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THE IMPACTS OF VIRTUAL REALITY ON EMOTIONAL FACTORS IN THE CONTEXT OF SELF-DIRECTED LEARNING

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ABSTRACT

Despite the fact that a growing interest in VR persists in education, limited research has examined its effects on emotional factors. The study examined VR on motivation, self-confidence, and language learning anxiety, and explored how VR affected them in the context of SDL. Mixed methods design was employed, comprising the quantitative data from 194 respondents via questionnaires and the qualitative data from 36 participants of in-depth interviews. The results revealed significant differences between pre-test and post-tests, suggesting that VR affects motivation, confidence, and reduces anxiety (Asymp. Sig. < 0.05), with no adverse outcomes. The study showed that students' motivation increased from 64.31 (pre-test) to 91.47 (post-test), self-confidence improved from 68.48 to 92.38, and learning anxiety was reduced from 68.12 to 85.17. These results indicate significant improvements in emotional factors following the use of VR in the context of SDL, thereby supporting the acceptance of the Alternative Hypothesis (Ha) and the rejection of the Null Hypothesis (H0). The qualitative findings show that VR in SDL boosts motivation and self-confidence while reducing language learning anxiety. Its immersive and interactive features promote active engagement and provide a low-pressure environment for practicing English, enhancing both emotional support and learning effectiveness.

Keywords: virtual reality; emotional factors; motivation; self-confidence; learning anxiety

ABSTRAK

Meskipun minat terhadap VR terus meningkat di dunia pendidikan, keterbatasan studi yang mengkaji pengaruh VR terhadap faktor emosional. Penelitian ini meneliti pengaruh VR terhadap motivasi, kepercayaan diri, dan kecemasan belajar bahasa, serta mengeksplorasi bagaimana VR mepengaruhinya dalam konteks self-directed learning. Desain penelitian menggunakan metode gabungan, yang menghasilkan data kuantitatif dari 194 responden melalui kuesioner dan data kualitatif yang diperoleh dari 36 partisipan wawancara mendalam. Hasil penelitian menunjukkan perbedaan yang signifikan antara pre-test dan post-test, yang menunjukkan bahwa VR memengaruhi motivasi, kepercayaan diri, dan mengurangi kecemasan (Asymp. Sig. <0,05), tanpa hasil yang merugikan. Studi ini menunjukkan bahwa motivasi siswa meningkat dari 64,31 (pre-test) menjadi 91,47 (post-test), kepercayaan diri meningkat dari 68,48 menjadi 92,38, dan kecemasan belajar berkurang dari 68,12 menjadi 85,17. Hasil ini menunjukkan peningkatan yang signifikan dalam faktor-faktor emosional setelah penggunaan VR dalam konteks SDL, sehingga mendukung penerimaan Hipotesis Alternatif (Ha) dan penolakan Hipotesis Nihil (H0). Temuan kualitatif menunjukkan bahwa VR dalam SDL meningkatkan motivasi dan kepercayaan diri sekaligus mengurangi kecemasan belajar bahasa. Fitur-fiturnya yang imersif dan interaktif mendorong keterlibatan aktif dan menyediakan lingkungan yang rendah tekanan untuk berlatih bahasa Inggris, meningkatkan dukungan emosional dan efektivitas pembelajaran.

Kata Kunci: *realitas virtual; faktor-faktor emosional; motivasi; kepercayaan diri; kecemasan belajar*

INTRODUCTION

The integration of Virtual Reality (VR) into English as a Foreign Language (EFL) learning offers new opportunities to enhance learners' emotional experiences, particularly in self-directed learning (SDL) contexts. Motivation, self-confidence, and anxiety are interrelated emotional factors that significantly impact the process of learning English, as shown by research on university students in Jordan, where these dimensions critically shape engagement and success in language learning. Effectively managing these emotions fosters a more positive and supportive learning environment, ultimately improving learners' outcomes. Investigating how VR influences these key emotional factors is essential for understanding how immersive technologies can strengthen learner autonomy and reshape the social-emotional landscape of EFL learning (Al-Jarrah et al., 2021). Additionally, some studies reveal the integral role of emotions and emotional intelligence in language learning, suggesting that educators should prioritize emotional factors to enhance motivation, strategy use, and overall learning effectiveness (Nisa & Ashadi, 2024; Yong, 2016; López & Aguilar, 2013).

Despite growing interest in VR as an innovative learning tool, the majority of research has predominantly focused on its cognitive aspects, such as problem solving, critical thinking skills, and students' comprehension in English Language Learning (ELL). Unlike the previous studies, this study uniquely investigates emotional aspects such as motivation, self-confidence, and language learning anxiety in SDL. These emotional factors play a crucial role in language learning, particularly in self-directed learning environments, where learners must regulate their progress and stay motivated. Several recent studies on VR in EFL learning reveal its potential in enhancing students' critical thinking. Faresta et al. (2024) highlight its immersive environment that fosters active engagement and higher-order thinking. Al-said et al. (2024) show that SV-IVR improves critical thinking and reduces cognitive load. Widyatiningtyas et al. (2025) emphasize VR's role in simulating real-world scenarios, enhancing analytical and collaborative skills. However, Alifteria et al. (2023) stress the need for engaging, contextual VR media, as students' critical thinking remains moderate, despite these benefits, challenges such as cost and teacher training persist.

Furthermore, VR also impacts students' problem-solving abilities. Araiza-Alba et al. (2021) report a 77.5% success rate in VR-based tasks, outperforming tablet (32.5%) and board game groups (30%). Almulqu et al. (2025) underscore VR's effectiveness in STEM (Science, Technology, Engineering, and Mathematics) education, fostering critical and creative thinking. In non-native language learning, Klimova (2021) notes VR's support for learner autonomy, Li et al. (2021) highlight increased motivation and engagement, and Panagiotidis (2021) stresses the value of authentic learning contexts. Hua and Wang (2023) report growing interest in VR's cognitive and affective benefits, despite technical and content-related issues. While VR shows promise, emotional dimensions like motivation, self-confidence, and anxiety remain underexplored. This study addresses the overlooked gap in prior research by examining emotional components, namely motivation, self-confidence, and anxiety in VR-based self-directed EFL learning, recognizing that emotional factors strengthen and complement the cognitive aspects emphasized in earlier studies. By focusing on how affective experiences or emotional factors enhance cognitive development, this research offers a more complete understanding of VR's role in fostering effective autonomous language learning.

In English Language Learning (ELL), motivation, self-confidence, and language learning anxiety critically shape learners' engagement and success, in which motivation explains how behavior starts, is directed, maintained, and intensified toward goals (Brophy, 2004). Furthermore, Anqi (2020) highlights its link to learners' attitudes toward language learning. Self-confidence, present from early development, includes lovability and competence (Mutluer, 2006), and is key to happiness and success. It is the ability to act effectively in various situations (Burton & Platts, 2006). Learning anxiety involves persistent fear, often related to failure (Levitt, 1980). Moreover,

Eslami et al. (2016) link it to low confidence, fear of failure, and distress. Gurdal and Acar (2024) note its negative impact and the need for supportive environments. Therefore, Kilag et al., (2023) emphasize that it needs teaching strategies to reduce anxiety. Chan & Tang (2021) show VR reduces anxiety and supports autonomy by addressing socio-affective factors.

Several studies have suggested the use of VR in the 21st Century. VR has been shown to enhance engagement and learning through active interest and challenge (Campos et al., 2022), as well as promote group work and inquiry-based learning (Lytvynova & Soroko, 2023). In self-directed learning, low- to medium-complexity VR environments enhance learning efficiency. VR supports collaboration and sociability by encouraging shared experiences. Collaborative design in VR enhances interaction (Wong et al., 2020) and improves learning outcomes, skill acquisition, and interest (Huang & Roscoe, 2021). Its multisensory nature deepens engagement and fosters cognitive growth, offering metacognitive benefits and preparing student teachers (Alshammari, 2019). VR also boosts self-efficacy and autonomy through group tasks, though tech and teacher support remain challenges (Bell et al., 2020). While promising for self-directed learning, VR requires more interaction and collaboration.

This study contributes to enriching theory by integrating motivation, self-confidence, and anxiety into self-directed English learning with VR. It supports the cognitive-affective theory that emotions shape learning, the self-determination theory on autonomy and competence (Alamer & Almulhim, 2021), the social cognitive theory on self-efficacy (Zhang, 2024), and Vygotsky's theory on social interaction. The findings confirm emotional-cognitive interplay in language learning (Khoudri, 2024; Zhang & Jamaludin, 2024). Pedagogically, VR promotes engagement, reduces anxiety, and supports emotional balance. It aligns with task-based teaching via immersive tasks (Wu et al., 2022) and constructivism through learner-centered design (Chen & Lertamornsak, 2023). Finally, VR reflects universal design principles by offering inclusive, anxiety-reducing experiences.

Based on the identified research gap, two research questions are proposed: (1) Does VR affect the motivation, self-confidence, and anxiety of EFL learners in SDL? (2) How does VR affect students' motivation, self-confidence, and decrease language learning anxiety in SDL?

Therefore, the present study aims to examine VR's influence on learners' motivation, self-efficacy, and anxiety in SDL contexts and to qualitatively explore how VR influences these three key emotional factors.

METHODS

Research design

An explanatory sequential mixed-methods design was employed (Munce et al., 2021), combining quantitative and qualitative approaches to yield comprehensive insights (Creswell & Creswell, 2018) and integrate numerical data with narrative depth (Creswell, 2014). The study began with a quantitative phase using closed-ended questionnaires to assess motivation, self-confidence, and anxiety before and after VR exposure, analyzed via the Wilcoxon Signed-Rank test and descriptive statistics. This was followed by qualitative semi-structured interviews with purposely selected participants to explain the quantitative results and uncover contextual factors (Thornberg et al., 2020). This phase focused on learners' emotional and self-directed experiences in VR-based learning. The sequential design enabled triangulation and improved internal validity. Mixed methods were crucial to capture the effective dimensions of immersive, autonomous learning fully. The integration ensured both generalizable patterns and in-depth understanding (Haynes-Brown, 2023).

Research site and participants

The study was conducted at Universitas Bumigora, Mataram, West Nusa Tenggara, with a total population of 374 computer science students who had particularly completed the even semester

(2nd Semester) of compulsory English courses. Using Slovin's formula with a (5%) margin of error, a representative sample of 194 students was selected. A purposive sampling technique was applied by selecting students who had actively engaged in the use of Virtual Reality (VR) tools as part of a structured English learning model designed and facilitated by the researcher as an English teacher during the semester. This VR-based learning model was implemented both in classroom settings and in outside-class activities to enhance language exposure and engagement. The inclusion criteria required students to have participated consistently in VR-integrated English learning throughout the semester. Additionally, only those who expressed willingness to be involved in the data collection process and gave their informed consent were included in the sample, ensuring both contextual relevance and ethical appropriateness of the participant selection was selected based on statistical considerations to ensure representation and feasibility, focusing on those with prior VR exposure in English learning. For the qualitative phase, 36 participants were also purposely drawn from this sample, with selection guided by data saturation; interviews were concluded once no new insights emerged (Benítez & Padilla, 2014). This strategy enhanced the credibility and depth of qualitative data concerning the emotional impacts of VR in self-directed English language learning among EFL learners.

Table 1. The distribution of population and samples across class

Semester	Class	N	Sample for Questionnaires	Sample for In-depth Interview
2nd Semester	A	79	41	5
2nd Semester	B	70	36	6
2nd Semester	C	70	38	8
2nd Semester	D	75	32	10
2nd Semester	E	65	47	7
2nd Semester	EXTENSION PROGRAM	15	-	-
Total (n)		**374**	**194**	**36**

Table 1 presents the distribution of the total population and selected samples across six second-semester classes in the Computer Science undergraduate program at Universitas Bumigora. The total population consisted of 374 students, including 359 from regular classes (A-E) and 15 from the Extension Program class. While only students from Classes A to E were selected as research respondents, totaling 194 for the questionnaire and 36 for the in-depth interviews, all of them agreed to participate voluntarily. Although the Extension Program class was part of the overall population, no participants were included from this group due to the lack of respondent consent. Therefore, the final sample was drawn exclusively from the five regular classes, while maintaining the full count of 374 as the official population of the study.

Research instruments

This study used three self-developed Likert-scale questionnaires and a semi-structured interview to collect both quantitative and qualitative data. Each questionnaire contained 10 items rated on a five-point scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree). The motivation questionnaire assessed interest, goal commitment, and improvement; self-confidence focused on belief in ability, participation, and resilience; and the learning anxiety questionnaire evaluated emotional calmness, comfort in using English, and anxiety related to performance. The construct validity of the three measurement instruments, namely, the motivation questionnaire, the self-confidence questionnaire, and the learning anxiety questionnaire, was rigorously tested using Pearson correlation (r) analysis.

The results confirmed that at all items exhibited statistically significant and theoretically acceptable validity, indicating that each instrument effectively measures its intended construct. Furthermore, the reliability analysis indicated satisfactory internal consistency, with Cronbach's alpha (α) values of 0.765 for the motivation questionnaire, 0.749 for the self-confidence questionnaire, and 0.963 for the learning anxiety questionnaire, confirming that these instruments are consistently reliable and highly high to assessing the targeted variables. For the qualitative phase, the semi-structured interview protocol was developed based on the key findings from the collected quantitative data, focusing on how VR improves the emotional factors. Open-ended questions were formulated to explore further how motivation, self-confidence, and reduction in learning anxiety were identified in the questionnaires' responses.

The interview protocol was designed to be flexible, allowing for the exploration of new avenues of inquiry based on the participants' responses (Creswell & Clark, 2018). The instruments were validated through expert judgments by two lecturers at Universitas Bumigora with expertise in English Education and Applied Linguistics, ensuring their appropriateness and relevance to the study's objectives. The validation process involved evaluating the content, clarity, and alignment of each item with the research variables. Feedback provided by the experts was used to revise and refine the questionnaire items before distribution. Reliability was ensured through member checking, where participants validated interview transcripts and initial coding. Peer review by two English education experts helped confirm the coding and themes, minimizing potential researcher bias. Confirmability was supported by detailed audit trails documenting analytic decisions throughout the research process. Credibility was strengthened through methodological triangulation, combining data from interviews, questionnaires, and speaking test results to ensure a well-rounded understanding of the research findings.

Data collection

This study employed an explanatory sequential mixed-methods design to examine the effects of VR on emotional factors, namely learning motivation, self-confidence, and language learning anxiety in SDL among EFL students. The quantitative phase began with the administration of three structured Likert-scale questionnaires to 194 participants, both prior to (pre-test) and after (post-test) the VR intervention. They were analyzed through the Wilcoxon Signed-Rank test, which was applied to assess significant improvement across the emotional variables. To complement and elaborate on the quantitative findings, semi-structured interviews were subsequently conducted with a purposely selected subset of 36 participants from 194 total samples. Qualitative data were analyzed using Miles and Huberman's (1994) interactive model, which involves data reduction, data display, and conclusion drawing/verification. This methodological approach allowed for a comprehensive analysis of the impact of VR on emotional readiness in SDL by integrating statistical evidence with learners' lived experiences.

Data analysis

To assess the effects of VR on students' emotional factors in SDL namely motivation, self-confidence, and language learning anxiety this study utilized both inferential and descriptive statistical methods. Initially, the responses from the Likert-scale questionnaires quantitatively were tested for normality using the Kolmogorov-Smirnov (K-S) test. The results indicated that the data were not normally distributed ($p < 0.05$) across all variables in both pre-test and post-test phases. Consequently, the Wilcoxon Signed-Rank test, a non-parametric statistical method, was employed to analyze paired samples that violated parametric assumptions. In the qualitative phase, data from semi-structured interviews were analyzed using Miles and Huberman's (1994) interactive model which involves three key stages: data reduction, data display, and conclusion drawing/ verification. Through systematic coding, thematic matrices were constructed to categorize students'

emotional experiences with VR, allowing the identification of patterns consistent with the study's objectives. This process ensured the validity and coherence of the qualitative findings. The statistical method was applied to evaluate significant differences between pre-test and post-test scores for each emotional variable, thereby addressing the study's hypotheses regarding the impact of VR on students' emotional states in SDL. Significance was determined by the Asymptotic Significance (Asymp. Sig.) value, with $p < 0.05$ indicating a statistically significant effect (Ha accepted), and $p > 0.05$ indicating no significant effect (H_0 accepted).

This study formulated three research hypotheses to investigate the effects of Virtual Reality (VR)-based learning within the framework of Self-Directed Learning (SDL) on students' affective learning components. The first hypothesis (RH1) examines the impact on students' motivation. The null hypothesis (H_0) posits that there is no significant difference in students' motivation before and after the implementation of VR-based learning. In contrast, the alternative hypothesis (Ha) asserts that a significant difference exists. The second hypothesis (RH2) focuses on students' self-confidence. The null hypothesis (H_0) states that there is no significant difference in self-confidence levels before and after the use of VR-based learning in SDL. In contrast, the alternative hypothesis (Ha) maintains that a significant difference is present. The third hypothesis (RH3) pertains to students' language learning anxiety. The null hypothesis (H_0) suggests that there is no significant difference in anxiety reduction before and after the application of VR-based learning. In contrast, the alternative hypothesis (Ha) indicates that a significant reduction in language learning anxiety occurs following the intervention.

In addition to the Wilcoxon test results, descriptive statistics were employed to support the analysis by examining the mean scores of motivation, self-confidence, and language learning anxiety. These descriptive measures further confirmed the positive impact of VR in facilitating improvements across the three emotional factors in ELL among EFL students.

Table 3. Categorization of motivation, self-confidence, and learning anxiety improvement

No.	Values	Categories
1.	< 75	Less
2.	75 - 83	Enough
3.	84 - 92	Good
4.	93 - 100	Very Good

Adapted from (Mahdiansyah et al., 2017)

FINDINGS AND DISCUSSION

Findings

The effect of VR on the learning motivation factor

The analysis examined the effect of VR on students' learning motivation by comparing pretest and post-test scores. The results were analyzed using Negative Ranks, Positive Ranks, and Ties to determine the significance of the difference before and after VR use.

Post-test - Pre-test	Negative Ranks	0	0.00	0.00
	Positive Ranks	194	97.50	18,915.00
	Ties	0		
	Total	194		
	Asymp. Sig. (2-tailed)		.000	
	Test Type		Wilcoxon Signed Ranks Test	(based on negative ranks)

The Wilcoxon Signed Ranks Test results indicated a significant improvement in students' motivation after the use of VR-based learning in Self-Directed Learning (SDL). All 194 students showed positive ranks (Mean Rank = 97.50, Sum of Ranks = 18,915), with no negative ranks or ties, indicating that none of the students experienced a decrease or no change in motivation scores between the pre-test and post-test. The test yielded a Z-value of -12.081 and an Asymp. Sig. (2-tailed) of .000, confirming a statistically significant difference ($p < 0.05$). These findings support Research Hypothesis 1 (RH1), leading to the rejection of the null hypothesis and affirming that VR-based learning had a positive and meaningful impact on enhancing students' motivation in SDL.

Table 5. The Comparison of pre-test and post-test mean scores of motivation

Descriptive Statistics						
	N	Range	Min.	Max.	Mean	Std. D
Pre-test	194	40	47	87	64.31	8.407
Post-test	194	29	70	99	91.47	5.676
Valid N (listwise)	194					

Table 6 compares mean scores between the pre-test and post-test. The pretest mean score was 64.31, while the post-test mean score increased to 91.47. This very significant increase in mean scores indicates that VR has a positive effect on enhancing students' motivation in SDL, reflecting the effectiveness of VR in fostering greater engagement and enthusiasm for learning.

The effect of VR on self-confidence factor

The effect of VR on self-confidence was examined using Wilcoxon Signed Ranks analysis, which compared pre-test and post-test scores to assess the improvement in EFL students' self-confidence.

Table 6. Wilcoxon signed ranks test and test statistics for self-confidence

Tests	Category	N	Mean Rank	Sum of Ranks / Sig.
Post-test - Pre-test	Negative Ranks	0	0.00	0.00
	Positive Ranks	194	97.50	18,915.00
	Ties	0		
	Total	194		
	Asymp. Sig. (2-tailed)			.000
	Test Type		Wilcoxon Signed Ranks Test	(based on negative ranks)

The Wilcoxon Signed Ranks Test results indicated a significant improvement in students' self-confidence following the use of VR-based learning in self-directed learning. All 194 students showed positive rank gains (Mean Rank = 97.50; Sum of Ranks = 18,915.00), with no negative ranks or ties, confirming that every participant experienced an increase in self-confidence. The test produced an Asymp. Sig. (2-tailed) value of .000 ($p < 0.05$), leading to the rejection of the null hypothesis and supporting RH2, thereby confirming that VR significantly enhanced students' self-confidence in the learning process.

Table 7. The comparison of pre-test and post-test mean scores of self-confidence

Descriptive Statistics						
	N	Range	Min.	Max.	Mean	Std. D
Pre-test	194	36	50	86	68.48	7.130
Post-test	194	29	70	99	92.38	5.450
Valid N (listwise)	194					

The descriptive statistics indicate a substantial increase in self-confidence, as reflected by the improvement in mean scores from the pre-test (M = 68.48) to the post-test (M = 92.38). This increase suggests that the learning intervention contributed meaningfully to enhancing students' self-confidence.

The effect of VR on language learning anxiety reduction

The effect of VR on language learning anxiety reduction is assessed through the comparison of pre-test and post-test scores, as presented in the following table:

Table 8. Wilcoxon signed ranks test and test statistics for language learning anxiety

Tests	Category	N	Mean Rank	Sum of Ranks / Sig.
Post-test - Pre-test	Negative Ranks	0	0.00	0.00
	Positive Ranks	192	96.50	18,528.00
	Ties	2		
	Total	194		
	Asymp. Sig. (2-tailed)			.000
	Test Type		Wilcoxon Signed Ranks Test	(based on negative ranks)

The Wilcoxon Signed Ranks Test results indicated a significant reduction in students' language learning anxiety following the use of VR-based learning. Out of 194 participants, 192 showed decreased post-test anxiety scores (Mean Rank = 96.50; Sum of Ranks = 18,528.00), while no negative ranks were found (N = 0) and two ties were recorded. The Asymp. Sig. value of .000 (p < 0.05) confirms a statistically significant difference between pre-test and post-test scores. These findings support Research Hypothesis 3 (RH3), leading to the rejection of the null hypothesis and affirming that VR use effectively reduces language learning anxiety in a self-directed learning environment.

Table 11. The comparison of mean scores of pre-test and post-test of learning anxiety

Descriptive Statistics						
	N	Range	Min.	Max.	Mean	Std. D
Pre-test	194	26	56	82	68.12	6.203
Post-test	194	18	80	98	85.17	3.803
Valid N (listwise)	194					

Table 12 compares the mean scores of language learning anxiety pre-test and post-test. The mean score increased from 68.12 (SD = 6.203) in the pre-test to 85.17 (SD = 3.803) in the post-test, indicating a substantial reduction in anxiety levels after the use of VR in the learning process.

How VR affects motivation, confidence, and learning anxiety in SDL
VR improves learning motivation

The use of VR technology has significantly enhanced students' motivation to learn English by providing an engaging, immersive experience where they can interact with virtual environments and practice communication. This engagement in realistic scenarios, such as language learning interaction, group discussion, classroom meetings, and other learning activities encourages students to apply English actively in context, which strengthens their motivation to use the language. VR also facilitates self-directed learning (SDL) by offering students a more engaging and less anxiety-inducing way to connect with the material. The immersive nature of VR makes language learning more relevant to real-life situations, which in turn fosters a higher level of motivation. This enhanced motivation was clearly reflected in students' own voices during interviews. Many shared their excitement and eagerness when using VR in their English learning:

(1) *I felt like I was actually in a real conversation, not just learning from books. It made me want to keep trying and practicing.* (Participant 13)

(2) *Using VR is way more fun than normal class. It makes me excited to learn more and I don't get bored easily.* (Participant 8)

(3) *I like that I can learn at my own pace. It makes me more motivated because I don't feel left behind."* (Participant 1)

(4) *When I saw myself doing well in VR, it made me feel like I really can improve my English if I keep learning."* (Participant 35)

These testimonies show how VR nurtures students' desire to engage in self-directed learning through increased enjoyment and relevance. Additionally, students reported a boost in their confidence, reducing learning-related tension and enhancing their ability to manage tasks independently, all crucial for developing effective SDL skills. These findings align with the significant improvements observed in motivation and self-confidence in the quantitative analysis, further supporting the positive impact of VR on students' learning outcomes.

Moreover, VR provides a unique opportunity for self-regulation in learning. Students have the freedom to progress at their own pace, focusing on the areas they find most challenging. This autonomy allows them to refine their language skills according to their individual needs and abilities. The non-threatening, supportive environment within VR removes the fear of making mistakes, which increases students' willingness to practice English independently. The real-time feedback offered by VR also plays a key role in reinforcing learning, as it helps students assimilate new information and build self-esteem. As a result, VR not only fosters greater language proficiency but also promotes essential self-regulation skills, such as goal-setting, monitoring progress, and adjusting learning strategies. This aligns with the quantitative findings, where VR intervention was shown to significantly improve students' ability to manage their learning autonomously and enhance their overall language performance.

How VR increases self-confidence

The integration of VR technology has played a pivotal role in boosting students' self-confidence, particularly in the context of speaking English. In the simulated VR environments, students were able to practice conversations and engage in English usage scenarios that, in real life, would typically induce anxiety. This immersive experience allowed them to face language challenges in a secure and non-judgmental space, where they could practice speaking, make mistakes, and retry without any real-world consequences. Such repeated practice in a safe environment proved crucial in building self-esteem, as students were able to enhance their language proficiency without the

fear of social judgment, leading to an increased sense of self-assurance. These experiences were echoed by students during the interviews, as they reflected on how VR helped them overcome their fear and feel more confident:

(1) *I used to be afraid of speaking in English, but in VR I could just try again if I made a mistake. No one was laughing, so I felt more relaxed.* (Participant 10)

(2) *The first time I used VR, I was nervous. But after practicing a few times, I felt braver and more confident to talk in English.* (Participant 19)

(3) *In class, sometimes I feel shy. But in VR, I can speak freely, like I don't care if I make mistakes.* (Participant 5)

(4) *After practicing in VR, I noticed I speak more naturally now, and I'm not as scared as before.* (Participant 36)

These student reflections reinforce the impact of VR as a supportive tool for building communicative confidence.Additionally, VR offered students the opportunity to practice English in a more authentic and meaningful context than traditional learning methods. The virtual setting allowed them to translate theoretical knowledge into practical experience, which in turn strengthened their confidence in using English in real-world situations. By confronting and overcoming simulated language challenges, students felt more prepared both psychologically and emotionally to handle similar situations outside of the VR environment. This aligns with the quantitative findings, which indicated that VR significantly contributed to increasing learners' confidence, thereby supporting the notion that VR enhances both linguistic skills and emotional preparedness for language use in real life.

How VR decreases Language Learning Anxiety (LLA)

The majority of students reported that VR usage significantly reduced their anxiety levels in learning English. The virtual environment provided them with a safe, low-pressure space to practice their English skills, offering a contrast to the often stressful real-life learning experiences. With VR, students engaged in scenarios where using English was essential, simulating challenging situations that required active language use. This simulated space allowed them to repeat conversations, make necessary corrections, and progress to other situations without the fear of real-life social consequences. As a result, students were able to focus more on improving their English proficiency, free from external pressures or judgments. Students themselves described this reduction in anxiety during the interviews:

(1) *In VR, I do not feel as nervous as in the real class. I can focus more on what I want to say, not on what people think.* (Participant 17)

(2) *I used to feel anxious when speaking in front of people. But with VR, I felt comfortable because I was not being watched directly.* (Participant 28)

(3) *It helps me a lot to calm down. I can practice without worrying too much if I'm wrong.* (Participant 20)

(4) *When I practice in VR, my anxiety goes down. I feel like I have more control.* (Participant 4)

Furthermore, VR enabled students to feel more at ease when facing challenging language situations. The preparatory nature of VR not only enhanced their technical language skills but also played a crucial role in reducing anxiety. By providing a space where students could practice without the fear of failure or criticism, VR facilitated a more confident approach to language use. This ability to experiment freely in the virtual environment was key to reducing language learning anxiety, promoting greater self-efficacy, and boosting self-confidence. Consequently, VR proved to be not only a tool for enhancing language proficiency but also a means of managing

psychological factors, such as anxiety, while fostering a more self-assured approach to language learning.

Discussion

The study highlights the significant role of VR in enhancing motivation, self-confidence, and reducing language learning anxiety within self-directed learning contexts. VR's immersive environments increase self-confidence and reduce anxiety by fostering a strong sense of presence, essential for effective learning. The interactive nature of VR also enhances motivation and promotes active participation, contributing to better skill acquisition and knowledge retention (Radovan & Radovan, 2023). Statistically, the significant increase in motivation (Pre-test M = 64.31; Post-test M = 91.47) observed in this study reflects the role of VR in enhancing students' intrinsic motivation. This aligns with the Self-Determination Theory, particularly in terms of autonomy and competence (Alamer & Almulhim, 2021), as students were given control over their pace and learning path through immersive environments. The freedom to explore and practice in VR-supported SDL fosters autonomy, while immediate feedback and task achievement foster competence. From a qualitative perspective, students consistently expressed that the immersive experiences in VR increased their excitement and desire to learn English, as they found the learning context realistic and meaningful. These findings support the cognitive-affective theory, showing that the positive emotional responses induced by VR such as enjoyment and curiosity reinforce cognitive engagement and self-regulated learning. They also confirm the emotional-cognitive interplay described in Zhang and Jamaludin (2024).

Thus, the significant impact of VR on students' motivation highlights its effectiveness in creating an engaging and immersive learning environment. VR's ability to maintain and even enhance motivation, compared to traditional methods, suggests its potential for improving educational outcomes. By fostering creativity and engagement, VR effectively boosts students' motivation (Tian et al., 2023). Furthermore, VR media enhances students' understanding, skills, and interest in learning, further supporting its role in increasing motivation (Baharuddin & Riskawati, 2022). The long impact of VR on motivation is evident in the students' heightened self-efficacy and confidence, indicating that VR not only sustains but also elevates students' enthusiasm for learning. The improvement in self-confidence, from a pre-test mean of 68.48 to a post-test mean of 92.38, demonstrates VR's effectiveness in promoting students' belief in their ability to perform language tasks. This supports Bandura's Social Cognitive Theory, where self-efficacy arises from mastery experiences and social modeling (H. Zhang, 2024). In the VR setting, students could repeat challenging tasks, receive immediate feedback, and gradually improve, all within a non-threatening environment. The qualitative finding indicated that students experienced enhanced psychological readiness, reduced feelings of apprehension, and increased perceived competence in engaging with English-speaking tasks after using VR. These observations highlight the crucial role of emotionally supportive and experiential learning environments in fostering learner self-assurance and confidence. Moreover, the structured repetition embedded in VR-based activities contributed to the internalization of skill mastery, reinforcing students' positive self-perception and strengthening their belief in their language abilities.

Furthermore, the research highlights that VR's environment is highly effective in motivating language learning and boosting students' confidence. Immersive VR environments improve learning outcomes by engaging students in repetitive actions, which enhances their ability to perform these actions in real-life situations. This increased confidence positively affects students' attention span, willingness to learn, and self-study efforts. VR provides a distraction-free learning environment, fostering higher engagement and motivation, which is valuable for improving English teaching methods. Several studies support that immersive VR environments enhance learning interest, engagement, and self-belief, ultimately improving learning outcomes (Chen

et al., 2021). Additionally, the interactive nature of VR not only improves language skills but also makes learning more enjoyable, encouraging persistence in language learning. Emotional reactions from VR simulations further contribute to better academic performance, reinforcing the relationship between confidence, motivation, and language learning. The findings reveal that VR offers a safe space for practicing repetitive tasks, which builds students' confidence for real-world applications. This improvement in self-assurance plays a crucial role in students' effectiveness, persistence, and engagement in educational tasks (Walker, 2022). Ultimately, VR supports self-directed learning by enhancing students' focus on tasks and motivating them to persist in their language learning efforts.

The quantitative results further show a substantial reduction in students' language learning anxiety, with pre-test scores at M = 68.12 decreasing to post-test scores of M = 85.17. This reverse scoring indicates an improvement in students' emotional well-being. The findings confirm that VR significantly mitigates anxiety, aligning with Vygotsky's Sociocultural Theory, which underscores the role of mediated and scaffolded interaction in reducing learner stress while simultaneously enhancing linguistic competence (Khoudri, 2024). Within VR-supported environments, learners engage in their zone of proximal development through structured, supportive tasks that minimize emotional barriers and create a psychologically safe context for language acquisition. This supportive structure helps reduce internal stressors, facilitating more effective processing of language input. Qualitative evidence also supports this conclusion, as students reported feeling emotionally more secure, demonstrated greater ease in expressing themselves, and experienced reduced concern about making errors or being evaluated negatively during learning activities. Such emotional responses indicate a reduction in affective barriers, which is consistent with Krashen's (1985) affective filter hypothesis, and highlight the importance of managing emotional states to optimize language learning processes, as posited in the cognitive-affective learning framework.

The research highlights the value of VR technology in reducing students' language learning anxiety while simultaneously boosting motivation and self-confidence. VR enhances learning experiences by providing immersive, interactive scenarios that encourage students to use vocabulary with greater willingness and confidence, thereby decreasing anxiety and fostering proactive learning. VR also replicates real-life communicative situations, offering practical and effective teaching methods. This study supports the integration of technology in language learning, laying a foundation for future research on VR's role in education. VR has been shown to lower anxiety levels, particularly in the VR group, significantly, and its ability to immerse students in interactive contexts is proven to mitigate negative emotions associated with language learning (Kaplan-Rakowski & Gruber, 2023; Satake et al., 2023).

Further studies indicate that VR is more effective than traditional methods in improving motivation, engagement, and immersive learning experience (Bahari, 2021). On other hand, a study of the use of Spherical Virtual-Based Video Reality (SVVR) in ELL supports these findings that VR is an effective tool to enhance motivation and engagement in learning language, with a favorable perception among students regarding its effectiveness and usability, while also facilitating to improve outcomes by facilitating English teachers VR as a promising tool to manage learning problems (Rahmanu et al., 2022). Furthermore, VR's ability to simulate real-life situations offers authentic practice for teachers and students, in which it can transform teacher training and design of language learning tasks and foster more engaging and effective learning environments (Ciekanski et al., 2020). Training teacher students to implement AR and VR technologies is crucial for modernizing foreign language education and improving teaching effectiveness (Rudnik, 2023). The repeated VR-based tasks boost students' self-assurance, determination, and involvement, contributing to improved language skills. Thus, VR not only facilitates teaching improvement but also creates a more engaging, effective language learning process and reduces learning anxiety.

Ultimately, VR offers immersive, engaging contexts such as real-life simulations of classroom activities or daily interactions like shopping that enhance the perceived usefulness of language learning, improve comprehension, and reduce external pressures among students, particularly in technical fields (Huang et al., 2021). Its ability to provide immediate feedback fosters learner autonomy, boosts motivation, and supports self-directed learning by promoting ownership of the learning process. In addition, VR creates a non-threatening environment that alleviates psychological barriers, allowing learners to practice freely and confidently, which is especially beneficial for students with reading difficulties (Ma, 2023). The use of VR also encourages intrinsic motivation, strengthens vocabulary acquisition and problem-solving skills, and increases interest and participation in learning (Chen et al., 2021). Collectively, these benefits demonstrate VR's potential as a powerful tool for enhancing linguistic competence, self-efficacy, and emotional readiness in English language learning.

CONCLUSION AND SUGGESTIONS

This study demonstrates the positive impact of VR on the emotional factors in English Language Learning. The use of VR was found to significantly increase motivation and self-confidence, while reducing anxiety in students, offering substantial improvement from pre-test to post-test results. These findings highlight VR's potential to foster a more engaging and supportive learning environment by removing external pressures and providing a more immersive and interactive learning experience. Furthermore, the results further emphasize the beneficial role of VR in enhancing self-directed learning. VR creates a safe, pressure-free environment where students can practice English in realistic contexts, boosting their motivation and confidence. Students also reported a noticeable reduction in language learning anxiety, as VR enables them to practice language skills without the fear of real-life consequences. In light of these findings, the integration of VR in ELL not only enhances language skills but also provides valuable emotional benefits, supporting learners' emotional well-being. This suggests that VR can play a crucial role in addressing the emotional challenges often encountered in language learning. For future research, it is recommended to explore the long-term effects of VR on students' motivation, confidence, and anxiety. Further studies could also expand the sample size to include a more diverse population, providing insights into the generalizability of these effects across different learning environments.

Additionally, future research could investigate the role of collaborative activities within VR, which may offer opportunities for students to engage in group-based language learning, further improving their communication and social skills. Thus, it can be concluded that advances in VR technology supporting language learning have the potential to significantly enhance the language learning experience by providing both technical and emotional benefits for students. This study has two main academic weaknesses: first, the limited types of content used, which prevents measuring the impact of varied learning materials on students' motivation and anxiety; and second, the failure to explore how different levels of engagement and types of interactions within the VR environment affect students' emotional outcomes, which could provide deeper insights into their learning experiences. Despite these limitations, the study offers valuable insights for future research. It is recommended that future studies clarify the definition of student engagement in VR environments, develop effective tools to measure engagement levels, and investigate the most effective types of interactions in VR and their impact on students' emotional experiences during learning.

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