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REVIEW ARTICLE

How Virtual Reality Transforms English Classrooms: A Systematic Literature Review

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ABSTRACT - As a newly emergent technology, virtual reality (VR) is gaining popularity as an assistive tool in language classrooms, leading to a plethora of literature relating to its usage in language classrooms. Therefore, this paper reviews 40 past studies from 2019 to 2023 on utilising VR, specifically in English classrooms, using the systematic literature review as the approach. In contrast to the past research before 2018, most current VR research in English classrooms created their own VR applications. It suggests an increment of VR content for English classes. While these VR applications have different focused language aspects, most focus on vocabulary and speaking tasks. The notion can be attributed to the high engagement of the students and VR's admirable characteristics, such as its immersiveness and interactivity. The present study also found that the vast majority of the findings reported that the use of VR has positively attributed to learning the target language, which suggests the formidable influence of VR in learning English. Overall, the present study was able to compare contemporary findings on the utilisation of VR in English classrooms, contributing to a more precise and informed knowledge of the area of study.

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1.0 INTRODUCTION

With the constant development of technology in today's fast-paced world, many innovations are introduced as teaching tools in language classrooms. One of the sought-after innovations is virtual reality (VR). VR is a 3D environment created using virtual graphics and real-time motion detection, which allows users to be immersed in a virtual setting using a headset (Kurniawan et al., 2019; Ifanov et al., 2023). VR immerses users in a world that no one can imagine. VR's high technology and advancement allow users to walk, interact, or float anywhere. Ghenbarzadeh and Ghapanchi (2021) reported that VR has several unique characteristics, including creating a virtual environment for learners in virtual classrooms, gaming, discussions, and even field trips. It illustrates the high prospects of VR for self-learning purposes, where learners can learn and monitor the learning process themselves. Therefore, it is unsurprising that many educators see VR as a tool with great potential to be utilised in education.

A study by Yung and Khoo-Lattimore (2019) summarises related articles utilising VR in training. The comprehensive paper included three highly prominent databases: Web of Science, Google Scholar, and Compendex. However, the findings are limited to VR-based training in tourism. On the other hand, Utami et al. (2021) analysed past literature in language classrooms that utilised VR and linking to the context of 21st-century learning. The paper was uniquely written to tally to the theme of 21st-century learning but was limited to one database, Scopus. Berns (2021) reviewed 17 available VR applications in the market and found detailed findings, including target users, topics, learning approaches, and feedback. Although the study would benefit those looking for a cheaper and easier option to start using VR and want to comprehensively compare the commercial VR applications, the reviewed VR applications are only limited to the ones downloadable to phones, not VR headsets.

Another notable limitation of the study is that the paper reviews different VR applications but does not include research related to the usage of VR in language classrooms. More recently, Parmaxi (2023) reviewed articles on the use of VR in language classrooms and even prescribed practical implications for future research that can significantly benefit educators and researchers interested in the field. However, the reviewed articles are from 2015 to 2018 and are outdated as more newly published research and VR applications are currently available. Therefore, to fill in the gaps of previous papers in VR and language studies, this paper attempts to review related studies in English classrooms from 2019 to 2023 in three reputable databases: ScienceDirect, Scopus, and IEEE Xplore.

1.1 Problem Statement

As VR increasingly becomes recognised as a prominent educational tool, there has been a surge in the number of studies examining its applications, leading to a wealth of literature (Pataquiva & Klimova, 2022). However, navigating this extensive body of literature can be daunting due to its sheer volume, lack of organisation, and complexity. Moreover, in the digital transformation era, educators must critically assess the use of such technologies, ensuring the suitability of VR technologies and ensuring that they align with educational goals and remain contextually relevant (Elyildirim, 2022). Consequently, educators can benefit from informed decision-making through comprehensive literature reviews when considering integrating VR technology into language classrooms. According to Pataquiva and Klimova (2022), for educators to get the maximum potential of VR, they need adequate knowledge and training on VR. Van der Meer

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et al. (2023) reviewed 139 articles in VR and found that most VR content available is in Pedagogy (education), followed by Computer Science (robotics).

In contrast to other fields of study, little attention is given to publications in language classrooms, mainly English classrooms. Therefore, there is a need for a more recent paper that summarises more contemporary studies on VR in English classrooms. In particular, the present study would like to investigate the different types of VR applications employed in English classrooms. Furthermore, the focus on language areas will also be explored in the present study. Lastly, the effects of VR utilisation in English classrooms will be examined.

1.2 Research Questions

The following are the research questions formulated for this study:

1. What are the centrally focused language aspects of utilising VR in English classrooms from 2019 to 2023?
2. What are the effects of VR on students' learning in English classrooms?
3. What types of VR applications are utilised within English classrooms?

2.0 METHODOLOGY

2.1 Systematic Literature Review

SLR is a method used to "identify, assess, and interpret all findings on a research topic" (Ifanov et al., 2023, p.261). It is a type of secondary research that helps to identify and summarise relevant primary research. According to Kurniawan et al. (2019), by using SLR, a researcher can comprehensively understand the topic and synthesise different findings from different studies to find a research gap. The finding is also concurred by Zamziba et al. (2024), who used SLR to address research gaps and offer different perspectives on the research topic. Similarly, Tawfik et al. (2019) also reported that SLR helps researchers summarise research findings from various sources, which creates a better understanding of the topic. Another study by Mulrow (1994) highlights the significance of SLR in the academic world: time efficiency. SLR helps researchers acquire more organised, systematic, and efficient information without reading all documents too long.

2.2 Systematic Literature Review

In a study utilising SLR, Kurniawan et al. (2019) specify that SLR consists of three steps: determining the research questions, selecting relevant research/literature, and analysing the findings. The steps mentioned earlier were carefully followed to avoid biases in the present study.

Step 1 Determining the Research Questions

The following research questions are formulated to achieve the objectives of the present study:

1. What are the centrally focused language aspects of utilising VR in English classrooms from 2019 to 2023?
2. What are the effects of VR on students' learning in English classrooms?
3. What types of VR applications are utilised within English classrooms?

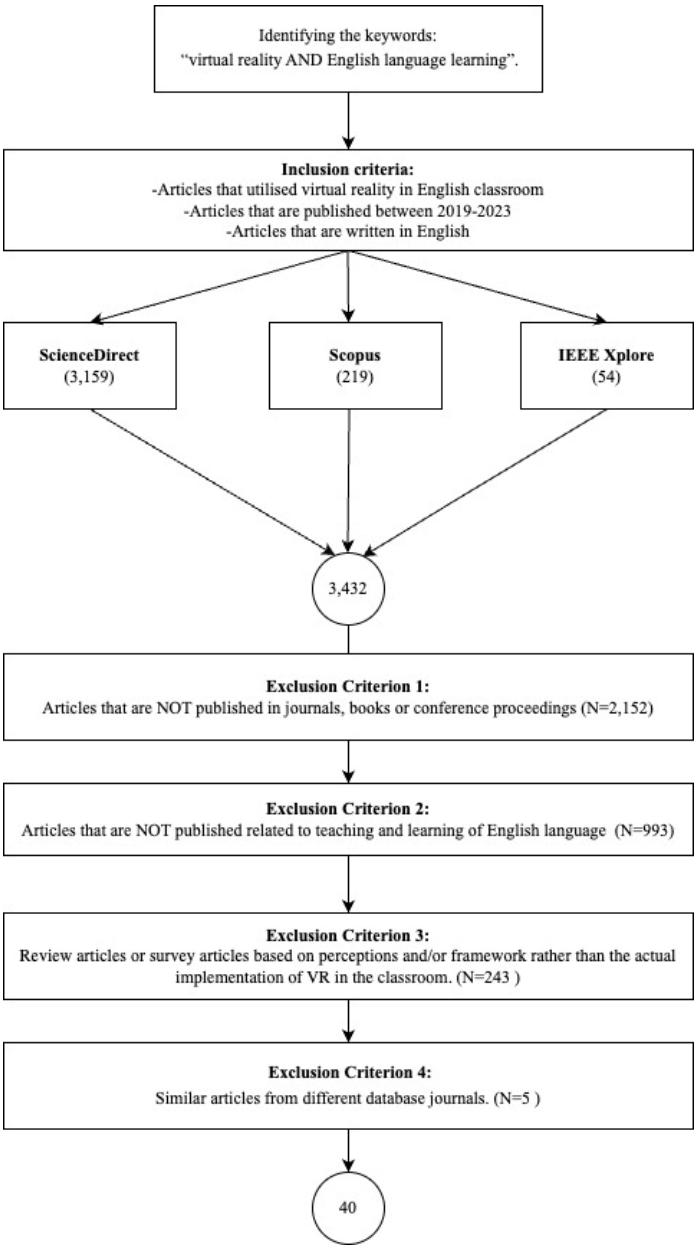
This study investigates the language aspects, tool efficacy, and types of applications used in past research related to virtual reality in English classrooms. These findings will suggest the current trends and aspects of utilising VR in English classrooms.

Step 2 Selecting Relevant Literature

This study sets out to determine the type of applications used for VR in English classrooms, investigate the purposes of VR in English classrooms, and assess its effectiveness in acquiring English. Therefore, to obtain comprehensive findings based on the objectives, the present study utilises three primary journal databases: ScienceDirect, Scopus, and IEEE Xplore. There are two justifications for using these databases. First, these databases are considered prominent, according to Kurniawan et al. (2019) and Ifanov et al. (2023). Secondly, these three databases have the most publications related to VR. It is evidenced in previous SLRs related to VR, which utilised the same databases (Kurniawan et al., 2019; Ifanov et al., 2023). Another SLR study by Yudinstseva (2023) also concurred that these three databases are highly reliable and that most studies on VR have been published. Hence, these databases were chosen for this study. The flow chart (Figure 1) illustrates the steps taken for the present study.

Figure 1

Steps used to determine the articles for the present study



As illustrated in Figure 1, all three databases were searched with the keywords "virtual reality AND English language learning". Then, the databases were segregated through four criteria, as seen in Figure 1, which finalised 40 articles in total. Table 1 provides the inclusion and exclusion criteria for the present study.

Table 1

Inclusion and exclusion criteria

	Criteria
Inclusion	• Articles that utilised VR in English classrooms • Articles published from 2019 to 2023 • Articles that are written in the English language
Exclusion	• Articles that are NOT published in journals, books, or conference proceedings • Articles NOT related to the English language and VR • Review articles or survey articles based on perceptions and/or framework rather than the actual implementation of the VR in the classroom • Similar articles from different database journals

The inclusion criteria ensure that the study's objectives are met. Firstly, the context is set for utilising VR in English classrooms only. The articles must be published from 2019 to 2023 to capture more recent and contemporary studies on VR. Finally, the articles must be written in English to ensure the researchers can effectively understand them. From the inclusion list, a total of 3,432 articles were found. The first exclusion list eliminates any papers not published in journals, books, or conference proceedings to ensure the high validity and standards of the findings. As some articles are unrelated to VR and English, the second exclusion criterion is to eliminate these. After that, articles that do not present any empirical data based on the implementation of the VR are omitted. This way, articles based on surveys and perceptions will be eliminated. Finally, duplicates of the remaining research papers from all three databases were omitted, resulting in 40 articles.

Step 3 Analysing the Findings

All of the details of the journal articles were exported and analysed using Microsoft Excel. Following the steps from Yudinstseva (2023) based on the coding from Lan (2020), the data extraction is arranged with the author(s) details, publication date, research design, methodology, key findings, and questions based on the formulated research questions. A descriptive analysis was also conducted based on the research questions.'

3.0 RESULTS AND DISCUSSION

3.1 Research Question 1:

What are the centrally focused language aspects of utilising VR in English classrooms from 2019 to 2023?

The language areas of the VR applications were explored for the first research question. For that, the details of the VR applications are explored and scrutinised by checking the focused language aspect. It refers to studies that centre on language components, such as different language skills (i.e. listening, reading), grammar points (i.e. verb tenses), and affective factors (i.e. motivation). For the 40 articles, it was found that most of the studies focused on one single language aspect only, whilst some studies utilised more than one language aspect. The information on this is tabulated in Table 2.

Table 2

Number of articles and language aspects

Category	Number of Articles (N= 40)	Articles
One main language aspect	31	Alemi & Khatony, 2020; Alfadil, 2020; Bacca-Acosta et al., 2023; Bacca-Acosta et al., 2021; Boda & Tóth, 2020; Cha et al., 2021; Chang et al., 2023; Chen & Liao, 2022; Chen et al, 2023; Chen, et al., 2021; Dooly et al., 2023; Huang et al., 2020; Jiao et al., 2023; Khatoony, 2019; Lai & Chen, 2023; Li & Jiang, 2021; Li et al., 2022; Lin & Wang, 2021; Liu et al., 2023; Liu, 2022; Liu & Habil, 2022; Mubarok et al., 2023; Orlosky et al., 2019; Peixoto et al, 2023; Pinto et al., 2021; Suzuki et al., 2021; Tai & Chen, 2021; Wang et al., 2021; Wang et al., 2021; Xue, 2022; Yueheng, 2022
Two main language aspects	4	Liu & Hou, 2020; Sun et al., 2020; Wu et al., 2022; Zhao et al., 2023
More than two language aspects	5	Chein et al., 2020; Chen & Hsu, 2020; Hung et al., 2023; Junior & Bodzin, 2020; Mubarok et al., 2023

As shown in Table 2, it is apparent that most of the articles only focused on one central language aspect. However, there is a small minority that focuses on two primary language focuses, and around five articles have more than two language aspects. The possible reason for this could be that VR is a relatively new technology. Therefore, only a few studies are done that focus on more aspects. It is also reported that for studies with more than one focus aspect, the other focus is predominantly affective factors (i.e. motivation, anxiety) and soft skills such as 21st-century skills (i.e. critical thinking). The finding can be evidenced by the findings from the present study, for instance, Mubarok et al. (2023), who studied oral presentation skills with creative thinking and cultural studies. Chein (2020) investigated the effects of VR on speaking performance with critical thinking and speaking anxiety. Similarly, Hung et al. (2023) studied the influence of VR on oral proficiency, speaking anxiety, and students' emotions. Next, the specific language areas are explored in Table 3.

Table 3

Number of articles and their language aspects

Language Aspect	Number of Articles	Articles
Speaking	**15**	Alemi & Khatony, 2020; Hung et al., 2023; Chein et al., 2020; Chen et al, 2023; Dooly et al., 2023; Hung et al., 2023; Khatoony, 2019; Li & Jiang, 2021; Liu & Hou, 2020; Mubarok et al., 2023; Wang et al., 2021; Wu et al., 2022; Xue, 2022; Yueheng, 2022; Zhao et al., 2023
Listening	**4**	Chen & Hsu, 2020; Peixoto et al., 2023; Sun et al., 2020; Tai & Chen, 2021
Reading	**5**	Boda & Tóth, 2020; Chen & Hsu, 2020; Liu et al.,2023; Liu, 2022; Sun et al., 2020
Writing	**1**	Khodabandeh, 2022
Verb tenses	**2**	Cha et al., 2021; Huang et al., 2020
Part of speech (i.e., preposition)	**1**	Bacca-Acosta et al., 2023
Vocabulary/ Choice of words	**17**	Alfadil, 2020; Bacca-Acosta et al., 2021; Chang et al., 2023; Chen & Liao, 2022; Chen, et al., 2021; Chen & Hsu, 2020; Jiao et al., 2023; Junior & Bodzin, 2020; Lai & Chen, 2023; Li et al., 2022; Liu & Habil, 2022; Liu & Hou, 2020; Pinto et al., 2021; Suzuki et al., 2021; Orlosky et al., 2019; Wu & Zhang, 2022; Zhao et al., 2023

It can be seen from Table 3 above that the highest number of articles, i.e., 17 articles, focused on vocabulary as the primary language aspect. Next, around 15 articles (35%) concentrate on speaking tasks. Five articles have reading as the main focus, and four emphasise listening as the primary language domain. Two articles used verb tenses (present/past/future) as the primary focus areas in the VR applications. Finally, only one article focused on writing as the primary focus. Similarly, only one of the articles utilised prepositions as the primary language task of the VR application.

This finding is revolutionary as it suggests the latest trend and language focus of VR utilisation in language studies. In contrast to the present study, Parmaxi (2023) found that speaking tasks are primarily investigated in VR research, whilst only one research covered vocabulary learning. More studies have been done after 2018 to utilise VR to improve vocabulary learning. The present study also found that although many studies cover vocabulary learning as the central language aspect, each study brings uniqueness into the mix. For example, Li et al. (2022) studied vocabulary acquisition for technical words among students using VR and PC games. Jiao et al. (2023) measured vocabulary acquisition using behavioural and neural approaches. The findings were outstanding as they compared two sets of data from different points of view. Another study by Wu and Zhang (2022) investigated vocabulary learning using a VR application called Forbidden City, built based on ancient Chinese context.

The present study found speaking to be the main focus in 15 out of 40 articles reviewed. Many researchers focus on speaking skills when using VR in language classrooms. Interestingly, the majority of the findings reported positive outcomes. 14 of the 15 articles suggest that VR can improve oral proficiency. Dooly et al. (2023) claim that VR allows less controlled and more spontaneous language production. Chen et al. (2023) also disclosed that the experimental group with VR training reported more significant speaking task improvements than the control group. Zhao et al. (2023) also reported positive outcomes of VR utilisation in speaking performance. The only study that did not report a positive finding is Hung et al. (2023). More details on this study will be explained in the following research question.

Table 3 presents that VR is highly popular in vocabulary and speaking tasks because it offers immersive interactive experiences that enhance students' engagement and fluency development. Palmeira et al. (2020) reviewed nine papers published on using VR to acquire vocabulary. They found that one key factor that resulted in the success of vocabulary acquisition was the high engagement and motivation of the students when playing VR games. In an SLR paper summarising 34 publications from 2015 to 2022 on second language acquisition using VR, Yudinstseva (2023) concluded that VR was effective in speaking tasks for four reasons: immersion, interaction, feedback, and creation. VR allows speakers to immerse in the virtual environment and interact with the non-player characters (NPC) and other players. The immediate direct feedback in VR enables speakers to improve their speaking abilities effectively. Finally, VR allows speakers to create original scenarios collaboratively, which enhances their speaking through platforms like Google Tilt Brush, OpenSimulator, and CoSpaces Edu (Yudinstseva, 2023).

Among all the language focuses, writing and part of speech (i.e. prepositions) are the least popular (one out of 40 articles). The finding could be due to several reasons, including the fact that there are few VR applications there that cater to the language demands (Kozlova & Priven, 2015; Ghenbarzadeh & Ghapanchi, 2021). Khodabandeh (2022) studied the impact of VR on writing proficiency by

creating their own VR application to achieve the research objectives. As for prepositions, Bacca-Acosta et al. (2023) report on the positive outcomes of using VR when learning prepositions; therefore, they highly encourage educators to use the technology.

3.2 Research Question 2:

What are the effects of VR on students' learning in English classrooms?

This research question summarises previous studies' findings on VR's efficacy in learning the English language. The results and findings from all 40 articles were explored to investigate this. Table 4 below displays the outcomes of the articles.

Table 4

Findings of the articles

Findings	Number of articles (N= 40)	Articles
Positively correlated to language acquisition	**36**	Alemi & Khatony, 2020; Alfadil, 2020; Bacca-Acosta et al., 2023; Bacca-Acosta et al., 2021; Boda & Tóth, 2020; Chang et al., 2023; Chein et al., 2020; Chen et al, 2023; Chen & Liao, 2022; Chen, et al., 2021; Chen & Hsu, 2020; Dooly et al., 2023; Huang et al., 2020; Jiao et al., 2023; Junior & Bodzin, 2020; Khatoony, 2019; Lai & Chen, 2023; Li et al., 2022; Li & Jiang, 2021; Lin & Wang, 2021; Liu et al., 2023; Liu & Habil, 2022; Liu & Hou, 2020; Mubarok et al., 2023; Orlosky et al., 2019; Peixoto et al, 2023; Pinto et al., 2021; Sun et al., 2020; Suzuki et al., 2021; Tai & Chen, 2021; Wang et al., 2021; Xue, 2022; Yueheng, 2022; Zhao et al., 2023
Not positively correlated to language acquisition	**1**	Hung et al., 2023
No findings (Ongoing)	**3**	Cha et al., 2021; Liu, 2022; Wu et al., 2022

Table 4 illustrates the findings from all 40 articles. Three articles do not report any findings because the projects are still ongoing, and the articles are from conference proceedings, which explains the lack of findings. However, the studies are still relevant as they provide the frameworks and methodologies for implementing VR in language classrooms. For instance, Wu et al. (2022) used Reinhardt and Sykes's taxonomy, Game Enhanced Language Learning Pedagogy (GELL), as the main framework of their study. Liu (2022) provided technical descriptions of using UNITY as the leading design platform that can benefit many researchers when designing VR applications. Cha et al. (2021) utilised the idea of Natural Language Processing (NLP) when learning verb tenses. Although these studies did not report any findings, the articles provided substantial information on utilising VR in language classrooms.

As Table 4.0 shows, it is notable that a vast majority of the articles reported positive effects of the use of VR in English classrooms. All of the studies employed statistical tools to indicate the effectiveness of VR in acquiring language focus, and 90% reported that VR positively contributed to language acquisition. As a case in point, Li et al. (2022) used the t-test to measure the significant difference between the pre-test and post-test for VR group learners and found that students who used VR provided more word inputs than learners who used PC video games. Not only that, Jiao et al. (2023) managed to use both behavioural and brain approaches to measure lexical acquisition. Jiao et al. (2023) conclude that VR allows learners to immerse in a virtual world and encounter sensory experiences, thus facilitating lexical acquisition.

Hung et al. (2023) could not find statistical evidence to support that VR facilitates speaking proficiency; however, the qualitative data collected through participant interviews revealed positive experiences with VR. The participants described VR as a safe environment and flexible language practice tool. To recapitulate, VR is a promising tool for assisting with language acquisition.

3.3 Research Question 3:

What types of VR applications are utilised within English classrooms?

The last research question aims to know whether the studies generate their own VR application or use existing commercial VR games available in the market. The summary of the types of types of VR applications used in English classrooms is tabulated in Table 5.

Table 5

Types of VR applications

Type of Application	Number of articles (N= 40)	Articles
Created from scratch	**28**	Alemi & Khatony, 2020; Cha et al., 2021; Jiao et al., 2023; Chein et al., 2020; Chen et al., 2023; Chen & Liao, 2022; Chen & Hsu, 2020; Huang et al., 2020; Hung et al., 2023; Junior & Bodzin, 2020; Khatoony, 2019; Khodabandeh, 2022; Liu et al., 2023; Liu & Habil, 2022; Lin & Wang, 2021; Liu, 2022; Liu & Hou, 2020; Mubarok et al., 2023; Orlosky et al., 2019; Peixoto et al., 2023; Sun et al., 2020; Suzuki et al., 2021; Wang et al., 2021; Wu et al., 2022; Xue, 2022; Yueheng, 2022; Zhao et al., 2023
Used existing VR applications	**8**	Alfadil, 2020; Boda & Tóth, 2020; Dooly et al., 2023; Lai & Chen, 2023; Li et al., 2022; Pinto et al., 2021; Tai & Chen, 2021; Wang et al., 2021
Not mentioned	**4**	Bacca-Acosta et al., 2023; Chang et al., 2023; Chen, et al., 2021; Li & Jiang, 2021

Table 5 shows that most of the research (28 out of 40) created their own VR applications. This finding is interesting because an SLR paper by Parmaxi (2023) reported that from 2015-2018, most of the VR research utilised existing and available VR applications, which suggests a growth in VR content in contemporary literature. Most of the literature on creating VR applications reported using Unity as the design platform. In an article, Liu (2022) justifies using Unity when designing VR applications. The reasons why Unity is widely used amongst VR developers include features of 3D modelling and can be used for most operating systems. Not only that, but Unity also has open access, and there are several free templates that users can choose from when designing VR applications.

Table 5 also illustrates that eight out of 40 articles used commercial VR applications available on the market, such as Mondly and House of Languages. These VR applications are easily accessible by purchasing one's own VR headset. In contrast, Parmaxi (2023) found that most VR research used Second Life, a commercial VR application. Yung and Khoo-Lattimore (2019) also reported that Second Life is the most used platform in tourism-related VR research. In a research paper summarising the chronology of virtual worlds, Kaplan and Haenlein (2009) detail the birth of Second Life and its stature as one of the pioneers in virtual applications. Also, several studies have found the application helpful in fostering listening, speaking, and cultural skills (Chen & Lin, 2018; Melchor-Couto, 2018; Lan, 2020). The findings explained Parmaxi's outcomes on the high number of research using Second Life. Nevertheless, the present study reported newer VR applications, including Mondly and House of Languages, which could open more research opportunities for educators interested in VR.

There are several advantages and disadvantages to creating your own VR applications and utilising existing VR applications in the market (Ashtari et al., 2020; Hanson & Shelton, 2008; Challoner, 2017). The following Table 6.0 summarises the positive and negative points.

Table 6

Pros and cons of creating own VR and using commercial VR

	Pros	Cons
Creating your own VR application	• Tally to research objectives	• Time-consuming • Expensive
Using commercial VR application	• Slightly cheaper	• Limited content

Table 6 illustrates the pros and cons of creating your own VR application and using a commercial VR application. The advantage of creating a VR application is that the researcher can easily tally the VR design and contexts according to the research objectives (Challoner, 2017). However, the project can be time-consuming since designing and developing the VR application takes time. The project can also be expensive since the researcher must pay the VR developer and designer (Hanson & Shelton, 2008). On the other hand, another alternative is to use commercial and readily available VR applications in the market. It is convenient because it is slightly cheaper than developing its own VR content. However, the context and design of the VR application are fixed, so the research project is quite limited to these contents. Overall, deciding whether to create one's own VR application or use existing VR applications on the market heavily depends on research funds, time, and objectives (Ashtari et al., 2020; Challoner, 2017).

5.0 CONCLUSION

5.1 Recommendations for Future Research

Overall, the literature review data collected for the present study provided insights into the type of VR applications used in English class, the language focus on the VR applications used, and the effectiveness of VR in English acquisition. The findings provided several implications for interested educators and researchers for future studies.

Utilise existing VR applications

First, the findings suggest that there are commercial VR applications available in the market that are under-researched. The available literature shows that most studies created VR applications, and only eight used commercial VR applications. So, future studies can utilise the available VR applications in the market but with a different language focus. For instance, future studies can research listening, reading, and writing, as these are under-researched in VR publications (Sun et al., 2020; Liu et al., 2023; Khodabandeh, 2022).

Focus on specific grammar points.

Second, the study provided an overview of the areas of study using VR. The findings show that vocabulary is the main focus of most VR applications. On the other hand, more attention should be given to writing and other grammatical points, such as prepositions (Bacca-Acosta et al., 2023; Khodabandeh, 2022). Hence, future studies may want to probe more into these language focuses.

Start using VR!

Finally, the present study can conclude that VR is highly effective in learning English. The findings revealed that most of the studies on VR in English classes found VR to be an effective tool. Through this finding, it is hoped that VR can receive the attention it deserves, and more educators are keen to utilise this tool as part of the learning tool in the classroom. Not only that, but on a larger scale, it is hoped that policymakers can invest more in VR studies as it can help improve students' motivation and also help them acquire the language.

5.2 Limitations of the Study

This study has several limitations. First, it is limited to the search keywords "virtual reality and English language learning," which may have excluded relevant studies that used different terminology or focused on related concepts. It is also limited to the three databases and articles published from 2019 to 2023 and to publications written in English. The narrow scope of the inclusive criteria might limit the study's findings and could not accurately reflect the broader range of this field's study.

In conclusion, this study summarises 40 contemporary research studies on VR applications that assist in English language acquisition. This study found a noteworthy finding, which shows that VR is an effective tool for learning English, with the vast majority of the studies finding positive outcomes. This study also helps to summarise the available VR applications in English classes so that more educators can utilise VR in their classrooms. Not only that, but the language focuses on VR applications, which are also explored in the present study. The findings suggest more research perspectives for the researchers interested in VR and the pedagogical implications for educators who implement VR in their classrooms. It is also hoped that the findings of this study will draw more attention to VR so that more VR content can be accessible to all students.

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CONFLICT OF INTEREST

The authors declare that no conflicts of interest.

AUTHOR(S) CONTRIBUTION

Wan Noor Farah Wan Shamsuddin (Conceptualisation; Methodology; Writing - original draft; Project administration)

Nik Aloesnita Nik Mohd Alwi (Validation; Writing - review & editing; Funding acquisition; Supervision)

Umi Kalsom Masrom (Conceptualisation; Methodology; Writing - review & editing; Funding acquisition; Supervision)

REFERENCES

Alemi, M., & Khatoony, S. (2020). Virtual reality-assisted pronunciation training (VRAPT) for young EFL learners. *Teaching English with Technology, 20*(4), Article 5981. https://www.ceeol.com/search/article-detail?id=903822

Alfadil, M. (2020). Effectiveness of virtual reality game in foreign language vocabulary acquisition. *Computers & Education, 153*, Article 103893. https://doi.org/10.1016/j.compedu.2020.103893

Ashtari, N., Bunt, A., McGrenere, J., Nebeling, M., & Chilana, P. K. (2020). Creating augmented and virtual reality applications: Current practices, challenges, and opportunities. *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, 1–13. https://doi.org/10.1145/3313831.3376722

Bacca-Acosta, J., Tejada, J., Lampropoulos, G., & Avila, C. (2023). A comparative eye-tracking study between a virtual reality system and a desktop environment for learning the prepositions of place in English. *CALICO Journal, 40*(1). https://doi.org/10.1558/cj.22803

Bacca-Acosta, J., Tejada, J., & Ospino-Ibañez, C. (2021). Learning to follow directions in English through a virtual reality environment: An eye-tracking study and evaluation of usability. In *Designing, Deploying, and Evaluating Virtual and Augmented Reality in Education* (pp. 262–288). IGI Global. https://doi.org/10.4018/978-1-7998-5043-4.ch013

Berns, A. (2021). A review of virtual reality-based language learning apps. *RIED. Revista Iberoamericana de Educación a Distancia*. http://dx.doi.org/10.5944/ried.24.1.27486

Boas, Y. A. G. V. (2013). Overview of virtual reality technologies. In *Interactive Multimedia Conference* (Vol. 2013).

Boda, I. K., & Tóth, E. (2020, September). English language learning in virtual 3D space by visualizing the library content of ancient texts. In *2020 11th IEEE International Conference on Cognitive Infocommunications (CogInfoCom)* (pp. 000305–000312). IEEE. https://doi.org/10.1109/CogInfoCom50765.2020.9237887

Cha, S., Tian, Y., Shaalan, M., Hyun, J., & Lee, K. H. (2021). Implementation of prototype environment of virtual reality platform for virtual lab (Use case of ESL). In *2021 IEEE International Conference on Big Data (Big Data)* (pp. 5868–5870). IEEE. https://doi.org/10.1109/BigData52589.2021.9671565

Challoner, J. (2017). *All about virtual reality.* Dorling Kindersley.

Chang, H., Park, J., & Suh, J. (2023). Virtual reality as a pedagogical tool: An experimental study of English learners in lower elementary grades. *Education and Information Technologies*, 1–34. https://doi.org/10.1007/s10639-023-11988-y

Chen, C. H., Hung, H. T., & Yeh, H. C. (2021). Virtual reality in problem-based learning contexts: Effects on the problem-solving performance, vocabulary acquisition, and motivation of English language learners. *Journal of Computer Assisted Learning, 37*(3), 851–860. https://doi.org/10.1111/jcal.12528

Chen, C. Y., Chang, S. C., Hwang, G. J., & Zou, D. (2023). Facilitating EFL learners' active behaviors in speaking: A progressive question prompt-based peer-tutoring approach with VR contexts. *Interactive Learning Environments, 31*(4), 2268–2287. https://doi.org/10.1080/10494820.2021.1878232

Chen, M., & Lin, H. (2018). Virtual geographic environments (VGEs): Originating from or beyond virtual reality (VR)? *International Journal of Digital Earth, 11*(4), 329–333. https://doi.org/10.1080/17538947.2017.1419452

Chen, H. L., & Liao, Y. C. (2022). Effects of panoramic image virtual reality on the workplace English learning performance of vocational high school students. *Journal of Educational Computing Research, 59*(8), 1601–1622. https://eric.ed.gov/?id=EJ1321486

Chen, Y. L., & Hsu, C. C. (2020). Self-regulated mobile game-based English learning in a virtual reality environment. *Computers & Education, 154*, Article 103910. https://doi.org/10.1016/j.compedu.2020.103910

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*, Article 103751. https://doi.org/10.1016/j.compedu.2019.103751

Dooly, M., Thrasher, T., & Sadler, R. (2023). "Whoa! Incredible!": Language learning experiences in virtual reality. *RELC Journal, 54*(2), 321–339. https://doi.org/10.1177/00336882231167610

Elyıldırım, S. (2022). Information and communication technology literacy in language teaching and learning. *International Journal of Language Education and Applied Linguistics,* 11(2), 1–5. https://doi.org/10.15282/ijleal.v11i2.7302

Ghanbarzadeh, R., & Ghapanchi, A. H. (2021). A literature review on the use of three-dimensional virtual worlds in higher education. In *Current and prospective applications of virtual reality in higher education* (pp. 21–47). https://doi.org/10.4018/978-1-7998-4960-5.ch002

González-Lloret, M., & Ortega, L. (Eds.). (2014). *Technology-mediated TBLT: Researching technology and tasks* (Vol. 6). John Benjamins Publishing Company.

Grewal, D., Noble, S. M., Roggeveen, A. L., & Nordfält, J. (2020). The future of in-store technology. *Journal of the Academy of Marketing Science, 48*(1), 96–113. https://doi.org/10.1007/s11747-019-00697-z

Hafner, C. A., Chik, A., & Jones, R. (2015). Digital literacies and language learning. *Language Learning & Technology, 19*(3), 1–7. https://llt.msu.edu/issues/october2015/commentary.pdf

Hanson, K., & Shelton, B. E. (2008). Design and development of virtual reality: Analysis of challenges faced by educators. *Journal of Educational Technology & Society, 11*(1), 118–131. http://www.jstor.org/stable/jeductechsoci.11.1.118

Huang, X., He, J., & Wang, H. (2020, June). A case study: Students' perception of a collaborative game-based virtual learning environment. In *2020 6th International Conference of the Immersive Learning Research Network (iLRN)* (pp. 46–53). IEEE. https://doi.org/10.23919/iLRN47897.2020.9155159

Hung, S. T. A., Chen, W. J., & Chien, S. Y. (2023). Virtual reality is not always a cure-all: Evidence from a quasi-experiment of EFL business speaking courses. *Interactive Learning Environments,* 1–17. https://doi.org/10.1080/10494820.2023.2200811

Ifanov, J. P., Salim, S., Syahputra, M. E., & Suri, P. A. (2023). A systematic literature review on the implementation of virtual reality for learning. *Procedia Computer Science, 216*, 260–265. https://doi.org/10.1016/j.procs.2022.12.135

Jensen, L., & Konradsen, F. (2018). A review of the use of virtual reality head-mounted displays in education and training. *Education and Information Technologies, 23*, 1515–1529. https://doi.org/10.1007/s10639-017-9676-0

Jiao, L., Zhu, M., Xu, Z., Zhou, G., Schwieter, J. W., & Liu, C. (2023). An ERP study on novel word learning in an immersive virtual reality context. *Bilingualism: Language and Cognition,* 1–9. https://doi.org/10.1017/S136672892300038X

Junior, R. A., & Bodzin, A. (2020). Work-in-progress – Immersive virtual reality design considerations to promote learning for English language learners. In *2020 6th International Conference of the Immersive Learning Research Network (iLRN)* (pp. 251–254). IEEE. https://doi.org/10.23919/iLRN47897.2020.9155141

Kaplan, A. M., & Haenlein, M. (2009). The fairyland of Second Life: Virtual social worlds and how to use them. *Business Horizons, 52*(6), 563–572. https://doi.org/10.1016/j.bushor.2009.07.002

Khatoony, S. (2019). An innovative teaching with serious games through virtual reality-assisted language learning. In *2019 International Serious Games Symposium (ISGS)* (pp. 100–108). IEEE. https://doi.org/10.1109/isgs49501.2019.9047018

Khodabandeh, F. (2022). Exploring the applicability of virtual reality-enhanced education on extrovert and introvert EFL learners' paragraph writing. *International Journal of Educational Technology in Higher Education, 19*(1), 1–21. https://doi.org/10.1186/s41239-022-00334-w

Kurniawan, C., Rosmansyah, Y., & Dabarsyah, B. (2019, July). A systematic literature review on virtual reality for learning. In *2019 IEEE 5th International Conference on Wireless and Telematics (ICWT)* (pp. 1–4). IEEE. https://doi.org/10.1109/ICWT47785.2019.8978263

Kozlova, I., & Priven, D. (2015). ESL teacher training in 3D virtual worlds. *Language Learning & Technology, 19*(1), 83–101. https://doi.org/10125/44403

Lan, Y. J. (2020). Immersion into virtual reality for language learning. In *Psychology of learning and motivation* (Vol. 72, pp. 1–26). Academic Press. https://doi.org/10.1016/bs.plm.2020.03.001

Lai, K. W. K., & Chen, H. J. H. (2023). A comparative study on the effects of a VR and PC visual novel game on vocabulary learning. *Computer Assisted Language Learning, 36*(3), 312–345. https://doi.org/10.1080/09588221.2021.1928226

Li, X., & Jiang, Q. (2021). Application of virtual reality technology in English interpretation teaching. In *2021 2nd International Conference on Information Science and Education (ICISE-IE)* (pp. 124–127). IEEE. https://www.researchgate.net/publication/354572822_Application_of_Virtual_Reality_in_English_Teaching

Li, Y., Ying, S., Chen, Q., & Guan, J. (2022). An experiential learning-based virtual reality approach to foster students' vocabulary acquisition and learning engagement in English for geography. *Sustainability, 14*(22), Article 15359. https://doi.org/10.3390/su142215359

Liang, M. Y. (2019). Beyond elocution: Multimodal narrative discourse analysis of L2 storytelling. *ReCALL, 31*(1), 56–74. https://doi.org/10.1017/S0958344018000095

Lin, Y. J., & Wang, H. C. (2021). Using virtual reality to facilitate learners' creative self-efficacy and intrinsic motivation in an EFL classroom. *Education and Information Technologies, 26*(4), 4487–4505. https://doi.org/10.1007/s10639-021-10472-9

Melchor-Couto, S. (2018). Virtual world anonymity and foreign language oral interaction. *ReCALL, 30*(2), 232–249. https://doi.org/10.1017/S0958344017000398

Mroz, A. (2015). The development of second language critical thinking in a virtual language learning environment: A process-oriented mixed-method study. *CALICO Journal, 32*(3), 528–553. https://www.jstor.org/stable/calicojournal.32.3.528

Mubarok, H., Lin, C. J., & Hwang, G. J. (2023). A virtual reality-based collaborative argument mapping approach in the EFL classroom. *Interactive Learning Environments*, 1-19. https://doi.org/10.1080/10494820.2023.2207197

Mulrow, C. D. (1994). Systematic reviews: Rationale for systematic reviews. *BMJ, 309*(6954), 597–599. https://doi.org/10.1136/bmj.309.6954.597

Mujber, T. S., Szecsi, T., & Hashmi, M. S. (2004). Virtual reality applications in manufacturing process simulation. *Journal of Materials Processing Technology, 155*, 1834–1838. https://doi.org/10.1016/j.jmatprotec.2004.04.401

Orlosky, J., Huynh, B., & Hollerer, T. (2019). Using eye-tracked virtual reality to classify understanding of vocabulary in recall tasks. In *2019 IEEE International Conference on Artificial Intelligence and Virtual Reality (AIVR)* (pp. 66–667). IEEE. https://doi.org/10.1109/AIVR46125.2019.00019

Palmeira, E. G. Q., Saint Martin, V. B., Gonçalves, V. B., Moraes, Í. A., Júnior, E. A. L., & Cardoso, A. (2020). The use of immersive virtual reality for vocabulary acquisition: A systematic literature review. *Anais do XXXI Simpósio Brasileiro de Informática na Educação*, 532–541. https://doi.org/10.5753/cbie.sbie.2020.532

Parmaxi, A. (2023). Virtual reality in language learning: A systematic review and implications for research and practice. *Interactive Learning Environments, 31*(1), 172–184. https://doi.org/10.1080/10494820.2020.1765392

Pataquiva, F. D. P. F., & Klimova, B. (2022). A systematic review of virtual reality in the acquisition of a second language. *International Journal of Emerging Technologies in Learning (iJET), 17*(15), 43–53. https://www.learntechlib.org/p/223055/

Peixoto, B., Bessa, L. C. P., Gonçalves, G., Bessa, M., & Melo, M. (2023). Teaching EFL with immersive virtual reality technologies: A comparison with the conventional listening method. *IEEE Access, 11*, 21498–21507. https://doi.org/10.1109/ACCESS.2023.3249578

Pinto, R. D., Monteiro, P., Melo, M., Cabral, L., & Bessa, M. (2021, November). Does gamification in virtual reality improve second language learning? *2021 International Conference on Graphics and Interaction (ICGI)* (pp. 1–8). IEEE. https://doi.org/10.1109/ICGI54032.2021.9655286

Shih, Y. C. (2015). A virtual walkthrough London: Culture learning through a cultural immersion experience. *Computer Assisted Language Learning, 28*(5), 407–428. https://doi.org/10.1080/09588221.2013.851703

Sun, C., Yao, Y., Wang, R., & Ye, X. (2020). A study on the influence of scene reality of VR environment on English learners' learning engagement and effectiveness. In *2020 IEEE 2nd International Conference on Computer Science and Educational Informatization (CSEI)* (pp. 181–185). IEEE. https://doi.org/0.1109/CSEI50228.2020.9142520

Suzuki, T., Ochiai, T., & Hoshino, J. (2021). Scenario-based customer service VR training system using a second language. *2021 Nicograph International (NicoInt)* (pp. 94–97). https://doi.org/10.1109/NICOINT52941.2021.00025

Tai, T. Y., & Chen, H. H. J. (2021). The impact of immersive virtual reality on EFL learners' listening comprehension. *Journal of Educational Computing Research, 59*(7), 1272–1293. https://doi.org/10.1177/0735633121994291

Tawfik, G. M., Dila, K. A. S., Mohamed, M. Y. F., Tam, D. N. H., Kien, N. D., Ahmed, A. M., & Huy, N. T. (2019). A step-by-step guide for conducting a systematic review and meta-analysis with simulation data. *Tropical Medicine and Health, 47*(1), 1–9. https://doi.org/10.1186/s41182-019-0165-6

Utami, L. P. R. A., Suwastini, N. K. A., Dantes, G. R., Suprihatin, C. T., & Adnyani, K. E. K. (2021). Virtual reality for supporting authentic learning in 21st-century language classrooms. *Jurnal Pendidikan Teknologi dan Kejuruan, 18*(1), 132–141. https://doi.org/10.23887/jptk-undiksha.v18i1.32376

Van der Meer, N., Van der Werf, V., Brinkman, W. P., & Specht, M. (2023). Virtual reality and collaborative learning: A systematic literature review. *Frontiers in Virtual Reality, 4*, Article 1159905. https://doi.org/10.3389/frvir.2023.1159905

Vázquez, C., Xia, L., Aikawa, T., & Maes, P. (2018, July). Words in motion: Kinesthetic language learning in virtual reality. *2018 IEEE 18th International Conference on Advanced Learning Technologies (ICALT)* (pp. 272–276). IEEE. https://doi.org/10.1109/ICALT.2018.00069

Wang, C., Lian, X., Zhuang, C., Kwok, P. K., & Yan, M. (2021). A virtual reality-based spoken English learning platform. *2021 IEEE 24th International Conference on Computer Supported Cooperative Work in Design (CSCWD)*, 867–872. IEEE. https://doi.org/10.1109/cscwd49262.2021.9437696

Wang, Z., Guo, Y., Wang, Y., Tu, Y. F., & Liu, C. (2021). Technological solutions for sustainable development: Effects of a visual prompt scaffolding-based virtual reality approach on EFL learners' reading comprehension, learning attitude, motivation, and anxiety. *Sustainability, 13*(24), Article 13977. https://doi.org/10.3390/su132413977

Wu, J. G., Zhang, D., & Wang, M. (2022). Game-based virtual reality for languaculture learning: An example of the Forbidden City. *2022 8th International Conference of the Immersive Learning Research Network (iLRN)* (pp. 1–5). IEEE. https://doi.org/10.23919/ilrn55037.2022.9815946

Wu, J. G., Zhang, D., & Lee, S. M. (2023). Into the brave new metaverse: Envisaging future language teaching and learning. *IEEE Transactions on Learning Technologies, 17*, 44–53. https://doi.org/10.1109/TLT.2023.3259470

Xie, B., Liu, H., Alghofaili, R., Zhang, Y., Jiang, Y., Lobo, F. D., & Yu, L. F. (2021). A review of virtual reality skill training applications. *Frontiers in Virtual Reality, 2*, Article 645153. https://doi.org/10.3389/frvir.2021.645153

Xue, R. (2022). Design mechanism of oral English intelligent training based on virtual reality. *2022 IEEE 4th Eurasia Conference on IOT, Communication and Engineering (ECICE)* (pp. 242–245). IEEE. https://doi.org/10.1109/ECICE54560.2022.00054

Xu, D., & Liu, M. (2022). Enhancing language learning through virtual reality: A systematic review. *Journal of Computer-Assisted Learning, 38*(1), 1–16. https://doi.org/10.1111/jcal.12606

Yalcin, M. A., & Altun, A. (2016). Effects of virtual reality on learning English as a foreign language. *Educational Sciences: Theory & Practice, 16*(3), 809–818. https://doi.org/10.12738/estp.2016.3.0199

Yildirim, Z. (2014). The effect of virtual reality-based learning on EFL learners' vocabulary learning. *Computer Assisted Language Learning, 27*(6), 539–557. https://doi.org/10.1080/09588221.2013.869917

Yilmaz, R. M., & Bayar, M. A. (2020). The effectiveness of virtual reality technologies in teaching English vocabulary. *Computers & Education, 144*, 103709. https://doi.org/10.1016/j.compedu.2019.103709

Zeng, X., & Zhou, Y. (2020). Application of virtual reality in college English teaching. *Proceedings of the 2020 International Conference on Education, Management and Social Science* (pp. 195–199). https://doi.org/10.2991/assehr.k.200212.033