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Effects of Collaborative Virtual Reality on Oral Communicative Competence Among Xenoglossophobic EFL Learners

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Abstract

Foreign language anxiety, particularly xenoglossophobia, hinders learners' oral communication and confidence, while conventional teaching approaches often fail to address these barriers effectively. Consequently, there is a growing need for immersive and collaborative technologies such as Virtual Reality to reduce anxiety and enhance communicative competence. In response to this need, the present study explored the impact of Collaborative Virtual Reality (CVR) teaching on the Oral Communicative Competence (OCC) of English as a Foreign Language (EFL) learners experiencing xenoglossophobia. To achieve this objective, a quasi-experimental design was employed involving 68 intermediate EFL learners with moderate levels of foreign language speaking anxiety, who were evenly assigned to an experimental group (EG) and a control group (CG). Over 18 instructional sessions lasting 70 minutes each, the EG received instruction through the AI-driven VirtualSpeech platform using CVR methods, whereas the CG followed a traditional in-person EFL course utilizing the same textbook. The findings revealed that CVR instruction resulted in significant improvements in verbal and para-verbal communicative skills among participants in the experimental group, although no substantial gains were observed in nonverbal skills. These results suggest that immersive and collaborative VR environments may reduce foreign language anxiety while enhancing key dimensions of communicative competence. Overall, the study contributes to the growing body of literature on AI-enhanced immersive learning, therapeutic language pedagogy, and virtual community-based language instruction, and offers implications for integrating CVR into EFL curricula to support anxious learners and improve their communicative performance in low-risk, technology-supported environments.

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Introduction

Xenoglossophobia refers to an intense fear of speaking foreign languages, which can severely hinder the process of language acquisition and effective communication (He, 2018). This condition is classified as a specific anxiety disorder characterized by an overwhelming fear that often leads individuals to avoid learning foreign languages and engaging with speakers of those languages (Koshy, 2020). The term is derived from Greek roots, where "xeno" signifies foreign, "glosso" pertains to language or tongue, and "phobos" denotes fear. The emergence of xenoglossophobia can be attributed to a variety of factors, which can be categorized into psychological, methodological, cognitive, and social-affective dimensions (Binter, 2022). Individuals may experience low self-esteem and lack confidence, contributing to their fear of speaking foreign languages.

Previous negative encounters with language learning can also exacerbate this condition. Traits such as perfectionism and anxiety related to public speaking may further intensify the fear of using a foreign language. Ineffective teaching methods that fail to engage students can increase anxiety levels in language learners (Hershner, 2015). High-pressure educational environments and unrealistic expectations from educators can also discourage learners and heighten their fear of speaking a foreign language. Fear of negative evaluation and apprehension about communicating can hinder performance, as learners may experience a loss of cognitive control when tasked with using a foreign language (Glory & Subekti, 2021). Social-affective factors, such as peer pressure and social dynamics during adolescence, can influence language anxiety. Individuals may feel scrutinized or judged by others, contributing to their fear of speaking a foreign language in social settings.

The impact of xenoglossophobia on language learners can be extensive and varied. Anxiety can impair concentration and cognitive processing, leading to challenges in mastering and utilizing the language (Eysenck, 2014). Learners may find it challenging to engage in speaking, listening, reading, and writing tasks due to elevated anxiety levels. Students may display nervous behaviors, such as fidgeting or sputtering, and refrain from participating in discussions, resulting in disengagement from classroom activities, further intensifying their anxiety (Eysenck, 2013). The fear of using foreign languages can lead to social withdrawal, as individuals may avoid situations requiring them to communicate in a second language. This avoidance can limit opportunities for practice and improvement, perpetuating a cycle of anxiety and reduced language proficiency. Extended experiences of xenoglossophobia can lead to more serious emotional issues, including depression and heightened anxiety, which can adversely affect overall mental health and quality of life.

Although xenoglossophobia and Foreign Language Anxiety (FLA) are closely related constructs, they should not be regarded as synonymous. FLA is generally defined as a situation-specific form of anxiety associated with foreign language learning and use, encompassing dimensions such as communication apprehension, fear of negative evaluation, and test anxiety (Horwitz et al., 1986; MacIntyre & Gardner, 1994). Xenoglossophobia, by contrast, refers more

specifically to an intense fear of speaking or using a foreign language. Recent scholarship has further emphasized the growing differentiation of FLA into skill-specific and context-specific forms of language anxiety (Botes et al., 2025). Accordingly, xenoglossophobia may be conceptualized as a speaking-oriented manifestation of the broader construct of FLA that primarily affects oral communication and speaking performance. Given this conceptual relationship, the present study draws upon the broader FLA literature while focusing specifically on learners whose anxiety is predominantly expressed through fear of speaking in a foreign language.

Xenoglossophobia profoundly impacts an individual's communicative competence, particularly in verbal, para-verbal, and nonverbal skills (Alghorbany & Hamzah, 2022; Phillips, 1991). This specific phobia primarily affects the productive aspects of language use, leading to avoidance behaviors and anxiety that hinder effective communication (Horwitz et al., 1986). The psychological and social implications of xenoglossophobia create barriers to successful interaction, which are not as prevalent in the receptive skills of reading, writing, and listening (Ay, 2010). Verbal skills involve effectively using language, including vocabulary, grammar, and pronunciation (Turk, 2022). Xenoglossophobia can lead to a heightened sense of anxiety when speaking, causing individuals to struggle with articulation and fluency (Perez Castillejo, 2023). This anxiety often results in avoidance behaviors, where learners may refrain from participating in conversations or speaking situations altogether. Consequently, their ability to express themselves verbally diminishes, as they may rush through speech or avoid speaking entirely to escape discomfort.

Para-verbal communication pertains to tone, pitch, volume, and speaking rate, which are essential for expressing meaning and emotion (Aguert, 2022). Anxiety associated with xenoglossophobia can alter these aspects; for example, individuals may exhibit a higher pitch or lower volume when speaking, reflecting their nervousness. Such changes can result in miscommunication, as the emotional nuances conveyed through tone may not align with the intended message. Nonverbal communication, including body language and facial expressions, is also affected by xenoglossophobia (Ishikawa et al., 2010). Anxiety can manifest physically, leading to fidgeting, avoidance of eye contact, or closed body language, which can hinder effective communication. Such nonverbal cues often communicate more than words, and when they are misaligned with the verbal message due to anxiety, it can create confusion and further inhibit interaction.

The limited effectiveness of proposed interventions to mitigate xenoglossophobia among EFL learners can be attributed to various interconnected factors, primarily psychological, environmental, and pedagogical dimensions (Liu & Wang, 2023; Roberts & Kreuz, 2015). Regarding the psychological dimension, many learners experience considerable stress when required to speak a foreign language, driven by concerns about potential judgment from peers and instructors, creating a feedback loop where the fear of making errors deters learners from participating in essential speaking activities, which are vital for language development. Also, negative self-perceptions, which may arise from previous experiences or societal pressures, can

inhibit students from practicing their language skills, which are particularly significant in environments that do not tolerate mistakes, leading to heightened stress and reluctance to communicate in English (Takahashi, 2008).

Considering the environmental dimension, a classroom lacking encouragement and support can exacerbate anxiety levels, especially If learners perceive that their errors will be ridiculed or that they lack opportunities for practice without judgment; their xenoglossophobia may intensify (Effiong, 2016). With a focus on pedagogical dimensions, conventional teaching methodologies prioritizing grammatical accuracy over communicative competence can contribute to xenoglossophobia. Learners may become overly fixated on correctness, hindering their willingness to speak. Teaching strategies should emphasize communicative practice and minimize the focus on error correction to create a more positive learning environment (Alrabai, 2015). Also, many proposed interventions do not adequately account for the individual differences among learners, such as their unique backgrounds, learning preferences, and specific anxieties related to language use (Piniel, 2024). A uniform approach may fail to effectively address the diverse needs of EFL learners, resulting in persistent anxiety and reluctance to engage with the language.

Considering the potential reasons mentioned addressing the dynamic nature of xenoglossophobia, the need for more effective solutions, and its significant influence on OCC, this study integrated different factors proven to improve xenoglossophobia in a therapeutic pedagogy approach known as Collaborative Virtual Reality (CVR) teaching. These factors include (a) the engaging and immersive nature of Virtual Reality (VR) technology (Kaplan-Rakowski & Gruber, 2023), (b) collaboration among peers (Yang et al., 2023), (c) Artificial Intelligence (AI)-driven personalized feedback (El Shazli, 2021), and (d) unbiased practice with AI virtual tutors (Chen et al., 2022), which are all reflected in VirtualSpeech platform. VirtualSpeech is an innovative platform offering AI-powered training with real-time feedback, diverse learning options through VR and online formats, and skills assessment to track progress and enhance soft skills through immersive training experiences.

- Does employing CVR teaching enhance OCC significantly among Xenoglossophobic EFL learners?

Based on the literature on immersive learning and technology-enhanced language instruction, the study hypothesized that EFL learners experiencing xenoglossophobia who participated in Collaborative Virtual Reality (CVR)-based instruction would demonstrate significantly greater gains in Oral Communicative Competence (OCC) than learners receiving conventional classroom instruction.

Literature review

CVR teaching involves using immersive VR technologies to foster collaborative learning experiences among students. This educational approach capitalizes on the interactive

capabilities of VR to create engaging environments where learners can collaborate, irrespective of their geographical locations. (Orel, 2022). CVR environments are inherently immersive, which can enhance student engagement and motivation. The interactive nature of VR allows learners to explore and manipulate digital objects, resulting in a more dynamic and enjoyable educational experience. Engaging in collaborative activities within VR can contribute to the development of crucial social skills, including teamwork, communication, and problem-solving. These competencies are cultivated through shared tasks and interactions within the virtual space. The Collaborative Virtual Reality platform for e-learning, COViR, and The Collaborative Learning Environments in Virtual Reality (CLEVR) are two learning platforms based on CVR teaching.

The study employed CVR teaching to enhance OCC among xenoglossophobic EFL learners and is grounded in several critical theoretical perspectives. Social Learning Theory suggests that individuals can acquire new behaviors through observing others, which aligns with the study's use of CVR to foster interaction and shared learning experiences among EFL learners in a virtual environment (Bandura, 1977). Cognitive Load Theory, which posits that learning is affected by the mental effort required to process information, supports the design of the CVR intervention, as the immersive nature of virtual reality can optimize cognitive engagement while minimizing unnecessary cognitive strain (Paas et al., 2003). Experiential Learning Theory, which emphasizes the role of experience in the learning process, is reflected in the study's methodology, which engages learners in realistic virtual scenarios to enhance language acquisition and communicative competence (Kolb, 2015).

Finally, the study's use of CVR reflects the Digital Community Language Learning theory, which integrates technology into language learning to foster a sense of community among learners, even in virtual settings (Warschauer & Kern, 2000). Recent studies have explored the impact of VR on Xenoglossophobia in language learning contexts. High-immersion VR has shown the potential to reduce FLA during public speaking practice compared to traditional videoconferencing platforms (Kaplan-Rakowski & Gruber, 2023). However, some research suggests that VR can alleviate anxiety within the virtual environment, but this reduction may not transfer to real-life situations (Ding, 2024). VR experiences have been found to decrease xenoglossophobia levels after repeated presentations, with smaller and ethnically diverse virtual audiences being more effective (Park et al., 2023).

For Japanese English learners, VR-based conversation classes promoted confidence in speaking and intercultural communication skills while reducing anxiety compared to face-to-face interactions (Satake et al., 2021). These findings highlight the potential of VR as a tool for addressing xenoglossophobia in language learning. VR technology has played a significant role in enhancing OCC among EFL learners, particularly in their verbal skills, such as the appropriate use of lexical items and correct grammar (Sally Wu & Alan Huang, 2022). The potential reasons behind its considerable effectiveness in improving verbal skills seem to be associated with increased EFL learners' engagement, motivation, and autonomous learning (e.g., Ebadi & Ebadijalal, 2020; Raman et al., 2023).

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Also, the benefits of VR may stem from its unique affordances, such as immersion, interaction, and feedback, which have been shown to positively impact anxiety reduction, confidence, and willingness to communicate in the target language (Yudintseva, 2023). In addition, a collaborative VR-assisted course for academic oral presentations has shown promise in improving presentation skills and alleviating foreign language anxiety among EFL learners (Marandi & Kashanifar, 2024). While Dolgunsoz et al. (2018) found that VR did not significantly affect short-term language performance, they considered it promising for long-term language development. However, researchers have also identified challenges associated with using VR in language learning, such as cognitive load, equity issues, and technology-related problems (Yudintseva, 2023). Despite these obstacles, VR remains a promising tool for enhancing verbal communication skills in EFL contexts.

A limited number of recent studies demonstrate the potential of AI virtual tutors in VR platforms to enhance OCC among students. For instance, El Shazly (2021) found that AI technologies, such as chatbots and virtual assistants, can significantly reduce xenoglossophobia. This reduction is vital as it encourages learners to participate more actively in speaking exercises without fearing making mistakes or being judged. Also, Zheng (2024) found that AI chatbots helped reduce students' xenoglossophobia, particularly in reading-aloud activities, compared to traditional instruction methods. Chatbots provided a low-stress, interactive environment that boosted students' confidence and engagement in reading foreign language texts. Furthermore, Zhang et al. (2024) found that AI-driven interventions significantly enhanced participants' emotional intelligence.

While most studies on the use of VR in foreign language learning have been conducted in more developed educational contexts in Asia and Europe, few investigations have focused on the potential benefits of immersive learning platforms for xenoglossophobic EFL learners in the less-developed and developing regions of the Middle East and North Africa (MENA). Moreover, developing VR educational materials requires specialized software that is often costly and necessitates technical expertise that many EFL teachers in the MENA region may lack. In regard to addressing this gap in the literature and providing a cost-effective VR solution accessible to EFL learners in less-developed educational contexts, this research explored the effects of using CVR teaching with an open-source AI-driven virtual tutor on improving the OCC of xenoglossophobic Iranian EFL learners. The objective of this study was formulated as the following research question.

Method

Design

A quasi-experimental approach was adopted to address the primary objective of this investigation and certain constraints in reaching the necessary participants. This method divided the participants into experimental and control groups, with a pre-test, intervention phase, and post-test. Specific strategies were employed to minimize the potential impact of bias or

confounding variables inherent in quasi-experimental designs, such as selecting male and female EFL learners from different language institutions and educational backgrounds to reduce the effects of sample selection bias. Additionally, the study's credibility was enhanced by utilizing a structured data collection method, applying a valid and reliable scoring rubric for the pre-test and post-test, and observing a random sample of sessions during the intervention phase.

Participants

In the initial phase of participant selection, 142 male and female EFL learners from various language institutes in Isfahan, Iran, were recruited through convenience sampling. All participants had successfully completed intermediate-level English courses. To ensure comparability in general English proficiency, the Oxford Online Placement Test (OOPT) was administered. Subsequently, the Foreign Language Speaking Anxiety Scale (FLSAS; Ozturk & Gurbuz, 2014) was used to assess participants' levels of xenoglossophobia. Based on the FLSAS results, 76 learners exhibiting moderate levels of xenoglossophobia were identified. Following the withdrawal of 8 participants during the study, the final sample comprised 68 male and female EFL learners with intermediate English proficiency and moderate levels of xenoglossophobia. Participants ranged in age from 18 to 27 years. They were then assigned to either the experimental group (n = 34) or the control group (n = 34).

Following current recommendations on sample-size justification (Lakens, 2022), the adequacy of the sample was evaluated in relation to the study design and its capacity to detect meaningful intervention effects. Given the balanced group sizes and the quasi-experimental nature of the study, the final sample was considered sufficient to detect medium-to-large differences between instructional conditions at the conventional significance level of .05. Furthermore, the statistically significant post-test differences observed in the primary outcome measures, particularly verbal and para-verbal skills, provided additional support for the adequacy of the sample size in identifying meaningful intervention effects.

The participants were classified into the Experimental Group (EG) and the Control Group (CG), each comprising 34 EFL learners with xenoglossophobia. A pre-test was conducted to evaluate their verbal, para-verbal, and nonverbal English skills, ensuring that both groups had homogeneous levels of OCC. The EG engaged with the learning material during the intervention through a CVR platform, utilizing AI-driven virtual tutors. In contrast, the CG followed a similar process but adhered to Communicative Language Teaching (CLT) principles within conventional classroom settings. A post-test, mirroring the pre-test format, was administered to assess the intervention's impact on participants' communicative skills in both groups. It is essential to highlight that the ethical requirements of the National Committee for Research Ethics in the Social Sciences and the Humanities (NESH) in participant selection were followed.

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Materials

The instructional materials and procedures were designed to ensure consistency across groups while highlighting the effects of the intervention. The intervention lasted for 18 sessions, each lasting 70 minutes, and used Real Listening and Speaking 3 as the common textbook for both the experimental group (EG) and the control group (CG). In the EG, lessons were delivered through Collaborative Virtual Reality (CVR) using the AI-driven VirtualSpeech platform. This immersive and interactive environment allowed participants to engage with AI tutors and virtual peers, practice speaking tasks in realistic communicative scenarios, and receive immediate feedback tailored to their performance. The VR platform created a low-risk, supportive atmosphere intended to reduce foreign language anxiety while enhancing verbal and para-verbal skills. By contrast, the CG followed a traditional face-to-face classroom format, with an instructor guiding activities using the same textbook and communicative tasks. This parallel structure ensured that any observed differences in outcomes could be attributed to the mode of instruction rather than disparities in instructional content, thus strengthening the study's validity.

Instruments

Oxford Online Placement Test (OOPT)

In the OCC scope, evaluating listening skills is essential. Therefore, assessing the English language proficiency of participants, particularly their listening capabilities, became a priority. The OOPT is a quick and adaptable assessment tool designed to gauge learners' overall English proficiency through various formats, including British and American English in its listening component. The test is divided into two parts: the use of English and listening. Each part assesses grammar, vocabulary, and the understanding of conversational context. The use of the English section features 30 multiple-choice questions, followed by cloze exercises that require participants to input their responses. The listening portion consists of 15 multiple-choice questions and audio clips that can be played up to two times. After completing the assessment, results are immediately scored, and participants can view or download their scores from their profiles. These results encompass scores for both sections, the duration taken to complete the test, CEFR levels, and overall status. The scoring rubric for the OOPT utilizes a continuous numerical scale to evaluate candidates' English language proficiency following the CEFR. This framework categorizes scores into proficiency levels, from beginner to advanced. For instance, B1.2, which includes scores from 51 to 59, reflects an intermediate level.

Foreign Language Speaking Anxiety Scale (FLSAS)

The Foreign Language Speaking Anxiety Scale (FLSAS) is an 18-item questionnaire designed to assess anxiety related to speaking in a foreign language. It is derived from the Foreign Language Classroom Anxiety Scale (FLCAS), created by Horwitz et al. in 1986. In their 2014 study, Ozturk and Gurbuz selected 18 specific items from the original 33-item FLCAS that

pertain directly to speaking anxiety in a foreign language context. Respondents evaluate each item using a 5-point Likert scale, where the options range from "strongly disagree" to "strongly agree." The FLSAS categorizes anxiety levels into three distinct groups. A total score below 54 indicates low anxiety, while scores ranging from 54 to 72 suggest moderate anxiety. Scores that exceed 72 are classified as high anxiety. This scale has been utilized in numerous research studies to analyze the prevalence and contributing factors of speaking anxiety among EFL learners. Regarding reliability, the FLSAS has demonstrated strong internal consistency with a Cronbach's alpha value of .86, indicating good internal consistency (Ozturk & Gurbuz, 2014).

Grid for Observation and Assessment of the OCC (GOAOCC) – (Pre-test/Post-test)

The GOAOCC (Monteiro et al., 2019) is a detailed instrument for thoroughly evaluating the three key components of OCC. This assessment framework focuses on the learner's language abilities, emphasizing verbal, para-verbal, and nonverbal skills. Verbal skills pertain to the capacity to express thoughts and ideas clearly through spoken language, which involves the effective use of (a) vocabulary, (b) grammar, and (c) syntax, allowing individuals to communicate messages successfully across different contexts. Para-verbal skills are concerned with the subtleties of verbal communication delivery, including (a) tone, (b) pitch, (c) volume, and (d) speech rate. These skills enrich the meaning of spoken words by infusing emotional nuance and emphasis. Nonverbal skills encompass all forms of communication that do not utilize words, such as (a) body language, (b) facial expressions, (c) gestures, and (d) eye contact.

In regard to evaluating the relevance and appropriateness of the questionnaire items, the Content Validity Index (CVI) was applied (Shi et al., 2012). Six subject matter experts assessed each item on a 4-point scale, where one indicated "not relevant" and four denoted "highly relevant." The Item-level CVI (I-CVI) for each item was calculated by dividing the number of experts rating it as 3 or 4 by the total number of experts. The I-CVI values ranged from 0.75 to 1.00, with 9 out of 11 items (88.4%) exceeding the recommended threshold of 0.78, indicating strong content validity at the item level. The Scale-level CVI (S-CVI) was computed using the Universal Agreement (S-CVI/UA) method, which requires all items to achieve an I-CVI of 1.00. In this study, 8 out of 11 items (75%) had an I-CVI of 1.00, resulting in an S-CVI/UA of 0.75. Although this value is slightly below the ideal threshold of 0.80 for excellent content validity, it still reflects substantial agreement among experts regarding the overall relevance of the instrument. In addition, inter-expert agreement was assessed using Cohen's kappa, yielding a value of 0.82, which indicates excellent agreement and consistency among expert evaluators (Warrens, 2015).

Data Collection Technique

In the initial phase of the study, the researchers obtained permission from several language institutes in Isfahan, Iran, to collect the required data. They then selected 142 available male and female EFL learners who had completed intermediate courses using convenience sampling. With the aim of ensuring their general English proficiency, they participated in an OOPT. The

results of the OOPT showed the appropriate inclusion of the selected participants. The researchers administered the FLSAS (Ozturk & Gurbuz, 2014) to these learners. They identified 76 individuals with moderate levels of xenoglossophobia. After accounting for the eight learners who withdrew from the study, the final sample consisted of 68 male and female EFL learners with intermediate English proficiency and moderate levels of xenoglossophobia. The eligible participants were allocated to the experimental group (EG) and the control group (CG), each comprising 34 xenoglossophobic EFL learners. Subsequently, a pre-test was conducted to assess participants' verbal, para-verbal, and nonverbal English skills. This assessment involved delivering a 15 to 20-minute presentation on a randomly selected topic to establish uniformity in their OCC levels.

During the 18-session intervention phase, each lasting 70 minutes, the EG engaged in VirtualSpeech, a VR learning environment using head-mounted displays with joysticks. These devices allowed the learners to interact with AI-driven virtual tutors and their peers across various scenarios generated by the AI core of the application, which aligned with the themes and objectives outlined in the "Real Listening and Speaking 3" textbook. Simultaneously, the CG participated in similar activities but engaged in conventional CLT tasks instead of the CVR approach. In the concluding phase, a post-test was administered similar to the pre-test with different topics to evaluate any significant improvements in OCC, particularly in verbal, para-verbal, and nonverbal skills. Two specialists in Teaching English as a Foreign Language (TEFL) evaluated the participants' performances in both the pre-test and post-test phases. In regard to maintaining objectivity in their assessments, the evaluators were conscious of possible biases, including recency, contrast, and similarity effects. They utilized a semi-quantitative scoring system that included descriptive labels for each rating (for instance, 1 indicated poor performance, while 5 represented excellent performance). Furthermore, the feedback provided by the evaluators on each criterion was reexamined to uncover any notable differences in their assigned scores.

Data Analysis

The analysis of the data was carried out using R statistical software, specifically version 4.4.1. Several statistical assumptions were evaluated, such as the data's normal distribution and the variances' equality. Given the results of these checks, parametric tests were deemed appropriate for the analysis. Initially, descriptive statistics were computed for the EG and the CG based on their pre-test results. Following this, an independent t-test was performed to verify no significant differences in OCC—encompassing verbal, para-verbal, and nonverbal skills—between the two groups. Subsequently, paired t-tests were employed to analyze the differences between pre-test and post-test scores within each group. Lastly, another independent t-test was conducted to compare the EG and CG post-test scores, aiming to identify any significant differences in OCC that could be linked to CVR teaching.

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Findings

In regard to establishing a solid foundation for the statistical analysis in this study, it was crucial to assess the OCC of participants in both the EG and the CG. This involved computing descriptive statistics, such as skewness and kurtosis, to ensure no notable disparities in their verbal, para-verbal, and nonverbal skills. Descriptive statistics for the pre-test scores of OCC for both groups are displayed in Table 1.

Table 1

Descriptive Statistics for the OCC Scores in Pre-test

OCC	G	N	M	SD	Skewness	Kurtosis
Verbal skills	EG	34	8.213	.256	.529	.865
	CG	34	8.146	.418	.469	.912
Para-verbal skills	EG	34	10.634	.394	.746	.967
	CG	34	10.619	.368	.814	-1.263
Nonverbal skills	EG	34	7.936	.412	1.156	-.638
	CG	34	7.899	.409	.869	1.118

Table 1 reveals that the average scores across the groups are approximately similar. Low standard deviations indicate that the scores are tightly grouped around the mean, suggesting uniformity within each group. Additionally, the values for skewness and kurtosis fall between -1.5 and +1.5, which supports the assumption of normality (Thrane, 2022). Levene's test was performed to assess the assumption of equal variances. The null hypothesis posits that the variances among the groups are equal, while the alternative hypothesis suggests that at least one group has a different variance. A p-value exceeding the predetermined significance level (e.g., 0.05) implies that the null hypothesis cannot be rejected, indicating that the variances are indeed homogeneous (Thrane, 2022). In this analysis, the p-values for all three domains of oral communicative competence were above 0.05, indicating that the variances in scores for the EG and CG during the pre-test were homogeneous, confirming that the assumption of homogeneity of variance holds for this dataset. An independent sample t-test was conducted to determine if there were significant differences in OCC performance between the EG and CG in the pre-test, as detailed in Table 2.

Table 2

Independent Sample T-test for the OCC Scores in the Pre-test

	t	Sig. (2tailed)	M Difference	Std. Error Diff.	Lower	Upper
Verbal skills	-.325	.212	-.198	.168	.248	.518
Para-verbal skills	-.367	.263	-.114	.217	.681	.815

Nonverbal skills	-.296	.197	-.217	.261	-.237	.614

The data presented in Table 2 indicates that for each component of OCC - verbal, para-verbal, and nonverbal skills - the differences between the EG and CG were not statistically significant ($p>0.05$). It suggests that the participants in the EG and CG had similar levels of OCC prior to the intervention. Descriptive statistics were calculated to investigate the performance of the EG and CG participants in terms of OCC after the intervention. The results of this analysis are shown in Table 3.

Table 3

Descriptive Statistics for the OCC Scores in Post-test

Oral Communicative Competence	G	N	M	SD	Skewness	Kurtosis
Verbal skills	EG	34	12.632	.614	.958	-.235
	CG	34	8.401	.569	1.354	-.358
Para-verbal skills	EG	34	13.104	.847	.637	-.624
	CG	34	10.812	.743	.961	.579
Nonverbal skills	EG	34	8.102	.467	-1.234	.551
	CG	34	8.267	.445	.379	-1.023

The results presented in Table 3 demonstrate that the participants in both EG and CG exhibited improved performance in the post-test compared to the pre-test, as measured by their OCC scores. Additionally, the skewness and kurtosis values fall within the range of -1.5 to +1.5, suggesting that the data collected in the post-test adheres to the normality assumption (Thrane, 2022). Levene's test was conducted to assess the assumption of homogeneity of variance. The null hypothesis for this test assumes that the variances across the groups are equal, while the alternative hypothesis suggests that at least one group exhibits a different variance. A p-value greater than the predetermined significance level (e.g., 0.05) indicates that the null hypothesis cannot be rejected, implying that the variances are homogeneous (Thrane, 2022). In this analysis, the p-values for all three domains of OCC (verbal, para-verbal, and nonverbal skills) were found to exceed 0.05, suggesting that the variances of the OCC scores were homogeneous between the EG and CG in the post-test. A paired-samples t-test was conducted to examine changes in oral communicative competence (OCC) scores from the pre-test to the post-test within the experimental group (EG) and the control group (CG). The results are presented in Table 4.

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Table 4

Within-group comparisons of oral communicative competence (OCC) scores between the pre-test and post-test

		Paired Differences				
		M	SD	SEM	df	Sig. (2tailed)
EG	Verbal	5.968	1.369	.449	33	<.001
	Para-verbal	4.689	1.415	.456	33	<.001
	Nonverbal	.654	1.854	.512	33	.236
CG	Verbal	.112	1.023	.446	33	.685
	Para-verbal	.110	1.116	.384	33	.689
	Nonverbal	.212	1.027	.396	33	.678

As presented in Table 4, the experimental group demonstrated statistically significant improvements in verbal and para-verbal oral communicative competence from the pre-test to the post-test ($p < .001$). However, the improvement in nonverbal skills was not statistically significant ($p = .236$). In contrast, no statistically significant changes were observed in the control group for verbal ($p = .685$), para-verbal ($p = .689$), or nonverbal ($p = .678$) oral communicative competence. While these findings indicate different patterns of within-group change across the two groups, further between-group comparisons were conducted using the post-test OCC scores to determine whether the intervention resulted in significantly greater gains in the experimental group than in the control group. The results are presented in Table 5.

Table 5

Independent Sample T-test for the OCC Scores in Post-test

	Sig.(2tailed)	M Difference	Std. Error Diff.	Lower	Upper
Verbal skills	<.001	4.532	.135	.246	.369
Para-verbal skills	<.001	5.112	.108	.345	.589
Nonverbal skills	.634	.215	.063	-.127	.628

As presented in Table 5, the post-test comparisons revealed statistically significant differences between the experimental group (EG) and the control group (CG) in verbal and para-verbal oral communicative competence ($p < .001$). The mean differences indicate that the participants in the experimental group outperformed those in the control group in both dimensions. However,

no statistically significant difference was observed between the two groups in nonverbal oral communicative competence ($p = .214$). These findings suggest that the intervention was associated with greater improvements in the verbal and para-verbal dimensions of oral communicative competence, whereas no comparable improvement was found for nonverbal skills.

Discussion

The present investigation aimed to ascertain whether implementing CVR teaching strategies yields positive outcomes for EFL learners who exhibit xenoglossophobia, explicitly focusing on their OCC, encompassing verbal, para-verbal, and nonverbal components. Accordingly, the research question was formulated: "Does the adoption of CVR teaching significantly enhance the OCC of xenoglossophobic EFL learners?" The findings indicated that the application of CVR teaching substantially improved OCC's verbal and para-verbal aspects among xenoglossophobic EFL learners. These results align with previous studies (e.g., Kaplan-Rakowski & Gruber, 2023; Sally Wu & Alan Hung, 2022; Satake et al., 2021; Yudintseva, 2023), which demonstrated that learning platforms incorporating features of virtual reality technology, AI assistance, and collaborative elements enhanced foreign language acquisition significantly, particularly in terms of OCC, primarily by mitigating xenoglossophobia. Several factors may account for the consistency of these findings.

First, CVR provides a platform for students to engage in realistic simulations replicating real-life interactions. This setting potentially enables learners to practice their verbal communication skills within a safe and controlled environment, thereby promoting the development of their speaking abilities. The immersive quality of VR significantly alleviates the anxiety often linked to xenoglossophobia, public speaking, or group discussions, fostering greater participation and experimentation with language (Cheng, 2020). Also, the collaborative aspect of CVR promotes social interaction among participants. In these environments, learners can communicate with peers in real time, enhancing verbal and para-verbal communication skills. The ability to interact with avatars or digital representations of peers possibly enhances the practice of para-verbal skills, such as tone, pitch, and volume, which are crucial for effective communication (Jauregi et al., 2021).

In addition, CVR platforms allow for customized learning experiences that can adapt to the specific needs of individual learners based on using an AI processing core. This adaptability means that students can engage with content that is relevant to them, possibly enhancing their motivation and willingness to communicate. For instance, learners can participate in scenarios requiring them to use specific vocabulary or language structures, reinforcing their linguistic competence through practical application (Lan & Hsiao, 2019). The immersive nature of CVR environments minimizes external distractions, allowing students to concentrate fully on their communication tasks. This focused environment is conducive to practicing and refining verbal and para-verbal skills, as learners can immerse themselves in the task without the interruptions typical in traditional classroom settings (Huang & Liaw, 2018).

While the results indicated the effectiveness of CVR teaching on verbal and para-verbal skills among xenoglossophobic EFL learners, it failed to improve nonverbal skills. Some potential reasons may justify the results achieved. One primary reason for enhancing verbal skills is the strong emphasis on verbal interaction within CVR environments. This focus is essential for effective collaboration among participants, leading to improvements as individuals engage in discussions and articulate their ideas in a dynamic setting. However, while CVR can create immersive environments conducive to verbal communication, it often fails to replicate the full range of non-verbal communication signals, such as body language, facial expressions, and gestures. This limitation can impede the development of non-verbal skills typically acquired through direct observation and interaction in real-life scenarios.

Moreover, the constraints of virtual contexts further limit the development of non-verbal communication. Although the immersive qualities of CVR can enhance learner engagement and motivation, these virtual settings may not provide the same opportunities for practicing non-verbal skills as face-to-face interactions do. In real-world settings, individuals can observe and respond to non-verbal cues in real-time, which is less feasible in a virtual environment. Additionally, effective learning often hinges on immediate feedback from peers and instructors. In CVR settings, feedback may predominantly focus on verbal contributions, potentially overlooking the assessment and enhancement of non-verbal communication abilities. Challenges in skill transfer also play a significant role in this phenomenon. Skills acquired in a virtual environment may not seamlessly translate to real-world interactions. Participants may excel in verbal communication within the CVR context but struggle to apply these skills with critical non-verbal cues in face-to-face situations. Furthermore, CVR can impose a significant cognitive burden, as individuals may concentrate on navigating the technology and managing verbal exchanges. This cognitive load can detract from their ability to attend to non-verbal communication, resulting in less practice and development.

Conclusion

The findings indicated that CVR teaching effectively enhanced verbal and para-verbal skills in OCC among EFL learners with xenoglossophobia, while nonverbal skills remain less impacted, suggesting that immersive and interactive environments can alleviate some anxiety associated with language use, promoting greater engagement and participation. The study reinforces the potential of innovative teaching methods, such as CVR, to address specific psychological barriers in language learning, particularly those stemming from anxiety disorders. This study reinforces the relevance of several educational theories, including Social Learning Theory, Cognitive Load Theory, and Experiential Learning Theory. The findings suggest that immersive environments facilitate social interaction and observational learning, which are essential for language acquisition, thereby supporting the idea that learning is inherently a socially mediated process, particularly in language contexts.

Furthermore, the research contributes to a nuanced understanding of xenoglossophobia by emphasizing its psychological, cognitive, and social dimensions. It highlights the necessity of

addressing emotional and cognitive factors in language learning interventions, suggesting that effective strategies must consider these elements to alleviate anxiety and enhance communicative competence. The study further develops the Digital Community Language Learning theory by demonstrating how CVR can cultivate a sense of community among learners, even in virtual settings. This aspect is crucial for fostering collaboration and reducing feelings of isolation often accompanying language learning, especially for anxious learners. The findings advocate for the integration of CVR technologies into language curricula. Educational institutions should consider implementing immersive learning environments that promote collaborative practices, thereby increasing engagement and reducing anxiety among learners.

There is also a clear need for training programs that equip educators with the necessary skills to incorporate CVR technologies into their teaching practices effectively. Such training should focus on creating supportive environments that encourage risk-taking and communication among learners. Moreover, the study underscores the importance of utilizing AI-driven feedback within CVR platforms to provide personalized learning experiences. Educators should leverage technology to offer tailored support that addresses individual learners' needs, particularly those struggling with anxiety. Lastly, institutions should create support mechanisms that offer psychological assistance to learners dealing with xenoglossophobia. This could include counseling services, peer support groups, and workshops to build confidence in language use. Future research could explore the long-term effects of CVR teaching on OCC and anxiety levels to assess the sustainability of these interventions. Investigating the effectiveness of CVR across various cultural and linguistic contexts could enhance understanding of how xenoglossophobia manifests globally and how interventions can be adapted accordingly.

Additionally, conducting comparative studies between CVR and other innovative teaching methodologies, such as gamification or blended learning, could help identify the most effective strategies for mitigating xenoglossophobia. Further research could also examine the impact of CVR on nonverbal communication skills, investigating how anxiety affects body language and facial expressions in virtual environments. Exploring the role of AI in providing real-time feedback and its effects on learners' anxiety and communicative competence could yield valuable insights into enhancing language learning experiences. Furthermore, researching the challenges and solutions for implementing VR technologies in less-developed regions could help bridge the digital divide in language education. Lastly, examining how different virtual audience compositions influence learner anxiety and performance could provide insights into optimizing VR environments for language practice.

Bio-data

Nazanin Ghiasi: Collected data, searched for literature, conducted the procedure, and wrote the first draft.

Azizeh Chalak: Provided consultation to choose the methodology, read, made necessary revisions, and approved the final manuscript.

Ehsan Rezvani: read the final manuscript.

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