



The Impact of AI Avatars via Low-Immersion Virtual Reality on Foreign Language Anxiety, Motivation, and Speaking Proficiency among Japanese EFL Students

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Abstract

In today's globalized world, speaking proficiency in English is essential for academic, professional, and social participation. However, many learners in English as a foreign language (EFL) contexts have limited opportunities for authentic spoken interaction and often experience foreign language anxiety (FLA), which can inhibit oral performance. This issue is especially important for students preparing to study abroad, as short-term overseas programs require immediate communicative engagement in classrooms, homestays, and daily life. Pre-departure support that allows learners to rehearse realistic communication in a low-pressure environment may therefore be valuable. This pilot study examined whether one month of AI avatar-mediated speaking practice in low-immersion virtual reality (LiVR) was associated with changes in speaking proficiency, FLA, motivation, and learner acceptance among Japanese university EFL learners preparing to study abroad. Participants were 11 students enrolled in a one-month study-abroad program in Australia. They used the Immerse VR platform via personal computers to practice spoken English with AI avatars in simulated communicative environments. Data included pre- and post-intervention Versant speaking scores for all 11 participants, as well as FLA and motivation questionnaires completed by 10 participants who provided complete pre- and post-intervention data, and a post-intervention Technology Acceptance Model (TAM) questionnaire. Results showed a statistically significant and large reduction in FLA from pretest to posttest, whereas motivation remained high and stable. Speaking proficiency showed modest improvement, with the largest gain observed in vocabulary, although this effect did not remain significant after correction for multiple comparisons. Total time spent on the platform (Time on Site; TOS) was not significantly associated with gains in speaking or changes in anxiety and motivation. TAM results indicated moderately positive learner perceptions, especially regarding enjoyment, usefulness, and ease of use, although convenience and access appeared somewhat limited. These findings suggest that AI avatar-mediated LiVR speaking practice may be a useful pre-departure support tool, particularly for reducing speaking-related anxiety among Japanese EFL learners.

Keywords: *low-immersion VR; AI avatars; foreign language anxiety; speaking proficiency; study abroad preparation*

1. Introduction

In today's globalized world, English is widely used for international communication, making speaking proficiency an essential skill for academic, professional, and social participation [1–3]. However, many learners struggle to develop speaking ability because they have limited opportunities for authentic interaction, experience speaking-related anxiety, and often lack access to immersive communicative environments [4–6].

These challenges are particularly evident in EFL contexts such as Japan, where classroom instruction often prioritizes reading and grammar over speaking. Students frequently participate in study-abroad programs with limited speaking readiness, and may have few opportunities to use English spontaneously in realistic settings before departure. This lack of communicative practice may hinder the development of speaking proficiency and may also contribute to foreign language anxiety (FLA), which has been shown to negatively affect oral performance and willingness to communicate [4, 7, 8, 9, 10]. In contrast, positive beliefs about language learning and increased self-confidence are associated with lower anxiety and greater engagement in speaking [11]. Supporting learners in reducing FLA may therefore be an important step toward improving spoken English.

The program investigated in this study was a one-month study-abroad program in Australia for Japanese university students, with goals including improving English proficiency and fostering intercultural understanding. Because such programs provide limited time for adjustment, pre-departure tools that allow learners to rehearse realistic communication may help them engage more actively once abroad.



One promising response is the use of virtual reality (VR), which can provide safe, interactive, and context-rich spaces for language practice [12, 13]. VR enables learners to engage in simulated environments that resemble real-world communicative situations, potentially increasing engagement, motivation, and confidence while reducing affective barriers. In language education, prior research suggests that VR can support speaking development, willingness to communicate, and anxiety reduction, although findings regarding measurable gains in speaking proficiency remain mixed and context-dependent [14–18]. This suggests that VR may be particularly effective for affective outcomes, while its impact on speaking performance requires further investigation.

VR can also be classified according to the degree of immersion: low-immersion virtual reality (LiVR) is typically accessed through desktop or mobile devices, while high-immersion virtual reality (HiVR) usually involves head-mounted displays [19]. The present study used LiVR, as students accessed Immerse VR via personal computer from school or home, making daily practice more feasible than HiVR.

Recent advances in artificial intelligence (AI), especially generative AI, have expanded the possibilities of VR-based language learning. AI conversational partners can provide learners with flexible, individualized speaking opportunities without requiring a human interlocutor, which may be especially beneficial for learners who are reluctant to speak in front of others [20–24].

Several VR platforms now incorporate AI avatars for speaking practice in simulated real-world environments. Initial research on VR-based language practice suggests that such environments can be motivating and enjoyable for learners [25, 26]. Motivation is recognized as a key driver of language learning effort and achievement [27, 28], and the ideal L2 self—the vision of oneself as a successful future language user—has been proposed as a central motivational force in second language acquisition [29]. Assessing motivational change requires reliable measurement instruments such as the Attitude/Motivation Test Battery [30]. Learner acceptance of educational technology is also a critical factor, as captured by the Technology Acceptance Model [31], which has been applied in mobile-assisted language learning contexts to examine how perceived usefulness and ease of use influence continued engagement [32]. Nevertheless, relatively few studies have examined AI avatar VR as a pre-departure speaking support tool for Japanese EFL learners, and fewer still have addressed anxiety, motivation, speaking performance, and technology acceptance within a single design. To address this gap, the present study investigates whether one month of AI avatar-mediated speaking practice in VR is associated with changes in foreign language anxiety, motivation, and speaking proficiency, and examines learners' acceptance of the technology after the intervention.

1. Does practicing speaking with AI avatars in LiVR reduce foreign language anxiety?
2. Does practicing speaking with AI avatars in LiVR increase motivation to learn English?
3. Does practicing speaking with AI avatars in LiVR improve speaking proficiency?
4. How do students perceive the technology of Immerse VR?

2. Method

2.1 Participants

The participants were 11 Japanese university students preparing for a one-month study-abroad program in Australia that included homestay and general English instruction. All 11 students completed the Versant speaking test at both time points, while 10 students provided complete pre- and post-intervention questionnaire data; one participant did not complete both questionnaires and was therefore excluded from the questionnaire-based analyses. Based on pretest Versant scores, four students were classified at CEFR B1, four at A2+, and three at A2.

2.2 Intervention and Setting

The intervention consisted of one month of AI avatar-mediated speaking practice using the Immerse VR platform, which provided simulated communicative environments including airports, restaurants, parks, and supermarkets. The intervention was implemented as LiVR, as this was more accessible and feasible for sustained daily practice than HiVR, which requires head-mounted displays and involves higher cost and technical demands. Students were asked to practice speaking every day using a personal computer from school or home. To structure their practice, students kept a speaking journal in which they recorded the topic category practiced each day using an initial letter: Socializing (S), Life and Living (L), Home and Community (H), Expressing Feelings (E), and Managing Communication (M). These five categories were pre-selected by the instructor from study-abroad-related scenes available on the Immerse VR



platform. At the end of the month, students wrote an overall reflection on their experience with the platform as the final journal entry. The journal data are not analyzed quantitatively in the present study and are reported here as contextual information.

2.3 Measures

Speaking proficiency was assessed with the Versant Speaking Test (scores range from 20 to 80) administered before and after the intervention for all 11 participants, reporting fluency, pronunciation, sentence mastery, vocabulary, overall score, and intelligibility. FLA and motivation were measured using pre- and post-questionnaires completed by all students; however, one participant did not complete both time points, resulting in a final questionnaire sample of 10. The FLA scale consisted of 24 items adapted from the Foreign Language Classroom Anxiety Scale, and the motivation scale consisted of 8 items, both using a 5-point Likert format. All 11 students completed an 18-item post-intervention TAM questionnaire evaluating the VR platform (Cronbach's alpha = .85).

2.4 Data Analysis

Pre- and post-intervention comparisons were conducted using paired t tests, Wilcoxon tests, effect sizes, and Holm-adjusted p values for Versant outcomes. Questionnaire reliability was assessed using Cronbach's alpha. Correlational analyses examined associations between total time spent on the platform site (Time On Site: TOS) and changes in all major outcome variables.

3. Results

3.1 Preliminary Analyses

Questionnaire analyses were based on 10 students, as one participant did not complete both the pre- and post-questionnaires and was therefore excluded from the questionnaire-based analyses. The FLA scale (Q1-Q24) demonstrated high internal consistency at both time points, with Cronbach's alpha of .922 at pretest and .967 at posttest, indicating that the scale measured a coherent construct reliably across the intervention. The motivation scale (Q25-Q32) showed lower but usable reliability, with Cronbach's alpha of .608 at pretest and .678 at posttest. While these values fall below the conventional threshold of .70, they are considered acceptable for exploratory classroom-based research with small samples, and motivation findings should accordingly be interpreted with some caution.

3.2 Foreign Language Anxiety and Motivation

Table 1 presents the pre- and post-intervention means, standard deviations, mean differences, significance levels, and effect sizes for both the FLA and motivation scales. FLA decreased substantially from pretest to posttest. The mean FLA score fell from 3.304 (SD = 0.594) at pretest to 2.471 (SD = 0.880) at posttest, a reduction of 0.833 points on the five-point scale. This decrease was statistically significant ($p = .001$) and associated with a large effect size ($d = -1.518$), indicating that the magnitude of anxiety reduction was both reliable and practically meaningful. The increase in standard deviation from pretest to posttest suggests that students responded somewhat differently to the intervention, with some experiencing greater anxiety reduction than others.

Table 1. Pre- and Post-Intervention Foreign Language Anxiety and Motivation Scores

Measure	N	Pre M	Pre SD	Post M	Post SD	Mean Diff	p	Effect Size (d)
FLA (Q1-Q24)	10	3.304	0.594	2.471	0.880	-0.833	.0010	-1.518
Motivation (Q25-Q32)	10	4.163	0.373	4.213	0.417	+0.050	.737	0.109

Note. Higher FLA scores indicate greater anxiety; higher motivation scores indicate stronger motivation. One participant was excluded due to incomplete data.

By contrast, motivation remained high and stable at both time points. The mean motivation score increased only slightly from 4.163 (SD = 0.373) at pretest to 4.213 (SD = 0.417) at posttest, a difference of 0.050 points that was neither statistically significant ($p = .737$) nor practically meaningful ($d = 0.109$). These results suggest that students entered the intervention with already relatively high motivation to learn English and that this motivation was maintained throughout the month of VR practice without



showing a measurable increase.

3.3 Speaking Proficiency

Table 2 presents pre- and post-intervention Versant speaking scores across all six measured dimensions for all 11 participants, including paired t test results, Wilcoxon signed-rank test p values, paired effect sizes (dz), and Holm-adjusted p values to correct for multiple comparisons. Overall, scores showed modest improvements across most dimensions, though none of the changes remained statistically significant after Holm correction.

Vocabulary showed the strongest positive change, with a gain of 5.64 points and a large effect size ($dz = 0.86$). Although this reached significance before Holm correction ($t(10) = 2.86, p = .017$), it did not remain significant after correction (adjusted $p = .101$) and should therefore be interpreted cautiously.

The overall Versant score increased from 39.45 ($SD = 6.07$) at pretest to 42.55 ($SD = 6.04$) at posttest, a gain of 3.09 points. The effect size was moderate ($dz = 0.58$), and the uncorrected p value approached but did not reach conventional significance ($t(10) = 1.91, p = .085$; Wilcoxon $p = .066$). Gains in fluency (1.55 points, $dz = 0.22$), pronunciation (1.45 points, $dz = 0.18$), and sentence mastery (2.55 points, $dz = 0.29$) were smaller in magnitude and did not approach statistical significance before or after correction. Intelligibility showed a negligible decrease from pretest ($M = 3.36, SD = 0.50$) to posttest ($M = 3.27, SD = 0.47$), a difference of only 0.09 points that was non-significant ($p = .676$) and trivial in effect size ($dz = -0.13$). This result indicates that intelligibility remained essentially unchanged over the course of the intervention.

Table 2. Pre- and Post-Intervention Versant Speaking Test Scores

Outcome	Pre M (SD)	Post M (SD)	Mean Diff [95% CI]	Paired t Test	dz	Wilcoxon p	Holm-Adjusted p
Fluency	33.55 (9.52)	35.09 (8.92)	1.55 [-3.07, 6.16]	$t(10)=0.75, p=.473$	0.22	.520	1.000
Pronunciation	39.36 (8.57)	40.82 (11.65)	1.45 [-4.08, 6.99]	$t(10)=0.59, p=.571$	0.18	.678	1.000
Sentence Mastery	45.36 (10.60)	47.91 (9.07)	2.55 [-3.40, 8.49]	$t(10)=0.95, p=.362$	0.29	.220	1.000
Vocabulary	44.09 (12.31)	49.73 (11.82)	5.64 [1.25, 10.02]	$t(10)=2.86, p=.0169$	0.86	.0186	.101
Overall	39.45 (6.07)	42.55 (6.04)	3.09 [-0.51, 6.69]	$t(10)=1.91, p=.0847$	0.58	.066	.423
Intelligibility	3.36 (0.50)	3.27 (0.47)	-0.09 [-0.56, 0.38]	$t(10)=-0.43, p=.676$	-0.13	.655	1.000

Note. $N = 11$. Positive mean differences indicate improvement from pretest to posttest. Holm-adjusted p values correct for multiple comparisons across six outcomes.

3.4 Time on Site and Individual Differences

Students' time on site (TOS) varied substantially, ranging from 0.78 to 28.83 hours ($M = 8.61, SD = 7.43, Mdn = 7.02$), indicating considerable individual differences in platform engagement despite the daily practice requirement. Correlational analyses examined whether greater TOS was associated with larger gains in speaking performance or more favorable changes in questionnaire outcomes. For the overall Versant score, Pearson's r was $-.029 (p = .933)$ and Spearman's ρ was $-.105 (p = .759)$, indicating no meaningful association between TOS and speaking improvement. Similarly, no meaningful associations were found between TOS and changes in FLA (Pearson $r = -.132, p = .715$; Spearman $\rho = .042, p = .907$) or motivation (Pearson $r = .128, p = .724$; Spearman $\rho = .132, p = .717$). The same null pattern held for vocabulary gain (Pearson $r = .421, p = .197$; Spearman $\rho = -.200, p = .555$), although the Pearson correlation was numerically larger and warrants monitoring in future studies with larger samples. One exploratory finding warrants mention with considerable caution: TOS showed a positive association with pretest FLA scores (Pearson $r = .663, p = .037$). However, this result is likely sensitive to the influence of the single highest-usage student (28.83 hours), who may have driven the correlation substantially. With only 11 participants, a single outlying data point can produce a nominally significant correlation that is not meaningful at the population level. This association should therefore not be



interpreted as evidence of a reliable relationship between baseline anxiety and engagement, but rather as a hypothesis worth examining in larger future samples.

3.5 Technology Acceptance

Students completed the TAM questionnaire after the one-month intervention to evaluate their perceptions of the Immerse VR platform. The overall mean TAM score was 3.40 out of 5 (Cronbach's $\alpha = .85$), indicating a moderately positive evaluation of the platform as a whole.

The highest-rated dimensions were enjoyment, perceived usefulness, and ease of use, each with a mean of 3.86, indicating moderately positive perceptions in these areas. Students appear to have found the platform somewhat useful and accessible, though these ratings fall in the mid-to-upper range of the scale rather than indicating strongly positive impressions. The lowest-rated item was 'I can learn English at any place with Immerse' ($M = 2.43$), which stood notably below the other items and suggests that location flexibility was a practical concern.

Discussion

The clearest finding of this pilot study was the substantial reduction in foreign language anxiety. Students' FLA scores decreased significantly over the one-month intervention, and the effect size was large ($d = -1.518$). This finding is consistent with the idea that AI avatar-mediated VR speaking practice may provide a lower-pressure environment for oral rehearsal before learners encounter real-world communicative demands [4, 7]. For students preparing to study abroad, this may be especially important because reduced anxiety may increase willingness to speak with teachers, peers, host families, and community members once abroad. Notably, the magnitude of the anxiety reduction observed here exceeded what is often reported in classroom-based interventions, which may reflect several features of the VR environment. Interacting with AI avatars rather than human interlocutors may reduce social evaluation concerns, as the perceived consequences of making errors in front of an avatar may be lower than in face-to-face communication, at least in terms of social evaluation anxiety [6]. The structure of the intervention may also have contributed to this outcome. The instructor pre-selected five study-abroad-related topic categories from the Immerse VR platform—Socializing, Life and Living, Home and Community, Expressing Feelings, and Managing Communication—ensuring that students practiced across a broad range of everyday communicative situations they were likely to encounter during their homestay and study-abroad program. This systematic rehearsal of functionally diverse scenarios may have gradually built a sense of readiness and reduced the anticipatory anxiety associated with speaking in unfamiliar communicative situations. In this sense, the present findings align with prior research suggesting that VR can support affective outcomes such as reduced anxiety and increased confidence [14, 17], even when measurable speaking gains are less consistent.

Motivation, by contrast, did not show a meaningful increase. However, this result should be interpreted carefully. Students' motivation was already high at pretest ($M = 4.163$ out of 5), leaving limited room for measurable growth. Rather than indicating that the intervention was ineffective, the stability of motivation scores may suggest that the VR practice helped sustain students' already strong motivational orientation during the pre-departure period. This interpretation is plausible in light of the program context: students who had already committed to an overseas learning experience are likely to have entered the study with a strong desire to improve, consistent with the notion of the ideal L2 self driving future-oriented language learning behavior [29]. Maintaining that motivation over a one-month preparatory period is itself a meaningful outcome. Future research might employ more fine-grained measures of motivational change, or capture fluctuations at multiple points across the intervention, in order to detect subtler shifts that a pretest-posttest design may miss.

The speaking results were encouraging but more tentative. Vocabulary showed the strongest positive change (5.64 points, $dz = 0.86$), and the overall Versant score also increased by 3.09 points, but neither remained statistically significant after correction for multiple comparisons. The pattern of gains is nevertheless noteworthy. Vocabulary showed the largest gain among the speaking dimensions assessed, though the reasons for this pattern remain speculative. One possibility is that the five topic categories may have exposed students to domain-relevant lexis across a range of everyday communicative contexts that VR environments are well suited to simulate [12]. Whether this thematic structure contributed meaningfully to the observed gain, however, cannot be determined from the present data alone.

More broadly, this pattern is consistent with the mixed findings reported in the VR language learning literature, where positive affective outcomes tend to be more consistent than measurable speaking gains



[14, 17]. One possible interpretation is that anxiety reduction may begin to emerge before detectable changes in speaking proficiency, particularly in short interventions [5]. Gains in confidence and reduced inhibition may need to accumulate before speaking improvement becomes observable, rather than co-occurring with it [5, 7], suggesting that longer intervention periods may be needed to translate affective changes into observable proficiency gains.

The lack of a clear relationship between time on site and learning outcomes also deserves attention. Greater use of the platform did not automatically lead to larger gains in speaking performance or stronger changes in anxiety and motivation. This suggests that the sheer amount of practice alone may not be sufficient to explain outcome differences. One particularly interesting exploratory finding was the positive association between baseline anxiety and time on site ($r = .663$), suggesting that more anxious learners may have engaged with the platform more frequently, possibly because the avatar environment may have felt like a less threatening space than face-to-face interaction [6]. If this pattern replicates in larger samples, it would have meaningful implications for how VR tools are positioned: not as general-purpose practice supplements, but as targeted interventions for learners who find human interlocutors especially threatening. Learner profiles and interaction quality therefore warrant closer investigation in future research.

Finally, the TAM findings support the practical feasibility of using AI avatar-mediated VR speaking practice in a pre-departure context. Students generally found the platform enjoyable, useful, and easy to use, which is encouraging given that learner acceptance is a prerequisite for sustained engagement with any educational technology [31]. These results are broadly consistent with prior findings on avatar-based VR practice, which has been reported as motivating and enjoyable by learners in similar contexts [25, 26]. At the same time, the relatively low rating for location flexibility points to a concrete design challenge. Because the intervention was implemented as LIVR on personal computers, practice was inherently tied to locations where a PC was available—a constraint that may have limited the frequency and spontaneity of engagement [19]. Transitioning to a smartphone-compatible platform could substantially increase accessibility and allow learners to practice in commuting time, at home, or in other informal contexts. This would also better align with the everyday, distributed practice patterns that second language acquisition research consistently associates with proficiency development. More broadly, these findings suggest that pedagogical promise and technical accessibility must be developed together: even a motivating and anxiety-reducing tool may underperform if practical barriers reduce the consistency of learner engagement.

Conclusion

Several limitations should be acknowledged when interpreting these findings. This was a small-scale pilot study with only 11 participants and a one-group pretest-posttest design without a comparison group, which limits causal claims. It cannot be concluded with certainty that the observed changes were caused solely by the VR intervention rather than by other aspects of pre-departure preparation or ongoing English learning. The intervention lasted only one month, time on site varied substantially across students, and some analyses were explicitly exploratory and may have been sensitive to outliers. Motivation scale reliability was also lower than that of the FLA measure, suggesting that motivational findings should be interpreted with caution. Despite these limitations, the findings suggest that AI avatar-mediated VR speaking practice may serve as a useful bridge between classroom learning and real-world communication for students preparing to study abroad, particularly in terms of reducing speaking-related anxiety. Future research should include larger samples, comparison groups, longer intervention periods, and more detailed analyses of the quality of learner interaction in order to clarify how and under what conditions AI avatar VR practice contributes to speaking development and anxiety reduction.

Note : FLA findings from this dataset were partially reported in a previous conference proceedings [Saito, Y., "The Impact of AI-Driven Speaking Practice in VR on Foreign Language Anxiety Among Japanese EFL Learners", The IAFOR International Conference on Education – Hawaii 2026 Official Conference Proceedings, pp. 319–329, 2026. doi: 10.22492/issn.2189-1036.2026.30]. The present study extends that work by additionally examining speaking proficiency, motivation, technology acceptance, and the role of a structured speaking journal in the intervention design.

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