who answered between the age of 26 to 30 were 17.6% follow by 30 and above made up the remaining 2% of the sample. About 32.2.25 percent of the participants were 100 level students. Also, 28.7 % are 200 level students then 300level and 400 level were 18.5 and 16.1 while only 4.5 % were Postgraduate students.

Findings

Measurement Model Assessment

Evaluating the measurement model involves analyzing its internal consistency reliability, convergent validity, and discriminant validity. This phase included an assessment of internal consistency, during which Cronbach's alpha was computed for each construct, yielding satisfactory values that exceeded the acceptable threshold of 0.70 (Hair et al., 2019). To assess the internal consistency reliability, we tested the composite reliability (CR) and Cronbach's Alpha (Hair Jr et al., 2016). As shown in Table 3, the values for Cronbach's Alpha and CR are above the recommended threshold value of 0.70, indicating good internal consistency reliability. The convergent validity is evaluated by testing the average variance extracted (AVE) and factors loadings. The values of factor loadings, as shown in Table 2, are all greater than 0.7. Additionally, the AVE values for all constructs exceed the recommended threshold value of 0.5. These results indicate that the convergent validity is confirmed.

Table 2. Reliability, Validity, and Goodness of Fit - (N = 357).

Factor	Item	Factor loading (λ)	AVE	CR	Cronbach's Alpha	R- square
Attitude	ATT1	0.873	0.601	0.814	0.674	0.701
	ATT2	0.836				
	ATT3	0.531				
	ATT4	0.584				
Subjective Norm	SN1	0.382	0.597	0.874	0.818	0.454
	SN2	0.715				
	SN3	0.949				
	SN4	0.780				
	SN5	0.519				
Perceived Behavior	PB1	0.519	0.527	0.864	0.807	0.833
	PB2	0.740				
	PB3	0.900				
	PB4	0.454				
Cognitive Aspect (CA)	CA1	0.344	0.408	0.759	0.619	0.000
	CA2	0.884				
	CA3	0.402				

Factor	Item	Factor loading (λ)	AVE	CR	Cronbach's Alpha	R- square
Affective Aspect (AA)	AA1	0.627	0.429	0.780	0.655	0.477
	AA2	0.637				
	AA3	0.767				
Behavioral Intention	BI1	0.867	0.775	0.911	0.857	0.7280
	BI2	0.844				
	BI3	0.928				

CR = Composite Reliability, AVE = Average Variance Extracted,

To evaluate the discriminant validity, it is suggested to test the Heterotrait-Monotrait ratio of correlations (HTMT) (Henseler et al., 2015). According to Table 4, it is evident that all HTMT values are less than the proposed threshold value of 0.85. This indicates that there are no issues with discriminant validity.

Table 3. HTMT Results

	ATT	SN	PB	CA	AA	BI
ATT						
SN	0.633					
PB	0.614	0.698				
CA	0.657	0.830	0.690			
AA	0.638	0.6714	0.823	0.690		
BI	0.635	0.601	0.671	0.662	0.577	

Structural Model Assessment

After ensuring that the proposed model is reliable and valid, the next step is to assess the structural model by testing the relationships among the constructs and the coefficient of determination (R^2). MSE have significant impacts on BI, thereby confirming hypotheses H1, H3, H4, and H5. Ultimately, the findings indicate that both MFC and MBI have a favorable impact on MUB, thereby confirming the validity of hypotheses. In addition, Fig. 2 demonstrates that the research model explains 67.6 % and 66.2 % of the variation in MBI and MUB, respectively, indicating a strong ability to predict outcomes within the sample. Table 8 revealed that the Q2 values for both MBI and MUB in the field of education in the metaverse were all above 0. These results indicate that the model exhibited a satisfactory level of accuracy in its predictions. Furthermore, all of the root mean squared error (RMSE) indices in the Partial Least Squares Structural Equation Modeling (PLS-SEM)

According to the presented information in Table 4, the findings of this study addressed the first hypothesis (H1)

through a positive and significant relationship between Attitudes and Behavioral intention (β = -0.076, t = -0.076, p < 0.001). Therefore, the findings show that students' Attitudes significantly affects their Behavioral intention. To address the second hypothesis (H2) in this study, the findings portrayed the relationship between Subjective norms and Behavioral intention (β= 0.62, t = 9.09, p < 0.000). To present the findings according to the third hypothesis, (H3) was rejected based on the results of β = 0.019, t = 0.574, and p < 0.566) The fourth hypothesis (H4) proposed in this study presented a significant relationship between Cognitive beliefs and Behavioral intention through the results that supported this relationship (β= -0.044, t = 2.207, p < 0.027). The fifth hypothesis was predicted to show a significant and direct effect between Affective responses and Behavioral intention. The findings showed β = 0.590, t =9.508, and p < 0.001, which supports hypothesis (H5) and states that Affective responses influenced students' Behavioral intention.

Table 4. Hypotheses Testing Results

Hypothesis	Structural path	Path coefficient	t-value	p-value	Remarks
H1	Attitudes → Behavioral intention	-0.076	2.004	0.045	Supported
H2	Subjective norms → Behavioral intention	0.617	9.090	0.000	Supported
H3	Perceived behavioral → Behavioral intention	0.019	0.574	0.566	Not Supported
H4	Cognitive beliefs → Behavioral intention	-0.044	2.207	0.027	Supported
H5	Affective responses → Behavioral intention	0.590	9.508	0.000	Supported

Discussion and Conclusion

This study offers useful theoretical insights and practical applications that improve our understanding of the factors influencing students' intentions to engage with gamified I-VR technology in education. Using the Theory of Planned Behavior (TPB), previous research has shown its effectiveness in assessing behavioral intentions related to educational technologies across different contexts (Lampropoulos & Kinshuk, 2024; Adam, 2024). The study develops a detailed framework that combines TPB principles with modified teaching elements, aiming to clarify students' intentions in English and Literary Studies regarding gamified IVR adoption. The findings indicate that positive attitudes significantly affect the use of gamified I-VR, with students who have had favorable experiences showing greater confidence in adopting new technologies (Al-Emran et al., 2023).

The integrated model effectively explains variance in students' adoption intentions, emphasizing the importance of motivational and cognitive factors. Constructs from TPB notably impact students' willingness to embrace gamified IVR, particularly attitudes and subjective norms. Furthermore, the study notes gender influences technology adoption, with male students showing a stronger preference for gamified I-VR. This underscores the

need to consider cultural contexts when interpreting findings, as they significantly affect educational technology usage (Lynch, 2024).

The findings from this study on adopting gamified I-VR in education have important practical implications for technology integration strategies. The significant impact of perceived self-efficacy highlights the need for educational institutions to implement comprehensive training programs that boost student confidence in using VR technology. Administrators should communicate the benefits and challenges of VR adoption to alleviate misconceptions. Also, decision-makers can leverage insights from the research to effectively integrate gamified I-VR into educational platforms, ensuring alignment with institutional support frameworks. Continuous technical assistance and resources are essential for helping students overcome challenges when using VR technology.

This study highlights the game-changing potential of gamified immersive virtual reality (I-VR) in English and Literary Studies, emphasizing its ability to promote interactive, student-centered learning. Using the Theory of Planned Behavior (TPB), the research identifies attitudes, social influences, and perceived behavioral control as key factors influencing students' willingness to adopt I-VR. Moreover, cognitive beliefs about its effectiveness and emotional responses to its use significantly shape adoption intentions. Despite these promising findings, challenges such as high costs, limited access to technology, and the need for comprehensive training persist, particularly in resource-constrained environments like Federal University Wukari. To tackle these barriers, partnerships with technology companies, increased public sector investment, and institutional support are essential. These strategies can reduce costs, improve accessibility, and provide the necessary training for both educators and students.

Future research should look into I-VR applications across different academic disciplines and assess its long-term effects on learning outcomes. Incorporating alternative frameworks, such as Unified Theory of Acceptance and Use of Technology (UTAUT), could give broader insights into technology adoption dynamics. Addressing these areas will allow educational institutions to fully utilize the potential of I-VR, change humanities education, and develop critical skills essential for the 21st century.

Recommendations

This study offers useful insights into VR integration in education, yet it presents notable limitations that future research should address. Firstly, the reliance on self-reported measures may introduce response biases, potentially skewing results. Future studies could use a mixed-methods approach, combining qualitative interviews and observational data to achieve a more complete understanding of gamified VR usage. Additionally, the sample was limited to students from the Department of English and Literary Studies at Federal University Wukari, which may affect the generalizability of the findings. Expanding research to include diverse disciplines and educational levels would improve its applicability. Exploring additional theoretical frameworks, such as the Unified Theory of Acceptance and Use of Technology (UTAUT), could provide deeper insights. Lastly, longitudinal studies are necessary to assess the long-term impacts of gamified IVR as a learning tool and to track changes in student perceptions over time.

Acknowledgements

We thank the English and Literary Studies department staff at Federal University Wukari for their support. Special thanks to the students for their survey participation, providing essential insights. We also appreciate our colleagues and mentors for their guidance and feedback, which improved our research.

References

Adam, T. (2024). A Justice-Oriented Conceptual and Analytical Framework for Decolonising and Desecularising the Field of Educational Technology. *Education Sciences*, *14*(9), 962.

Ajzen, I. (2011). The theory of planned behaviour: Reactions and reflections. *Psychology & health*, *26*(9), 1113-1127.

Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude-behavior relation: Reasoned and automatic processes. *European review of social psychology*, *11*(1), 1-33.

Akour, I. A., Al-Maroof, R. S., Alfaisal, R., & Salloum, S. A. (2022). A conceptual framework for determining metaverse adoption in higher institutions of gulf area: An empirical study using hybrid SEM-ANN approach. *Computers and education: artificial intelligence*, *3*, 100052.

Alawadhi, M., Alhumaid, K., Almarzooqi, S., Aljasmi, S., Aburayya, A., Salloum, S. A., & Almesmari, W. (2022). Factors affecting medical students' acceptance of the metaverse system in medical training in the United Arab Emirates. *South Eastern European Journal of Public Health (SEEJPH)*.

Al-Emran, M., Al-Qaysi, N., Al-Sharafi, M. A., Alhadawi, H. S., Ansari, H., Arpaci, I., & Ali, N. A. (2024). Factors Shaping Physicians' Adoption of Telemedicine: A Systematic Review, Proposed Framework, and Future Research Agenda. *International Journal of Human–Computer Interaction*, 1-20.

Alhamad, H., & Donyai, P. (2021). The validity of the theory of planned behaviour for understanding people's beliefs and intentions toward reusing medicines. *Pharmacy*, *9*(1), 58.

Almarzouqi, A., Aburayya, A., Alfaisal, R., Elbadawi, M. A., & Salloum, S. A. (2024). Ethical Implications of Using ChatGPT in Educational Environments: A Comprehensive Review. *Artificial Intelligence in Education: The Power and Dangers of ChatGPT in the Classroom*, 185-199.

Anggraini, R. (2024). Optimizing Media Integration for Foreign Language Acquisition: A Public Perspective. *Bhandar: Harvesting Community Service in Asia*, *1*(1).

Arpaci, I., Masrek, M. N., Al-Sharafi, M. A., & Al-Emran, M. (2023). Evaluating the actual use of cloud computing in higher education through information management factors: a cross-cultural comparison. *Education and Information Technologies*, *28*(9), 12089-12109.

Ateş, H., & Garzón, J. (2023). An integrated model for examining teachers' intentions to use augmented reality in science courses. *Education and Information Technologies*, *28*(2), 1299-1321.

Ayanwale, M. A., Adelana, O. P., Ishola, A. M., & Adeeko, O. (2024). Education 4.0: Exploring computer science teachers' readiness. *EURASIA Journal of Mathematics, Science and Technology Education*, *20*(8), em2492.

Botra, A., Rerselman, M., & Ford, M. (2014, May). Gamification beyond badges. In *2014 IST-Africa Conference Proceedings* (pp. 1-10). IEEE.

Chien, S. Y., Hwang, G. J., & Jong, M. S. Y. (2020). Effects of peer assessment within the context of spherical video-based virtual reality on EFL students' English-Speaking performance and learning perceptions. *Computers & Education*, *146*, 103751.

Chou, C. M., Shen, T. C., Shen, T. C., & Shen, C. H. (2024). Teachers' adoption of AI-supported teaching behavior and its influencing factors: using structural equation modeling. *Journal of Computers in Education*, 1-44.

Christopoulos, A., & Mystakidis, S. (2023). Gamification in education. *Encyclopedia*, *3*(4), 1223-1243

Costan, E., Gonzales, G., Gonzales, R., Enriquez, L., Costan, F., Suladay, D., ... & Ocampo, L. (2021). Education 4.0 in developing economies: a systematic literature review of implementation barriers and future research agenda. *Sustainability*, *13*(22), 12763.

Dicheva, D., Dichev, C., Agre, G., & Angelova, G. (2015). Gamification in education: A systematic mapping study. *Journal of educational technology & society*, *18*(3), 75-88.

Gigante, M. A. (2017). *Immersive virtual reality: The future of education*. Journal of Educational Technology, 14(3), 45-58.

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European business review*, *31*(1), 2-24.

Hair, Jr, J. F., Sarstedt, M., Matthews, L. M., & Ringle, C. M. (2016). Identifying and treating unobserved heterogeneity with FIMIX-PLS: part I–method. *European business review*, *28*(1), 63-76.

Hamilton, D., McKechnie, J., Edgerton, E., & Wilson, C. (2021). Immersive virtual reality as a pedagogical tool in education: a systematic literature review of quantitative learning outcomes and experimental design. *Journal of Computers in Education*, *8*(1), 1-32.

Han, I. (2020). Immersive virtual field trips in education: A mixed-methods study on elementary students' presence and perceived learning. *British Journal of Educational Technology*, *51*(2), 420-435.

Lampropoulos, G., & Kinshuk. (2024). Virtual reality and gamification in education: a systematic review. *Educational technology research and development*, 1-95.

Lege, R., & Bonner, E. (2020). Virtual reality in education: The promise, progress, and challenge. *Jalt Call Journal*, *16*(3), 167-180.

Lewis, Z. H., Swartz, M. C., & Lyons, E. J. (2016). What's the point?: a review of reward systems implemented in gamification interventions. *Games for health journal*, *5*(2), 93-99.

Lynch, D. J. (2024). *Discerning the Resistance to Acceptance of Advanced Technology by Emergency Management Coordinators in New Jersey* (Doctoral dissertation, New Jersey City University).

Makransky, G., Mayer, R., Nøremølle, A., Cordoba, A. L., Wandall, J., & Bonde, M. (2020). Investigating the feasibility of using assessment and explanatory feedback in desktop virtual reality simulations. *Educational Technology Research and Development*, *68*, 293-317.

Martí-Parreño, J., Méndez-Ibáñez, E., & Alonso-Arroyo, A. (2016). The use of gamification in education: a bibliometric and text mining analysis. *Journal of computer assisted learning*, *32*(6), 663-676.

Predescu, A., & Mocanu, M. (2024). Gamification in Real-World Applications: Interactive Maps and Augmented Reality.

Psico-Smart. (2021). The impact of virtual reality and augmented reality in gamified learning experiences. Retrieved

from https://psico-smart.com/en/blogs/blog-the-impact-of-virtual-reality-and-augmented-reality-in-gamified learning-experiences-176458

PMC. (2020). The effect of virtual reality learning on students' motivation: A scoping review. Retrieved from https://pmc.ncbi.nlm.nih.gov/articles/PMC7940910/

ResearchGate. (2024). Effectiveness of virtual reality on learning engagement: A meta-analysis. Retrieved from https://www.researchgate.net/publication/376560196_Effectiveness_of_Virtual_Reality_on_LearningEngagement

Radianti, J., Majchrzak, T. A., Fromm, J., & Wohlgenannt, I. (2020). A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Computers & Education*, *147*, 103778.

TechTarget. (2021). *What is virtual reality (VR)?* Retrieved from https://www.techtarget.com/whatis/definition/virtual-reality-VR

Tu, C. H., Sujo-Montes, L. E., & Yen, C. J. (2015). Gamification for learning. *Media Rich Instruction: Connecting Curriculum to All Learners*, 203-217.

Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information systems research*, *11*(4), 342-365.

Yang, E. C. L., Nimri, R., & Lai, M. Y. (2022). Uncovering the critical drivers of solo holiday attitudes and intentions. *Tourism Management Perspectives*, *41*, 100913.

Zaidan, A. S., Alshammary, K. M., Khaw, K. W., Yousif, M., & Chew, X. (2023, December). Investigating Behavior of Using Metaverse by Integrating UTAUT2 and Self-efficacy. In *International Multi-Disciplinary Conference-Integrated Sciences and Technologies* (pp. 81-94). Cham: Springer Nature Switzerland.

Zhang, S., & Hasim, Z. (2023). Gamification in EFL/ESL instruction: A systematic review of empirical research. *Frontiers in Psychology*, *13*, 1030790.

Zhao, L. T., Wang, D. S., Liang, F. Y., & Chen, J. (2023). A recommendation system for effective learning strategies: An integrated approach using context-dependent DEA. *Expert Systems with Applications*, *211*, 118535.

Zheng, Z., Zeng, M., Huang, W., & Sun, N. (2024). The influence of university library environment on student interactions and college students' learning engagement. *Humanities and Social Sciences Communications*, *11*(1), 1-14.

Author Information

Azetu Azashi Agyo
https://orcid.org/0000-0001-9673-5025
Federal University Wukari
Kastina-Ala Road
P.M.B 1020 Wukari
Nigeria
Contact e-mail: *agyo2016@fuwukari.edu.ng*

Emmanuel John Anagu
https://orcid.org/0009-0001-0509-6449
Federal University Wukari
Kastina-Ala Road
P.M.B 1020 Wukari
Nigeria