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Enhancing English Verbal Communication Skills through Virtual Reality: A Study on Engagement, Motivation, and Autonomy among English as a Second Language Learners

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Abstract. Technological innovations make enormous transformations in the education paradigm. Virtual Reality (VR) is a ubiquitous technology that provides ample opportunities for educators to expand English as a Second Language (ESL) learners' language learning. This paper looks at ESL learners' level of engagement, motivation, and autonomous learning in developing their English verbal communication skills through VR-integrated lessons. It also explores the relationship between learners' engagement, motivation, and autonomous learning in VR-based lessons. 166 high school senior students were purposively chosen for this mixed-method study. Findings from the survey, which was analysed in SPSS, revealed that the participants perceived a high level of engagement (M=4.55), motivation (M=4.36), and autonomous learning (M=3.90). Meanwhile, the correlation analysis indicated that there is a strong relationship between learners' engagement, motivation, and autonomous learning. The observation report stated that samples displayed a very positive attitude towards learning through VR to develop their communication skills. Additionally, the reports from the focus group discussions which were analysed thematically highlighted that VR provides real-life experience, VR improves memory retention, VR is engaging, and VR helps improve one's communication skills. The findings implied that integrating VR into education is a promising tool for educators to enhance ESL learners' verbal communication skills and boost digital literacy while preparing learners for a technologically advanced world. In conclusion, this study validates that VR assists

educators in developing ESL learners' verbal communication skills. Nevertheless, a comprehensive analysis is needed to explore more how far learners could develop their English communication skills through VR-based lessons.

Keywords: English as a Second Language (ESL) learners; verbal communication skill; virtual reality; engagement; motivation; and autonomy

1. Introduction

The advancement and dependence on technology have transformed every aspect of life today. In particular, the advent of technology has resulted in remarkable impacts in the education realm (Hawkridge, 2022). These emerging technologies have given a new dimension to the teaching and learning process in both classroom learning (Avelino & Ismail, 2021) and distance learning (Sadeghi, 2019). In line with current trends, Virtual Reality (VR) is omnipresent as it expands learners' learning beyond the actual classroom experience (Kamińska et al., 2019). Virtual Reality is a technological innovation that simulates life experiences and builds thoughts using computers and various accessories, promoting communication among individuals, machines, and other entities (Bardi, 2019). This ubiquitous technology has been widely used in classrooms, especially in language classrooms (Parmaxi, 2020; Yaccob et al., 2022). In English language teaching and learning, VR is an asset as teachers can situate students within the virtual situation, giving them the possibility of experiencing real-life interaction in which the target language can be developed (Andujar & Buchner, 2019; Ismail & Hashim, 2020)

Mastering a target language requires more practice and experience. In the ESL context, mastering a second language is still tough and challenging as learners possess a lack of confidence in using the language (Aziz & Kashinathan, 2021). Although learners have adequate exposure to the English language in this period, they still feel unconfident in communicating fluently as they lack practice in real-life situations. On the other hand, the teaching materials used by educators are inadequate for ESL learners to acquire the language effectively and later authentically apply it in real-world communicative situations (Ali Alghamdi et al., 2019). Studies have also revealed that language teachers emphasise memorising vocabulary items, grammatical rules, and structures of the target language (Ali Alghamdi et al., 2019). Nevertheless, they are unable to emphasise teaching how to use and connect these language forms with their actual meaning and when to apply them successfully in real-life situations. Consequently, these practices have neither aided teachers in achieving their ultimate goal nor enabled learners to communicate in the target language in situations beyond the classroom context.

Hence, meaningful methods and authentic materials are greatly accentuated to make language learning more useful and applicable in current real-life communicative situations (Toro et al., 2019). Although the integration of authentic materials can develop learners' language accuracy as well as fluency

(Alobaid, 2020; Hashim, 2018; Toro et al., 2019), they must be appropriate to the current development of students' environment and context. Furthermore, these methods are designed to not only enhance engagement but also foster motivation and autonomy in learners by ensuring a more effective and impactful acquisition of communication skills.

Apparently, today's learners, the Z generation, prefer digitalised materials compared to conventional textbooks (Chicioreanu & Amza, 2018; Hashim, 2018). In this case, VR technology plays a crucial role in ESL teaching and learning by providing learners with opportunities to communicate in authentic situations (Flores, 2022; Hurrell & Baker, 2020). Although materials are prepared to cater to the learners, their engagement in learning is of utmost importance as it increases students' autonomy learning and enhances student motivation (Berli, 2021; Martin & Sadaf, 2018). Hence, the adoption of immersive technology which caters to learners' needs allows them to stimulate their motivation and foster self-directed learning besides keeping learners engaged (Ferrer et al., 2020; Makri et al., 2021; Sally Wu & Alan Hung, 2022).

Despite numerous studies (Al-Amri et al., 2020; Calvert & Abadia, 2020; Dhimolea et al., 2022; Di Natale et al., 2020; Halabi, 2020; Huang et al., 2021; Liu et al., 2020; Zhang, 2022) on learners' engagement and motivation in VR lessons, to date there has been no empirical study on high school ESL learners' engagement, motivation, and autonomous learning in developing their verbal communication skills through VR. Therefore, this study explored ESL learners' engagement levels in enhancing communication skills through VR. Additionally, it explored learners' level of motivation and autonomy in developing communication skills through VR. The study also investigated the relationship between learners' engagement, motivation, and autonomous learning through VR. Hence, the research questions of this study are:

1. What are the levels of engagement experienced by ESL learners in the process of enhancing communication skills through Virtual Reality (VR) integration?
2. How do ESL learners perceive their motivation levels when engaging in activities aimed at developing communication skills through VR?
3. To what extent do ESL learners exhibit autonomy in the process of developing their communication skills within a Virtual Reality environment?
4. What is the relationship between ESL learners' engagement, motivation, and autonomous learning in the context of VR-enhanced communication skills development?

Significance of the study

The study has a potential to bring about positive transformation in the field of language education, especially for ESL learners by utilising VR technology. The results of the study contribute to both theoretical and practical benefits.

Theoretical benefits:

The study contributes to the theoretical framework of language learning and educational technology, particularly in the field of VR. The results justify how

VR can positively influence ESL learners' engagement, motivation, and autonomous learning; it enriches the perspective of innovative pedagogical approaches. Additionally, by exploring the relationships between engagement, motivation and autonomous learning through VR experience, the study provides theoretical potential for understanding how immersive technologies influence language acquisition and verbal communication skills development.

Practical benefits:
The findings of the study practically benefits educators, curriculum designers and policymakers. The positive correlation between high engagement, motivation and autonomous learning in the VR-enhanced language learning environment supports the integration of such technologies as it can be an effective strategy for enhancing communication skills among ESL learners. The detailed insights into participants' experiences with VR provide guidance for educators to integrate VR tools into language teaching and the learning process.

In sum, the findings of the study are theoretically significant as it contributes to our understanding of the use of VR in language learning while considering the learners' engagement, motivation, and autonomy. Meanwhile, the findings are practically significant as they offer actionable insights for educators and stakeholders to optimise the integration of VR in ESL activities for the learners.

2. Literature Review

English as a Second Language (ESL) learners encounter multiple challenges in developing their English verbal communication skills (Aziz & Kashinathan, 2021). Virtual Reality is an emerging technological tool that provides ESL learners with excellent opportunities to effectively develop their verbal communication skills. Previous literature contributes a comprehensive understanding of the use of VR in fostering ESL learners' engagement, motivation, and autonomy in developing their English verbal communication skills.

The importance of English Verbal Communication Skills for ESL learners
It is undeniable that English is seen as a global language, and its importance has tremendously increased the number of English as a Second Language (ESL) learners in finding ways to enhance their verbal communication skills. Effective verbal communication is essential in various aspects of one's life, particularly in education, employment, and social interaction (McGunagle & Zizka, 2020). Therefore, ESL learners are urged to develop verbal communication skills to fully partake in academic and social life. An extensive body of research has proven that strong verbal communication skills can lead to better academic achievement, job opportunities and enhanced social integration (Crisianita & Mandasari, 2022; Majid et al., 2019; McGunagle & Zizka, 2020; Rao, 2019; Salendab & Laguda, 2023). However, it is crucial to cultivate engagement, motivation, and autonomy among language learners to learn the language effectively. As VR technology becomes more accessible, ESL learners obtain tremendous opportunities to practise and develop their English verbal communication skills in a realistic and immersive environment.

Virtual Reality is a Potential Tool for Developing English Verbal Communication Skills

VR technology has been gaining more attention these recent years for its potential benefits to users. Recent studies have proven that VR is a promising tool for developing ESL learners' English verbal communication skills. As VR provides immersive and interactive environments, learners find it helpful for them to practise and engage in real-life communication scenarios (Riches et al., 2023). Research by Rendi (2023) highlights that learners can enhance their fluency, accuracy, pronunciation and, most importantly, confidence in communicating in English through simulations and role-play activities. Several studies also highlight the positive impact of VR on learners' attitudes towards effective communication (Ebadi & Ebadijalal, 2022; Gruber, 2023; Kim et al., 2021; Shorey et al., 2020). Also, studies reveal that VR offers a more enjoyable, safe, fun, and unique learning experience, which makes learners more interested in language learning (Chen & Kent, 2020; Huang et al., 2021; Peixoto et al, 2019). These findings imply that integrating VR into language learning activities can enhance learners' English verbal communication skills tremendously.

ESL Learners' Engagement, Motivation and Autonomy in the Development of Verbal Communication Skills through VR

Previous studies investigated the impact of VR technology on ESL learners' engagement, motivation, and autonomy in developing their English verbal communication skills. The findings are in favour as learners are engaged and motivated throughout the intervention (Chen et al., 2021; Lan, 2020). The researchers emphasised that learners actively participated in language learning activities because of the interactive and immersive learning experience. This finding is consistent with other studies (Chen & Hwang, 2022; Chen & Kent, 2020; Hiver et al., 2020) that ESL learners are highly engaged and motivated in VR simulations, providing them with opportunities to practise real-life conversations in a supportive setting. Moreover, Lan (2020), Shadiev and Yang (2020) and Qiu et al. (2023) agree that the immersive nature of VR allows learners to actively engage and practise in the authentic language learning environment. Thus, these findings suggest that incorporating VR technology into ESL classrooms can be a significant approach to bring about an increased engagement and motivation of learners in developing their English verbal communication skills.

Furthermore, research carried out by Lan (2020), Nicolaidou et al. (2023) and Parmaxi (2023) emphasised learners' autonomy in VR-integrated language learning activities. The participants revealed that VR allows them to take control of their learning process, and the most significant impact was that they could explore various language learning situations independently. Research by Alfadil (2020) and Chen and Hsu (2020) also revealed that VR simulations allow learners to practise English conversations, boosting confidence and autonomy in developing their verbal communication skills. Additionally, several studies agree that VR results in higher autonomy and self-directed learning levels among learners as the technology helps learners overcome their fear of making mistakes (Alwafi et al., 2022; Lawrence & Ahmed, 2023; Mynard, 2019). Thus, these findings imply that learners can be more autonomous and increase their

willingness to engage in English conversations, leading to enhanced verbal communication skills.

Thus, the literature review suggests that, while there is extensive descriptive research, particularly systematic reviews focused on the effectiveness of VR technology in the development of verbal communication skills among ESL learners, there is still a scarcity of experimental research that may provide detailed data on the effectiveness of VR in developing English verbal communication skills. Furthermore, the existing studies highlighted the importance of motivation, engagement, and autonomy in language learning generally; however, they do not specifically address the use of VR in developing English verbal communication skills. Therefore, the research gap in this study focuses on the need for more empirical research investigating the effectiveness of VR in developing ESL learners' English verbal communication skills and the relationship between ESL learners' motivation, engagement, and autonomy in VR-integrated language learning.

Conceptual Framework

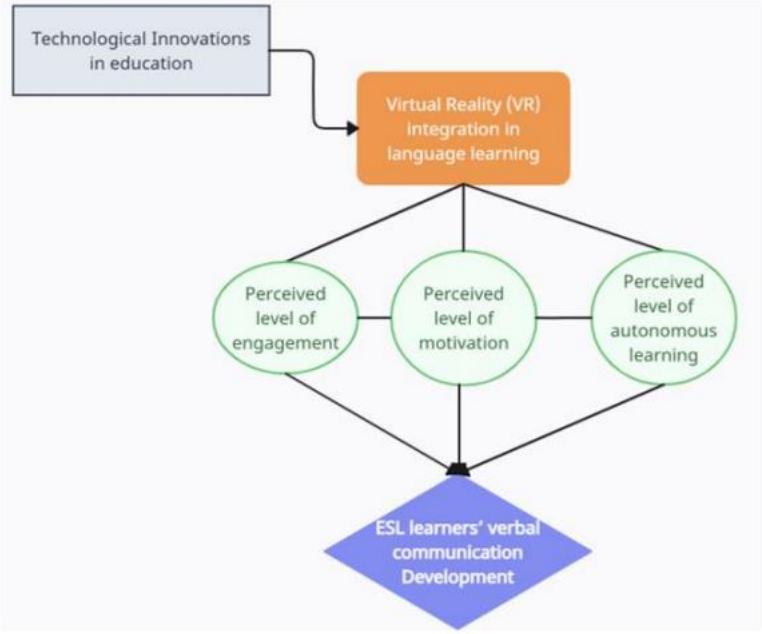

Figure 1: Conceptual Framework

The conceptual framework (Figure 1) outlines the factors and relationships involved in integrating VR technology to develop ESL learners' communication skills. It focuses on the impact of VR on ESL learners' engagement, motivation, and autonomous learning, which influence the development of their English verbal communication skills (Albiladi & Alshareef, 2019).

The framework begins with the remarkable transformation resulting in promising technological innovations in education. VR is widely accepted and practised in the education paradigm as one of the ubiquitous technologies, particularly in language learning (Parmaxi, 2023). The core element of the framework is integrating VR technology into ESL learners' language learning.

This integration provides ample opportunities for educators to initiate immersive and engaging learning experiences. Engagement, motivation, and autonomous learning are three key factors underpinning language learning success (Albiladi & Alshareef, 2019; Wang et al., 2021). Engaged learners are actively involved in the learning process, while motivation drives their willingness to participate and persist in their language learning independently (Mercer, 2019). Meanwhile, autonomous learning allows learners to take control of their learning and make decisions regarding their learning directions (Mashrabovna, 2022; Zainuddin et al., 2019).

Hence, the study investigates the ESL learners' perceived engagement, motivation, and autonomous learning levels in VR-integrated classrooms. These factors influence the learners' attitudes and participation in language learning. The framework hypothesises a strong relationship between ESL learners' engagement, motivation, and autonomous learning in VR-integrated lessons. High levels of engagement and motivation are believed to result in autonomous learning (Alamer & Al Khateeb, 2023; Wang et al., 2021). Thus, it can be concluded that the factors are interrelated in the context of ESL learners using VR technology. Overall, the conceptual framework emphasises the effectiveness of VR technology in the ESL learners' language learning process. The learners' increased engagement, motivation and autonomous learning will eventually lead to enhanced English verbal communication skills.

3. Method

The research questions and objectives outlined in this study were comprehensively addressed through a well-structured methodological approach. The following sub-sections namely Research Design, Research Samples, Research Instrument, Data Collection Procedure and Data Analysis help shape the robustness and validity of the research findings.

Research Design

This study employed a mixed-method approach which is a research strategy that combines both quantitative and qualitative methods to gain a more comprehensive understanding of the research questions (Creswell, 1999). Each design employed meets a specific purpose in gathering rich data on ESL learners' engagement, motivation, and autonomous learning in the context of verbal communication skills development through Virtual Reality.

A survey was used to collect the quantitative data from the participants regarding their perceived engagement, motivation, and autonomy in enhancing their verbal communication skills through VR. By employing a survey, this study obtained experimental insights into the perceived levels of engagement, motivation, and autonomous learning. Moreover, it allowed for easy comparison and statistical analysis to understand the broad patterns within the participants. The survey questions were designed based on previous references related to perceived engagement, motivation, and autonomy as well as communication skills enhancement.

Next, participant observation was used to capture qualitative data on participants' attitudes, reactions, and responses during VR enhanced communication activities. This approach helped with thorough observation and documentation of the participants' behaviours in the VR-integrated learning. Besides providing a more in-depth understanding of how learners engage with VR technology, it also allowed the researcher to capture the participants' reactions towards different aspects of the VR experience.

Finally, a focus group discussion method was carried out to obtain the participants' insights and in-depth perspectives on the use of VR technology to develop their communication skills. By engaging the participants in group discussion, collective insights on VR experiences and their adaptation towards the technology were explored. Their shared experience and various viewpoints generated rich qualitative data that complement the quantitative findings from the survey.

In sum, the mix-method approach employed in this study enhances the overall validity and reliability of the study by triangulating data from multiple sources and methodologies.

Research Samples

As the aim of the study is to describe a particular context in depth, a purposive sampling method was employed. By intentionally selecting participants who were highly relevant to the research focus, the study had a detailed exploration of ESL learners' engagement, motivation, and autonomous learning in the context of verbal communication skills development through VR. As the participants possessed specific characteristics related to the context, they provided the most relevant and insightful information for the research questions.

Thus, the purposive sampling for this study involved the intentional selection of 166 high school students out of a total population of 3158. These participants had the same age range (18 years old) and were studying the same level (Senior 3). The selected participants consisted of both male and female students with Chinese as their first language. Meanwhile, English was their second language and was only used during English lessons and other English medium subjects such as Science and Mathematics.

To further justify the chosen sample, participants were identified through their average oral proficiency, as assessed by the national oral assessment (Sijil Pelajaran Malaysia Oral Test). This ensured that the selected participants had a common baseline in language proficiency. Additionally, the chosen participants shared a commonality in having prior experience handling VR headsets, adding a valuable dimension to their participation in VR-integrated verbal communication skills learning.

Research Instruments

The research instruments employed to collect data for this study are a survey form (5-point Likert scale), a structured observation sheet and a focus group discussion.

The survey included three components: perceived engagement, perceived motivation, and perceived autonomy learning (refer to Appendices for detailed items). The respondents' perceived level of engagement and motivation levels were gauged from high to low; meanwhile, the independent learning was gauged from very independent to highly dependent. Next, the researcher created the observation grid to observe participants based on five criteria, namely adherence to instructions, displayed behaviour and engagement during the VR experience, communication behaviour, involvement in communication and participants' actions after VR experience (Refer to the Appendices for the detailed observation grid).

In additions, this study used mobile phones, Google Earth VR (arvr.google.com), and VR goggles. In order to save time and secure a reliable tool to be utilised in the study, the well-prepared Google Earth VR application was chosen to arrange virtual field trips during the lessons. The virtual field trips were focused on expeditions aligned with the school syllabus: Arts and Culture (Figure 2 and Figure 3 provide a visual context of the expeditions related to arts and culture). As for the focus group discussion, a semi-structured interview was carried out (refer to the appendices for the interview questions).

Source: Google Earth VR (arvr.google.com)

Figure 2: Festival of Lights (Screenshot)

Source: Google Earth VR (arvr.google.com)

Figure 3: Food served during the festival (Screenshot)

Validity and Reliability

Both quantitative and qualitative instruments employed in this study were validated through content and face validity. Experts from the technology-enhanced language learning reviewed both observation grid and focus group discussion interview questions. They ensured that the instruments covered all relevant aspects of the construct. Additionally, the employment of a mixed-method approach allowed the triangulation of findings from both qualitative and quantitative data, enhancing the overall validity of the study.

The reliability of the survey instrument was checked through internal consistency. Based on the survey on perceived engagement, motivation and autonomous learning, the internal consistency measured by Cronbach's alpha was found to be 0.73. It suggested a moderate to satisfactory level of internal consistency for the survey items. The coefficient identified that the degrees to which participants' responses across the items being measured (perceived engagement, motivation and autonomous) were correlated.

Data Collection Procedure

The study was carried out class by class. Each class had a different schedule. First, the participants from the first class were briefed on the purpose of the study, and the instructions were made clear. The participants were assigned in pairs and given a specific place in the classroom. Each participant was asked to communicate with each other while going on a virtual tour. For example, they needed to initiate questions such as "What do you see now?" "Which place is this?" "Isn't it beautiful?" "What are they doing?" and some other questions that helped them prompt and answer the questions.

After the briefing, the participants searched the sites for the visit on their mobile phones and fixed them on their VR goggles. Then, they started exploring the sites, and as instructed, they initiated the conversations. The researcher observed the participants' behaviour and completed the observation grid (refer to the appendices for the observation grid). The researcher and an assistant teacher monitored the participants and assisted them whenever they needed help. Upon completion of the task, each participant was given a survey form.

The researcher then divided the participants into five to eight groups and conducted a focus group discussion. Participants shared their experiences, and the discussion was recorded. The researcher also took note of each participant's responses. These procedures were repeated for the other three classes.

Data Analysis

The analysis was carried out distinguishingly for qualitative and quantitative data. SPSS, the computer software for statistical analysis, was employed to analyse the quantitative data, where means of scores, standard deviation and correlations were figured out. Meanwhile, the observation report and focus group discussion data were coded thematically.

4. Findings

Survey Results on Perceived Level of Engagement, Motivation, and Autonomy

The quantitative data obtained from the survey were analysed using descriptive statistics, specifically mean values and standard deviations, to measure the perceived levels of engagement, motivation, and autonomy among ESL students.

In total, 166 survey forms obtained from 66 male and 100 female respondents were analysed. As the objective of the study was to look at the level of engagement, motivation, and autonomy among ESL students in enhancing communication skills through VR, the result was captured through descriptive statistics, mainly by mean and standard deviations. The interpretation of the mean score was referred to the revised SLEQ (1.00 to 2.33 is low, 2.34 to 3.66 is average, and 3.67 to 5.00 is high).

The results (Table 1) revealed that participants perceived a high level of engagement with total mean values of 4.55 and standard deviations of 0.60. In terms of motivation, participants displayed a high level of motivation with mean values of 4.36 and standard deviations of 0.61. The result of autonomous learning indicates that participants perceived a high level of autonomous learning. This can be seen from the total mean values of 3.90 with 0.72 standard deviations.

Table 1: Descriptive Statistics of Perceived Level of Learners' Engagement, Motivation and Autonomy

	N	Mean	Std. Deviation	Level
Engagement	166	4.55	0.60	High
Motivation	166	4.36	0.61	High
Autonomy	166	3.90	0.72	High

Qualitative Analysis of Observation Results on Participants' Attitude towards the Use of VR Goggles, their Reactions towards VR Experience, and their Involvement in Communication

The observation results that displayed respondents' attitudes towards the use of VR goggles and their reactions during VR experiences describe valuable qualitative insights. The inclusion of specific examples from the participants not only enriched the qualitative analysis but also offered a deeper understanding of the observed scenarios. The observations highlighted participants' positive attitude and their varied communication behaviours during the tour.

Positive Attitude of the Respondents

The positive attitude displayed by the participants during the VR experience depicted their active participation and enthusiasm. The participants adhered to the instructions and cooperated well throughout the session. First, all the participants followed the instructions given by the teacher. The total number of 166 participants had their turns as scheduled. Although they had minimal

trouble in equipping themselves with VR goggles, all of them displayed a positive attitude while engaging in virtual tours; they viewed the sites all around, making small movements. As they explored the sites by moving around, they tried to enhance their experience by touching and feeling the virtual objects. Those gestures exhibited participants' high level of engagement and interaction in the virtual world.

Participants also displayed positive feelings and emotions while using VR technology for virtual tours; they displayed a spectrum of emotions which included joy, happiness, surprise, enjoyment, amazement, and gratification, highlighting the enriching nature of their virtual experiences. These expressions not only mirrored their engagement but also emphasised the immersive and emotionally impactful aspects of VR technology in the context of language learning.

Thus, the positive attitude as well as positive emotions displayed throughout the sessions showcased participants' active physical engagement. This contributes to the broader understanding of the effectiveness of VR-enhanced language learning experiences for ESL students.

Participants' Communication Behaviours

The communication behaviours displayed by the participants during the Virtual Reality tour were diverse and reflective of varying levels of language engagement. The majority of participants opted to articulate their observations in English, employing a range of common adjectives such as "beautiful", "wow", "nice", "unique", and "colorful". This demonstrated a proactive effort to express their impressions and emotions in the target language, contributing to an enriched and descriptive exchange.

Notably, some participants chose to use the Chinese language to describe the virtual sites. They appeared to be comfortable as they described the aspects in the virtual environment. The influence of their language background or proficiency level hindered them from using English to describe or initiate the communication with their peers. Nevertheless, participants who communicated in Chinese attempted to use English to describe the things using simple words and phrases prior to the reminders by the instructor.

Furthermore, the communication behaviours involved active listening as participants engaged in meaningful sharing sessions about their virtual surroundings. The use of adjectives and descriptive phrases ("*It's beautiful*…, *Wow*…, …*nice*..., *it's unique*…, *colourful*") demonstrated participants' behaviour in comprehending the immersive experience collaboratively. However, there were a few students who had poor communication where only strings of words were used, such as "*Yes*…", "*Uhmm*…", "*Right, I also saw that*….", "*It's great*…" and some other common words. This shows challenges faced by ESL learners in expressing detailed thoughts during the VR tour.

Hence, the varied communication behaviours displayed by the participants contributes to a greater understanding of how ESL learners navigate and utilise language in immersive learning environments, ranging from expressive and descriptive communication to limited verbal exchanges due to the influence of language background.

Qualitative Analysis of Focus Group Discussion on Participants' Insights about their Engagement in VR Experience and their Communication Skills Development

The discussion carried out in groups provided the researcher with participants' insights on their use of VR in developing their communication skills. Most of their responses were constructive. They expressed their positive feelings about using VR for going around places. The thematic analysis of the focus group discussion captured four key themes; the real-life experience provided by VR, improved memory retention, the engaging nature of VR and the use of VR in communication.

VR Gives Real-life Experience

Most of the participants stated they had real-life experiences as VR brought them to sites, they had never previously been to or felt. The immersive experience allowed them to enjoy the tour and learn things enthusiastically. Some of the statements by the participants, such as "*It's exciting to have an expedition this way! It's a real tour*"; "*I agree, it brought me to the place I felt like it's real*"; and "*I felt the situation, it was real, I wish I could see more like this*" indicated that the VR tool gave the participants real-life experiences.

VR Improves Memory Retention

The majority of the participants could describe the situations they went through on the VR tour. They could vividly express the things around them and the sites they viewed. This shows that participants improved their memory retention as they could n remember things better even after the lesson. For instance, statements like "*I still remember I saw many colorful lights on the wall, floor…*"; "*The art was amazing; it has some unique sketches"; and "I turned at the back and I saw a dark room and suddenly it was lit up…*" are evidence that the VR tool helped improve the participants' memory retention.

VR is Engaging

The virtual world allowed most of the participants to engage in lessons more enthusiastically. Participants' statements such as "*It kept me focused throughout the lesson*"; "*The 3D environments are very interesting. It makes me pay more attention on my tour*"; and "*This is actually a memorable learning because I can feel the magic of being present at the place*" revealed that the interactive 3D environments aroused their interest and attention throughout the lesson. They felt they were completely engaged in the tour and attentive to the teacher's instructions, unlike the usual classroom. The participants also felt that this to be a memorable learning.

Communication through VR

The majority of the participants had positive feedback to the second interview question (What do you think about using VR?) They felt it was a great way of inducing communication skills among the different types of learners. In particular, the participants mentioned the passive students who had to open their minds and express their views during the lesson. It seemed the shy and unconfident students grabbed the opportunity to articulate their thoughts by describing the sites and things they saw. A few participants felt they had inadequate experience and practice in communicating through VR tours. They preferred real-life situations that allowed them to express their ideas and thoughts more clearly. Some of the participants' direct quotes are as follows: "*I didn't expect my partner to give me some response during the tour as he's always quiet and very reluctant to talk. But he managed to give me some responses in this lesson*"; "*I feel that I'm quite shy and passive. But, after having this lesson, I feel like I got some confidence to communicate with my friend in English, especially whenever he asked me questions like 'What do you see now? What is it like?' and so on. This way, I can express my ideas without feeling shy instead of having to stand up in the classroom and answer the teacher's questions*" and "*I don't think I can develop my English communication skills through VR as I prefer more practice in real life*".

The Relationship among Respondents' Engagement, Motivation and Autonomy in Developing their Communication Skills through VR

Further analysis was conducted to investigate the relationship between the three variables (engagement, motivation, and autonomous learning). Referring to Table 2, the correlation analysis with the covariance measurement shows significant relationships between the key variables in the study.

First, there is a strong positive correlation between engagement and motivation ($r=.595$, $p<.001$) with the covariance value (.358). It reflects that while ESL learners display higher level of engagement in VR-based language learning, their motivation to participate in the lesson and learn the language also increases.

Similar to that, a strong positive correlation exists between motivation and autonomy ($r=.501$, $p<.001$) with the covariance value (.186), showing that motivated learners are more likely to engage in autonomous learning activities. In addition, there is also a positive correlation between engagement and autonomy ($r=.430$, $p<.001$) with the covariance (.223), indicating that learners actively engaged in VR activities are more likely to perceive higher levels of autonomy in their learning.

This concludes that there is a higher connection between ESL learners' engagement, motivation, and autonomy in their learning of language with the aid of VR technology. Notably, the covariance values between engagement and motivation, engagement and autonomy, and motivation and autonomy further justify the positive relationships between the variables.

Table 2: Correlation between learners' perceived engagement, perceived motivation and perceived autonomous learning

		Engagement	Motivation	Autonomy
Engagement	Pearson Correlation	1	.595**	.430**
	Sig. (2-tailed)		.000	.000
	Sum of Squares and Cross-products	59.114	36.108	30.771
	Covariance	.358	.219	.186
	N	166	166	166
Motivation	Pearson Correlation	.595**	1	.501**
	Sig. (2-tailed)	.000		.000
	Sum of Squares and Cross-products	36.108	62.313	36.783
	Covariance	.219	.378	.223
	N	166	166	166
Autonomy	Pearson Correlation	.430**	.501**	1
	Sig. (2-tailed)	.000	.000	
	Sum of Squares and Cross-products	30.771	36.783	86.458
	Covariance	.186	.223	.524
	N	166	166	166

**. Correlation is significant at the 0.01 level (2-tailed).

5. Discussion

Survey Results on Perceived Level of Engagement, Motivation, and Autonomy

The primary aim of this study is to investigate ESL learners' level of engagement, motivation, and autonomous learning in developing their English communication skills through VR-integrated lessons. The findings indicated that VR has played a huge role in engaging students in language learning, particularly in developing their communication skills. The survey results indicated that participants perceived a high level of engagement and motivation during their virtual tour. Notably, previous studies carried out by Di Natale et al. (2020), Mahmoud et al. (2020), Bodzin et al. (2021), Huang et al. (2021), and Wang, Grant, and Grist (2021) captured the similar novelty effect, which is that immersive environments promote higher engagement and motivation among the learners. Participants also perceived autonomous learning, allowing them to learn more independently in VR-based learning. Moreover, the participants' perceived engagement influences motivation and autonomous learning (García et al., 2019; Geng et al., 2019; Zainuddin, 2020). This was proven in this study as the correlation findings emphasise the strong relationship between engagement, motivation and autonomy in the context of VR-enhanced language learning among ESL students. This concludes that complete engagement in lessons increases one's motivation to learn more, resulting in self-autonomous learning.

Observation and Focus Group Discussion on Participants' Insights about their Engagement in VR Experience and their Communication Skills Development

The observation and focus group findings implied that participants were positive about using VR technology during language learning. A positive attitude towards learning will increase students' engagement and motivation (Liu, 2021; Nur et al., 2022). This study proved that the use of VR technology in developing students' verbal communication skills is a significant success as it allows students to communicate as well as express their feelings and thoughts freely. Although a few participants labelled themselves shy and passive, they could, on average, still engage in the VR environment and communicate with their peers. This shows the clear ability of VR tools to capture students' attention and engagement. In sum, VR provides new opportunities for learners to immerse in various contexts more freely with increased motivation and engagement (Chicioreanu & Amza, 2018; Lund & Wang, 2019).

Integration of Qualitative and Quantitative Data

Notably, there is a strong connection between the survey results and the qualitative insights. The participants' perceived high engagement, motivation and autonomy are highly connected with their positive attitudes and active participation during the VR experience. As the learners find the VR learning experience is interesting and compelling, they develop favourable attitudes towards the learning process. Moreover, high engagement allows learners to actively participate and engage with the learning content during the VR experience. Learners' high motivation in their language learning goals fosters positive attitudes that enable them to engage in communication confidently as they see the practical applications of language skills within the VR environment. Learners' high level of autonomy also contributes to positive attitudes and active participation as it helps them understand and improve their language skills through more receptive feedback provided within the VR environment.

6. Conclusion

In conclusion, effective communication skills are crucial in employability of high school students. The adoption of VR technology in ESL classrooms is one of the greatest initiatives of educators to enhance learners' communication proficiency. This study emphasises learners' engagement, motivation, and autonomous learning in the process of elevating their communication skills through VR-based language activities. Thus, the findings of the study claim that learners' increased engagement subsequently influences their motivation and autonomous learning to a higher level. Additionally, the study also highlights that there is a robust and strong positive relationship between learners' engagement, motivation, and autonomous learning in the context of VR-based language learning.

The practical implication suggests that VR can be a promising tool for educators to develop ESL learners' verbal communication skills, as integrating VR into the language learning can be a practical way to foster learners' engagement, motivation, and autonomous learning. Moreover, adequate training, guidance and resources to educators will result in significant language learning outcomes.

Most importantly, this study contributes to the development of the curriculum by highlighting the benefits of VR for ESL learners. The findings can convince the curriculum developers and policymakers to ponder the use of VR-incorporated activities and resources in the preparation of effective language teaching and learning outcomes.

Meanwhile, social implications suggest that, with the capitalisation of VR technology, learners from diverse backgrounds can get to experience more accessible language learning opportunities, which may eventually diminish educational inequalities. Next, ESL learners' digital literacy is boosted as learners are prepared for the technologically advanced world by empowering them to utilise technology more effectively in various aspects of life. Finally, ESL learners get to enhance their English verbal communication skills through VR-based activities; they tend to accelerate their cross-cultural communication and understanding. This helps to promote global connections and cooperation.

Limitation and Recommendation

The study was conducted with a relatively small sample size of 166 high school senior students. This may limit the generalisability of the findings to a broader ESL learner population. Although this study employed a small scale of samples, detailed insights from samples could not be captured. An interview session with each sample could have provided rich data for this study. Due to the number of samples (N=166), the interview session was unplanned.

Furthermore, the study could not capture the long-term effectiveness of VR-integrated lessons involving ESL learners' language learning. In terms of contextual factors, the study did not account for criteria such as learners' prior experience with VR technology and their English language proficiency levels, which could have influenced the results.

Thus, to address the limitation, future research could focus on expanding the sample size by including a more diverse range of ESL learners from various educational levels and backgrounds. In addition, future studies should explore learners' experiences through a detailed interview and observation with a larger sample, which would enhance the depth of understanding as well as producing context-specific insights that quantitative data might not capture. Moreover, a more comprehensive analysis of learners' achievement in enhancing their English verbal communication skills with the assistance of VR technology would add more significant evidence to the respective literature. Further studies may examine how far learners could develop their English verbal communication skills through VR-based lessons.

7. References

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Appendices

Form 1: Survey form

Aspects	**Levels** Very high				Very low
Perceived engagement I was engaged and involved in the lesson.	5	4	3	2	1
Perceived motivation I got motivated to see the sites and talk about it to my friend.	5	4	3	2	1
Perceived autonomous learning I explored and learnt on my own without seeking help from my friend or teacher.	5	4	3	2	1

Form 2: Observation Grid

Observation Criteria	**Description**	**Records**
Adherence to Instructions	Were all participants able to follow the instructions provided for the VR-integrated language lessons?	
	How well did participants adhere to their scheduled turns during the VR tours?	
	Were there any challenges faced by participants in equipping themselves with VR goggles?	
	Participants' overall adherence to instructions (1 - low adherence and 5 - high adherence)	
Attitude and Engagement	Describe the overall attitude displayed by participants during the VR tours.	
	To what extent did participants display positive emotions and expressions (e.g., joy, happiness, surprise)?	
	Did participants actively engage with the virtual environment by looking around, making movements, and attempting to touch virtual objects?	
	Participants' overall level of engagement. (1 - low engagement 5 - high engagement)	
Communication	Describe the language used by	

Behaviour	participants to communicate during the VR tours.	
	Were common adjectives used in English to describe virtual scenes?	
	Were there examples where participants used the Chinese language to describe the virtual environment?	
	How responsive were participants to reminders about using English for communication?	
	Participants' overall communication behaviour. (1 - poor communication and 5 - excellent communication)	
Involvement in Communication	Describe how participants communicated with their peers during the VR tour.	
	Were there signs of active listening during the VR communication activities?	
	Participants' overall involvement in communication. (1 - low involvement and 5 - high involvement)	
Participant	Did participant reflect on the real-life experiences provided by VR?	
	Did participants display that they can remember the VR content and share it with other peers?	
	Did participants share the impact of VR on communication skills development with the teacher or peers?	

Form 3: Interview Questions (Focus Group Discussion)

Perceived Engagement

1. Can you describe your overall experience with the virtual reality (VR) tours?
2. Did VR experience help you in developing your communication skills?
3. How did you feel about the immersive nature of VR? Did the experience keep you focused during the lessons?

Perceived Motivation:

1. Did you feel happy or sad during the VR integrated lessons?
2. Did VR experience motivate you to communicate in English?
3. Can you share specific examples of the VR tours that motivated you to actively participate in communication activities?

4. Do you feel motivated to learn the language through VR?

Perceived Autonomy:

1. In what ways did the VR environment allow you to learn independently?
2. Can you share examples of how you felt more in control of your learning during the VR-integrated lessons?

Other supporting questions:

1. Can you share specific details or moments from the VR tours that you vividly remember?
2. How did these experiences enhance your understanding of the language content?
3. How did these experiences improve your memory related to the content?
4. How do you think these experiences contribute to your language learning?
5. Do you think your attitude towards learning is important? Why?
6. In that case, did your positive/negative attitudes influence your development of communication skills?
7. Were there specific communication activities or interactions during the VR tours that you can think of now?
8. Did you use English or Chinese when you explained the experience with your peer?
9. If Chinese, what made you communicate in Chinese? Why didn't you communicate in English?
10. Do you consider yourself shy (passive) or expressive (active)?
11. How did the VR experience influence your confidence?
12. Do you believe the VR environment provided a supportive platform for expressing ideas compared to traditional classroom settings?