



Facilitating Intercultural Competence Through Aviation English for Aircraft Maintenance Students

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ABSTRACT

Aircraft maintenance personnel work with technical documentation and colleagues across multilingual and multicultural settings, yet Aviation English instruction often gives limited attention to intercultural communicative competence (ICC). This classroom action research examined how an ICC-based Aviation English model was implemented and refined, how students responded to it, and whether and how students' perceived ICC changed. Participants were 24 Diploma 3 Aircraft Engineering students and two Aviation English lecturers at an Indonesian civil aviation polytechnic. Two cycles followed planning, acting, observing, and reflecting. Evidence comprised observation checklists and field notes, a 15-item student-response questionnaire, lecturer reflection, learning documentation, and a 20-item self-report Assessment of Intercultural Competence. Cycle 1 showed procedural enactment but insufficient clarity, scaffolding, and support. Cycle 2 bundled the CLIMB sequence with lecturer mentoring and authentic interaction with Timor-Leste students. Student-response medians increased across all five instructional components (all $p < .001$; $r = .75-.88$). Perceived ICC also increased across knowledge, attitude, skills, and awareness (all $p < .001$; $r = .86-.88$), with larger paired median gains in skills and knowledge. The findings support the feasibility of structured intercultural pedagogy in Aviation English, while the single-group design and bundled Cycle 2 changes preclude attributing improvement to CLIMB alone.

1. INTRODUCTION

The expansion of aviation in Southeast Asia has increased the need for personnel who are able to work in multilingual and multicultural environments (Hirsh, 2022; Indriani, 2021). The aviation industry in the region has grown alongside rising passenger demand, liberalized traffic regulations, and stronger competition among air carriers (Café et al., 2026; Fu & Oum, 2014). Indonesia also contributes significantly to this regional development because of its large aviation market and expanding aircraft operation (Yuliyanto et al., 2026). In this context, aircraft maintenance, repair, and overhaul activities are increasingly important because aircraft must be maintained in safe, reliable, and airworthy conditions.

The growth of aviation maintenance creates a direct need for language competence. ICAO Document 9835 primarily operationalizes language proficiency requirements for pilots and air traffic controllers and provides a safety-oriented benchmark for clear and unambiguous operational communication (International Civil Aviation Organization [ICAO], 2010). For aircraft maintenance students, Aviation English is essential for reading manuals, interpreting instructions, understanding technical documents, reporting maintenance findings, and clarifying information with professionals from different linguistic and cultural backgrounds (Nawata, 2026; Rahmati & Izadpanah, 2021). This need is reinforced by Maintenance Resource Management and Maintenance Human Factors guidance, which treats communication, teamwork, assertiveness, and safety culture as core defenses that support reliable maintenance performance (Federal Aviation Administration [FAA], 2017). In an MRO environment, clarification, accurate task-information transfer, and assertive safety communication function as human-factors defenses that support airworthiness and safe maintenance practice.

The importance of accurate maintenance communication can be seen in lexical ambiguity within technical texts (Johnson et al., 2025). A sentence such as "Round the edges of the round cap" illustrates how the same word may function differently as a verb, noun, or adjective. ASD-STE100 Simplified Technical English (STE) addresses this type of risk through controlled writing rules and a restricted dictionary that require approved meanings and parts of speech in technical documentation (Aerospace, Security and Defence Industries Association of Europe [ASD], 2025). STE can reduce ambiguity in manuals, but it cannot govern every spontaneous handover, clarification exchange, or cross-cultural interaction. Organizational and cultural expectations also shape clarification behavior. For example, perceived status distance, indirectness, or face-saving expectations can influence how a junior technician seeks clarification about an ambiguous instruction issued by a senior or foreign engineer. ICC therefore complements controlled technical language by developing socio-pragmatic behaviors such as clarifying, confirming, checking shared understanding, and negotiating meaning when textual clarity is insufficient or verbal negotiation is required (Mahmood et al., 2025; Wang & Friginal, 2025).

In Indonesian vocational aviation education, English learning is expected to support the competencies required by the aviation workforce (Cahyadi et al., 2022; Hendra et al., 2024; Pane et al., 2025). Vocational education and training under the transportation sector prepares students for job-related skills, including technical competence, language competence, and intercultural communication (Chui & Mohanmmed, 2024; Sheng, 2025; Yang et al., 2026). Current vocational aviation programs therefore benefit from closer alignment between English instruction and the communicative demands of the workplace (Abu Talib et al., 2025; Demirdöken & Atay, 2024; Yu &

Binti Mat Said, 2025). Aviation English that integrates technical vocabulary, grammar, workplace interaction, and intercultural communication prepares students for multilingual aviation teamwork.

Intercultural communicative competence is relevant to Aviation English because aviation workplaces involve diverse personnel, including engineers, inspectors, instructors, operators, and international partner (Feng et al., 2024; Katsarska, 2024). Differences in nationality, language, values, educational background, work culture, and communication style may affect how people interpret information and collaborate (Mushaathoni, 2024; C. Zhang, 2023). ICC helps learners develop openness, cultural knowledge, interpretive ability, interactional skills, and critical awareness. In aviation education, these abilities can support safe and respectful professional communication (Ertay & Gilanlioglu, 2024; Q. Zhang et al., 2025; Zhou et al., 2024).

The theoretical basis of this study draws on Byram's five-savoirs model and Deardorff's process perspective on intercultural competence (Byram, 1997; Deardorff, 2006; Nguyen et al., 2026; Xu et al., 2025). Byram distinguishes attitudes, knowledge, skills of interpreting and relating, skills of discovery and interaction, and critical cultural awareness. Deardorff frames these abilities developmentally: requisite attitudes and knowledge/skills support internal adaptability that can be expressed through observable intercultural communication behavior.

In an aircraft-maintenance context, these constructs can be operationalized through MRO communication tasks. *Savoir etre* is reflected in openness, curiosity, and willingness to clarify during shift handovers; *savoirs* includes awareness of professional, organizational, and cultural conventions; *savoir comprendre* supports interpretation of different communicative practices in defect reporting and audit responses; *savoir apprendre/faire* is enacted when technicians seek information, negotiate meaning, and adapt during troubleshooting; and *savoir s'engager* requires learners to evaluate cultural or hierarchical norms against professional safety obligations. Together, these perspectives justify explicit intercultural instruction while keeping maintenance tasks and safety-oriented communication as the applied context.

Although ICC is increasingly recognized in language and vocational education, existing Aviation English work frequently emphasizes aeronautical English, radiotelephony, technical comprehension, or isolated language needs (Pacheco et al., 2023; Terenzi, 2021), while maintenance-oriented studies emphasize technical English and manual comprehension (Embryany & Ratmanida, 2020; Korba et al., 2023; Wang & Frigal, 2025). Within the literature reviewed for this study, no classroom action-research investigation was identified that operationalized Byram's and Deardorff's ICC constructs within maintenance-specific Aviation English and linked iterative classroom redesign to both learners' responses and multidimensional ICC outcomes. This explicit gap matters because maintenance personnel must combine accurate technical interpretation with clarification, assertiveness, and meaning negotiation across linguistic, cultural, and hierarchical differences.

Accordingly, this study aimed to (1) document how an ICC-based Aviation English model was implemented and refined across two classroom action-research cycles; (2) examine students' responses to the instructional model; and (3) assess whether and how students' perceived ICC changed across the intervention. It addressed three research questions: (1) How was the ICC-based instructional model implemented and refined? (2) How did students respond to its implementation? and (3) Did students' perceived ICC change after the intervention, and, if so, how? The study contributes classroom-based evidence linking ICC theory, maintenance-specific ESP, and iterative

pedagogical refinement, while treating observed changes as within-classroom evidence rather than isolated causal effects.

2. METHODS

Research Design

This study used classroom action research (CAR) because the primary purpose was to improve Aviation English teaching practice while systematically examining student responses and learning outcomes (Tavakoli & Kavoshian, 2024). The intact Aviation English class was followed across two cycles, each comprising planning, acting, observing, and reflecting. Cycle 1 implemented the initial instructional sequence and generated evidence for pedagogical refinement. Cycle 2 incorporated the refinements identified through reflection, lecturer feedback, and student responses. Because CAR prioritizes iterative improvement in a natural classroom rather than experimental isolation, the design supports interpretation of within-classroom change but does not establish that any single Cycle 2 component caused the observed differences.

Participants and Research Setting

The study was conducted in the Aircraft Maintenance Engineering program at Surabaya Civil Aviation Polytechnic. The setting was selected because it prepares graduates for aviation competencies in a multilingual professional domain and provided an appropriate context for examining ICC-oriented Aviation English. The analytical student group was one intact class of 24 Diploma 3 Aircraft Engineering students enrolled at the institution's Pre-Intermediate English course level. Two Aviation English lecturers participated purposively because they were responsible for the course materials, teaching strategies, and implementation of the ICC-based instructional model.

The same 24 students contributed data across both cycles, preserving the paired within-class comparison. During Cycle 2, students from Timor-Leste who were enrolled at the institution joined a designated meeting and group discussion as guest interactants to provide authentic intercultural communication practice; they were not included in the 24-student analytical sample. The archived study materials identify the two lecturers' Aviation English teaching and ICCIM implementation roles and the Timor-Leste students' guest-interactant role, but do not report the lecturers' exact years of teaching experience or the number and language profile of the guest interactants. These participant-profile limits should be considered when assessing transferability beyond this setting.

Data Collection Technique

The instructional intervention was organized into pre-intercultural, whilst-intercultural, and post-intercultural learning activities (Heggernes, 2021; Shadiev & Sintawati, 2020). In Cycle 1, the lecturer introduced cultural materials related to Indonesia, China, and Thailand, including visually salient historical or community practices. Students identified the cultural origin of the materials, activated prior knowledge, compared practices, and discussed how unfamiliarity and difference influence communication. Cycle 1 functioned as a pedagogical lesson demonstrating that intercultural materials are most effective when cultural examples are framed through dynamic, situated communication and multiple perspectives. This lesson positioned cultural essentialism as a critical design consideration and directly guided Cycle 2 toward regional comparison, interaction, meaning negotiation, and functional ESP-oriented communication tasks.

Reflection from Cycle 1 identified priorities for clearer learning objectives, more coherent learning steps, and stronger lecturer guidance. In response, the curriculum manager supported short training and mentoring for the lecturer; this implementer-focused support was a co-intervention rather than merely a revision of lesson content. Cycle 2 also introduced the author-developed CLIMB sequence: combining culture and language learning, linking culture and intercultural communication, increasing tolerance for strangeness and differences, maintaining cultural identity, and broadening critical consciousness. Indonesian and Malaysian cultural materials, including Barongan and Reyog dance, were used, and Timor-Leste students joined a designated interaction to provide more authentic intercultural communication. These changes were deliberately bundled because Cycle 1 reflection indicated that clearer pedagogical structure, lecturer facilitation, and authentic interaction were simultaneously needed. Consequently, Cycle 1/Cycle 2 differences are interpreted as changes associated with the revised Cycle 2 instructional package, not as effects attributable to CLIMB alone.

Data were collected through classroom observation checklists with free-text notes, a student-response questionnaire, interview-guided lecturer reflection, learning documentation, and an ICC assessment. The observation checklist recorded procedural enactment of the instructional model and allowed contextual notes on implementation difficulties. The 15-item student-response questionnaire contained three items each for syntax, social system, principle of reaction, support system, and effects of the model, using a four-point scale from 1 to 4. Content validity had been examined by three expert judges using Aiken's V. The archived instrument-development record reported Cronbach's $\alpha = .979$; this value pertains to instrument development and is not interpreted as a reliability estimate for the present 24-student administrations, for which a new internal-consistency coefficient was not documented in the original classroom study. The ICC measure was a 20-item self-report Assessment of Intercultural Competence (AIC) adapted from Zhou (2011), comprising five knowledge items, four attitude items, seven skills items, and four awareness items on a five-point favorable scale (1 = very poor to 5 = excellent). Reanalysis of the 24 student administrations yielded $\alpha = .860$ before and $\alpha = .895$ after the intervention. Because AIC is a self-report measure, it indexes students' perceived ICC rather than independently observed workplace behavior and was interpreted alongside observation, reflection, and documentation.

Data Analysis Techniques

Qualitative evidence from observation, interview-guided reflection, and documentation was analyzed through data condensation, data display, and conclusion drawing (Bahfiarti, 2020; Jafarian, 2024). Data condensation selected material related to classroom implementation, student participation, lecturer guidance, and instructional revision; data display organized evidence by action-research cycle; and conclusion drawing identified implementation patterns and points of convergence or divergence with student responses and ICC outcomes. For transparency, the Results report brief excerpts from the archived observer and reflection records and distinguish those source records from later interpretation. No student dialogue was reconstructed when verbatim dialogue was not preserved in the archive.

Respondent-level ordinal composite scores were reanalyzed from the archived raw data and summarized with medians (Mdn) and interquartile ranges, reported as Q1-Q3. Student-response categories retained the four-point scoring convention adapted from Fahmi et al. (2022): $3.25 < X \leq 4.00$ = good, $2.50 < X \leq 3.25$ = enough, $1.75 < X \leq 2.50$ = fair, and $X \leq 1.75$ = poor. AIC categories

retained the five-point protocol used in the source study: $X > 4.08$ = excellent, $3.36 < X \leq 4.08$ = good, $2.64 < X \leq 3.36$ = fair, $1.92 < X \leq 2.64$ = poor, and $X \leq 1.92$ = very poor. These labels were descriptive only. Because the same 24 students contributed paired ordinal observations, Cycle 1/Cycle 2 and pre/post differences were tested with two-sided Wilcoxon signed-rank tests using exact probabilities from the non-zero paired differences. In APA style, all probabilities below .001 are reported as $p < .001$. Normal-approximation Z values are reported only to calculate the conventional standardized effect size $r = |Z|/\sqrt{N}$, with $N = 24$; exact probabilities, rather than Z-based approximations, were used for significance decisions. Qualitative evidence was triangulated with these quantitative results.

Ethical Considerations

The study was conducted in accordance with applicable institutional research ethics requirements. Ethical approval for the research was obtained from the relevant institutional authority before data collection. All participants were informed about the purpose and procedures of the study, the voluntary nature of participation, the confidentiality of their responses, and the use of the data solely for research purposes, and informed consent was obtained prior to participation. Student data were coded and reported in aggregate form without personally identifying information. Supporting ethical-approval documentation and informed-consent records are available and can be provided to the Editor or journal upon request.

3. RESULTS

The results are organized directly by the three research questions: implementation and refinement of the model (RQ1), students' responses to the instructional model (RQ2), and whether and how students' perceived ICC changed across the intervention (RQ3). Qualitative implementation evidence is presented alongside the paired ordinal summaries so that procedural enactment, learner experience, and perceived ICC outcomes remain analytically distinct.

3.1. Implementation and Refinement Across Two Cycles (RQ1)

In Cycle 1, the lecturer implemented the ICC-based instructional model through opening, main activity, and closing stages. The opening stage introduced intercultural-based English learning objectives and activated students' prior knowledge through brainstorming. In the main activity, students reviewed texts, images, and videos, then participated in individual analysis, group discussion, and comprehension tasks. The closing stage invited students to reflect on their learning experiences and develop solutions collaboratively. Observation showed that the lecturer enacted the model appropriately, while student feedback highlighted opportunities for clearer scaffolding that connected cultural topics with Aviation English communication.

Table 1. Lecturer Enactment of the Instructional Model in Cycle 1

No.	Cycle 1 Stage and Activity	Description of Lecturer Enactment	Procedural Evaluation
1.	Opening - Orientation	Delivering the objectives of intercultural-based English learning.	Appropriate
2.	Opening - Brainstorming	Providing information, motivation, identification, classification, verification, and conclusion related to learning materials.	Appropriate
3.	Main Activity - Individual Activity	Reviewing learning materials in the form of texts and videos provided by the lecturer.	Appropriate

No.	Cycle 1 Stage and Activity	Description of Lecturer Enactment	Procedural Evaluation
4.	Main Activity - Group Discussion	Conducting each stage of intercultural learning in groups.	Appropriate
5.	Main Activity - Comprehension Questions	Conducting each stage of intercultural learning through group-based comprehension tasks.	Appropriate
6.	Closing - Group Discussion	Discussing learning experiences and developing solutions collaboratively.	Appropriate
7.	Closing - Confirmation	Joining classroom discussion to develop solutions related to the learning process.	Appropriate

Archived Cycle 1 reflective records add qualitative depth to the binary checklist. The record noted that "common perceptions about the concept of ICC-based English learning objectives and ICC-based English learning steps were still required" and reported that the subsequent cycle needed clearer learning steps, better sequencing of materials, more explicit classroom instructions, more purposeful use of media and facilities, and more engaging assignments. In the reflection record, the English lecturers also stated that "learning by doing would assist them in putting theoretical ideas into practice" and that students should be given opportunities to practice the language they had learned for intercultural communication in real-life situations. These qualitative records clarify why a procedural judgment of "Appropriate" could coexist with lower student ratings of syntax and support: the observer checklist captured whether planned stages occurred, whereas the student questionnaire captured learners' experience of clarity, cognitive effort, accessibility, and classroom support. Together, the evidence sources guided clearer sequencing and stronger support in Cycle 2.

The reflection stage of Cycle 1 established shared priorities for strengthening ICC-based English objectives and learning steps. These priorities included clearer sequencing of learning materials, more explicit classroom instruction, purposeful use of learning media, more engaging assignments, and direct opportunities for students to practice English for intercultural communication. These priorities informed the instructional refinements implemented in Cycle 2.

In Cycle 2, the model was revised and implemented in the same classroom as a bundled instructional package. The lecturer used the CLIMB sequence to make the procedure more coherent, following the short training and mentoring described in Methods. Materials focused on similarities and differences between Indonesian and Malaysian cultures through texts, videos, cultural comparison, and group discussion. Timor-Leste students also joined the designated interaction, providing a more authentic intercultural communication context. The archived Cycle 2 observation checklist recorded enactment of the planned activities without additional corrective notes, while the reflective summary described students as "actively and happily involved" because the materials were considered appropriate and meaningful for their needs. This phrase comes from the archived reflective summary; no verbatim student dialogue was reconstructed beyond the preserved evidence.

Table 2. CLIMB Sequence Used in Cycle 2

CLIMB Element	Instructional Meaning	Classroom Application in Cycle 2
Combining culture and language learning	Culture and English were introduced through an integrated learning sequence.	Students read texts and watched videos while identifying cultural terms, expressions, and meanings.

CLIMB Element	Instructional Meaning	Classroom Application in Cycle 2
Linking culture and intercultural communication	Students connected cultural practices with how people communicate.	Students compared Indonesian and Malaysian cultural expressions and discussed possible misunderstandings.
Increasing tolerance for difference	Students were guided to accept unfamiliarity and otherness.	Students reflected on how they would feel and act when becoming part of another cultural community.
Maintaining cultural identity	Students compared their own background cultures with introduced cultures.	Students listed similarities and differences and discussed why communities preserve cultural identity.
Broadening critical consciousness	Students learned that cultural meanings are diverse and socially constructed.	Students discussed cultural values as context-sensitive perspectives and related this awareness to English communication.

Table 2 shows that the CLIMB sequence translated ICC theory into observable classroom procedures. The sequence made Cycle 2 more structured because each step connected cultural input with language practice, student reflection, and Aviation English communication. The theoretical alignment is explicit: Combining culture and language learning corresponds primarily to Byram's *savoirs* (knowledge); Linking culture and intercultural communication corresponds to *savoir comprendre* (interpreting and relating); Increasing tolerance for difference corresponds to *savoir etre* (attitudes, openness, and curiosity); and Maintaining cultural identity together with Broadening critical consciousness corresponds most directly to *savoir s'engager* (critical cultural awareness). Across the sequence, interactive tasks also engage *savoir apprendre/faire* (discovery and interaction). In Deardorff's process framework, these elements move from requisite attitudes and knowledge/skills toward internal adaptability and externally observable intercultural communication behavior (Byram, 1997; Deardorff, 2006).

Table 3. Classroom Action Research Implementation Across Two Cycles

Cycle	Planning	Acting	Observing	Reflecting/Improvement
Cycle 1	Negotiated collaboration among researcher, lecturers, students, and management to discuss the model and feasibility.	Three-stage intercultural learning using Indonesian, Chinese, and Thai cultural materials; students analyzed texts/images and discussed cultural identity.	Lecturer enactment was appropriate, and student feedback identified priorities for clearer instructions and a stronger connection between culture and Aviation English.	Reflection established priorities for lecturer training, clearer learning sequence, purposeful media use, and more engaging tasks.
Cycle 2	Post-training collaboration after lecturer mentoring; agreement on learning objectives and feasibility indicators; Timor-Leste students invited for authentic interaction.	Bundled Cycle 2 package: revised CLIMB sequence, Indonesian-Malaysian cultural comparison, group-based tasks, and authentic intercultural interaction.	Implementation became more organized and participatory; the observer checklist recorded planned enactment without additional corrective notes.	Reflection supported the revised package as feasible and meaningful, but the contributions of CLIMB, lecturer mentoring, and guest interaction cannot be isolated.

3.2. Student Responses to the Instructional Model (RQ2)

Students' ordinal responses improved from Cycle 1 to Cycle 2 across all five instructional components. In Cycle 1, the median for syntax was 2.33 (Q1-Q3 = 2.33-2.67) and the median for the support system was 2.33 (2.33-2.67), both in the fair category. Social system and principle of reaction were in the enough category, while effects of the model was already good. This pattern identifies the main Cycle 1 friction points as instructional sequencing and supporting conditions rather than a failure to enact the planned lesson stages.

After the Cycle 2 revisions, all five component medians were in the good category: syntax Mdn = 3.33 (Q1-Q3 = 3.00-3.33), social system Mdn = 3.67 (3.33-3.67), principle of reaction Mdn = 3.67 (3.67-3.67), support system Mdn = 3.67 (3.33-3.67), and effects of the model Mdn = 3.67 (3.59-4.00). Paired Wilcoxon tests indicated positive Cycle 2 shifts for every component (all $p < .001$) with large standardized effects ($r = .75-.88$). These results answer RQ2 by showing that learners evaluated the revised Cycle 2 instructional package more positively across sequence, interaction, lecturer response, support, and perceived effects.

Table 4. Students' Responses to the ICC-Based Instructional Model

Instructional Component	Cycle 1 Mdn [Q1-Q3]	Cycle 1 Category	Cycle 2 Mdn [Q1-Q3]	Cycle 2 Category	Interpretation
Syntax	2.33 [2.33-2.67]	Fair	3.33 [3.00-3.33]	Good	The sequence of learning activities became clearer after revision.
Social system	2.67 [2.33-2.67]	Enough	3.67 [3.33-3.67]	Good	Lecturer-student and student-student interaction improved.
Principle of reaction	2.67 [2.59-3.00]	Enough	3.67 [3.67-3.67]	Good	Lecturer responses and guidance became more supportive.
Support system	2.33 [2.33-2.67]	Fair	3.67 [3.33-3.67]	Good	Materials, media, and classroom support were strengthened.
Effects of the model	3.33 [3.00-3.33]	Good	3.67 [3.59-4.00]	Good	Students perceived stronger learning benefits after revision.

Paired Wilcoxon signed-rank results for Table 4 were: syntax, $Z = -4.31$, exact $p < .001$, $r = .88$; social system, $Z = -4.32$, exact $p < .001$, $r = .88$; principle of reaction, $Z = -4.13$, exact $p < .001$, $r = .84$; support system, $Z = -4.23$, exact $p < .001$, $r = .86$; and effects of the model, $Z = -3.67$, exact $p < .001$, $r = .75$. All non-zero paired changes were in the positive direction.

3.3. Perceived ICC Change (RQ3)

The AIC self-report assessment was administered before and after the intervention. At baseline, the medians were knowledge 2.80 (Q1-Q3 = 2.35-2.85), attitude 3.25 (3.00-3.50), skills 2.71 (2.39-3.04), and awareness 3.13 (2.75-3.50); using the retained descriptive cut-offs, all four median scores were in the fair category. These baseline distributions provide the paired reference for RQ3 and differ slightly from classifications based on arithmetic means because the present revision follows the reviewer's request to summarize ordinal composites with medians and interquartile ranges.

After the intervention, all four perceived ICC dimensions had medians in the good category: knowledge 3.90 (Q1-Q3 = 3.75-4.05), attitude 4.00 (3.75-4.06), skills 4.00 (3.86-4.29), and awareness 4.00 (3.69-4.25). The median of the individual paired changes was +1.29 for skills, +1.20 for knowledge, +1.00 for awareness, and +0.75 for attitude. Thus, the largest paired median gains occurred in skills and knowledge, while attitude and awareness also improved but showed smaller shifts. This differentiated pattern is consistent with short-cycle instruction more rapidly influencing reported knowledge and interactional strategies than deeper affective orientation and cultural self-awareness, although the self-report design does not establish objective behavioral change.

Table 5. Students' ICC Competence Before and After the Implementation

ICC Dimension	Before Mdn [Q1-Q3]	Before Category	After Mdn [Q1-Q3]	After Category	Paired Mdn Change
Knowledge	2.80 [2.35-2.85]	Fair	3.90 [3.75-4.05]	Good	+1.20
Attitude	3.25 [3.00-3.50]	Fair	4.00 [3.75-4.06]	Good	+0.75
Skills	2.71 [2.39-3.04]	Fair	4.00 [3.86-4.29]	Good	+1.29
Awareness	3.13 [2.75-3.50]	Fair	4.00 [3.69-4.25]	Good	+1.00

Paired Wilcoxon signed-rank results for Table 5 were: knowledge, $Z = -4.29$, exact $p < .001$, $r = .88$; attitude, $Z = -4.31$, exact $p < .001$, $r = .88$; skills, $Z = -4.30$, exact $p < .001$, $r = .88$; and awareness, $Z = -4.22$, exact $p < .001$, $r = .86$. Each dimension therefore showed a statistically significant positive within-sample shift in perceived ICC with a large standardized effect.

Taken together, the three result strands show (RQ1) a shift from procedurally complete but under-scaffolded Cycle 1 instruction to a more structured Cycle 2 package; (RQ2) more favorable student responses across all five instructional-model components; and (RQ3) positive paired shifts across all four dimensions of perceived ICC. These findings are internally coherent across observation, reflective notes, questionnaires, and the AIC, while the design does not separate the contributions of CLIMB, lecturer mentoring, and authentic guest interaction.

4. DISCUSSION

RQ1 concerned how the ICC-based model was implemented and refined. Cycle 1 demonstrated that procedural fidelity alone was not sufficient: the lecturer enacted the planned stages, yet observer notes and student responses identified uncertainty about objectives, sequence, and support. The Cycle 2 package responded directly to those problems through clearer CLIMB sequencing, lecturer mentoring, richer media, and authentic intercultural interaction. This iterative pattern is consistent with classroom action research, in which evidence from one cycle becomes the basis for the next pedagogical decision (Tavakoli & Kavoshian, 2024). It also supports ICC pedagogy that moves learners from cultural exposure to guided interpretation, reflection, and communication practice (Hicham et al., 2025; Lee et al., 2023; Zhou et al., 2024).

RQ2 focused on students' responses to the instructional model. The strongest practical contrast was visible in syntax and support: both had Cycle 1 medians of 2.33 (fair) and rose to 3.33 and 3.67, respectively (good), while social system, principle of reaction, and effects of the model also shifted positively. The apparent divergence between the observer's "Appropriate" enactment judgments and the lower Cycle 1 learner ratings is therefore informative rather than contradictory. Observer ratings indexed whether planned actions occurred; students evaluated how intelligible, manageable,

interactive, and well-supported those actions felt. Combining implementation fidelity with learner experience produced a more diagnostic basis for revision than either source alone.

The positive changes in social system and principle of reaction further indicate that ICC learning is interaction-dependent. Learners need opportunities to compare perspectives, negotiate meaning, and reflect on unfamiliarity within a supported environment. The Timor-Leste guest interaction increased the ecological authenticity of Cycle 2, but it also introduced a concurrent source of change. The more favorable Cycle 2 responses may therefore reflect the combined influence of structured CLIMB tasks, improved lecturer facilitation, and the novelty and authenticity of real intercultural contact. In a CAR design this bundling was pedagogically justified by the Cycle 1 reflection, but it prevents attributing the observed gains to CLIMB alone.

RQ3 asked whether and how students' perceived ICC changed. All four AIC dimensions shifted positively (all $p < .001$; $r = .86-.88$), but the paired median gains were differentiated: skills (+1.29) and knowledge (+1.20) exceeded awareness (+1.00) and attitude (+0.75). This pattern is compatible with Deardorff's developmental view and Byram's multidimensional framework because explicit tasks can make cultural knowledge and interactional strategies immediately available for reflection and self-report, whereas attitudes and critical self-awareness may require repeated encounters and longer-term identity work (Byram, 1997; Deardorff, 2006). The interpretation must nevertheless remain at the level of perceived ICC: the AIC does not demonstrate that students would display equivalent behavioral competence in a live maintenance workplace.

For Aviation English pedagogy, these findings connect technical clarity with human-factors communication. ASD-STE100 STE reduces avoidable ambiguity in technical documentation by controlling vocabulary, approved meanings, and parts of speech (ASD, 2025), while Maintenance Human Factors guidance emphasizes communication, teamwork, assertiveness, and safety culture (FAA, 2017). ICC addresses the interpersonal layer that remains when personnel must clarify a handover, query an ambiguous instruction, accommodate different communication styles, confirm shared understanding, or speak up across status and cultural boundaries. Thus, controlled technical English and ICC are complementary rather than competing safety defenses.

This relationship can be made more explicit through the aviation-maintenance "Dirty Dozen" framework. FAA identifies lack of communication, lack of teamwork, lack of assertiveness, lack of awareness, and norms among the common human-factor precursors to maintenance error (FAA, 2023). The ICC constructs examined here map conceptually, not causally, onto several of these risks: *savoir comprendre* and *savoir apprendre/faire* support clarification and negotiated meaning when communication is unclear; *savoir etre* supports openness in teamwork; and *savoir s'engager* can support questioning unsafe norms and speaking up across hierarchy, directly relevant to lack of assertiveness and norms. The present classroom data do not demonstrate reduced maintenance error, but they identify communication capacities that are relevant to these established human-factors defenses.

The study also contributes to ESP by showing that specialized English instruction can integrate lexical, grammatical, cultural, and reflective dimensions. In aviation, communication is situated within safety-oriented teamwork, institutional procedures, and multicultural collaboration. Therefore, an ESP course for aviation students should help learners use English to interpret, ask, clarify, compare, and negotiate meaning in professional contexts.

Practically, Aviation English lecturers can use the CLIMB sequence to structure intercultural tasks. The sequence begins with combining culture and language learning, continues with linking culture to communication, encourages tolerance toward unfamiliarity and difference, supports students in maintaining cultural identity, and ends with broadening critical consciousness. This structure helps lecturers present culture through nuanced, context-sensitive perspectives and encourages students to connect cultural understanding with professional communication behavior.

Lecturer readiness is also part of the interpretation. Cycle 1 showed that the instructor needed a stronger shared understanding of ICCIM objectives and learning steps, and the short training and mentoring before Cycle 2 supported more coherent facilitation. Because this mentoring occurred concurrently with CLIMB redesign and guest interaction, it should be treated as a co-intervention rather than background support. Practically, institutions considering ICC integration should combine syllabus/material revision with lecturer preparation for facilitating intercultural discussion, managing diverse classrooms, and connecting cultural content with maintenance-specific English objectives.

Another important point is the relationship between Aviation English and professional identity. Aircraft maintenance students are future users of technical manuals and future members of aviation teams whose work depends on coordination, precision, and responsibility. When students discuss cultural identity, unfamiliarity, and critical awareness, they begin to see English as a tool for professional participation and workplace learning. This orientation is relevant to vocational education because graduates are expected to transfer classroom learning into workplace practice.

The use of cultural materials from Indonesia, China, Thailand, Malaysia, and Timor Leste also shows that intercultural Aviation English can adopt a multilingual regional orientation. An Aviation English as a lingua franca (AELF) perspective foregrounds interaction among professionals with different first languages and multiple cultural norms. In global and regional MRO environments, English frequently mediates collaboration across this linguistic diversity. Accordingly, the primary ICC objective is mutual intelligibility, pragmatic clarity, interactional accommodation, and the ability to negotiate meaning across linguistic and cultural differences (Boonsuk, 2026). This orientation is especially relevant to Southeast Asian aviation, where multilingual cross-border cooperation is routine and professional safety depends on shared understanding.

The classroom evidence also suggests that the transition from cultural exposure to intercultural competence benefits from careful mediation. In Cycle 1, recognition of cultural objects and practices served as a useful starting point. Guided questions then moved students toward interpreting why cultural practices matter, how communication styles vary, and how meaning emerges from different cultural assumptions. This mediating role is central to language teaching because students learn to use English to explain, compare, and negotiate meanings.

The maintenance context strengthens the relevance of this approach. Aircraft maintenance communication frequently involves written documents, task instructions, warnings, operational limits, and coordination across personnel. The precision required in maintenance work places strong emphasis on clear interpretation and clarification. When students discuss lexical ambiguity and cultural interpretation in the same course, they become more aware that communication accuracy integrates grammatical precision with contextual interpretation, clarification of intention, and confirmation of shared understanding.

The data from the two cycles also show that instructional media should be carefully selected. Images, texts, and videos were useful because they made cultural content visible and discussable. Visual materials function most effectively as prompts for questions that lead students to analyze perspectives, compare meanings, and connect cultural content with Aviation English tasks. In this study, the movement from visual prompts to discussion and reflection helped students build a more active intercultural learning experience.

The model may also be adapted into syllabus design. A syllabus for Aviation English can place technical reading, terminology, intercultural comparison, and scenario-based communication in one sequence. For example, after reading a maintenance-related text, students can identify possible sources of ambiguity, discuss how different personnel might interpret the instruction, practice clarification strategies, and reflect on how communication style may affect teamwork. Such sequencing embeds ICC as a regular component of Aviation English learning.

For classroom management, the findings highlight the value of group discussion. Group tasks allowed students to articulate their own cultural backgrounds and listen to others. This is important because students in aviation vocational education may come from different local languages and cultural communities. By using English to share and compare perspectives, they practiced both language production and intercultural negotiation. The improvement in the social system score from Cycle 1 to Cycle 2 indicates that this interaction became more productive after the lecturer strengthened guidance.

Institutionally, Aviation English programs for aircraft maintenance can be aligned with complementary safety references. ICAO Document 9835 provides a safety-oriented language-proficiency framework primarily for pilot-controller communication (ICAO, 2010); ASD-STE100 addresses controlled technical documentation (ASD, 2025); and maintenance human-factors guidance addresses communication, teamwork, assertiveness, awareness, and safety culture directly (FAA, 2017, 2023). An ICC-oriented maintenance English syllabus can therefore position technical reading, controlled-language awareness, clarification strategies, intercultural negotiation, and speak-up behaviors within authentic scenarios such as defect reporting, shift handovers, troubleshooting, and audit responses.

The findings are also useful for lecturer professional development. Lecturers benefit from support in designing questions, facilitating culturally responsive discussions, selecting context-sensitive materials, and assessing ICC without reducing culture to fixed national stereotypes. The Cycle 2 experience suggests that professional development should precede or accompany implementation; however, because mentoring was part of the bundled Cycle 2 package, the present study cannot quantify how much of the improvement was attributable specifically to lecturer development.

Overall, the study is best interpreted as context-specific evidence that Aviation English can integrate technical meaning, communicative behavior, cultural sensitivity, and reflective awareness within vocational preparation. For aircraft maintenance students, the practical value lies in learning not only what English technical information means, but also how to clarify, compare, negotiate, and challenge unsafe assumptions in multilingual teamwork. The CLIMB sequence offers one organizing device for that integration, while the results support the revised instructional package as a whole rather than establishing CLIMB as an isolated causal mechanism.

Several limitations qualify these conclusions. First, both the student-response questionnaire and AIC rely on self-report; the AIC therefore captures perceived capability rather than objectively observed behavioral competence and may be influenced by social-desirability bias, intervention awareness, or Hawthorne-type effects. Second, the single-group pre/post design provides no counterfactual, so maturation, repeated testing, novelty, and other time-varying influences cannot be separated from the intervention. Third, Cycle 2 deliberately bundled CLIMB redesign, lecturer mentoring, richer facilitation, and Timor-Leste guest interaction, making component-specific attribution impossible. Fourth, the questionnaire alpha = .979 belongs to instrument development, and current-sample internal consistency for that 15-item measure was not documented in the original classroom study. Fifth, the observer checklist was primarily procedural and the archive preserved limited verbatim student dialogue; archived observer and reflective records deepen triangulation but do not substitute for a fuller qualitative corpus. Finally, the study involved only 24 students and two lecturers at one institution, lacked complete lecturer/guest-interactant profile data, and used an immediate post-intervention assessment without delayed retention or workplace transfer measures. Future studies should use multicenter or comparison-group designs, delayed follow-up, performance-based intercultural scenarios, independent behavioral ratings, and authentic MRO communication tasks to test retention, transfer, and safety-relevant behavior.

5. CONCLUSION

This study examined how an ICC-based Aviation English instructional model was implemented and refined for aircraft maintenance students, how students responded to the instructional process, and whether and how perceived ICC changed. Cycle 1 was procedurally enacted but exposed weaknesses in clarity, sequencing, lecturer guidance, and classroom support. Cycle 2 addressed those needs through a bundled package of the CLIMB sequence, lecturer mentoring, improved facilitation and media, and authentic interaction with Timor-Leste students. Student-response medians moved into the good category across all five instructional components, with significant positive paired changes in every component (all $p < .001$; $r = .75-.88$).

Perceived ICC also shifted positively across knowledge, attitude, skills, and awareness (all $p < .001$; $r = .86-.88$). The paired median gains were largest for skills (+1.29) and knowledge (+1.20), followed by awareness (+1.00) and attitude (+0.75), indicating a differentiated rather than uniform pattern of change. These results support the feasibility of connecting language work with cultural comparison, guided reflection, clarification, and professional communication practice. They do not, however, establish objective workplace behavior or an isolated causal effect of CLIMB because the AIC was self-reported, there was no control group, and multiple Cycle 2 changes occurred together.

For practice, Aviation English programs for aircraft maintenance can integrate ICC with technical-language controls and maintenance human-factors communication, including clarification, assertiveness, teamwork, and critical examination of unsafe norms. For research, the next step is validation across larger and multiple-site samples using comparison groups, delayed follow-up, and performance-based assessment in authentic or simulated MRO tasks. Such designs would determine whether the classroom gains observed here are retained, transfer to behavioral competence, and contribute to safer multilingual maintenance communication.

6. REFERENCES

- Abu Talib, M., Nasir, Q., Dakalbab, F., & Saud, H. (2025). Future aviation jobs: The role of technology in shaping skills and competencies. *Journal of Open Innovation: Technology, Market, and Complexity*, 11(2), 100517. <https://doi.org/10.1016/j.joitmc.2025.100517>
- Aerospace, Security and Defence Industries Association of Europe. (2025). ASD-STE100 Simplified Technical English: Standard for technical documentation (Issue 9). https://www.asd-ste100.org/assets/files/ASD-STE100_ISSUE9.pdf
- Bahfiarti, T. (2020). A case study of psychosocial challenges in the implementation of Family Planning health in the patriarchal society of West Sulawesi. *Enfermería Clínica*, 30, 267–271. <https://doi.org/10.1016/j.enfcli.2019.07.101>
- Boonsuk, Y. (2026). When EFL meets ELF: negotiating intelligibility and intercultural communication in ASEAN EMI classrooms. *Language Awareness*, 1–31. <https://doi.org/10.1080/09658416.2026.2626503>
- Byram, M. (1997). Teaching and assessing intercultural communicative competence. *Multilingual Matters*.
- Café, E., Fageda, X., Fioravanti, R., & Gomes, V. (2026). Evaluating the effects of liberalization and modernization policies on aviation in small island developing states. *Transportation Research Part A: Policy and Practice*, 204, 104812. <https://doi.org/10.1016/j.tra.2025.104812>
- Cahyadi, C. I., Oka, I. G. A. A. M., & Masito, F. (2022). The Importance of Aviation Vocational Education in Indonesia. *AL-ISHLAH: Jurnal Pendidikan*, 14(2), 1869–1878. <https://doi.org/10.35445/alishlah.v14i2.1257>
- Chui, R., & Mohanmmmed, L. A. (2024). A Advancing Higher Vocational English Reading Instruction: The Development Protocol of the Intercultural Awareness Experiential Teaching (IAET) Model. *Journal of Intercultural Communication*, 189–202. <https://doi.org/10.36923/jicc.v24i1.546>
- 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>
- Demirdöken, G., & Atay, D. (2024). Enhancing aviation English competency: A simulation-based approach for aspiring pilots. *English for Specific Purposes*, 76, 106–121. <https://doi.org/10.1016/j.esp.2024.08.001>
- Embryany, F., & Ratmanida. (2020). A Need Analysis of English Learning for the Aircraft Maintenance Students. *Proceedings of the 1st International Conference on Lifelong Learning and Education for Sustainability (ICLLES 2019)*. <https://doi.org/10.2991/assehr.k.200217.008>
- Ertay, Z., & Gilanlioglu, I. (2024). The Development and Validation of an Intercultural Communicative Competence Scale for Students. *Sage Open*, 14(2). <https://doi.org/10.1177/21582440241252495>
- Fahmi, F., Chalisah, N., Istyadi, M., Irhasyuarna, Y., & Kusasi, M. (2022). Scientific literacy on the topic of light and optical instruments in the innovation of science teaching materials. *Jurnal Inovasi Pendidikan IPA*, 8(2), 154–163. <https://doi.org/10.21831/jipi.v8i2.41343>
- Federal Aviation Administration. (2017). Maintenance human factors training (Advisory Circular No. 120-72A). U.S. Department of Transportation. https://www.faa.gov/documentlibrary/media/advisory_circular/ac_120-72a.pdf
- Federal Aviation Administration. (2023, June 5). Human factors in aviation maintenance. https://www.faa.gov/about/initiatives/maintenance_hf
- Feng, M., Abdul Aziz, M. N. Bin, & Dalib, S. (2024). Exploring the Relationship Between Language competence and Intercultural Communicative Competence Among English as a Foreign language Learners: A Mixed-Methods Study. *International Journal of Educational Methodology*, 10(4), 671–684. <https://doi.org/10.12973/ijem.10.4.671>
- Fu, X., & Oum, T. H. (2014). Air Transport Liberalization and its Effects on Airline Competition and

- Traffic Growth – An Overview. In *The Economics of International Airline Transport* (pp. 11–44). Emerald Group Publishing Limited. <https://doi.org/10.1108/S2212-160920140000004000>
- Heggernes, S. L. (2021). A critical review of the role of texts in fostering Intercultural Communicative competence in the English Language classroom. *Educational Research Review*, 33, 100390. <https://doi.org/10.1016/j.edurev.2021.100390>
- Hendra, O., Kurnianto, B., & Endrawijaya, I. (2024). Collaborative governance for aviation approved training organisation: an adapted model for multi-stakeholder collaboration. *Higher Education, Skills and Work-Based Learning*, 14(2), 418–434. <https://doi.org/10.1108/HESWBL-06-2023-0164>
- Hicham, K., AlQbailat, N. M., Ismail, I. A., Qpilat, N. M., Al-Khawaldeh, N. N., Al-Shboul, O. K., & Masrar, F. Z. (2025). Interculturalizing ELT: Culture-based classes to enhance language skills and intercultural communicative competence dimensions. *Ampersand*, 14, 100221. <https://doi.org/10.1016/j.amper.2025.100221>
- Hirsh, M. (2022). The development of Southeast Asia's low-cost aviation industry. In *Low-Cost Aviation* (pp. 71–82). Elsevier. <https://doi.org/10.1016/B978-0-12-820131-2.00015-1>
- Indriani, M. (2021). AVIATION DIPLOMACY IN SOUTHEAST ASIA. *Journal of Social Political Sciences*, 2(4), 369–380. <https://doi.org/10.52166/jsps.v2i4.78>
- International Civil Aviation Organization. (2010). Manual on the implementation of ICAO language proficiency requirements (Doc 9835, 2nd ed.). ICAO.
- Jafarian, S. (2024). The Value of Qualitative Research in Diversity, Equity, and Inclusion. *Veterinary Clinics of North America: Small Animal Practice*, 54(5), 797–811. <https://doi.org/10.1016/j.cvsm.2024.06.004>
- Johnson, K., Morais, C., & Patelli, E. (2025). Enhancing procedure quality: Advanced language tools for identifying ambiguity and high-potential violation triggers. *Reliability Engineering & System Safety*, 264, 111308. <https://doi.org/10.1016/j.res.2025.111308>
- Katsarska, V. (2024). SYNERGY OF COMPETENCES IN AERONAUTICAL ENGLISH EDUCATION. *ENVIRONMENT. TECHNOLOGY. RESOURCES. Proceedings of the International Scientific and Practical Conference*, 2, 399–404. <https://doi.org/10.17770/etr2024vol2.8098>
- Korba, P., Sekelová, I., Mikula, B., & Koščáková, M. (2023). Needs Analysis of Aircraft Mechanics' English Language Skills. *Aerospace*, 10(2), 189. <https://doi.org/10.3390/aerospace10020189>
- Lee, T.-Y., Ho, Y.-C., & Chen, C.-H. (2023). Integrating intercultural communicative competence into an online EFL classroom: an empirical study of a secondary school in Thailand. *Asian-Pacific Journal of Second and Foreign Language Education*, 8(1), 4. <https://doi.org/10.1186/s40862-022-00174-1>
- MAHMOOD, A. S., Mat Saad, N. S., & Mohd Nur, N. (2025). Taking Flight with Aviation English: How are Malaysian Teachers Preparing the Next Generation? *F1000Research*, 14, 1036. <https://doi.org/10.12688/f1000research.169220.1>
- Mushaathoni, M. (2024). Workers' Perceptions Regarding Approaches To Intercultural Communication In The Workplace: A Study In A South African University. *Journal of Intercultural Communication*, 174–188. <https://doi.org/10.36923/jicc.v24i1.325>
- Nawata, Y. (2026). Validating a Japanese aviation English listening test: effects of pilot training experience and general English listening proficiency. *Language Testing in Asia*, 16(1), 16. <https://doi.org/10.1186/s40468-026-00425-9>
- Nguyen, H. T., Trinh, L. Q., & Vo, T. D. (2026). “Beyond professional competence”: Intercultural communicative competence development in an EMI medical program. *Learning and Instruction*, 104, 102355. <https://doi.org/10.1016/j.learninstruc.2026.102355>
- Pacheco, A., Garcia, A. C. de M., Monteiro, A. L. T., Prado, M. C. de A., & Tosqui-Lucks, P. (2023). Using corpus linguistics to create tasks for teaching and assessing Aeronautical English. *Applied Corpus Linguistics*, 3(3), 100075. <https://doi.org/10.1016/j.acorp.2023.100075>
- Pane, I. I. I., Mei, C. C. Y., T'chiang, D. C. U., Fibriasari, H., Sylvia, T., Naibaho, Y., & Sadri, I. (2025).

- Appropriating English proficiency test format: A case study of Indonesian Aviation School* (Vol. 2024, Issue Ijcah 2024). Atlantis Press SARL. https://doi.org/10.2991/978-2-38476-317-7_216
- Rahmati, M., & Izadpanah, S. (2021). A study of the proficiency and performance of Iranian Air Traffic Controllers: attitude, work experience and specific aviation English courses. *Asian-Pacific Journal of Second and Foreign Language Education*, 6(1), 2. <https://doi.org/10.1186/s40862-020-00105-y>
- Shadiev, R., & Sintawati, W. (2020). A review of research on intercultural learning supported by technology. *Educational Research Review*, 31, 100338. <https://doi.org/10.1016/j.edurev.2020.100338>
- Sheng, X. (2025). Foreign Language Education as a Strategic Enabler for Vocational Education Internationalization: Reconceptualizing Values and Innovating Pathways. *World Vocational and Technical Education*, 1(3), 349–365. <https://doi.org/10.1515/wvte-2025-0026>
- Tavakoli, M., & Kavoshian, S. (2024). Implementing action research to improve L2 classroom communication patterns: a grounded theory analysis approach. *Educational Action Research*, 32(5), 789–806. <https://doi.org/10.1080/09650792.2024.2324184>
- Terenzi, D. (2021). Overcoming Challenges in English for Aviation Maintenance: Technical Publications Selection for the Construction of a Corpus and Its Use to Teach Language Aspects Considering Learners Needs. *Open Journal of Applied Sciences*, 11(10), 1122–1134. <https://doi.org/10.4236/ojapps.2021.1110084>
- Wang, A. W., & Friginal, E. (2025). The case of English for aviation maintenance: A multi-dimensional analysis of commercial aircraft manuals. *English for Specific Purposes*, 79, 87–100. <https://doi.org/10.1016/j.esp.2025.04.004>
- Xu, H., Wang, Y., & Ma, J. (2025). A comprehensive review of intercultural communicative competence in EFL education and global business. *Cogent Education*, 12(1). <https://doi.org/10.1080/2331186X.2025.2557608>
- Yang, C., Fleischer, M., Yang, K., & Huang, Q. (2026). Intercultural competence in vocational education and training: a systematic scoping review and research agenda. *Frontiers in Education*, 11. <https://doi.org/10.3389/feduc.2026.1836757>
- Yu, C., & Binti Mat Said, S. (2025). Enhancing Aviation English Speaking Skills through Virtual Reality-Assisted Language Learning: Insights from Vocational College Teachers in China. *International Journal of Academic Research in Progressive Education and Development*, 14(2). <https://doi.org/10.6007/IJARPED/v14-i2/25359>
- Yuliyanto, A., Rahmah, C., & Kosasih, N. G. (2026). Assessing the performance of airports in Indonesia based on game cross-efficiency DEA model. *Research in Transportation Business & Management*, 64, 101555. <https://doi.org/10.1016/j.rtbm.2025.101555>
- Zhang, C. (2023). Addressing Cultural Differences: Effective Communication Techniques in Complex Organization. *Academic Journal of Management and Social Sciences*, 5(3), 30–33. <https://doi.org/10.54097/5txujkkq>
- Zhang, Q., Mohammad Ismail, M. I. R., & Zakaria, A. R. Bin. (2025). Enhancing intercultural competence in technical higher education through AI-driven frameworks. *Scientific Reports*, 15(1), 22019. <https://doi.org/10.1038/s41598-025-03303-1>
- Zhou, R., Samad, A., & Perinpasingam, T. (2024). A systematic review of cross-cultural communicative competence in EFL teaching: insights from China. *Humanities and Social Sciences Communications*, 11(1), 1750. <https://doi.org/10.1057/s41599-024-04071-5>
- Zhou, Y. (2011). A study of Chinese university EFL teachers and their intercultural competence teaching [Doctoral dissertation, University of Windsor]. Electronic Theses and Dissertations, 428.