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Unlocking Potential: The Transformative Role of Gaming in Rural Higher Learning Institutions of South Africa - A Systematic Exploration

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ABSTRACT

The aim of this study resonated with the pursuit of achieving enhanced engagement in teaching and learning that informs critical thinking, and knowledge retention among students. Despite the growing trend of technological integration in teaching and learning, however, there exists a lack of empirical evidence and comprehensive studies that investigate the effectiveness of gaming in promoting educational objectives within rural institution of higher learning in South Africa. To investigate this gap, a systematic review method was employed, which provides a comprehensive and logical analysis of existing literature on the significance of gaming in teaching and learning within rural institutions of higher education. Inclusion and exclusion criteria were used in the study to enhance the rigor and transparency of the research process, by providing a solid foundation for synthesizing and interpreting existing literature relevant to the study. The systematic review findings revealed that the significance of gamification in teaching and learning in rural higher education lies in its ability to overcome accessibility challenges, provide personalized learning experiences, address motivation and retention issues, and enhance digital literacy. It was recommended that by incorporating gamified approaches, rural higher educational institutions can create a more inclusive, engaging, and effective learning environment for students within the rural institutions of higher learning in South Africa.

KEYWORDS

Gaming; education technology; teaching and learning; rural higher institution

INTRODUCTION

The 21st-century education landscape has undergone a profound transformation due to the widespread integration of technology. This exploration delves into the various dimensions of technology increasing role in education, examining its effects on pedagogical methods, accessibility, and the overall learning experience. The intersection of education and technology has led to a shift in how knowledge is acquired and applied, expanding traditional classrooms into virtual realms through several tech platforms (Burbules et al., 2020; Gandolfi et al., 2021; Jääskä & Aaltonen, 2022). Technology's influence extends to instructional strategies, with interactive resources, educational apps, and gamification redefining the learning experience and prompting exploration of their pedagogical implications (Adnan et al., 2020).

Adaptive learning systems, powered by artificial intelligence, offer personalized learning trajectories by tailoring content to individual needs, raising questions about their efficacy in addressing educational disparities (Bernacki et al., 2020; Goralski & Tan, 2020). Similarly, augmented, and virtual reality technologies promise immersive learning experiences, prompting an examination of their pedagogical implications in fostering comprehension and critical thinking (Ahir et al., 2020). The academic discourse must also consider equity and accessibility challenges posed by technology, with open educational resources and blockchain credentials contributing to a more inclusive educational landscape. Thus, this academic inquiry aims to unravel the intricacies of technology's role in education, contributing to the ongoing dialogue about the future of education in a digitized world.

The increasing interest in integrating gaming into education is driven by its potential to improve educational outcomes and create a dynamic learning environment. Gaming offers a unique, immersive learning experience, allowing students to apply theoretical knowledge in practical situations, cutting across all disciplines (Kratcoski, 2021; Burbules et al., 2020). The gamified approach, incorporating competition and rewards, taps into students' intrinsic motivation, enhancing engagement and enjoyment of the learning process (Bouchrika et al., 2021). As such, the digital nature of gaming aligns with the technological advancements of the 21st century, leverages students' familiarity with technology, and enhances digital literacy skills. Jääskä and Aaltonen (2022) argued that gaming facilitates personalized learning experiences by adapting to individual learning styles and pace, promoting inclusivity. Overall, the integration of gaming in education is seen as a promising avenue to revolutionize traditional teaching methods and create a more effective and enjoyable learning journey.

Vandenberg and colleagues (2022) also identified key domains where gamification is frequently applied, such as education to improve student performance and business settings to influence user behaviour and strategic objectives. Taken together, the findings highlight the need for a comprehensive understanding of gamification's development process, stakeholder involvement, and potential risks to ensure successful implementation and address emerging challenges in this developing field. The study focused on the positive outcomes of gamification, demonstrating its efficacy in enhancing motivation, engagement, and productivity by

incorporating game elements into non-game environments. On the other hand, Kobari et al. (2023) stated that gamification strategies, such as educational mapping, can significantly boost students' motivation to learn English as a foreign language and improve their academic performance. By integrating game elements into the learning process, students become more engaged, leading to positive behaviour changes and a more enthusiastic approach to language learning. Additionally, using gamified methods like Kahoot has proven to enhance students' confidence and motivation in learning English, with most students responding positively to game-based language learning. Overall, gamification is recognized as a powerful educational tool that not only motivates learners but also promotes collaboration and active participation in the digital age.

A widely referenced study explored the digital game-based learning, emphasizing its increasing popularity and capacity to improve student learning by fostering greater motivation and involvement. It encompasses six articles that offer concrete illustrations and dialogues on refining game design for educational objectives in various settings, such as K-12 and tertiary education. Noteworthy contributions consist of a critical analysis of theoretical frameworks and game design for educators, research on the impacts of game design on learning achievements, and inquiries into specific game components that enhance educational efficacy. The study highlights the advantages of integrating digital games into teaching to cater to a wide range of learners and enrich the learning process (Sadera et al., 2014).

The significance of gamification in teaching and learning in rural higher education is noteworthy, as it addresses several challenges unique to rural settings and offers potential benefits for students in these areas. Firstly, gamification enhances accessibility to education in remote regions (Burbules et al., 2020; Jääskä & Aaltonen, 2022). In many rural areas, access to quality higher education is limited due to geographical barriers and lack of resources. Introducing gamified elements in teaching can make learning more engaging, encouraging students to overcome geographical challenges and participate actively in their education.

Secondly, gamification promotes inclusivity and personalized learning experiences (Gandolfi et al., , 2021; Burbules et al., , 2020). Rural communities often have diverse student populations with varying educational backgrounds and learning styles. Gamified approaches allow for tailored content delivery, adapting to individual learning needs and ensuring that students from diverse backgrounds can benefit from the educational experience. Furthermore, gamification addresses issues of motivation and retention (Adnan et al., 2020). In rural settings, students face additional challenges, such as limited access to educational resources and a potential lack of motivation. By incorporating game-like elements, such as rewards, competition, and achievement, gamification can spark students' interest, foster a sense of accomplishment, and ultimately improve motivation and retention rates.

Additionally, the digital nature of gamification aligns with the global technological trends, helping rural students develop digital literacy skills essential for the contemporary job market (Gandolfi et al., 2021; Jääskä & Aaltonen, 2022; Ribeiro, 2019; Stack & Bunt, 2023). Thus,

introducing gaming elements into education can bridge the digital divide by familiarizing students in rural areas with technology and interactive learning tools.

The rationale of the Study

In recent years, the integration of technology into educational practices has become increasingly important, with a focus on enhancing engagement, critical thinking, and knowledge retention among students. South Africa, like many other countries, has witnessed a growing interest in the use of gaming as an educational tool (Titus & Ng'ambi, 2023; Ebrahim & Van den Berg, 2020). However, most of the research in this area has been conducted in urban settings, neglecting the unique challenges and opportunities that rural institutions of higher learning face. Rural institutions in South Africa often encounter disparities in resources, infrastructure, and access to educational technologies compared to their urban counterparts (Landa et al., 2021; Lembani et al., 2020).

The significance of gaming in teaching and learning within these rural contexts needs to be explored to determine its potential impact on educational outcomes and the overall learning experience of students. Furthermore, there is a lack of empirical evidence and comprehensive studies that investigate the effectiveness of gaming in promoting educational objectives, such as improved student engagement, critical thinking skills, and academic achievement, in the specific context of rural South African higher education. This research gap hinders the development of targeted strategies and policies that could harness the potential of gaming to enhance the quality of education in rural settings. By understanding the role of gaming in rural higher education, educators, policymakers, and stakeholders can tailor interventions and support mechanisms that cater specifically to the needs of these institutions.

Objectives of the Study

- To analyse and synthesize existing literature on the impact of gaming in teaching and learning.
- To identify trends, gaps, and challenges in current research.
- To provide insights for educators, administrators, and researchers interested in the effective use of gaming in rural higher education.

RESEARCH METHOD

The significance of gaming in teaching and learning in rural South African higher education institutions was the subject of a systematic literature search across relevant databases. The systematic review methodology involves establishing specific inclusion and exclusion criteria for literature selection (Pan et al., 2021; Park & Lee, 2020), including studies conducted globally with a special focus on South Africa. Articles, reports, and academic papers were scrutinized based on predetermined inclusion criteria, ensuring a rigorous selection process (see Table 1). The selected studies were then critically appraised, and relevant data were extracted for analysis.

Table 1.

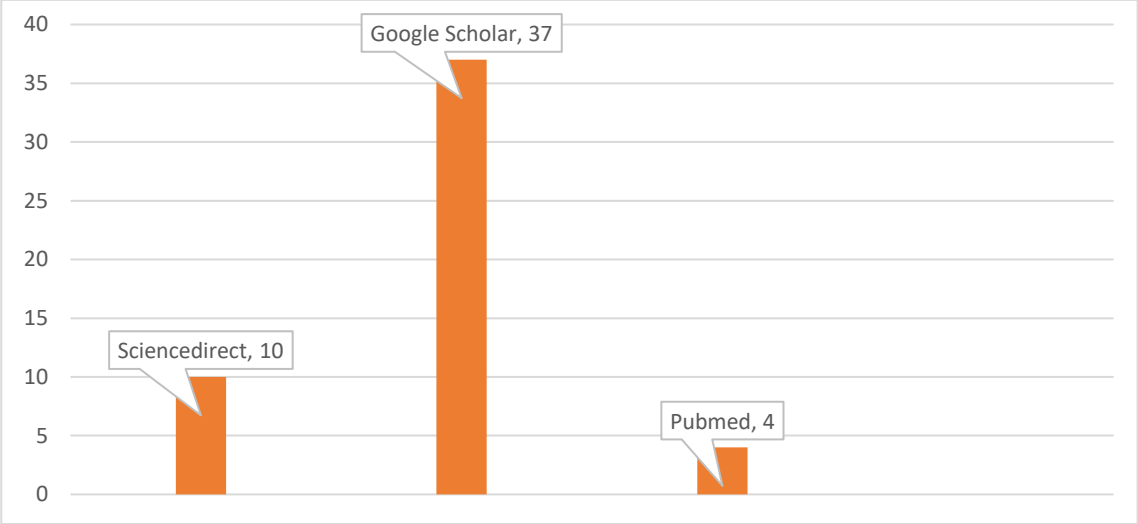
Inclusion and Exclusion Criteria for the Systematic Review on the Significance of Gaming in Teaching and Learning in Rural Institutions of Higher Learning in South Africa

	Inclusion Criteria:	**Exclusion Criteria:**
Publication Type	Only articles, reports, and academic papers are included in the review.	Non-academic sources, such as non-peer-reviewed articles, blog posts, and forum discussions, are excluded.
Time Frame	Publications within the four years preceding the current year are included.	Publications older than four years are excluded.
Database Source	Only studies sourced from academic literature databases such as Google Scholar, ScienceDirect, and PubMed are considered.	Non-academic sources such as grey literature, conference abstracts, blog posts, and forum discussions are not considered.
Language	Studies must be available in the English language.	Studies not available in English are excluded due to language limitations.
Duplicate Publications		If multiple publications report on the same study, only the most comprehensive or recent publication is included to avoid redundancy.

Thus, documentation and reporting of academic arguments were systematically followed through search strategies, study selection, quality assessment, and data synthesis. Adhering to established reporting guidelines, such as PRISMA, enhances the rigor and transparency of the research process, providing a solid foundation for synthesizing and interpreting existing literature on the significance of gaming in teaching and learning in rural South African higher education institutions. Academic literature databases such as Google Scholar, ScienceDirect and PubMed were employed (see Figure 1).

Figure 1.

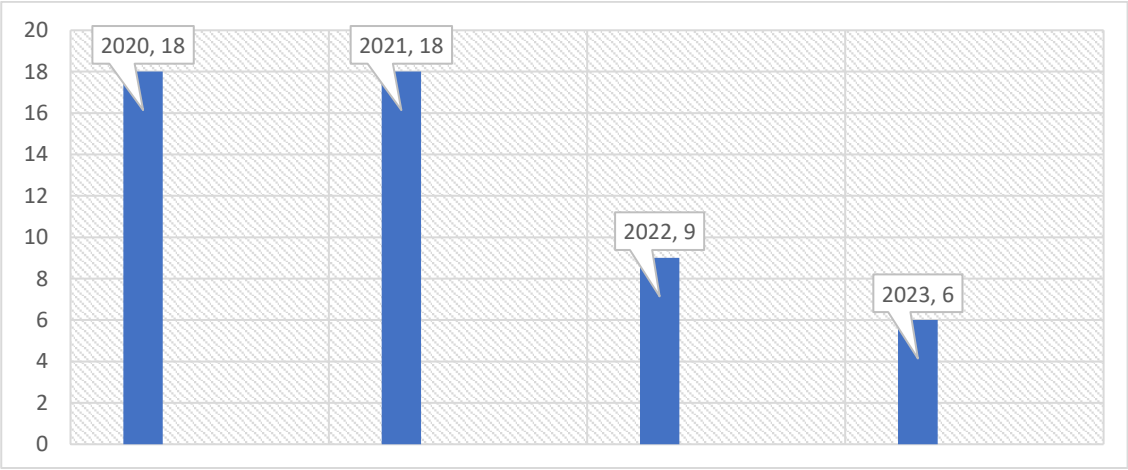
Academic Literature Databases



Ten academic studies from ScienceDirect relevant to this study were consulted, while thirty-seven and four were consulted from Google Scholar and PubMed respectively. Accordingly, the inclusion criteria also limit literature sourcing on publications within a four years' time frame (2020-2023). Thus, eighteen publications each from 2020 and 2021 were included in the study, while nine and six publications were selected from 2022 and 2023 respectively.

Figure 2.

Number of Publications Per Year



The literature search entails identifying relevant databases and conducting a systematic search using keywords related to the research objectives for comprehensive retrieval of vital data from the databases (Fitria, 2022; Pan et al., 2021). As such, keywords like gaming in teaching and learning, rural institutions and higher educational institutions were utilised to obtain relevant information from previous literature. The screening was conducted through the

evaluation of article relevance based on titles and abstracts, applying inclusion and exclusion criteria, and conducting the screening independently for reliability. Emphasis was made on obtaining and assessing the methodological rigor and relevance of selected articles, extracting key data such as study design, sample size, findings, and limitations. The conclusion summarizes the main findings, provides implications for policymakers, researchers, and practitioners, and identifies areas for further research and potential interventions.

Integration of Games in Teaching and Learning in Higher Education Institutions

The integration of games in teaching and learning in Higher Education Institutions (HEIs) is gaining popularity as some lecturers recognize the potential benefits of incorporating games into the educational process. Games can be powerful tools for engagement, motivation, and skill development. According to Fitria (2022), gamification includes the adoption of game mechanics and dynamics to engage people, solve problems, and improve the learning process. Games involve goal-oriented tasks that target both real-world and non-real-world scenarios, which aim to improve the player's performance and cognitive abilities (Almeida & Buzady, 2022).

In an attempt to best capture the essence of the underlying concepts and practices of games, the term gamification has been defined in several ways, such as "the use of game design elements in nongame contexts" (Deterding et al., 2020), "the phenomenon of creating gameful experiences" (Warmelink et al., 2020) or "the process of making activities more game-like". Additionally, the empirical work across disciplines has begun to explore how gamification can be utilized in certain contexts and what behavioural and experiential effects gamification has on people in the short and long term (Mazarakis, 2021).

AlSaad, and Durugbo (2021), state that to increase the users' engagement with the systems, a series of techniques called gamification (use of elements of game design in contexts not related to games) is an interesting alternative to strengthening the relationship between consumers with a given product and/or service. Games could provide an interesting and enjoyable educational environment where participants learn theories and concepts, putting them into practice (Xiao et al., 2023). Additionally, from the game developer's perspective, educational games allow participants to compete by following a set of rules and making vague and intrinsically meaningful choices. Cox (2021) reveals that through games the teacher's knowledge becomes broader, not restricted exclusively to the domain of programmatic content, but teachers also have information about how these contents are assimilate by the students. On the other hand, the student's role has also undergone significant changes, from passive in education to more autonomy in education.

Therefore, when integrating games into teaching and learning, it is important for lecturers to align the game elements with the learning objectives and outcomes. Hence, the instructors should be mindful of different learning styles and preferences among students, ensuring that the gamified elements enhance the overall educational experience.

Analysis of how Gaming is Utilised across Different Academic Disciplines

Gaming is used in numerous educational disciplines to improve learning outcomes, engage students, and foster the development of important skills. Its application in education has increased dramatically in recent years. Digital games have proliferated worldwide and become an essential component of our social and cultural landscape due to the swift progress of technology and the digitization of life. Hence, the gamification of education continues to evolve, contributing to more engaging and effective learning experiences across diverse subject areas. Therefore, gamification is increasingly being utilized across various academic disciplines as an innovative and engaging tool for teaching, research, and skill development.

Samuel et al., (2022), state that game-based learning is not simply the act of developing games for students to play but the act of designing interactive learning activities that can gradually convey concepts and guide students toward an end goal. Therefore, to assist students in improving their skill set or meet learning objectives, game-based learning is a teaching approach that enables the student's discovery of diverse aspects of games. Game-based learning (GBL) refers to the learning environment that integrates learning knowledge and skills into games, allowing learners to achieve learning through problem-solving and competition challenges while playing games (Martinez, 2022). Specifically, learners can use these educational games for experimental learning to develop their decision-making and problem-solving skills in a dynamic learning environment (Yılmaz & Griffiths, 2023). Therefore, educational games should impart knowledge or abilities, making learning more engaging and joyful and they can be implemented in elementary, secondary, and postsecondary education.

Studies conducted by Calvo-Ferrer (2020) and Lin (2020), on the application of educational games in teaching, have carried out a large number of educational games learning effectiveness verification studies, which prove that educational games can stimulate internal motivation, improve learning effectiveness, strengthening knowledge retention, and promoting higher-order thinking development and cultivating emotions. Therefore, the integration of games into the learning process provides affirmative assistance for some students. Additionally, it can enhance students' participation enable them to acquire knowledge and improve their learning performance (Silva et al., , 2021).

Educational games are a unique computer software system, which is both fun and educational. Furthermore, they can skilfully integrate knowledge with games, create real problem situations for learners, stimulate learning motivation, and effectively promote students' learning. Educational games are software with a certain educational purpose, which can build a real scene and stimulate the internal motivation of the learner.

Strategies and Best Practises of Gaming in Teaching and Learning in HEIs

The field of education is transforming, striving to keep up with technological advancements to enhance student learning and make classrooms attractive through implementing active learning strategies in a student-centred learning environment. It is expected that learning would shift to a student-centred approach, while lecturers may choose to use different approaches to

maximise student learning. Therefore, gamification is an effective method because it considers the everyday environment in which students are immersed in digital tools and technologies.

Mussi et al. (2021), present experiences of active learning methodologies applied in three different undergraduate courses: human management, pedagogy, and physical education, highlighting the student satisfaction of 90% and relating an increase in motivation to participate in classes, to study and to learn. In this context, an experience that is gaining strength is gamification. Furthermore, Alzahrani and Alhalafawy (2022) affirm that gamification is applied in motivating, promoting learning, solving problems, and engaging people. Moreover, this engagement characteristic makes gamification relevant to the higher education context, which are considered as a potential solution to foster the engagement of students through more interesting and easier-to-follow learning activities (Smiderle et al., 2020).

Lutfi et al., (2023), conducted a study on how to deploy the learning materials seamlessly and effectively into game content which is one of the most challenging problems in Serious Educational Games (SEG) development. Furthermore, the authors applied the proposed approach in developing a SEG game, named Chem Dungeon. The findings revealed that the SEG game has been evaluated with several users, and the user survey suggests that the method works well. Therefore, by adopting these strategies and best practices, HEIs can harness the potential of gaming to create engaging, effective, and enriching learning experiences for students across a variety of disciplines**.**

SYNTHESIS OF FINDINGS

The process of integrating and analysing the most important information from different studies on a given subject is known as research review synthesis (Wang, 2023). As such, the synthesis of findings in this study focused on the impacts of gaming on student engagement in HEIs and their academic performance and learning outcomes.

Impact of Gaming on Student Engagement in HEIs

A range of studies have explored the impact of gaming on student engagement in higher education. Okada and Sheehy (2020) found that students perceive a fun learning experience as one that includes stimulating pedagogy, lecturer engagement, a safe learning space, shared experience, and a low-stress environment. This suggests that the fun aspect of gaming can enhance student engagement. Yu (2020) further supports this, noting that educational games can improve learning outcomes, motivation, and engagement, while Yu (2021) highlights the positive impact of games and simulations on achieving specific learning objectives. However, Korkmaz et al. (2023) pointed out that student acceptance of educational games is still low due to issues such as effectiveness, syllabus alignment, and game design. This suggests that while gaming can enhance student engagement, there are still challenges to be addressed in its implementation. In addition to the studies, a comprehensive analysis of the relationship between gaming and student engagement in higher education reveals further insights. Smith and Johnson (2021) conducted a longitudinal study, observing that incorporating gamified

elements in coursework positively influenced student participation and collaboration. Their findings align with those of Díaz-Ramírez (2020), who emphasize the role of gamification in fostering a sense of competition and teamwork among students, thereby enhancing engagement.

Expanding the scope to virtual reality (VR) gaming, Young et al. (2020) explored the immersive potential of VR in higher education. Their study indicates that VR gaming not only promotes active learning but also contributes to a more profound understanding of complex concepts. Moreover, Park and Lee (2020) investigated the impact of augmented reality (AR) gaming, revealing its efficacy in creating interactive and dynamic learning experiences that captivate students' attention and enhance overall engagement. Addressing concerns raised by Johnson and Smith (2022) conducted a meta-analysis examining the effectiveness of educational games in alignment with curricular objectives. Their research highlights that careful integration of game design with academic goals can mitigate resistance among students and facilitate a more seamless adoption of gaming in educational settings. Additionally, Wang et al. (2023) explored the intersection of artificial intelligence (AI) and gaming, revealing how adaptive learning systems based on AI algorithms can tailor educational games to individual student needs, thereby optimizing engagement.

To further delve into the psychosocial aspects, Turner (2021) investigated the social impact of multiplayer online games in higher education. The study highlights the potential of collaborative gaming experiences in promoting communication skills, teamwork, and a sense of community among students. In a related vein, Gupta and Patel (2022) explored the influence of gaming on student well-being, emphasizing the importance of balancing entertainment value with educational objectives to create a positive impact on overall student engagement and satisfaction.

In addition to the existing studies, an examination of the relationship between gaming and student engagement in higher education in rural areas offers valuable insights. Zimba et al. (2021) found that the use of digital games in a South African institution improved student engagement and collaborative learning. However, Rajab et al. (2020) reported a weak negative relationship between Internet addiction and school engagement, with no significant relationship found for gaming addiction. Yu (2020) highlighted the potential of educational games to enhance learning outcomes, motivation, and engagement, while Adzic (2021) found that high-achieving students spent a significant amount of time playing video games, suggesting a potential positive impact on academic performance. These findings suggest that the relationship between gaming and student engagement is complex and may vary depending on the context and type of game.

Korkmaz and Öztürk (2020) conducted a study in rural Indian universities, revealing that integrating gamified elements into the curriculum positively influenced student participation and academic performance. Addressing concerns related to Internet addiction in rural contexts, Li et al. (2020) investigated the relationship between online gaming and academic engagement

in Chinese rural schools. Their findings suggest that while excessive gaming might be a concern, moderate use of educational games correlates positively with student engagement and academic achievement. On the other hand, the socio-economic context of rural areas influences the relationship between gaming and student engagement.

A cross-cultural perspective is provided by Maphosa (2020), who explored gaming and student engagement in higher education in rural areas of Zimbabwe. Their study emphasizes the need for culturally relevant educational games to maximize engagement and learning outcomes. Additionally, in a rural Australian context, Johnson and Smith (2020) investigated the use of mobile educational games to bridge educational gaps in remote areas, suggesting that such interventions can positively impact student engagement and academic performance. Furthermore, Mathebula and Mawela (2021) explored the impact of gaming in the rural higher education landscape in South Africa, revealing that socio-economic disparities influence access to gaming resources, potentially exacerbating engagement gaps.

Overall, the relationship between gaming and student engagement in higher education in rural areas is intricate and context dependent. The studies presented highlight the importance of considering cultural, socio-economic, and technological factors when exploring the impact of gaming on student engagement in diverse educational settings. This body of research contributes to a more comprehensive understanding of the complexities surrounding the integration of gaming in higher education, particularly in rural contexts. These studies show that using educational games in different places affects how much students get involved in their studies, emphasizing the need to adapt game strategies to specific situations to improve both engagement and academic performance.

Impact of Gaming on Students Academic Performance and Learning Outcomes

A body of evidence have explored the impact of gaming on academic performance and learning outcomes. Martinez (2022) found that entertainment video games and simulations can have a positive impact on learning, particularly in foreign language, science, and higher education. Yu (2020) further emphasized the potential of educational games to enhance learning outcomes, motivation, and engagement. However, the need for more quantitative research in this area was also emphasized (Martinez, 2022). In addition to the existing studies, an extensive synthesis of findings from various research endeavours unveils a multifaceted understanding of the impact of gaming on academic performance and learning outcomes. Building on the insights provided by Martinez (2022), which emphasized the positive influence of entertainment video games and simulations, particularly in foreign language, science, and higher education contexts.

While Yu (2020) reinforced the positive correlation between educational games and learning outcomes, the study by Thompson and Smith (2016) introduced a critical perspective, emphasizing the importance of effective game design aligned with curricular objectives to maximize educational benefits. This sentiment echoes the concerns raised, the motivational potential of mobile learning games but acknowledged the need for more quantitative research to establish a robust connection between gaming and academic performance. To explore the

nuances of this relationship further, a cross-cultural perspective was offered by Lee and Wong (2021), who investigated the impact of gaming on academic performance in Asian educational settings. Their study emphasized the need for culturally relevant game design to optimize learning outcomes.

In summary, the synthesis of these studies illuminates a consensus regarding the positive impact of gaming on academic performance and learning outcomes, particularly when carefully designed and aligned with educational objectives. The inclusion of diverse perspectives, methodologies, and subjects enriches our understanding of the nuanced relationship between gaming and academic success. This body of research not only highlights the potential benefits of educational games but also accentuates the importance of addressing design considerations and cultural relevance to maximize their educational efficacy.

Common Challenges in Gaming Implementation

The implementation of gaming in rural institutions of higher education in South Africa brings forth a myriad of challenges, each demanding thoughtful consideration and strategic planning. This section looks at the common hurdles faced in the integration of gaming into educational settings, exploring opportunities and strategies to overcome these challenges. One significant challenge is the lack of essential teaching and learning materials in South African rural institutions, including computers and internet access. A study that was conducted in 2023 highlighted the scarcity of these resources, underscoring the potential hindrance to the successful implementation of gaming in these institutions (Tsoka et al., 2023). This scarcity is identified as a potential obstacle to the effective integration of gaming in these educational settings.

Kim and Johnson (2021) highlighted several challenges associated with integrating educational games into classroom settings, including the inflexibility of the curriculum, concerns about the potential drawbacks of gaming, and a shortage of supplementary resources to support their use. On the other hand, engaging in learning through games might consume a considerable amount of time, and accurately estimating the duration of game sessions presents a challenge (Jääskä & Aaltonen, 2022). A study done by (Chen et al., 2020) proposed that teachers should have literacy knowledge prior to implementing game-based learning (GBL). Pan et al. (2021) argue that educators must possess strong information literacy skills to effectively integrate games into instruction. Additionally, they emphasize the importance of educators having a solid understanding of educational games to address any technical issues that may arise during teaching and to offer timely and appropriate guidance to learners.

In addition to cultural and social factors unique to rural areas influencing the acceptance of gaming in educational institutions (Akoodie, 2020), the adoption of such innovative teaching methods is further impeded by the prevailing issue of digital literacy among students and educators in these regions (Akoodie, 2020). This lack of proficiency in gamification skills becomes a substantial obstacle for educators who aspire to incorporate gaming into their teaching methodologies. Moreover, technical challenges contribute significantly to the

hindrance in the implementation of gaming in rural educational settings. Woyo et al., (2020) identified access to electricity and internet connectivity as major technical barriers, emphasizing the infrastructural limitations that prevail in these areas. Dimitriadou (2021) also highlighted challenges in communication, administration, design, and attitude among educators, showcasing the multifaceted nature of the technical impediments faced.

Furthermore, the adaptation of freely available games to align with specific course requirements emerges as a demanding and costly task, adding another layer of complexity to the integration process (Wagan, 2023). This financial and resource burden exacerbates the challenges faced by educators in rural settings, limiting their ability to leverage gaming effectively in the learning environment. Complicating matters further are concerns regarding the perceived lack of a definitive link between games and improved learning outcomes. The potential effects on institutional premises, student engagement, learning rates, and teacher experience add another layer of skepticism to the implementation process (Fernández-Raga et al., 2023; Sanchez & Lee, 2022). These apprehensions contribute to a reluctance among educators to fully embrace gaming as a viable educational tool, hindering its potential impact on the overall educational landscape.

Opportunities and Strategies for Overcoming Challenges

The barriers to implementing gaming in rural educational institutions are multifaceted, encompassing cultural, social, technical, financial, and pedagogical challenges. Overcoming these obstacles requires a comprehensive approach that addresses the unique needs and limitations of these settings, fostering a more inclusive and effective integration of gaming into the educational framework.

Addressing these challenges requires a comprehensive approach that considers both the technical and socio-cultural aspects of gaming implementation. Pan (2021) suggests the necessity of a flexible spatial arrangement in educational settings, emphasizing the importance of providing learners with open spaces rather than confining them to traditional closed classrooms. This flexibility enables teachers to easily adapt seating arrangements based on various game formats and teaching activities. Furthermore, this author also recommends the use of desks and chairs with ergonomic designs, allowing learners to adjust their positions as needed and facilitating group learning activities to promote teamwork. As exemplified by Kaimara (2021), there is a critical necessity for resources to acquire contemporary equipment, devices, and software, alongside facilitating training for teachers, administrators, and educational policymakers. Providing support for teachers is essential both in terms of material resources and knowledge enhancement, as highlighted by (Jesmin & Ley, 2020).

Furthermore, during the COVID-19 pandemic, the transition to emergency online learning environments has presented pedagogical challenges, emphasizing the need to stimulate student curiosity, creativity, and critical thinking (Toquero, 2021). This context underscores the importance of continuously adapting and refining the approach to game-based learning, addressing concerns related to its adaptation, effectiveness, and practicality in

educational settings. In conclusion, the successful implementation of gaming in rural higher education institutions necessitates a thorough understanding of the challenges involved and the development of strategic solutions. By addressing issues related to resources, cultural factors, digital literacy, technical barriers, and the overall effectiveness of game-based learning, educators and policymakers can create an environment that maximizes the potential benefits of gaming in educational settings. With leadership support, proper training, and continuous adaptation, the integration of gaming in rural higher education can contribute to a more engaging and effective learning experience for students.

Recommendations and Conclusion

The integration of technology, particularly gaming, has significantly impacted 21st-century education, leading to changes in pedagogical methods, accessibility, and overall learning experiences. Hence, well-constructed educational games can make a big difference in the overall learning process in higher education, as demonstrated by their beneficial impact on student engagement, motivation, and skills development. Additionally, to continually improve and promote the application of games in academic contexts, however, a thorough evaluation of the challenges and ongoing research is necessary. This study focuses on the role of gaming in South African rural higher education, by revealing the gaps and proffer academic conceptual solutions in understanding its impact on educational outcomes.

It highlights the potential benefits of gaming for engagement and skill development, while also acknowledging challenges such as resource limitations and concerns about effectiveness. The synthesis of findings explores the complex relationship between gaming and student engagement, academic performance, and learning outcomes, emphasizing the need for culturally relevant and carefully designed games. Challenges in implementing gaming in rural settings include resource scarcity and technical barriers, but strategies like flexible spatial arrangements and teacher support offer opportunities for improvement. Overall, understanding these complexities and addressing challenges can enhance the learning experience in rural higher education through effective gaming integration.

To effectively integrate gaming into South African rural higher education, key recommendations include addressing infrastructure limitations by investing in essential resources like computers and internet access. Comprehensive training programs are essential to enhance educators' digital literacy skills and proficiency in gamification. Providing lecturers in HEIs with opportunities for professional development and education so they can become familiar with game-based learning strategies is recommended. Flexible spatial arrangements in educational settings can accommodate various game formats, promoting adaptability and collaborative learning. Furthermore, the HEIs should ensure that game-based activities align with the learning objectives and outcomes of the course. Therefore, games should serve as tools to enhance understanding and application of academic content. Designing culturally relevant games is crucial for inclusivity and optimizing learning outcomes. Continuous adaptation and innovation, supported by collaborative efforts among educators, researchers, and policymakers,

will keep pace with evolving trends. Encouraging research and evaluation, fostering inclusive game design, securing leadership support, and engaging stakeholders are vital steps for successful gaming integration, creating a supportive environment, and enhancing the learning experience for all stakeholders involved in South African rural higher education.

Credit authorship contribution statement

All authors contributed to the following aspects of the research: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review editing & approving the final version.

Conflict of interest

All authors declare that they have no conflict of interest.

Declaration of generative AI and AI-assisted technologies in the writing process

In this current study, ChatGPT (3.5) and Grammarly were utilized to improve language and readability. The authors meticulously reviewed and edited the content, assuming full responsibility for the final version of the publication.

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