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Virtual Reality (VR) Based Material in Teaching English in Higher Education Institution: A Bibliometric Analysis

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ABSTRACT

This bibliometric analysis explores the integration of Virtual Reality (VR) technology in English language instruction within higher education institutions. This study uses Publish or Perish (PoP) and VoS Viewers software. Publish or Perish was used to find out and analyse the article indexes by Crossref related to the virtual material teaching English in higher education institutions from 2019 to 2024, with a 1000-document limitation. Examining Virtual Reality (VR) resources for English language instruction in higher education reveals a heightened research interest, particularly during the pandemic. An analysis of 1,000 articles from 2019 to 2024 indicates a significant increase in publications concerning distance learning requirements. Collaborations among researchers exhibit robust networks, highlighting substantial themes such as pandemic challenges and the integration of immersive technologies. Virtual reality possesses the capacity to enhance student engagement; however, challenges related to infrastructure, cost, and accessibility must be resolved. Collaboration between educators and researchers is crucial to surmount these obstacles and leverage technology, ensuring a balance between conventional methods and innovative practices in English language instruction. Utilizing virtual reality (VR) materials in the instruction of English within higher education institutions offers promising prospects for transforming the conventional classroom into a dynamic and interactive educational environment. The ongoing advancement of technology necessitates further investigation and examination of virtual reality (VR) applications in education to fully utilize their capacity to enhance the teaching and learning process.

Keywords: Virtual Reality; Education; English; Language; Higher Education

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1. Introduction

Technology has been pivotal in transforming education in recent years, providing educators and students with diverse tools and resources that enhance learning. Among these advancements, Virtual Reality (VR) has emerged as a significant innovation, enabling immersive and interactive learning environments that simulate real-world scenarios. Initially developed in the mid-20th century for military and research purposes, VR technology has become more accessible and user-friendly, finding applications across various sectors, including education [1].

Research indicates that VR can substantially benefit English language learning, improving pronunciation, reading comprehension, and intercultural communication skills while reducing learner anxiety. However, integrating VR in educational settings presents challenges, including high costs, technical difficulties, user experience, and engagement concerns [2]. This study delves into the trends and implications of using VR-based materials to teach English in higher education. The research questions we seek to address are pivotal in understanding the role of VR in enhancing English language instruction:

(1) What are the main trends in the research of VR-based materials for teaching English in higher education institutions over the past decade?
(2) Who are the most cited authors and key influential papers in VR-based English language education?
(3) How do collaboration networks and keyword trends shape the development of VR-based teaching materials in English language education?

By investigating these questions, this research aims to contribute to a deeper understanding of VR's role in enhancing English language instruction and to provide practical insights for educators looking to implement VR technology effectively.

2. Literature Review

Virtual Reality (VR) based material for teaching refers to using VR technology to create immersive and interactive learning environments that simulate real-world scenarios. With VR technology, students can experience learning in a 3D environment that closely resembles real-life conditions, allowing them to engage with and navigate a virtual setting. This technology is beneficial in teaching subjects like language, where students can practice their language skills in a simulated environment that mimics real-life situations. VR technology has opened new educational horizons and allowed students to learn innovatively. VR technology has been increasingly used to teach English in higher education institutions [3]. It allows students to experience immersive and interactive learning environments that simulate real-world scenarios. With VR technology, students can practice their language skills in a simulated environment that mimics real-life situations, such as ordering food in a restaurant, booking a hotel room, describing things, and conversing with a native speaker. Moreover, VR technology can provide students instant feedback on their language proficiency, enabling them to improve their skills more effectively [4]. The use of VR-based material in teaching the English language has shown promising results, suggesting that it can significantly enhance students' language learning experience and improve their language skills.

Virtual reality (VR) technology has its roots in the mid-20th century when early forms of VR were used for research and military training. The first VR head-mounted display was developed by Ivan Sutherland in 1968, and it consisted of a bulky headset that displayed wireframe graphics to the user. In the 1980s and 1990s, VR technology became more widely available to consumers, but it was still expensive and limited in functionality. In recent years, technological advancements have led to more affordable and user-friendly VR devices, such as the Oculus Rift and HTC Vive, making VR more accessible to a broader range of users [5]. Today, VR technology is used in various applications, including entertainment, education, healthcare, and more [6].

Virtual reality (VR) is a computer-generated three-dimensional (3D) environment that allows individuals to engage with and navigate around a virtual setting that closely resembles real-life conditions [7]. With VR technology, students can practice their language skills in a simulated environment that mimics real-life situations, such as ordering food in a restaurant, booking a hotel room, or conversing with a native speaker. Moreover, VR technology can provide students instant feedback on their language skills, allowing them to identify areas where they need to improve. This feedback can be crucial in helping students develop their

language skills quickly and effectively [8]. Using technology in teaching and learning has opened up new educational horizons.

Virtual Reality has become an exciting phenomenon in education. This technology helps make learning more varied, adaptive, and exciting [9]. Besides that, virtual Reality could significantly improve the interaction during the learning process, leading to a more engaging and exciting educational experience for students [10]. Virtual reality-based material could reduce students' nervousness because it creates a sense of realism [11]. And then, in another article, VR can potentially improve civil engineering education, PBL, and tasks [8]. This is supported by the article, which stated that Virtual reality (VR) learning has been found to enhance student engagement levels, leading to improved academic performance [12].

The primary emphasis of this approach lies in the visual three-dimensional component of virtual reality, without integrating actual movement as observed in fully immersive VR experiences. An illustrative instance of semi-immersive virtual reality (VR) is the flight simulator that airlines, aerospace technology, industrial engineering design, and military organisations employ for pilot training [12]. Fully immersive virtual reality provides an exceptional experience, fully engrossing the viewer in the simulated three-dimensional environment. It integrates visual, auditory, and, occasionally, tactile elements. Individuals don specialised gear such as helmets, goggles, or gloves, enabling them to engage with their surroundings actively. In addition, the space may include equipment like treadmills or stationary bicycles to offer users the experience of physical movement [13]. Virtual reality is utilised across diverse domains, encompassing gaming, teaching, medical simulations, and architecture. Users are provided with the capability to generate simulated, interactive, and purposefully created settings, thereby augmenting the user experience through fully immersive and interactive technologies [6].

Technology has revolutionised the way we learn and teach in recent years. With the advent of various educational technologies, students and teachers can access a wide range of tools and resources that make the learning process more efficient and effective. One of the most significant developments is using virtual reality (VR) technology in teaching and learning. VR technology allows students to experience immersive and interactive learning environments that simulate real-world scenarios [14].

In general, VR positively impacts the education sector based on several previous research results, including foreign language teaching, especially English learning. The results of several research studies confirm that there are three advantages of using VR in EFL: improving students' pronunciation, reading comprehension, speaking, and listening comprehension, enhancing intercultural learning, and reducing learners' anxiety [15]. And another article explains that virtual reality (VR) technology can enhance language instruction and facilitate the advancement and progress of English teaching [16]. VR can offer comprehensive insights into pupils' performance by providing precise instructions on modifying many characteristics, including voice volume and speech rate, among other factors [17]. Virtual reality enables students to comprehend and elucidate phenomena and situations beyond the reach of conventional approaches, immersing them in the real world through modelling [18]. Virtual reality (VR) technology can also enhance language instruction and facilitate the advancement and progress of English teaching [16]. Another benefit of using VR in teaching EFL is that a VR environment could improve students' achievement more than students who were taught traditionally [19].

Another important thing is combining English language materials with Virtual Reality. Designing VR-based material for teaching the English language can be an exciting and innovative way to enhance the learning experience for students. With virtual reality technology, students can immerse themselves in scenarios that simulate real-life situations, allowing them to practice their language skills in a safe and controlled environment. To design VR-based material for teaching the English language, it is essential to clearly understand the learning objectives and outcomes that need to be achieved. The material should align with the curriculum and focus on specific language skills such as listening, speaking, reading, and writing. Incorporating interactive activities such as role-playing, gamification, and simulations can make the VR-based material more engaging and effective. For example, students can role-play as hotel receptionists and interact with virtual guests, allowing them to practice their conversation and customer service skills. The VR-based material should also provide instant feedback to students, allowing them to identify their strengths and weaknesses and work on

improving their language skills. Teachers can track student progress and provide personalised feedback, tailoring their teaching approach to individual student needs.

Virtual reality may offer precise guidance on modifying particular aspects while offering clear insights into the students' performance[17]. This suggests that a well-designed combination of VR and instructional materials would have a positive impact. Immersive material design could enhance students' experiences and engagement during the learning process. Because the language environment and motivation are essential for effective language learning, creating novel, motivated language learning environments, such as virtual reality (VR), emerges as a pivotal component in the learning process[20]. Virtual reality in an educational setting enables students to comprehend and elucidate phenomena and situations beyond the reach of conventional approaches, immersing them in the real world through modelling[18].

3. Methodology

This study uses Publish or Perish (PoP) and VoS Viewers software. **Figure 1** shows the process of collecting the data from Crossref. Publish or Perish was used to find out and analyse the article indexes by Crossref related to the virtual material teaching English in higher education institutions from 2019 to 2024, with a 1000-document limitation. Crossref is used because many publishers and libraries employ Crossref's indexing service, which is widely considered one of the best, to make sure that their content is discoverable and accessible to a worldwide audience. Crossref supports research visibility and impact by offering high-quality indexing for scholarly information. It also plays a significant role in furthering knowledge and innovation across various sectors.

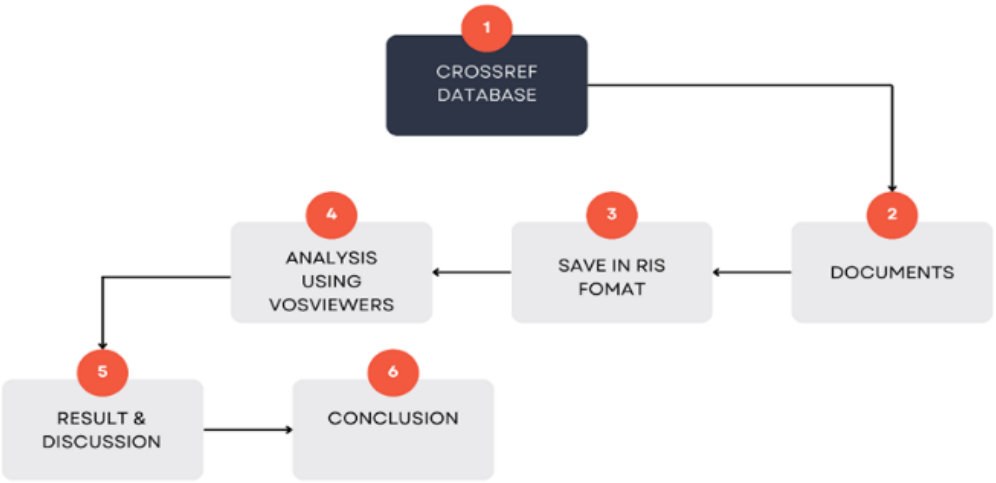

Figure 1. The process of collecting data.

Vo's viewers were also used in this study to analyse and map the articles related to the VR-based material in teaching English in higher education institutions—the software package known as VOS viewer is utilised to generate and visualise bibliometric networks. For example, these networks can encompass many entities, such as journals, researchers, or individual publications. They can be formed by considering citation patterns, bibliographic coupling, co-citation relationships, or co-authorship connections. In addition, VOS viewer has text mining capabilities that enable the creation and visualisation of co-occurrence networks, including significant phrases derived from a corpus of scholarly literature[21].

When the data has been acquired and stored in a RIS file or Research Information Systems Citation File format, the subsequent procedure involves inputting the file into Vosviewer software. This process aims to visually represent network patterns or connections among bibliometrics, which can be categorised into three distinct types: network visualisation, overlay visualisation, and density visualisation. On the other hand, network visualisation aims to visualise the network's strength or the relationship between research terms. Overlay visualisation, on the other hand, aims to visually represent historical traces based on the publication year of the research. Density visualisation, on the other hand, seeks to visualise the density or emphasis on research groups.

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4. Findings and Discussion

These are the findings of a Research Map (PoP) analysis focused on exploring and searching for scholarly articles registered in the CrossRef database. The study sought to discern trends, patterns, and significance of pertinent research and assess the influence of these articles within the discipline. The study employs a systematic methodology and analytical approach to offer profound insights into the contributions and evolution of the existing literature.

4.1. The Main Trends in the Research of VR-based Materials for Teaching English in Higher Education Institutions over the Past Decade

The data presented in the attached **Figure 2** comes from a comprehensive publication searching and tracking using Publish or Perish. The search specifically targeted the Crossref publication "Virtual Reality-Based Materials in English Language Teaching in Higher Education Institutions," published between 2019 and 2024. It resulted in 1000 articles with 4117 citations, 823.40 citations per year, 4.12 citations per paper, and 1725.88 citations per author.

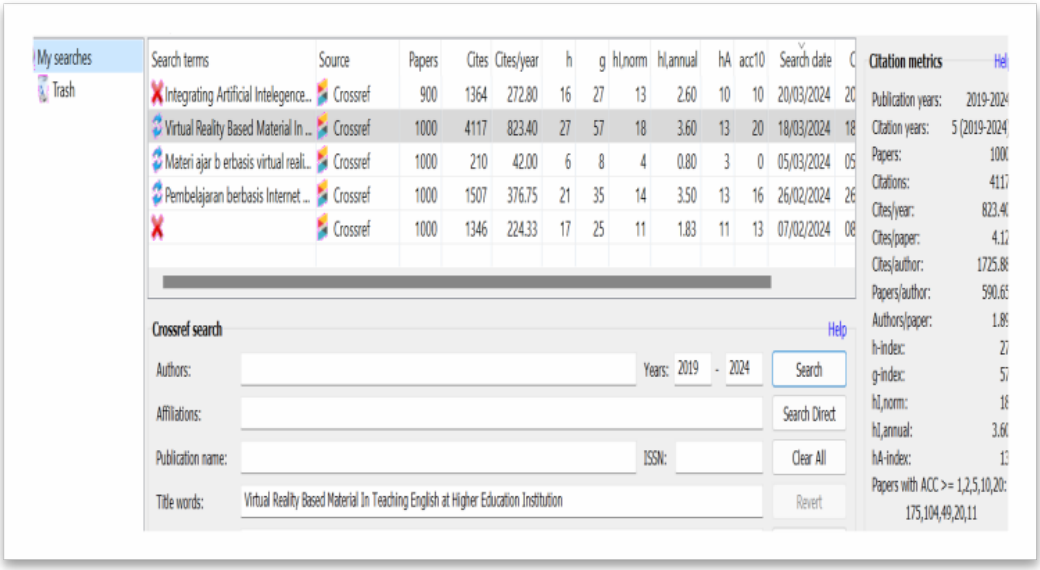

Figure 2. The result of VR-based material Searching.

An investigation of 1,000 documents published over five years on VR-based materials in English instruction within higher education shows significant research engagement and growing interest. In 2019, 146 documents (14.6%) marked the initial surge in interest in VR's educational applications, likely due to increased affordability and accessibil-

ity. Research continued to rise in 2020, with 210 documents (21%) reflecting the demand for innovative remote learning solutions during the pandemic. In 2021, publications slightly declined to 185 documents (18.5%), but VR remained crucial for immersive learning as institutions adapted to hybrid models. Research continued in 2022 with 179 documents (17.9%), emphasizing VR's role in enhancing language engagement. In 2023, interest peaked at 230 documents (23%), highlighting VR's integration into educational practices. By March 2024, 50 papers (5%) were produced, indicating a robust trajectory for VR in education. Overall, the consistent growth over five years underscores substantial academic interest in VR-based research in English education, driven by technological advancements and educational needs.

In **Figure 3** above, the line graph shows the changes in the quantity of "Documents" from 2019 to 2024. Key points include: In 2019, the count started at about 150, rising significantly to around 220 in 2020. A slight decline occurred between 2021 and 2022, stabilizing at approximately 200. The number increased again in 2023, nearing 220, but then dropped sharply in 2024 to about 50. This reflects a growth phase followed by stability and a drastic decline, suggesting possible shifts in data collection or production processes. There's potential for increasing document numbers in 2024, especially with the rising interest in virtual reality in education.

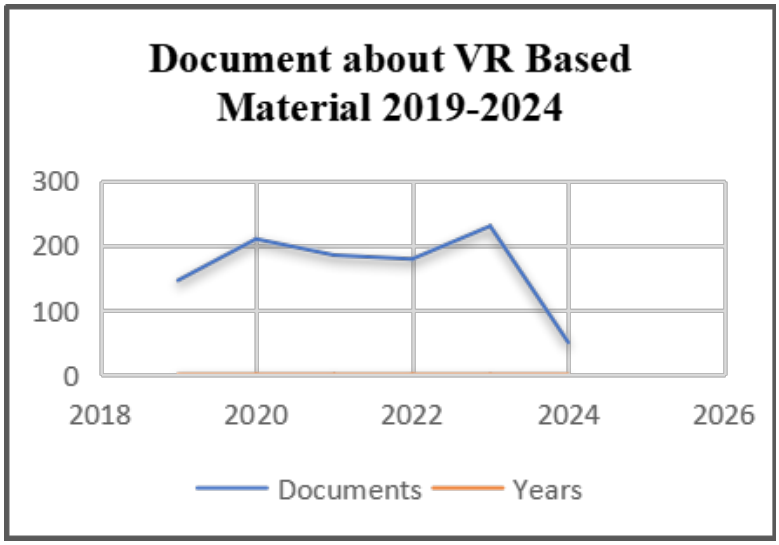

Figure 3. The VR Documents in 2019 to 2024.

4.2. The Mapping of Publications about VR, VR-based Material based on the Author (Co-Authorship)

This analysis focuses on key authors who have significantly contributed to the research domain. The "Documents" in **Figure 4** above shows the number of publications each author has: Yulia Simanova has 5, Nourddine Amrous has 4, and Jamal Bahmadi has 2. "Aggregate Link Strength" evaluates the strength of collaborations among authors through co-authorship and citations. For example, Simanova has a link strength of 13, indicating strong connections, while Bahmadi and Chapaiskov have a link strength of 12. Simanova and Amrous are likely to have a considerable impact on the research area due to their publication volume and strong linkages, signaling their prominence within the field.

The illustration in **Figure 5** shows a network visualization created with VOSviewer, which is used for bibliometric network construction.

Nodes (Circles): Each circle represents an author or research entity in Virtual Reality (VR) and English teaching research. Larger nodes indicate authors with more significant contributions to the field. Edges (Lines): The lines between nodes illustrate co-authorship. Thicker lines signify stronger collaborations, indicating multiple joint papers or projects. The network features at least two color clusters: green and red, representing groups of closely collaborating authors. For example, Simonova Yuliia in the green cluster has strong ties with Petrenko, Andriy, and Podkopayev, Serhii, while the red cluster includes Iordanov Igor and Boichenko Hennadii. Slim lines between clusters show collaborative links, albeit weaker.

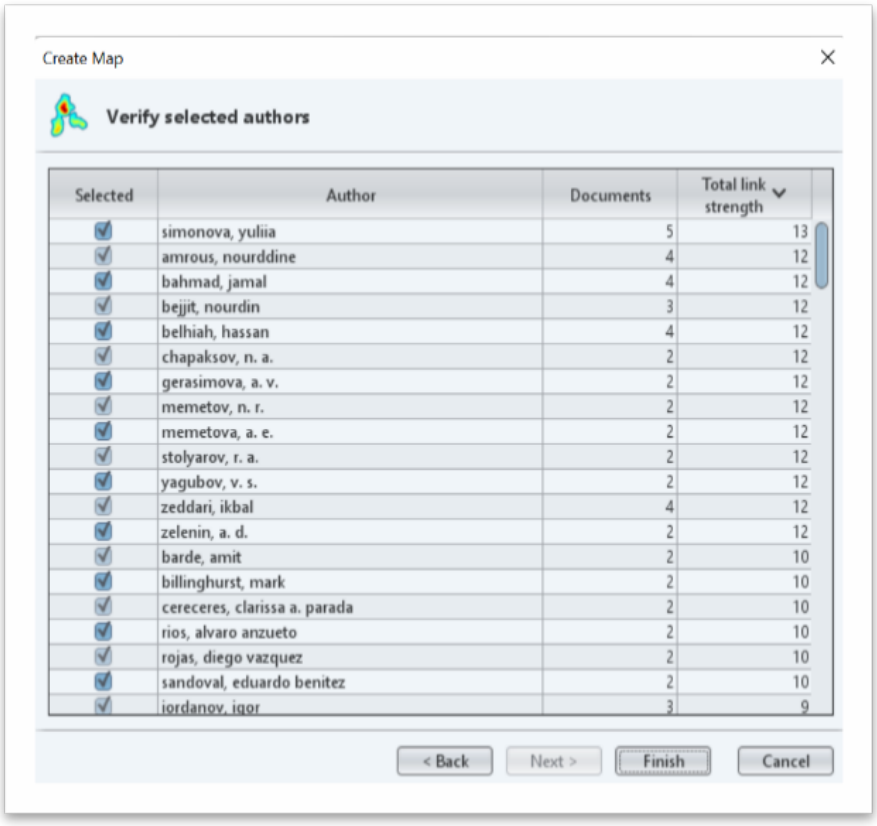

Figure 4. The List of co-Authorship and Authors about VR Material Based on Teaching English at Higher Education in the Vosviewers application.

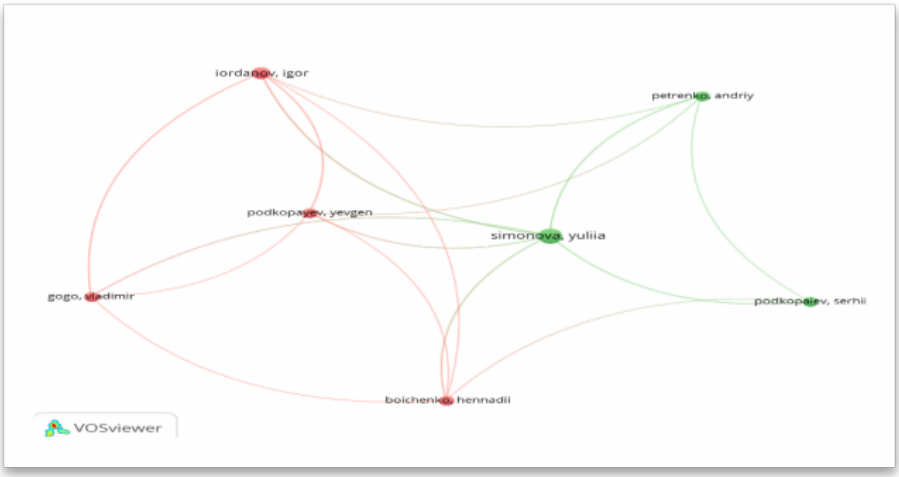

Figure 5. Network Visualization of Co-Authorship.

Larger nodes and thick edges indicate influential authors like Simonova Yuliia and Podkopayev, Serhii, highlighting their significant roles in research productivity. To identify the most frequently cited articles, larger nodes and inter-cluster connections can be analyzed, and citation databases like Scopus or Web of Science can provide citation frequency rankings for the papers.

4.3. The Collaboration Networks and Keyword Trends Shape the Development of VR-based Teaching Materials in the Context of English Language Education in Higher Education

Based on the VoSviewer analysis in **Figure 6**, several clusters based on colour groups can be seen. Namely,

cluster 1 is red and consists of 19 items: adoption, attitude, case study, characteristic, community, Covid, engagement, English language teaching, evaluation, faculty, higher education institution, institution, LMS, pandemic, perception, practice, project, significant difference, and strategy. Cluster 2 is green and consists of 15 items: assessment, benefit challenge, educator, field, framework, game, immersive virtual reality, implication, insight, IVR, participant, reality, science, and support. Cluster 3 is blue, which consists of 13 items: ability, college, combination, English teaching, higher vocational college, higher vocational colleges, higher vocational English teaching, innovation, interest, system, teaching method, user, and virtual reality technology. Cluster 4 is yellow and consists of 10: basis, condition, culture, English, English language, foreign language, importance, language, teaching English, and teaching material. Cluster 5 is purple and consists of 10 items: achievement, activity, effect, experiment, experimental group, form, performance, physical education, school, and VR Technology. Then cluster 6 is black, consisting of 6 items: augmented reality, future, literature, medical education, observation, and virtual.

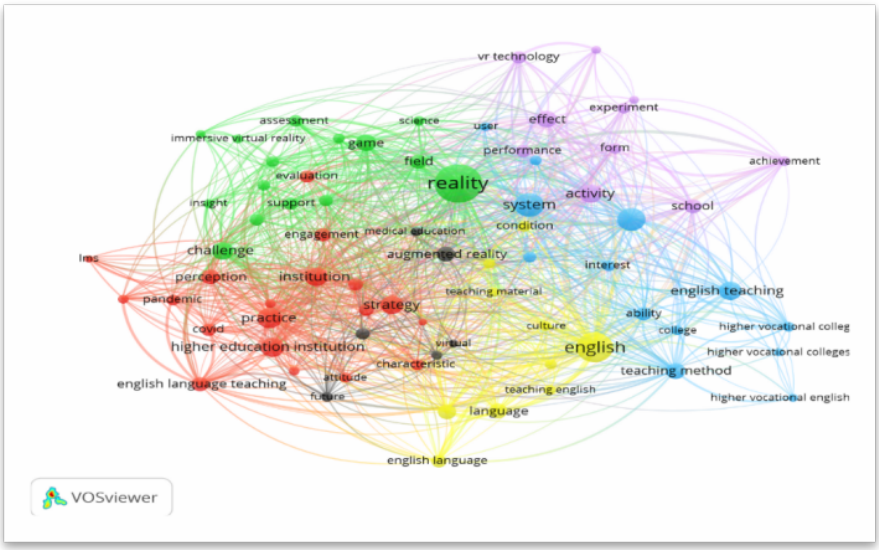

Figure 6. Mapping Visualization based on keywords.

Figure 6 presents keyword search results categorized by publication year, highlighting trends in educational technology research through a co-occurrence network. Notable clusters include the red cluster, which addresses challenges and strategies in higher education; the green cluster, focused on immersive technologies like VR and AR; the blue cluster, centering on methodologies for English language instruction; the yellow cluster, which examines systemic approaches to language acquisition; and the purple cluster, exploring the effects of VR technology on users. Each color group underscores significant research themes, illustrating the interconnectedness of concepts within educational technology. The relationships indicated by the nodes and edges reveal how frequently terms co-occur, reflecting their relevance within the dataset. In conclusion, this visualization effectively maps the evolving landscape of educational technology research, highlighting the need for continued exploration of immersive and systemic approaches to enhance learning outcomes.

This bibliometric analysis uses density visualisation to explore the significance and relationships of key terms in virtual reality (VR) within English education. The visualisation in **Figure 7** shows the prominent clusters of terms, where larger nodes like "virtual reality technology," "reality," and "English teaching" indicate central concepts in the dataset. Denser connections show strong correlations, particularly between "virtual reality technology," "system," and "teaching method." The color coding highlights temporal trends, with yellow and green representing recent discussions (post-2022) about VR and gamification, while blue indicates established topics from earlier discussions (2021) like "English teaching." The analysis identifies three principal themes: the contemporary integration of VR in education,

traditional approaches to English instruction, and the institutional challenges of implementing new technologies. Overall, the findings underscore a growing trend towards immersive and gamified learning in English education, balancing innovative technology with longstanding educational principles, shaping the future of language instruction.

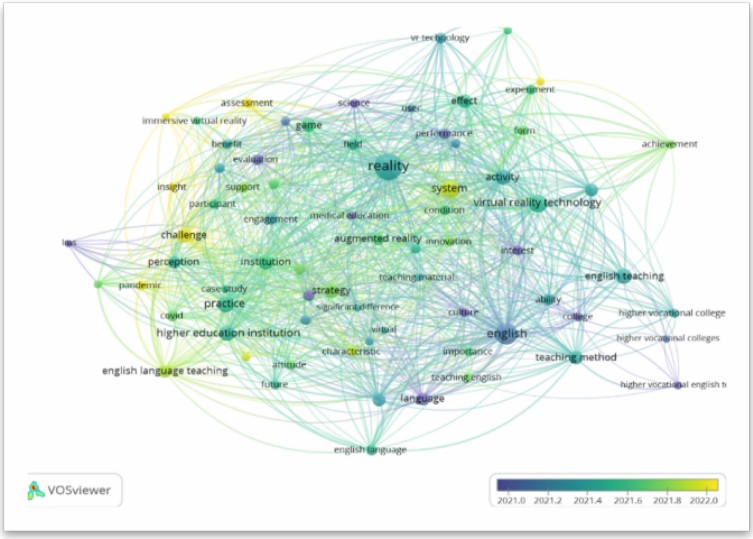

Figure 7. Overlay Visualization based on keywords.

The density visualization in **Figure 8** highlights the significant role of VR-based materials in tertiary English language education through color-coded clusters that reveal key insights. Core themes underscore the strong interconnections between "reality," "virtual reality technology," and "English," emphasizing how VR can create immersive environments conducive to learning. Additionally, terms like "system," "activity," and "performance" reflect an active exploration of VR in interactive learning contexts, enhancing student engagement in real-world language tasks. Green clusters indicate the ongoing integration of VR into conventional teaching methods, enriching instruction in grammar, vocabulary, and communication. This integration is especially crucial at higher education, where students require advanced language proficiency and engaging learning experiences. Emerging trends, such as "immersive virtual reality" and "augmented reality," point to the latest advancements in English language education.

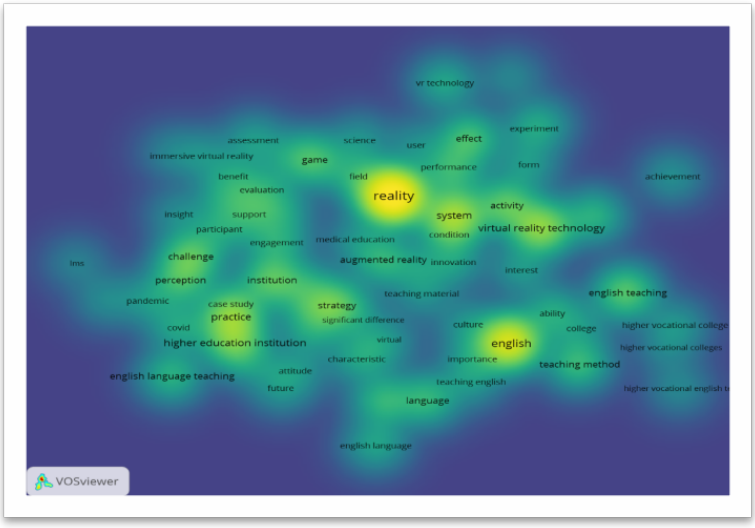

Figure 8. Mapping density based on keywords.

The relationship between gaming and education indicates that gamification is crucial in enhancing engagement and motivation in English language acquisition. Educators can employ game-based strategies in virtual reality to develop engaging and interactive learning experiences that resonate with students [22]. Institutional and Practical Execution: Terms like "higher education institution," "practice," and "institution" are centrally positioned, signifying that the integration of VR-based materials in higher education is a significant topic of discourse. This illustrates the pragmatic challenges and prospects of integrating VR into the institutional framework, including aligning these technologies with curricular objectives, acquiring requisite infrastructure, and resolving potential obstacles concerning cost and accessibility [23]. The term "challenge" prominently underscores the obstacles institutions encounter in effectively implementing these advanced technologies. The term "engagement" associated with these clusters signifies that VR substantially enhances student participation in learning, rendering language acquisition more captivating than conventional methods.

Teaching media is crucial in enhancing the teaching and learning process through various means. With teaching media, the teaching and learning process will engage and retain students. Media such as videos, interactive simulations, and animations captivate students' attention [24]. Engaged students are more likely to retain information and concepts over time. Visual Aid: Visual representations help clarify complex topics, making them easier to understand. Diagrams, charts, and graphs can elucidate abstract concepts and enhance comprehension [25].

Interactivity: Interactive media encourages active participation, allowing students to manipulate elements and explore ideas directly. This approach fosters more profound understanding and critical thinking skills [26]. Motivation: Suitable media lessons stimulate interest in the subject matter and create a dynamic learning environment. Incorporating multimedia elements like videos and podcasts caters to diverse learning styles and preferences. Relevance: Media demonstrate the real-world applications of theoretical concepts, illustrating their practical significance [27]. This contextualisation helps students grasp the relevance of what they are learning. Accessibility: Digital media can be accessed anytime, anywhere, facilitating self-paced learning and accommodating diverse schedules and learning needs [28].

Many media can be used in learning, especially English learning. However, VR is an exciting medium that has the potential to be developed because virtual reality (VR) technology enables students to be immersed in many cultures and environments, allowing them to enhance their language proficiency within a more genuine context [29]. For instance, individuals can engage in activities like placing meal orders at a restaurant, seeking directions, or conversing with a native speaker. Furthermore, virtual reality (VR) can give students prompt language proficiency feedback. Inevitable virtual reality (VR) language learning programs allow students to engage with virtual characters that offer input according to their pronunciation and grammar. This intervention could enhance learners' real-time speaking and listening abilities. Moreover, virtual reality (VR) can provide students with a secure and regulated setting to improve their language proficiency [30]. In conventional language learning environments, students may experience feelings of self-consciousness or anxiety when engaging in public speaking. Virtual Reality (VR) enables students to enhance their language proficiency in a simulated setting, free from criticism or errors [31].

An Academic Analysis of Virtual Reality in English Language Instruction

Research on integrating Virtual Reality (VR) for teaching English in higher education has gained significant attention recently. An analysis of 1,000 articles published between 2019 and 2024, with 4,117 citations, highlights this growing interest. However, a critical evaluation of VR's pedagogical effectiveness and equity issues is urgently needed. Many studies indicate that immersive learning environments enhance engagement, language retention, and speaking skills. Yet, these benefits may not be universally accessible, as the effectiveness of VR relies on the quality of its content and the instructor's ability to integrate it into the curriculum. Additionally, student skill development can vary based on prior language proficiency and technology familiarity. Equity issues also present challenges, as not all students have equal access to VR resources, potentially widening educational gaps, particularly for low-income students. Institutions must find ways to provide equitable access and resources and ensure that VR content is culturally inclusive and can be accessed by all students to achieve better outcomes, such as facilitating the students with VR laboratories, VR software, or a website allowing them to access it anytime and from anywhere.

Critical Examination of VR Integration

Are researchers reflecting initial enthusiasm for virtual reality without rigorously assessing its practical ramifications? The transformative potential of virtual reality in language education cannot be fully actualized if the discourse lacks critical examination, particularly concerning accessibility, pedagogical efficacy, and the possibility of technological distraction. As the field progresses, it is crucial to critically evaluate whether the existing trajectory truly improves learning outcomes or represents a transient trend driven by technological allure. Numerous studies emphasize advantages such as heightened engagement; however, these assertions frequently lack substantial empirical validation. The pedagogical efficacy of VR depends on the deliberate design of activities that correspond with explicit learning objectives; otherwise, students may prioritize the technology over substantive language acquisition. A thorough analysis of VR's practical and equitable integration in language instruction is crucial to guarantee that its transformative potential is available to all learners. Researchers must transcend enthusiasm and thoroughly analyze to cultivate a more equitable educational environment.

Research Trends and Sustainability

Data reveals a marked increase in research interest regarding Virtual Reality (VR) in English language instruction, particularly during the global pandemic. The surge in publications—from 146 in 2019 to 210 in 2020—reflects an immediate adaptation by educators to remote learning environments, highlighting VR's potential to bridge gaps created by the pandemic. However, the subsequent decline in 2021, with 185 published documents, raises critical questions about the sustainability of this momentum. This downturn may indicate that initial enthusiasm for VR did not lead to developing long-term, effective pedagogical strategies. Were institutions adopting VR merely as a superficial fix rather than integrating it meaningfully into their curricula? Additionally, were educators sufficiently trained to utilize VR effectively?

The peak in 2023, with 230 published papers, suggests a maturation of the discourse surrounding VR in education, signaling that researchers are beginning to critically evaluate the implications of VR for language acquisition. Nevertheless, the early 2024 figures, reflecting only 50 documents, indicate a concerning plateau in research output, prompting questions about whether educators reverted to short-term implementations lacking depth amid the initial excitement for VR. This raises an essential contradiction: while engagement with VR technology appears high, this does not necessarily translate into demonstrable learning success. The quality of research in this area is paramount; it is essential to ascertain whether scholars are engaging with the nuanced impacts of VR on learner engagement and outcomes or merely reiterating established findings without a critical lens. Moreover, co-authorship analysis identifies key contributors, such as Yulia Simanova and Nourddine Amrous, underscoring the interconnectedness of scholars in this field. However, this concentration of voices raises concerns about intellectual homogenization; a landscape dominated by a few prominent figures may marginalize diverse perspectives, stifling creativity and constraining the exploration of alternative methodologies.

Addressing these contradictions necessitates a more inclusive research approach that actively seeks to diversify voices and methods. Encouraging interdisciplinary collaboration can stimulate innovative thinking and deepen the understanding of VR's educational implications. This inclusivity must extend beyond mere representation to foster an environment that values diverse theoretical frameworks and pedagogical strategies. In conclusion, while the initial engagement with VR technology in education is promising, the evidence suggests that high levels of engagement do not always correlate with successful learning outcomes. Future research must critically examine these contradictions, focusing on developing robust, long-term VR integration strategies that prioritize engagement and educational effectiveness. Only through sustained, high-quality research can the transformative potential of VR in education be fully realized.

5. Conclusions

Integrating Virtual Reality (VR) technology has significantly altered the educational landscape, particularly in the context of English language instruction at the higher education level. The expanding corpus of research from 2019 to 2024 emphasizes the rising acknowledgment of virtual reality as a crucial educational instrument, propelled by technological advancements and the demand for innovative

teaching methodologies, especially accentuated during the COVID-19 pandemic.

Virtual reality facilitates experiential learning by replicating genuine real-world situations, thereby improving pronunciation and intercultural communication skills while concurrently reducing learner anxiety. Nonetheless, considerable obstacles to extensive adoption remain. These encompass elevated expenses associated with VR equipment, intricate technical challenges that may daunt educators and students, cybersickness, and the requirement for extensive training programs. Moreover, there are apprehensions about the possible deterioration of interpersonal communication skills, which requires a more sophisticated incorporation of technology into educational systems. Notwithstanding these advancements, significant deficiencies persist in the literature. There is a notable deficiency of longitudinal studies evaluating the enduring effects of VR on student learning outcomes and engagement in various educational settings. Furthermore, research examining pedagogical strategies that effectively integrate VR into curricula is inadequate. This disparity is particularly concerning, as a lack of comprehensive knowledge regarding best practices may hinder educators from effectively utilizing VR to optimize its advantages.

Furthermore, research on the socio-cultural ramifications of virtual reality in language acquisition is scarce. Comprehending the interactions and advantages of various populations with VR could guide the development of more inclusive educational methodologies. Future research should emphasize these domains, concentrating on the creation of effective instructional resources, extensive training for educators, and empirical investigations that assess the long-term efficacy of VR in improving language acquisition.

Although VR offers considerable potential for enhancing student engagement and educational results, academic institutions must judiciously allocate resources towards infrastructure and training to fully harness its capabilities. Rectifying these research deficiencies is crucial for progressing the discipline and guaranteeing that VR significantly aids in equipping students for proficient communication in a progressively globalized society.

Author Contributions

N.A. conceived and designed the analysis, collected the data, contributed data or analysis tools, prepared the manuscript, and wrote the original paper. N.A., N.N., and M.B. conceived and designed the analysis, contributed data or analysis tools, reviewed the manuscript, and validated the final paper. All authors had read and validated the final paper.

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Conflicts of Interest

The authors declare no conflict of interest.

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