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The Impact of Social Virtual Reality-Based Learning on Japanese Language Proficiency and Cultural Competence among Indonesian Prospective Migrant Workers

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Abstract Preparing prospective migrant workers for employment in Japan requires not only Japanese language proficiency but also cultural competence to navigate workplace communication and intercultural interactions. This study compared Social Virtual Reality (Social VR)-based and conventional instruction in developing these two competencies among 200 Indonesian prospective migrant workers. A quasi-experimental pretest–posttest design was implemented across ten intact classes, with both groups completing 78 instructional sessions over six months. Researcher-developed instruments measured Japanese language proficiency and cultural competence. Data were analyzed using MANCOVA and ANCOVA, controlling for pretest scores, alongside class-level sensitivity analyses. Participant-level MANCOVA revealed a significant group difference, whereas class-level MANCOVA did not. Participant-level ANCOVAs favored Social VR for both competencies, while class-level analyses indicated positive differences across all nine indicators. These findings suggest that Social VR-based instruction may support the development of Japanese language proficiency and cultural competence among prospective migrant workers. However, results should be interpreted cautiously because of the limited number of classes and the quasi-experimental design.

Keywords: *Social virtual reality, Japanese language proficiency, Cultural competence, Prospective migrant workers, Employment*

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1. Introduction

Prospective Indonesian migrant workers preparing for employment in Japan need Japanese language proficiency and cultural competence to communicate appropriately in workplace settings. Language proficiency enables them to understand instructions and interact with coworkers, while cultural competence helps them navigate workplace hierarchies, politeness conventions, discipline, and social norms (Okubo, 2025; Rahayu et al., 2025). Because prospective workers may enter diverse occupational sectors, pre-departure training should address workplace communication and cultural competencies across occupational sectors.

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Effective workplace communication requires contextual knowledge of *keigo* (honorific language), occupational vocabulary, and interactional patterns appropriate to social relationships and hierarchies (Okubo, 2025; Rahayu et al., 2025). Pre-departure programs should consequently align language curricula with industry needs (Ramdani et al., 2024), particularly given reported mismatches between instruction at vocational training institutions (Lembaga Pelatihan Kerja [LPK]) and actual workplace communication demands (Salombe et al., 2025). Integrating Japanese language learning with intercultural communication and cultural instruction may strengthen learners' linguistic and intercultural competencies (Risda et al., 2025). Work-related learning contexts may also help learners acquire practical vocabulary and expressions (Fuadzin et al., 2025). Thus, effective preparation should extend beyond vocabulary and grammar to include contextualized communication, pragmatics, and cultural practices (Christou et al., 2025; Fuadzin et al., 2025). However, translating these instructional requirements into effective learning experiences requires pedagogical approaches that allow learners to practise language use and intercultural communication in realistic workplace contexts.

Prospective Indonesian migrant workers may encounter difficulties using Japanese expressions, *keigo*, and language varieties appropriately across social and professional contexts (Jaya & Suryani, 2026; Prihandari et al., 2025; Salombe et al., 2025). Although *keigo* supports communicative adaptability in Japanese workplaces (Rahayu et al., 2025), successful intercultural communication also requires an understanding of dialectal variation, workplace hierarchies, discipline, and communication norms (Mustaqim & Priventa, 2026; Nurjaleka et al., 2026). These challenges highlight the need for realistic and interactive learning opportunities. Social virtual reality (Social VR) enables avatar-mediated interaction in simulated environments and can support collaborative learning (Knutzen et al., 2025; Wang et al., 2026; Zappa et al., 2025). Previous research suggests that virtual reality (VR) may support vocabulary acquisition, fluency, pronunciation, motivation, and engagement through contextualized scenarios (Chen et al., 2022; Yu & Duan, 2024). Extended reality can simulate professional communication (Christou et al., 2025; Yan et al., 2024), while Social VR may facilitate intercultural learning through social interaction and a sense of virtual presence (Gruber & Wagner, 2024; Li et al., 2024). Such environments may allow learners to practise communicating with supervisors and coworkers, following instructions, using *keigo*, and interpreting workplace norms.

Previous studies have examined the role of VR-based instruction in language and cultural learning. Taguchi (2023) investigated intercultural conflict mediation through immersive VR, whereas Gruber and Wagner (2024) examined VR-supported intercultural citizenship in a virtual exchange project. Li et al. (2024) explored VR-based intercultural learning and communication skills, while Yu and Duan (2024) synthesized evidence on VR-assisted language education. Despite these contributions, comparative evidence on Social VR-based instruction that examines both Japanese language proficiency and cultural competence among prospective Indonesian migrant workers remains limited. To address this gap, the present study compared six months of Social VR-based instruction with conventional instruction, assessing both outcomes through everyday and general workplace communication tasks rather than occupation-specific technical assessments. The study addressed two research questions:

1. Do Japanese language proficiency outcomes differ between the instructional groups after controlling for baseline proficiency?
2. Do cultural competence outcomes differ between the instructional groups after controlling for baseline cultural competence?

2. Theoretical Framework

2.1. Social VR-Based Instruction

Social VR refers to computer-generated three-dimensional environments in which multiple users interact through avatars and communicate within shared virtual spaces. Unlike conventional screen-based learning, Social VR enables learners to participate in simulated situations, communicate with peers, collaborate on tasks, and experience contextualized interactions. Its educational potential is grounded in social constructivism (Vygotsky, 1978), which emphasizes knowledge construction through social interaction, and experiential learning theory (Kolb, 1984), which conceptualizes learning as a process involving concrete experience, reflective observation, abstract conceptualization, and

active experimentation. Within these shared virtual environments, avatar-mediated interaction fosters a sense of social presence.

Social presence theory posits that communication media differ in their capacity to convey the salience of interlocutors and interpersonal warmth, with media higher in social presence better supporting relational and collaborative communication (Short et al., 1976). Social presence provides an additional explanation of how interpersonal interaction in virtual environments may facilitate engagement and meaningful communication (Di Natale et al., 2024). Through avatar-mediated communication, learners can experience a sense of co-presence, participate in collaborative activities, and respond to other participants in relatively realistic contexts. Barreda-Angeles et al. (2023) found that Social VR facilitated social presence, natural communication, and a sense of community among university students, although technological limitations and physical discomfort were also reported. Similarly, Dunmoye et al. (2024) found significant associations between social presence indicators and cognitive engagement in a desktop-based collaborative VR learning environment. Interactive open communication was identified as a prominent element of social presence during collaborative learning and problem-solving. These affordances my apply to language education as well. In language education, VR provides opportunities for contextualized communication, role-play, and situational practice. A meta-analysis by Yu and Duan (2024), covering 41 randomized controlled studies, reported positive outcomes for language-learning performance, motivation, satisfaction, and self-efficacy. These findings suggest that immersive technology should be integrated with structured instructional activities rather than treated as an independent source of learning effectiveness. Accordingly, pedagogical scaffolding, meaningful interaction, feedback, and reflection remain important conditions for productive Social VR-based instruction.

2.2. Cultural Competence

Cultural competence refers to the ability to understand, interpret, and respond appropriately to cultural values, social conventions, communication patterns, and behavioral expectations in intercultural situations. It extends beyond factual knowledge of another culture to include awareness of cultural differences, openness toward alternative perspectives, interpretive skills, and appropriate interactional responses. Deardorff's (2006) process model of intercultural competence conceptualizes this development through attitudes, knowledge and comprehension, skills, and internal and external outcomes. Byram's (1997) model of intercultural communicative competence further emphasizes intercultural attitudes, knowledge, interpreting and relating skills, discovery and interaction skills, and critical cultural awareness. These perspectives are particularly relevant to workplace communication because appropriate interaction requires understanding not only linguistic expressions but also the social meanings underlying communication. For example, politeness, hierarchical relationships, professional expectations, and culturally appropriate responses influence how individuals interpret and participate in workplace interactions. Cultural competence therefore involves the ability to negotiate meaning and adapt communication to different sociocultural circumstances rather than simply memorizing cultural information.

Recent studies have explored the contribution of immersive technologies to intercultural learning. Li et al. (2024) reported improvements in intercultural awareness, attitudes, knowledge, and communication skills following a VR-based learning experience among international students, while Risda (2026) further examined the role of immersive learning environments in supporting intercultural competence development. Shadiev et al. (2024) demonstrated that interactive 360-degree VR-supported activities could facilitate cognitive development and address cross-cultural stereotypes through engagement with culturally different perspectives. Similarly, Gruber and Wagner (2024) found that combining VR with virtual exchange provided opportunities for intercultural dialogue, relationship-building, and the development of intercultural competence among language learners. Collectively, these findings indicate that meaningful intercultural learning requires opportunities to encounter different perspectives, communicate across cultural boundaries, and reflect on culturally situated experiences.

2.3. Integrative Framework

The theoretical framework integrates social constructivism (Vygotsky, 1978), experiential learning theory (Kolb, 1984), social presence theory (Short et al., 1976), and Deardorff's (2006) process model

of intercultural competence. These perspectives provide complementary explanations of how socially mediated virtual experiences may support language learning and intercultural development. Social constructivism explains how learners construct knowledge through interaction, while experiential learning emphasizes the relationship between direct experience, reflection, and subsequent application. Social presence theory explains the importance of perceived interpersonal connection in virtual interaction, whereas Deardorff's model provides a framework for understanding the development of intercultural competence through attitudes, knowledge, skills, and interactional outcomes. However, these theoretical perspectives may not translate into effective learning outcomes unless they are deliberately activated through instructional design. Indeed, virtual immersion alone does not necessarily produce linguistic or intercultural development. Learning opportunities depend on meaningful interaction, appropriate scaffolding, feedback, and reflection. The findings of Barreda-Angeles et al. (2023), Dunmoye et al. (2024), Li et al. (2024), and Gruber and Wagner (2024) provide empirical support for the relevance of social interaction, collaborative engagement, and intercultural experiences in virtual learning environments. Nevertheless, the extent to which these processes translate into measurable learning outcomes depends on the instructional context and the characteristics of the learning activities.

Within this integrated framework, Social VR-based instruction provides a contextualized environment in which learners can engage in simulated communication, collaborative problem-solving, and culturally situated interactions. These activities may support Japanese language proficiency by creating opportunities to interpret information, formulate responses, and use language in context. Simultaneously, exposure to culturally relevant situations may encourage learners to recognize social conventions, interpret interpersonal expectations, and consider appropriate responses to cultural differences. Thus, language proficiency and cultural competence are conceptually related but remain distinct learning outcomes.

Based on this integrated theoretical framework, the present study examines whether Social VR-based instruction produces different outcomes from conventional instruction in Japanese language proficiency and cultural competence among Indonesian prospective migrant workers preparing for employment in Japan. By examining these two outcomes together, the study considers the complementary roles of linguistic development and intercultural preparation in workplace-oriented language education. The framework therefore provides the theoretical basis for comparing the two instructional approaches while recognizing that the proposed learning mechanisms are not independently tested as causal mediators.

3. Methodology

3.1. Research Design

This study employed a quantitative quasi-experimental pretest–posttest control group design to compare Japanese language proficiency and cultural competence between prospective Indonesian migrant workers receiving Social VR-based instruction (experimental group) and those receiving conventional instruction (control group).

3.2. Participants

The study involved 200 prospective Indonesian migrant workers enrolled in the Japanese-language preparation program at Lingua Global Utama Vocational Training Institute in Bandung, Indonesia. Participants were aged 20–40 years (M = 29.5, SD = 5.2); 110 were women (55%) and 90 were men (45%). Their educational backgrounds included senior high school (n = 120, 60%), a bachelor's degree (n = 60, 30%), and a master's degree (n = 20, 10%). All participants were beginners with no prior Japanese-language learning or Social VR-based instruction. Convenience sampling was used, and participation was voluntary. Specifically, ten intact classes were selected from the participating training institution based on their availability, accessibility, and suitability for the study. These classes had been established before the research began and were included as existing groups rather than being formed through individual participant selection or random assignment. All eligible trainees in the selected classes were invited to participate, and those who agreed provided informed consent. Throughout the

study, participants remained in their original classes. Individuals who did not meet the eligibility criteria or declined informed consent were excluded (Table 1).

Table 1
Eligibility Criteria for Participants

Category	Criteria
Inclusion criteria	1. Enrolled in the Japanese-language preparation program at LPK Lingua Global Utama, Bandung, Indonesia. 2. Aged 20–40 years. 3. Preparing for employment in Japan. 4. Had no previous Japanese-language learning experience. 5. Had no previous experience participating in Social VR-based Japanese-language learning. 6. Provided informed consent and agreed to complete the study procedures
Exclusion criteria	1. Did not meet all inclusion criteria. 2. Did not provide informed consent.

Participants were drawn from ten intact classes allocated to two instructional conditions. Five classes (100 participants; 20 per class) formed the experimental group and received Social VR-based instruction using VRChat for avatar-mediated interaction and simulated workplace scenarios. The remaining five classes (100 participants; 20 per class) formed the control group and received conventional classroom-based instruction without Social VR. Both groups received comparable instructional time, learning objectives, content, practice, feedback, and instructor attention, and were taught by the same instructor. Participants were not individually randomized. Baseline comparisons revealed no statistically significant differences in measured demographic characteristics or pretest scores. Nevertheless, potential selection bias and unmeasured class differences could not be excluded.

3.3. Instruments

The study used two researcher-developed instruments tailored to prospective Indonesian migrant workers preparing for employment in Japan: a Japanese language proficiency test and a cultural competence scale. Both addressed workplace communication, Japanese social and cultural norms, and contextually appropriate responses. Expert review and pilot testing assessed their relevance, clarity, and suitability. Instrument details and psychometric results are presented below.

3.3.1. Japanese Language Proficiency Test

Japanese language proficiency was assessed using a researcher-developed test informed by general assessment principles associated with the Japanese-Language Proficiency Test (JLPT). No official JLPT items, task formats, or proficiency-level descriptors were adopted. The test targeted beginner-level learners preparing for entry-level employment in Japan and assessed functional Japanese for everyday and workplace communication. This study-defined level did not correspond to an official JLPT certification. The reason for developing a test was that the study required a context-specific measure of functional Japanese proficiency relevant to the everyday and workplace communication needs of prospective migrant workers. Although standardized instruments such as the JLPT provide established measures of general Japanese proficiency, they do not fully address the specific situational communication tasks examined in this study. Therefore, a tailored assessment was developed to capture both receptive language skills and practical communication abilities in relevant contexts.

The test comprised 40 multiple-choice items (15 language knowledge, 10 reading comprehension, and 15 listening comprehension) and four situational communication tasks. Correct multiple-choice responses received one point and incorrect responses zero (range = 0–40). Each communication task was rated on expression accuracy, contextual understanding, response accuracy, and communicative appropriateness using a four-level rubric (1–4), yielding 16–64 points across the four tasks. The combined raw score ranged from 16 to 104 and was converted to 0–100 using [(raw score − 16)/88] × 100. Communication tasks contributed 48 of the 88 possible points, compared with 40 points for multiple-choice items. Each of the five indicators was also standardized separately to 0–100 using its theoretical minimum and maximum. Higher scores indicated greater proficiency.

The communication rubric ranged from substantial difficulty (1), through partially understandable communication with noticeable weaknesses (2) and generally clear, contextually appropriate communication with minor errors (3), to clear, accurate, relevant communication with minimal errors (4). Unanswered multiple-choice items received zero, whereas tasks lacking sufficient evaluable evidence were recorded as missing. Missing data were handled according to the study's data-management procedures.

Three PhD-qualified raters independently scored the communication tasks after reviewing the rubric, performance descriptors, and sample responses. They discussed discrepancies to improve scoring consistency. Five experts in Japanese language education, educational measurement, and vocational training evaluated item relevance, linguistic clarity, contextual appropriateness, and indicator alignment on a four-point scale. Mean Aiken's V was 0.88 (item range = 0.80–1.00). The test was piloted with 30 prospective migrant workers excluded from the main study. Reliability estimates were KR-20 = 0.84 for multiple-choice items and ICC(2,1) = 0.86 for communication-task ratings, using a two-way random-effects model with absolute agreement for single ratings. These results supported content validity, internal consistency, and inter-rater reliability in the target context.

3.3.2. Cultural Competence Scale

Although existing validated intercultural competence questionnaires provide established measures of general intercultural capabilities, they may not adequately capture the specific cultural expectations and workplace interaction contexts addressed in this study. Thus, cultural competence was assessed using a researcher-developed 24-item scale informed conceptually by Ghassemi Pour Sabet et al.'s (2025) review of intercultural competence assessment instruments. No items or predefined dimensions were adopted from the review. Based on the study framework and objectives, the scale covered four dimensions, each comprising six items: cultural understanding, awareness of cultural differences, interpretation of social situations, and selection of appropriate responses. Items addressed Japanese social norms, workplace expectations, and interactions with supervisors, coworkers, and members of the public. Development involved scenario drafting, clarity and dimensional reviews, expert evaluation, and pilot testing with 30 prospective migrant workers excluded from the main study.

Five experts in Japanese language education, educational measurement and evaluation, and intercultural communication assessed item relevance, linguistic clarity, contextual appropriateness, and dimensional alignment. Participants rated proposed responses to hypothetical situations on a five-point scale (1 = very inappropriate; 5 = very appropriate), rather than self-assessing their competence or selecting among alternatives. For example, they rated the appropriateness of politely asking a Japanese supervisor to clarify indirect feedback about work requiring improvement. Negatively keyed items were reverse-scored. The scale measured scenario-based judgments about Japanese social norms and context-sensitive communication, not overall intercultural competence or actual behavior.

Total raw scores ranged from 24 to 120 and were standardized to 0–100 using [(total raw score − 24)/96] × 100. Each six-item dimension ranged from 6 to 30 and was standardized using [(raw dimension score − 6)/24] × 100. Higher scores indicated stronger judgments of cultural appropriateness. Standardized dimension scores were compared between the Social VR-based instruction group and the conventional instruction group, controlling for baseline scores (Table 10). Expert review yielded a mean Aiken's V of 0.91 (item range = 0.80–1.00), and Cronbach's alpha was 0.89. Pilot testing provided additional evidence of clarity and contextual suitability, but not construct validity. The scale remains study-specific rather than standardized.

3.4. Procedure

3.4.1. Data Collection and Intervention

The study comprised four stages: preparation, pretest, intervention, and posttest. During preparation, the researchers coordinated with the training institute, developed learning materials and Social VR scenarios for everyday and workplace communication in Japan, and prepared the assessment instruments. Experts reviewed the materials and instruments for content, linguistic, and contextual

appropriateness. All participants completed pretests assessing their Japanese language proficiency and cultural competence under standardized conditions.

The intervention ran from January 10 to July 11, 2026, over approximately 26 weeks, with three 100-minute sessions per week. The 78 sessions provided 130 instructional hours per group. Overall attendance was 98%, although individual exposure varied. The experimental group received Social VR-based Japanese instruction, whereas the control group received conventional instruction. Both groups followed the same objectives, content, schedule, speaking practice, peer interaction, feedback procedures, and task repetition; the instructional medium was the primary planned difference.

The experimental group used VRChat on laptops for synchronous, avatar-mediated voice and text interactions in groups of four to five. Participants role-played workers, supervisors, and coworkers in activities involving self-introductions, workplace communication, instructions, clarification requests, and workplace problems. The instructor introduced objectives, scenarios, vocabulary, and workplace expressions, guided simulations, provided feedback, and facilitated task repetition. Each session comprised seven stages: orientation (10 minutes), language and cultural input (15 minutes), directed training (15 minutes), workplace simulation (30 minutes), interaction and problem-solving (15 minutes), feedback and reflection (10 minutes), and closing (5 minutes) (Table 2). The same session structure, objectives, duration, and planned feedback procedures were maintained throughout. Activities included practicing how to give and respond to workplace instructions in Japanese.

The control group received conventional Japanese language instruction without Social VR-based learning activities. Instruction was delivered through teacher-led explanations, textbook-based exercises, vocabulary and grammar practice, reading and listening activities, and face-to-face speaking exercises. The learning objectives, instructional content, session duration, and overall schedule were kept comparable to those of the experimental group. Feedback was provided directly by instructors through explanations, corrections, and guidance during classroom activities. Thus, the primary difference between the two groups was the instructional approach, particularly the integration of Social VR-based learning in the experimental group.

Table 2
Social VR-Based Instruction Stages

Stage	Learning and Social VR Activities	Time
Orientation	Introduction to learning objectives, the workplace context, and the virtual scenario.	10 minutes
Language and Cultural Input	Introduction to relevant vocabulary, workplace expressions, *keigo* (polite and honorific language), workplace etiquette, and Japanese workplace norms.	15 minutes
Directed Training	Guided avatar-mediated workplace communication practice, supported by relevant vocabulary, expressions, and instructor guidance.	15 minutes
Workplace Simulation	Practice in workplace scenarios involving instructions, reporting, questioning, clarification requests, and interactions with supervisors and coworkers.	30 minutes
Interaction and Problem-Solving	Resolving communication difficulties, interpreting cultural differences, and responding to workplace situations through Social VR interactions.	15 minutes
Feedback and Reflection	Instructor feedback on Japanese language use and culturally appropriate responses, followed by task repetition and performance reflection.	10 minutes
Closing	Session summary and preparation for the next scenario.	5 minutes
Total		100 minutes

After the intervention, both groups completed alternate posttest forms under comparable conditions. The forms used different items and scenarios but retained the same competency domains, formats, and scoring criteria; no pretest items were reused. Although the alternate forms were intended to reduce

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recall effects, practice effects and familiarity with the assessment formats or task types could not be fully excluded.

3.4.2. Data Analysis

Data were analyzed using IBM SPSS Statistics version 27. Descriptive statistics, including means and standard deviations, were calculated. Assumptions concerning normality, residual distribution, homogeneity of variance, linearity, homogeneity of regression slopes, multicollinearity, and influential observations were examined. The participant-level models showed no substantial violations of the assessed assumptions. The homogeneity-of-regression-slopes assumption was supported for Japanese language proficiency, $F(1, 196) = 1.184$, $p = .278$, and cultural competence, $F(1, 196) = 0.964$, $p = .327$. Multivariate interaction tests were nonsignificant for the Japanese language proficiency pretest, Pillai's Trace = .008, $F(2, 195) = 0.78$, $p = .460$, and the cultural competence pretest, Pillai's Trace = .011, $F(2, 195) = 1.08$, $p = .342$. Box's M test was nonsignificant ($p = .118$), as was the normalized Mardia kurtosis test ($z = 1.42$, $p = .155$). The pretest variables were moderately correlated ($r = .42$, $p = .001$), with no indication of problematic multicollinearity based on variance inflation factor and tolerance statistics. The maximum Cook's distance was .035. These diagnostics were applied to the participant-level models and did not establish the absence of class-level dependence.

The primary analysis used multivariate analysis of covariance (MANCOVA) to compare the Social VR-based instruction group and the conventional instruction group on Japanese language proficiency and cultural competence posttest scores, controlling for both corresponding pretest scores. Separate analyses of covariance (ANCOVAs) examined each overall outcome, controlling for its corresponding pretest score. Additional ANCOVAs examined five Japanese language proficiency indicators and four cultural competence indicators, with the corresponding pretest score included as a covariate in each model. Adjusted means, standard errors, adjusted mean differences, 95% confidence intervals, F statistics, and partial eta-squared values were calculated for these participant-level analyses.

Because participants were nested within ten intact classes, with five classes per instructional condition, the primary participant-level analyses did not account for potential within-class dependence. Therefore, two supplementary class-level sensitivity analyses were conducted to examine the robustness of the findings to class-level allocation. First, a class-level MANCOVA was performed using the ten classes as the units of analysis to examine the two primary outcomes simultaneously. The class-level mean posttest scores for Japanese language proficiency and cultural competence were included as dependent variables, instructional condition as the fixed factor, and both corresponding class-level mean pretest scores as covariates. Second, separate class-level ANCOVAs were conducted for the two overall outcomes and the nine outcome indicators (five Japanese language proficiency indicators and four cultural competence indicators). In each model, the class-level mean posttest score was the dependent variable, instructional condition was the fixed factor, and the corresponding class-level mean pretest score was included as a covariate. Thus, each class-level sensitivity analysis was based on ten class-level observations. Given the small number of classes and the resulting limited statistical power, these supplementary analyses were interpreted cautiously and were not considered a substitute for analyses accounting for clustering with a larger number of classes.

Holm's procedure was applied separately to the five Japanese language proficiency indicators and four cultural competence indicators to control the family-wise error rate within each outcome family. For the supplementary class-level ANCOVAs, multiplicity adjustments were based on the corresponding p values. Findings were interpreted as adjusted differences associated with instructional condition rather than definitive causal effects, considering potential class-level clustering, the limited number of classes, and the quasi-experimental allocation procedure.

4. Results

The results are organized around the two research questions examining differences between the Social VR-based instruction group and the conventional instruction group in Japanese language proficiency and cultural competence after controlling for baseline scores. Descriptive statistics, assumption checks, and inferential analyses are presented to address these research questions.

Descriptive statistics summarized pretest and posttest scores for the Social VR-based instruction group and the conventional instruction group across two outcomes: Japanese language proficiency and cultural competence. The results describe changes in both outcomes before the inferential analyses. Descriptive statistics for Japanese language proficiency are presented in Table 3.

Table 3
Descriptive Statistics for Japanese Language Proficiency Indicators

Indicator	Group	Pretest Mean (SD)	Posttest Mean (SD)	Mean Change (Δ)
Language knowledge	Experimental	62.35 (8.12)	84.26 (6.71)	21.91
	Control	62.71 (8.25)	73.18 (7.24)	10.47
Reading	Experimental	60.84 (8.46)	81.93 (7.02)	21.09
	Control	61.26 (8.38)	71.84 (7.51)	10.58
Listening	Experimental	61.27 (8.71)	80.87 (7.18)	19.60
	Control	61.63 (8.65)	70.92 (7.63)	9.29
Contextual language use	Experimental	60.92 (8.24)	83.15 (6.54)	22.23
	Control	61.48 (8.31)	71.06 (7.35)	9.58
Workplace communication	Experimental	60.82 (8.57)	83.71 (6.39)	22.89
	Control	62.03 (8.42)	70.31 (7.48)	8.28

As shown in Table 3, all five Japanese language proficiency indicators increased from pretest to posttest in both groups. The experimental group showed larger observed increases across all indicators (19.60–22.89 points) than the control group (8.28–10.58 points). The largest increases in the experimental group were observed in workplace communication (22.89 points) and contextual language use (22.23 points). These descriptive changes do not establish causality; adjusted between-group differences are examined in the subsequent inferential analyses. Table 4 presents the descriptive statistics for cultural competence.

Table 4
Descriptive Statistics for Cultural Competence Indicators

Indicator	Group	Pretest Mean (SD)	Posttest Mean (SD)	Mean Change (Δ)
Cultural understanding	Experimental	61.34 (7.63)	84.56 (5.91)	23.22
	Control	61.72 (7.81)	72.64 (6.72)	10.92
Cultural awareness	Experimental	60.68 (7.84)	83.92 (6.14)	23.24
	Control	61.15 (7.93)	71.86 (6.89)	10.71
Interpretation of social situations	Experimental	60.51 (8.02)	84.18 (6.02)	23.67
	Control	60.94 (8.16)	72.21 (6.94)	11.27
Selection of appropriate responses	Experimental	61.15 (7.72)	85.03 (5.73)	23.88
	Control	61.31 (7.85)	72.01 (6.65)	10.70

As shown in Table 4, all four cultural competence indicators increased from pretest to posttest in both groups. The experimental group showed larger observed increases (23.22–23.88 points) than the control group (10.70–11.27 points). The largest increases in the experimental group were in selection of appropriate responses (23.88 points) and interpretation of social situations (23.67 points). These descriptive findings do not establish causality; adjusted between-group differences are examined in the subsequent inferential analyses. Before conducting the MANCOVA and subsequent ANCOVAs, statistical assumptions were assessed, including normality, homogeneity of variance and covariance matrices, linearity, homogeneity of regression slopes, covariate correlation, multivariate outliers, and influential observations. The diagnostic results are presented in Table 5.

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Table 5

Assumption Checks and Diagnostic Results

Assumption/ Test	Variables/ Parameters	Test Statistic	p	Interpretation
Univariate normality	Japanese language proficiency posttest	Shapiro–Wilk, W = .987	.084	No significant departure from normality was detected
	Cultural competence posttest	Shapiro–Wilk, W = .991	.167	No significant departure from normality was detected
Homogeneity of variance	Japanese language proficiency	$F(1, 198) = 1.284$	.258	No significant difference in variances was detected
	Cultural competence	$F(1, 198) = 1.067$	.303	No significant difference in variances was detected
Linearity	Proficiency pretest–posttest relationship	Deviation from linearity, $F(18, 180) = 1.12$	.329	No significant deviation from linearity was detected
	Competence pretest–posttest relationship	Deviation from linearity, $F(18, 180) = 1.08$	.374	No significant deviation from linearity was detected
Homogeneity of regression slopes (ANCOVA models)	Japanese language proficiency pretest × group	$F(1, 196) = 1.184$	.278	No statistically significant interaction was detected in the Japanese language proficiency ANCOVA model
	Cultural competence pretest × group	$F(1, 196) = 0.964$	.327	No statistically significant interaction was detected in the cultural competence ANCOVA model
Homogeneity of regression slopes (MANCOVA model)	Japanese language proficiency pretest × group, assessed across both posttest outcomes	Pillai's Trace = .008; $F(2, 195) = 0.78$	.460	No statistically significant multivariate interaction detected
	Cultural competence pretest × group, assessed across both posttest outcomes	Pillai's Trace = .011; $F(2, 195) = 1.08$	.342	No statistically significant multivariate interaction detected
Covariate correlation	Proficiency pretest–competence pretest	r = .42	.001	Moderate positive correlation was observed
Multicollinearity	Covariates included in the analytical model	VIF = 1.21–1.34; tolerance = .75–.83	—	No evidence of problematic multicollinearity was found
Homogeneity of covariance matrices	Both dependent variables across groups	Box's M = 8.624; approximate F = 2.87	.118	No significant difference in covariance matrices was detected
Multivariate normality	Joint distribution of model variables	Mardia's normalized kurtosis, z = 1.42	.155	No significant departure was detected
Multivariate outliers	Four variables included in the Mahalanobis-distance calculation	Maximum Mahalanobis distance, D^2 = 16.42; $\chi^2(4)$ reference	.0025	No observation exceeded the prespecified screening threshold of $p < .001$
Influential observations	Fitted model estimates	Maximum Cook's distance = 0.035	—	No substantial influence was indicated by this diagnostic alone
Residual normality	Japanese language proficiency ANCOVA residuals	Shapiro–Wilk, W = .992	.412	No significant departure was detected
	Cultural competence ANCOVA residuals	Shapiro–Wilk, W = .989	.146	No significant departure was detected

Note. Assumptions were assessed at $\alpha = .05$, with multivariate outlier screening at $p < .001$. Linearity was assessed using the Deviation from Linearity test and, where appropriate, graphical diagnostics.

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As shown in Table 5, the diagnostic tests detected no statistically significant departures from univariate normality, homogeneity of variance, or linearity (all $p > .05$). The ANCOVA residuals also showed no significant departures from normality. The group-by-pretest interactions were nonsignificant in both the separate ANCOVA models and the multivariate MANCOVA model, providing no evidence of violations of the homogeneity of regression slopes assumption. Box's M ($p = .118$) and Mardia's normalized kurtosis test ($p = .155$) indicated no significant departures from the respective assumptions. The pretest covariates were moderately positively correlated ($r = .42$, $p = .001$), while the VIF and tolerance values indicated no problematic multicollinearity. The maximum Mahalanobis distance ($D^2 = 16.42$, $p = .0025$) did not exceed the prespecified outlier screening threshold ($p < .001$). The maximum Cook's distance was 0.035, indicating no substantial individual influence based on this diagnostic alone. Overall, the diagnostic tests provided no clear evidence of major violations of the assumptions assessed.

Table 6
MANCOVA Results and Class-Level Sensitivity Analysis

Model Effect	Pillai's Trace	F (df)	p	Class-level sensitivity analysis
Japanese language proficiency pretest	.612	153.72 (2, 195)	< .001	—
Cultural competence pretest	.284	38.64 (2, 195)	< .001	—
Instructional group	.487	92.38 (2, 195)	< .001	Pillai's Trace = .452; F(2, 6) = 3.31; p = .107

The participant-level MANCOVA (Table 6) revealed a significant multivariate group difference in the combined posttest outcomes of Japanese language proficiency and cultural competence after adjustment for both pretest scores, Pillai's Trace = .487, $F(2, 195) = 92.38$, $p < .001$, partial $\eta^2 = .487$. Both Japanese language proficiency pretest (Pillai's Trace = .612, $F(2, 195) = 153.72$, $p < .001$) and cultural competence pretest (Pillai's Trace = .284, $F(2, 195) = 38.64$, $p < .001$) were also significant. However, the class-level sensitivity analysis did not confirm the instructional-group effect, Pillai's Trace = .452, $F(2, 6) = 3.31$, $p = .107$. This finding warrants cautious interpretation given the small number of classes (ten, with five per condition). Accordingly, the results were interpreted as adjusted associations rather than definitive causal evidence. Separate ANCOVA results are presented in Table 7.

To address RQ1, an ANCOVA was conducted to examine whether Japanese language proficiency differed between the instructional groups after controlling for baseline proficiency. The results for both overall outcomes are presented in Table 7, while the indicator-level results for Japanese language proficiency are presented in Table 8.

Table 7
ANCOVA Results for Overall Outcomes and Class-level Sensitivity Analysis

Outcome	Effect	F (df)	p	partial η^2	Adjusted MD (95% CI)	Class-Level MD (95% CI)	Class-Level *p*
Japanese language proficiency	Pretest score	186.42 (1, 197)	< .001	.486	—	—	—
Japanese language proficiency	Instructional group	92.76 (1, 197)	< .001	.320	11.00 [8.75, 13.25]	11.00 [5.20, 16.80]	.014
Cultural competence	Pretest score	174.85 (1, 197)	< .001	.470	—	—	—
Cultural competence	Instructional group	108.34 (1, 197)	< .001	.355	11.30 [9.16, 13.44]	11.30 [4.70, 17.90]	.005

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The participant-level ANCOVA showed statistically significant group differences in Japanese language proficiency, $F(1, 197) = 92.76$, $p < .001$, partial $\eta^2 = .320$, adjusted MD = 11.00 (95% CI [8.75, 13.25]), and cultural competence, $F(1, 197) = 108.34$, $p < .001$, partial $\eta^2 = .355$, adjusted MD = 11.30 (95% CI [9.16, 13.44]). Both pretest scores were significantly associated with their respective posttest outcomes (Japanese language proficiency: $F(1, 197) = 186.42$, $p < .001$, partial $\eta^2 = .486$; cultural competence: $F(1, 197) = 174.85$, $p < .001$, partial $\eta^2 = .470$). Class-level sensitivity analyses yielded adjusted mean differences of 11.00 points for Japanese language proficiency (95% CI [5.20, 16.80], p = .014) and 11.30 points for cultural competence (95% CI [4.70, 17.90], p = .005). The wider confidence intervals indicated greater uncertainty, warranting cautious interpretation given the ten classes (five per condition). Indicator-level ANCOVA results for the five Japanese language proficiency dimensions are presented in Table 8.

Table 8

ANCOVA Results for Japanese Language Proficiency Indicators and Class-Level Sensitivity Analysis

Indicator	Experimental M (SE)	Control M (SE)	Adjusted MD	95% CI	F (1, 197)	Holm *p*	Class-Level MD (95% CI)	Class-Level Holm *p*
Language knowledge	84.12 (0.81)	73.31 (0.81)	10.81	[8.55, 13.07]	89.10	< .001	10.81 [4.20, 17.42]	.012
Reading	81.78 (0.82)	71.94 (0.82)	9.84	[7.56, 12.12]	72.50	< .001	9.84 [3.10, 16.58]	.018
Listening	80.69 (0.85)	70.83 (0.85)	9.86	[7.48, 12.24]	66.80	< .001	9.86 [2.20, 17.52]	.026
Contextual language use	82.96 (0.79)	71.18 (0.79)	11.78	[9.59, 13.97]	112.40	< .001	11.78 [4.60, 18.96]	.014
Workplace communication	83.47 (0.79)	70.52 (0.79)	12.95	[10.76, 15.14]	135.60	< .001	12.95 [5.40, 20.50]	.016

As shown in Table 8, the experimental group had higher adjusted means than the control group across all five Japanese language proficiency indicators. The participant-level adjusted mean differences ranged from 9.84 to 12.95 points, with all Holm-adjusted *p* values below .001. The class-level sensitivity analysis also showed positive differences across all indicators, ranging from 9.84 to 12.95 points, with Holm-adjusted *p* values ranging from .012 to .026. Workplace communication showed the largest difference (MD = 12.95, 95% CI [5.40, 20.50], $p = .016$). Given the small number of classes, these findings should be interpreted cautiously as adjusted group differences rather than causal effects.

To address RQ2, an ANCOVA was conducted to examine whether cultural competence differed between the instructional groups after controlling for baseline cultural competence. The overall results are presented in Table 7, while the indicator-level results for cultural competence are presented in Table 9.

As shown in Table 9, the experimental group obtained higher adjusted mean scores than the control group across all four cultural competence indicators. Participant-level adjusted mean differences ranged from 11.85 to 12.48 points (all Holm-adjusted $p < .001$). Class-level analyses also showed positive differences across all indicators, with Holm-adjusted $p = .032$. The largest class-level difference was found for the selection of appropriate responses (MD = 12.48, 95% CI [4.80, 20.16]). These findings indicate higher measured cultural competence scores in the experimental group but do not establish transfer to actual workplace interactions. Given the small number of classes, the class-level results should be interpreted cautiously as supplementary sensitivity evidence.

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Table 9
ANCOVA Results for Cultural Competence Indicators and Class-Level Sensitivity Analysis

Indicator	Experimental M (SE)	Control M (SE)	Adjusted MD	95% CI	F (1, 197)	Holm p	Class-level MD (95% CI)	Class-level F (1, 7)	Approx. raw p	Class-Level Holm p
Cultural understanding	84.43 (0.76)	72.58 (0.76)	11.85	[9.73, 13.97]	121.70	< .001	11.85 [4.10, 19.60]	11.96	.011	.032
Cultural awareness	83.76 (0.79)	71.79 (0.79)	11.97	[9.78, 14.16]	116.30	< .001	11.97 [3.80, 20.14]	10.98	.013	.032
Interpretation of social situations	84.05 (0.75)	72.04 (0.75)	12.01	[9.92, 14.10]	128.40	< .001	12.01 [4.50, 19.52]	13.09	.009	.032
Selection of appropriate responses	84.67 (0.72)	72.19 (0.72)	12.48	[10.48, 14.48]	151.20	< .001	12.48 [4.80, 20.16]	13.51	.008	.032

5. Discussion

This discussion is organized around the two research questions. RQ1 examined whether Japanese language proficiency differed between the Social VR-based and conventional instruction groups, whereas RQ2 examined the corresponding group differences in cultural competence. This study compared Social VR-based and conventional instruction in terms of Japanese language proficiency and cultural competence among Indonesian prospective migrant workers. The participant-level MANCOVA revealed a statistically significant multivariate group difference; however, this finding was not confirmed by the class-level sensitivity analysis. Supplementary ANCOVAs nevertheless showed higher adjusted scores in the Social VR group across both overall outcomes and all nine indicators. This pattern suggests favorable participant-level differences but warrants cautious interpretation because the class-level multivariate result did not reach statistical significance and the number of classes was limited. The theoretical framework provides complementary perspectives for interpreting these findings through social interaction, experiential learning, social presence, and the development of intercultural competence.

Regarding RQ1, the findings indicated higher adjusted Japanese language proficiency scores in the Social VR group across all five indicators. Workplace communication showed the largest participant-level difference, whereas reading comprehension showed the smallest. The class-level sensitivity analyses also indicated positive differences, although their wider confidence intervals reflected greater uncertainty. These findings can be interpreted through Vygotsky's (1978) social constructivist perspective, which emphasizes that learning develops through social interaction and guided support. In the Social VR environment, workplace communication activities and instructor guidance may have provided opportunities for participants to construct linguistic knowledge through contextualized interaction and scaffolding. These findings are broadly consistent with Taguchi and Hanks (2024), who reported improvements in interactional engagement, clarity, and content appropriateness among Spanish learners following a short Social VR intervention. Sun and Song (2026) also reported promising findings for vocabulary, listening, and retention, although evidence of immediate gains was inconclusive. Differences in populations, intervention duration, and assessment methods limit direct comparisons. Workplace scenarios may have supported contextualized communication (Wiboolyasarin et al., 2026; Zappa et al., 2025), although this mechanism was not directly examined. As Cowie and Alizadeh (2022) noted, learning outcomes depend on instructional design and support rather than immersion alone. From a culturological perspective, language proficiency also involves interpreting culturally situated meanings (Pishghadam, 2026).

The intervention incorporated workplace scenarios, instructor guidance, feedback, and task repetition, consistent with research on structured tasks and scaffolding in Social VR (Nik Aloesnita et al., 2025; Zhang & Zou, 2026). Kolb's (1984) experiential learning theory provides another perspective for

understanding these findings. Through workplace simulations, participants could engage in concrete communication experiences, reflect on their responses, conceptualize appropriate language use, and experiment with alternative responses through repeated tasks and feedback. This interpretation is also relevant to social presence theory, which highlights the importance of perceived social interaction in mediated communication (Short et al., 1976). Social VR may create conditions for more socially engaging communication by allowing participants to interact with others in a shared virtual environment. However, social presence itself was not directly measured in this study. Greater presence does not necessarily improve learning when sensory and interactional demands increase (De Witte et al., 2026; Peltzer et al., 2026). These considerations suggest that the potential educational value of Social VR depends on how immersive activities are structured and supported. Nevertheless, the contributions of individual intervention components were not isolated, implementation fidelity was not independently assessed, and cognitive load was not measured.

Regarding RQ2, the findings showed higher adjusted cultural competence scores in the Social VR group across all four indicators. The class-level sensitivity analyses also yielded positive differences across these indicators following Holm adjustment. These findings can be interpreted in relation to Deardorff's (2006) process model of intercultural competence, which conceptualizes intercultural competence as a developmental process involving attitudes, knowledge, skills, and internal and external outcomes. Exposure to culturally situated Japanese workplace scenarios may have encouraged participants to consider cultural expectations, interpret social situations, and evaluate contextually appropriate responses. Nevertheless, the present assessment primarily captured participants' judgments about hypothetical situations rather than their demonstrated intercultural performance in authentic encounters. Previous research on VR- and metaverse-supported intercultural learning has highlighted the potential of immersive technologies to foster intercultural communicative competence and cultural understanding. However, these approaches also present challenges, including technological difficulties, limited feedback, cultural stereotyping, and the need for adequate pedagogical preparation (Fathi et al., 2025; Tafazoli, 2024; Valizadeh & Morady Moghaddam, 2025; Xiao et al., 2026). Culturally situated scenarios may encourage interpretation and reflection (Alizadeh & Cowie, 2025; Wiboolyasarin et al., 2026), although these mechanisms were not directly examined. Magnitude Culturology offers a complementary perspective on how cultural meanings may be interpreted or misjudged in cross-cultural interactions (Pishghadam, 2026). Whether the observed judgments translate into appropriate responses to workplace hierarchies, politeness norms, and ambiguous interactions in Japan remains uncertain (Montroy & Matamala, 2025; Zhao, 2025).

Overall, Social VR-based instruction was associated with higher adjusted scores in Japanese language proficiency and cultural competence, although the nonsignificant class-level multivariate finding warrants caution. Taken together, the four theoretical perspectives provide complementary explanations for the potential contribution of Social VR. Social constructivism emphasizes guided interaction, experiential learning highlights learning through experience and reflection, social presence theory addresses the social dimension of virtual interaction, and Deardorff's model explains the developmental dimensions of intercultural competence. These perspectives suggest that the educational value of Social VR may arise not simply from the use of immersive technology but from the integration of meaningful tasks, social interaction, instructional guidance, and opportunities for cultural reflection. Training institutions may therefore consider structured workplace scenarios, guided interaction, feedback, and cultural reflection as complements to conventional instruction rather than established replacements. Previous VR-based intercultural training has incorporated guided debriefing to encourage learners to reflect on simulated workplace conflicts and consider appropriate intercultural communication strategies (Jiang et al., 2026).

Several limitations should be considered. The quasi-experimental design involved intact classes without individual randomization. Although the same instructor taught both conditions and no statistically significant baseline differences were observed, selection bias and class-level confounding remain possible. The small number of classes also limits the reliability of the class-level sensitivity estimates, and adjustment for pretest scores cannot eliminate unmeasured differences. Accordingly, the findings should be interpreted as adjusted group associations rather than causal effects. The single-institution setting further limits generalizability. Long-term retention and transfer to actual workplaces were not

assessed. Although the instruments showed preliminary evidence of validity and reliability, their psychometric properties have not been comprehensively established. In addition, social interaction, experiential learning processes, perceived social presence, and the developmental processes proposed by Deardorff's model were not directly measured as mediating mechanisms. Future research should involve larger and more diverse samples to examine construct validity, applicability across learning contexts, and performance in authentic workplace situations. It should also directly assess these theoretical processes to clarify how Social VR-based instruction may contribute to language learning and intercultural competence. Such research would strengthen the evidence supporting the instruments and clarify the generalizability and mechanisms underlying the observed findings.

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Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to participant confidentiality and ethical considerations.

Ethics Declaration

Ethical approval was obtained from the Research Ethics Committee of Universitas Pendidikan Indonesia (No. 735/UN40.F7/PT.01.01/2026, January 2, 2026), and permission was granted by LPK Lingua Global Utama. All participants provided written informed consent and could withdraw without penalty. Participant identities and data were kept confidential, securely stored, and used solely for research purposes.

References

Alizadeh, M., & Cowie, N. (2025). Technology-enhanced intercultural exchange in language learning and teaching: A scoping review. In S. Barker, S. Kelly, R. McInnes, & S. Dinmore (Eds.), *Future focussed: Educating in an era of continuous change* (pp. 487–492). ASCILITE. https://doi.org/10.65106/apubs.2025.2698

Barreda-Angeles, M., Horneber, S., & Hartmann, T. (2023). Easily applicable social virtual reality and social presence in online higher education during the COVID-19 pandemic: A qualitative study. *Computers & Education: X Reality, 2*, Article 100024. https://doi.org/10.1016/j.cexr.2023.100024

Byram, M. (1997). *Teaching and assessing intercultural communicative competence*. Multilingual Matters.

Chen, J., Dai, J., Zhu, K., & Xu, L. (2022). Effects of extended reality on language learning: A meta-analysis. *Frontiers in Psychology*, *13*, Article 1016519. https://doi.org/10.3389/fpsyg.2022.1016519

Christou, E., Parmaxi, A., & Christoforou, M. (2025). Implementation and application of extended reality in foreign language education for specific purposes: A systematic literature review. *Universal Access in the Information Society*, *24*, 2061–2076. https://doi.org/10.1007/s10209-025-01191-w

IN PRESS

Cowie, N., & Alizadeh, M. (2022). The affordances and challenges of virtual reality for language teaching. *International Journal of TESOL Studies*, *4*(3), 50–65. https://doi.org/10.46451/ijts.2022.03.05

Deardorff, D. K. (2006). Identification and assessment of intercultural competence as a student outcome of internationalization. *Journal of Studies in International Education*, *10*(3), 241–266. https://doi.org/10.1177/1028315306287002

De Witte, B., Reynaert, V., Kieken, D., Jabbour, J., Demarey, C., Dumoulin, A., & Possik, J. (2026). Immersive virtual reality learning and cognitive load: A multiple-day field study. *Computers in Human Behavior*, *176*, Article 108853. https://doi.org/10.1016/j.chb.2025.108853

Di Natale, A. F., Repetto, C., & Villani, D. (2024). Desktop-based virtual reality social platforms versus video conferencing platforms for online synchronous learning in higher education: An experimental study to evaluate students' learning gains and user experience. *Journal of Computer Assisted Learning*, *40*(6), 3454–3473. https://doi.org/10.1111/jcal.13075

Dunmoye, I. D., Rukangu, A., May, D., & Das, R. P. (2024). An exploratory study of social presence and cognitive engagement association in a collaborative virtual reality learning environment. *Computers & Education: X Reality*, *4*, Article 100054. https://doi.org/10.1016/j.cexr.2024.100054

Fathi, J., Zou, D., & Zhaleh, K. (2025). Promoting intercultural communicative competence and willingness to communicate in EFL learners through virtual reality: A mixed-methods examination. *Computer Assisted Language Learning*. https://doi.org/10.1080/09588221.2025.2496827

Fuadzin, R. S., Kusrini, D., Bachri, A. S., & Sakai, A. (2025). Japanese language for Indonesian interns and workers going to Japan in the restaurant sector: A narrative research. *Proceeding of International Conference on Japanese Studies, Language and Education*, *6*(1), 82–95. http://proceedings.aspbji.id/index.php/icjsle/article/view/113

Ghassemi Pour Sabet, P., Chapman, E., & Zhao, J. (2025). A critical review of the existing quantitative intercultural competence assessment instruments. *Education Research & Perspectives*, *52*, 132–184. https://doi.org/10.70953/ERPv52.2512005

Gruber, A., & Wagner, M. (2024). Fostering interdisciplinary intercultural citizenship with virtual reality in a world language virtual exchange project. *Intercultural Communication Education*, *7*(1), 1–19. https://doi.org/10.29140/ice.v7n1.1304

Jaya, M. S., & Suryani, P. A. (2026). Dari bahasa Jepang kelas ke bahasa Jepang lapangan: Adaptasi sosiolinguistik pekerja migran Indonesia di Hiroshima [From classroom Japanese to field Japanese: Sociolinguistic adaptation of Indonesian migrant workers in Hiroshima]. *Prosiding Seminar Nasional Bahasa Ibu*, *3*(1), 172–186.

Jiang, Y., Acheson, K., Bell, A., Griffith Smith, S., Ely, D., & Roberson, G. (2026). Learning by experience: Using VR simulation for the intercultural competence development of manufacturing technicians. *Human Resource Development International*, *29*(4), 784–812. https://doi.org/10.1080/13678868.2026.2655460

Knutzen, K., Rothenberger, L., Tribusean, I., & Xu, Y. (2025). Using social virtual reality in teaching intercultural communication. *Technology, Knowledge and Learning*, *30*, 1167–1187. https://doi.org/10.1007/s10758-025-09822-0

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.

Li, Q., Liu, Q., Jiang, M., & Wang, R. (2024). Virtual reality as a bridge: Enhancing intercultural learning and communication skills among international students. *International Communication of Chinese Culture*, *11*(3), 385–411. https://doi.org/10.1007/s40636-024-00297-9

Montroy, M., & Matamala, A. (2025). IMMERSE: Learning culture in the language learning classroom through VR. *XLinguae*, *18*(4), 292–307. https://doi.org/10.18355/XL.2025.18.04.19

Mustaqim, M., & Priventa, H. (2026). Horenso sebagai strategi adaptasi budaya kerja Jepang pada pekerja migran Indonesia pemegang visa Tokutei Ginou di Jepang [Horenso as a strategy for adapting Japanese work culture for Indonesian migrant workers holding Tokutei Ginou visas in Japan]. *TANDA: Jurnal Kajian Budaya, Bahasa dan Sastra*, *6*(5), 1–38. https://doi.org/10.69957/tanda.v6i05.3088

Nik Aloesnita, N. M. A., Wan Shamsuddin, W. N. F., Masrom, U. K., & Sa, N. T. (2025). Employing virtual reality-enhanced task-based language learning and teaching to mitigate interview anxiety. *Computer-Assisted Language Learning Electronic Journal*, *26*(3), 248–268. https://doi.org/10.54855/callej.252639

Nurjaleka, L., Diner, L., Rosliyah, Y., & Karyati, A. (2026). Workplace immersion and intercultural learning: Indonesian Japanese language learners in internship programs in Japan. *International Journal of Applied Linguistics*. https://doi.org/10.1111/ijal.70351

Okubo, M. (2025). Japanese language competencies and intercultural understanding required of highly skilled foreign professionals in Japan: Findings from interviews with small and medium-sized enterprises. *Journal of Technical Japanese Education*, *27*, 43–50. https://doi.org/10.11448/jtje.27.43

Peltzer, N. R., Kuhn, J., Stadler, M., Cera, R., Hoyer, C., Flegr, S., Fischer, M. R., & Richters, C. (2026). The interplay of self-regulation, cognitive load and learner resources: Implications for learning outcomes in virtual reality. *Computers & Education*, *249*, Article 105612. https://doi.org/10.1016/j.compedu.2026.105612

Pishghadam, R. (2026). When culture is misjudged: Toward magnitude culturology in language studies. *International Journal of Society, Culture and Language*, *14*(2), 123–137. https://doi.org/10.22034/ijscl.2026.735705

Prihandari, I., Efrizal, & Dewi, F. P. (2025). Kesiapan calon pekerja migran Indonesia (PMI) ke Jepang di lembaga pelatihan kerja (LPK) di Jawa Timur [Readiness of prospective Indonesian migrant workers (PMI) to go to Japan at job training institutions (LPK) in East Java]. *Ayumi: Jurnal Budaya, Bahasa dan Sastra*, *12*(2), 158–174. https://doi.org/10.25139/ayumi.v12i2.10909

Rahayu, E. T., Hartati, Arifiani Felayati, S., & Fadlullah, F. (2025). Keigo perspective for Indonesian migrants: A study of communication challenges and social adaptation of Indonesian migrants in Japan. *Forum for Linguistic Studies*, *7*(12), 856–866. https://doi.org/10.30564/fls.v7i12.10986

Ramdani, A. H., Istiqamah, W. H., & Inoue, T. (2024). Japanese language education and examination for Indonesian specified skilled worker (SSW) candidates: An analysis of the pre-departure program. *JapanEdu: Jurnal Pendidikan dan Pengajaran Bahasa Jepang*, *9*(1), 34–41.

Risda, D. (2026). The impact of culture-based Japanese language learning on the intercultural communication competence of prospective Indonesian migrant workers. *Theory and Practice in Language Studies*, *16*(4), 1314–1325. https://doi.org/10.17507/tpls.1604.27

Risda, D., Syihabuddin, S., Nurdin, E. S., & Malihah, E. (2025). The impact of intercultural Japanese language teaching based on Gen-AI and multimedia on intercultural communication adaptation, learning motivation (L2), and Japanese language proficiency. *International Journal of Learning, Teaching and Educational Research*, *24*(7), 256–277. https://doi.org/10.26803/ijlter.24.7.13

Salombe, F. D., Iskandar, K., & Rustam, M. R. (2025). Language barriers: Language training mismatch and communication challenges among Indonesian technical intern (TITP) in Japan. *KIRYOKU*, *9*(2), 455–469. https://doi.org/10.14710/kiryoku.v9i2.455-469

Shadiev, R., Chen, X., Reynolds, B. L., Song, Y., & Altinay, F. (2024). Facilitating cognitive development and addressing stereotypes with a cross-cultural learning activity supported by interactive 360-degree video technology. *British Journal of Educational Technology*, *55*(6), 2668–2696. https://doi.org/10.1111/bjet.13461

Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. John Wiley & Sons.

Sun, L., & Song, X. (2026). The effectiveness of virtual reality for K-12 foreign language learning: A systematic review of recent randomized controlled trials. *Frontiers in Psychology*, *16*, Article 1714481. https://doi.org/10.3389/fpsyg.2025.1714481

Tafazoli, D. (2024). From virtual reality to cultural reality: Integration of virtual reality into teaching culture in foreign language education. *Journal for Multicultural Education*, *18*(1–2), 6–24. https://doi.org/10.1108/JME-12-2023-0135

Taguchi, N. (2023). Using immersive virtual reality for the assessment of intercultural conflict mediation. *Language Learning & Technology*, *27*(3), 108–128. https://doi.org/10.64152/10125/73534

Taguchi, N., & Hanks, E. (2024). Social virtual reality for L2 Spanish development: Learning how to interact with others in a high-immersion virtual space. *The Modern Language Journal*, *108*(4), 954–975. https://doi.org/10.1111/modl.12968

Valizadeh, M., & Morady Moghaddam, M. (2025). Metaverse magic: Improving language learners' intercultural understanding through virtual reality. *Journal of Multilingual and Multicultural Development*, *46*(7), 2062–2081. https://doi.org/10.1080/01434632.2025.2538691

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wang, Y., Zhang, H., & Liu, D. (2026). The evolving impact of virtual reality-based cultural immersion: A longitudinal mixed-methods study on EFL learners' intercultural sensitivity, willingness to communicate, and L2 learning motivation. *Acta Psychologica*, *265*, Article 106631. https://doi.org/10.1016/j.actpsy.2026.106631

Wiboolyasarin, W., Jinowat, N., & Wiboolyasarin, K. (2026). Virtual reality in second language education: A systematic review of pedagogical affordances, methodologies, and technological trends (2020–2024). *Research Synthesis in Applied Linguistics*, *2*(1), 1–51. https://doi.org/10.1080/29984475.2025.2603960

Xiao, S., Chen, H., & Hu, B. (2026). Technology-supported cross-cultural learning effectiveness: A multilevel meta-analysis. *Humanities and Social Sciences Communications*, *13*, Article 1206. https://doi.org/10.1057/s41599-026-07214-y

Yan, W., Lowell, V. L., & Yang, L. (2024). Developing English language learners' speaking skills through applying a situated learning approach in VR-enhanced learning experiences. *Virtual Reality*, *28*, Article 167. https://doi.org/10.1007/s10055-024-01061-5

Yu, Z., & Duan, P. (2024). Meta-analyses of anxiety, motivation, performance, satisfaction, and self-efficacy in virtual reality-assisted language education. *Foreign Language Annals*, *57*(2), 550–580. https://doi.org/10.1111/flan.12748

Zappa, A., Slater, M., & Rodriguez-Fornells, A. (2025). Social interaction shapes and boosts second language learning: Virtual reality can show us how. *npj Science of Learning*, *10*, Article 90. https://doi.org/10.1038/s41539-025-00381-8

Zhang, Y., & Zou, D. (2026). Designing and evaluating a "Guided Social Immersion" workshop in VRChat for L2 speaking practice. In G. Chen, T. C. Hsu, L. Lim, & D. Wu (Eds.), *GCCCE 2026 Chinese conference proceedings* (pp. 185–190). The Global Chinese Conference on Computers in Education. https://nlt.gcsce.net/ojs/index.php/GCCCE/article/view/2609

Zhao, Z. (2025). Immersive language exchanges via virtual reality increase intercultural competence in modern languages degrees. *International Journal of Education and Social Development*, *3*(1), 46–57. https://doi.org/10.54097/m8fqk863

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