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Intercultural Communication and Technology-Enhanced English Language Learning Amid Armed Conflict Perspectives from Learners and Instructors in Sudan

Khalid Othman
Department of English Language & Literature, College of languages and Humanities, Qassim University, Saudi Arabia

ABSTRACT
The purpose of this project is to investigate the incorporation of technology-enhanced English language learning (TELL) and intercultural communication (IC) into higher education within the context of conflict-affected Sudan. We investigate the ways in which WhatsApp, Zoom, and YouTube may facilitate cross-cultural communication in settings with limited resources. Two quantitative questionnaires were employed by the researchers in order to gather data for their study. One of the questionnaires was given to 273 students, while the other was given to 98 teachers. The results of descriptive and factor analyses suggest that educational communities increase the utilization of technology for the purpose of engagement and curricular alignment, while focused instructional assistance enhances perceptions. This research illustrates that perceptions may be improved with the use of particular teaching. Because students see real intercultural opportunities as having less relevance and because they have fewer options for professional growth in intercultural pragmatics, instructors have a more favorable assessment of the affordances that are associated with intercultural interactions. Learners are disproportionately affected by access barriers, and despite the assistance of the institution, neither group has assessment procedures. Interculturality must be visible, palpable, and relevant in the planning, facilitation, and evaluation of activities in order to guarantee that technology will make it easier for individuals to acquire the English language during interruptions. Based on the data, it seems that technology may have some positive effects. It was suggested that micro-learning in intercultural pragmatics, real external connections, delivery that focusses on resilience, and intercultural evaluation frameworks be implemented. Because of financial restrictions, education, educator training, and emergency readiness are all negatively impacted.

KEYWORDS
Intercultural communication; technology-enhanced language learning; English as a lingua franca; higher education; Sudan; armed conflict; WhatsApp; Zoom; generative AI; intercultural competence; assessment fairness

1. Introduction

1.1 Intercultural Communication and Language Education

In digitally interconnected and translocal contexts, English has emerged as a lingua franca which facilitates intercultural communication and the study and use of English (Baker, 2024; Jackson, 2023. Facilitating students' comprehension of identity, meaning, and social connections across diverse cultures is one of the main objectives of foreign language education, which extends beyond language acquisition. Intercultural communication competency (ICC) among learners entails the ability to communicate effectively across different cultures (Dervin & Xiaowen, 2024; Guillén Yparrea & Ramírez Montoya, 2023). ICC holds significant relevance for higher education graduates. The implementation is inconsistent due to curricular, pedagogical, and institutional constraints (Dauber & Spencer-Oatey, 2023; Vromans et al., 2023).

1.2. Technology Enhanced Language Learning (TELL) and ICC

MALL, LMS, low-bandwidth messaging platforms, and generative AI tools like ChatGPT have improved interaction and engagement. Individualized, multimodal communication help, student participation and instant feedback can be obtained by utilizing these technologies. Ethical use, teacher readiness, and equal access remain issues (Hasumi & Chiu, 2024; Koç & Savaş, 2025; Lee et al., 2025). WhatsApp, SMS, and Zoom's bandwidth-aware capabilities have enabled joint learning and inquiry in resource-limited settings (Annamalai et al., 2024; Jordan, 2023; Syairofi, 2023).

1.3. Sudanese Higher Education Intercultural Communication Competence and Digital Language Practices

In English language learning, technology and intercultural communication are well-suited in Sudanese higher education. Postgraduate EFL education is improved using Zoom, podcasts improve listening and vocabulary and YouTube improves speaking fluency , all of which increase intercultural interaction and meaning making, according to recent study. ICC is increasingly emphasized in Sudan's English curriculum, which digital mediation may enhance (Gubair, 2022; Mugaddam, 2025). These advancements encourage policy approaches to build scalable, context-sensitive EdTech ecosystems via infrastructure, partnerships, and teacher capacity (Chatila et al., 2023; UNESCO, 2025).

1.4. Mediated intercultural communication in English (1.4).

Intercultural language learning is dynamic, negotiated, and context-dependent (Baker, 2024; Jackson, 2023). Research by JIC has continually stressed this. Recent research link IC/ICC to digitally mediated interactions that include voice, video, text, emoticons, and shared artifacts. These studies also study discourse-level strategies where individuals collectively find common ground and confront power dynamics. Mendes de Oliveira (2024) and Xu et al. (2024) show how players use varied repertoires and interactional methods to establish intelligibility and rapport in playful, project-based, or game-like online activities. Digitally assisted higher education settings should prioritize actual activities above "knowledge about cultures" for ICC, including both local and remote learners (Guillén Yparrea & Ramírez Montoya, 2023; Vromans et al., 2023).

1.5. English learning using technology: pros and cons

1.5.1. Educational Perspectives on Computer-Assisted, Mobile-Assisted, and Technology-Enhanced Language Learning Synthesis

Intercultural communicative competence education results from CALL, MALL, and TELL syntheses vary. In low-connectivity situations, mobile and messaging technologies lower participation barriers and enable cross-time and space communication (Annamalai et al., 2024; Jordan, 2023). Second, social, cognitive, and instructional WhatsApp presence promotes peer conversation and intercultural sense-making in communities of inquiry (Annamalai et al., 2024; Syairofi, 2023). According to (Barrot, 2024; Godwin Jones, 2024; Li, 2024), ethically led and educator-designed generative AI and chatbot interfaces provide individualized feedback, model interactions, and mimic conversations, which may improve learner autonomy and interactional rehearsal. These technologies bring AI output bias and delusion, excessive scaffolding that may hamper learner agency, and variable teacher preparation for human AI cooperation. According to research, educational design and task structure are as important as technology.

1.5.2. Task-Level Impact Empirical Evidence

Technology-enhanced English language learning tools' task-level effect is illustrated by additional studied. It is proved that the improvement of fluency, pronunciation, and learner self-regulation in varied EFL situations appeared as a result of automated speech assessment, tailored feedback, and AI-assisted speaking practice. (Metruk, 2024; Qiao & Zhao, 2023; Zou et al.), Low-bandwidth videoconferencing, tailored movies, and collaborative reflection improve students' speech and interaction (Sunjayanto Masykuri, 2023). Iterative, reflexive, and socially integrated rehearsal of interactional competence is essential for intercultural communication competence (ICC).

1.6. Sudanese higher education as a case context for IC oriented TELL

Sudan serves as a relevant context for examining the perceptions of learners and instructors regarding the multicultural opportunities and limitations inherent in technology-mediated English instruction. Local techniques encompass the use of Zoom for postgraduate EFL seminars, digital audio/podcasting for vocabulary and listening enhancement, and YouTube for improving spoken fluency (Badawi, 2025; Eljack et al., 2023; Mohammed, 2024; Suleman & Alhameem, 2025). In addition to tool utilization, the Sudanese English curriculum indicates a deliberate focus on intercultural communicative competence (ICC), which could be enhanced through digitally mediated activities that prioritize meaning negotiation, audience awareness, and

pragmatic flexibility (Gubair, 2022; Mugaddam, 2025). Sudan's EdTech ecosystem policy analyses advocate for context-appropriate, scalable techniques and cross-sector cooperation to facilitate intentional pedagogical integration (Chatila et al., 2023; UNESCO, 2025).

1.7. Significance of the study

This study makes a significant contribution to the growing body of research on technology-enhanced language learning and intercultural communication in a number of different ways. The purpose of this study is to improve upon previous research by investigating the ways in which technology-mediated behaviours enable communication among persons from different cultures within a higher education setting that is influenced by conflict. This is a circumstance that has received very little academic attention. In order to give a full knowledge of the ways in which students and teachers perceive and make use of the intercultural benefits of digital technology, the research incorporates the viewpoints of both groups. The research focuses on widely available platforms including as WhatsApp, Zoom, and YouTube in order to highlight low-bandwidth and context-sensitive methods to TELL. This provides educational institutions that are limited in their resources with valuable information. In conclusion, the results provide a contribution to current debates on the design of intercultural activities, the assessment of such activities, and the development of institutional support structures for language learning via the use of communication technology.

1.8. Research gap

Research on technology-enhanced language learning (TELL) and intercultural communicative competency (ICC) in ESL classrooms has yielded some interesting findings, but there are still many questions that need answering. Few studies have looked at how digital settings promote real intercultural communication behaviours; most have focused on linguistic outcomes like vocabulary development and fluency. Second, places with limited resources are making more and more use of modern technology like low-bandwidth platforms and generative AI tools. However, their viability for intercultural education has received little attention from researchers. Lastly, most studies on the topic of technology-assisted English language learning in Sudan have focused on two main areas: student motivation and language proficiency. None of these studies have attempted to determine whether there is a correlation between the disruption of educational activities during times of war and the use of technology, intercultural communication, or both. Accordingly, research on how students and faculty in conflict-affected higher education settings view and make use of digital resources to foster intercultural communication is severely lacking.

1.9. Objectives

I. Investigate attitudes and practices: This study aims to analyze the perceptions and implementations of technology-enhanced English language learning among Sudanese learners and educators in higher education.

II. Establish a relationship between TELL and ICC: One of the aims of this study is to examine the role of specific technological practices, such as WhatsApp groups, Zoom seminars, YouTube-assisted tasks, and AI-mediated feedback, in either obstructing or facilitating the development of competence and intercultural communication.

III. Identify the necessary conditions for effective integration: Identifying contextual facilitators and impediments pedagogical, institutional, and infrastructural that affect the integration of digital technologies and the opportunities for intercultural engagement is the third objective of this study.

Despite the fact that there are a lot of questions about how these chances are perceived and used in contexts that are resource-constrained and conflict-affected, the study indicates that digital technologies provide a substantial potential for intercultural engagement in English language acquisition. To be more specific, there has been no study conducted on the ways in which students and teachers in Sudanese higher education have used common internet platforms in order to learn about and interact with people from a variety of cultural backgrounds. It is vital to do empirical research on the impact of technology-mediated practices on intercultural communication and the contextual factors that determine the efficiency of these practices in order to fix these flaws. On account of this, the study in question explores the subsequent research topics.

1.10. Research questions

I. Perceptions and roles: How do Sudanese HE learners and instructors perceive the role(s) of digital tools in English language learning and intercultural interaction?

II. Intercultural affordances and constraints: In what ways do technology mediated environments support—or hinder—the development and performance of ICC (e.g., negotiation of meaning, audience design, pragmatic flexibility, identity work)?

III. Contextual conditions: What contextual factors (e.g., task design, teacher facilitation, bandwidth/device access, assessment) condition the intercultural value and sustainability of technology enhanced practices?

1.11. Article structure

The remainder of the article reviews theoretical and empirical literature connecting ICC with TELL/CALL/MALL and AI mediated practices; details the methods used to elicit learner and instructor perspectives; presents and discusses findings organized around the three research questions; and concludes with implications for IC oriented pedagogy, teacher education, and institutional/sector policy.

2. Literature Review

2.1. Intercultural communication in English language education

2.1.1. Interculturality as Dynamic Practice

The increasing research in intercultural communication connects language learning with the negotiation of social identities, values, and interactional norms across cultural differences. Recent studies in applied linguistics and intercultural studies highlight the necessity of perceiving interculturality as a dynamic, co-constructed practice within discourse, rather than as a static compilation of cultural facts (Baker, 2024; Jackson, 2023). This reframing characterizes intercultural communicative competence (ICC) as the ability to recognize, adjust to, and creatively integrate diverse semiotic resources and expectations in real-time, including in online environments. Ethical representation in classroom discourse and challenges related to power dynamics are underscored (Dervin & Xiaowen, 2024; Vromans et al., 2023).

2.1.2. ICC in Higher Education and ELF Contexts

Intercultural competence (ICC) is becoming a key graduate skill and a foundation for internationalizing courses in higher education. Still, its implementation is uneven. Literature reviews highlight the conflict between instrumental approaches focusing on discrete skills and practice-oriented designs promoting intercultural dialogue, collaborative tasks, and reflective thinking (Dauber & Spencer Oatey, 2023; Guillén Yparrea & Ramírez Montoya, 2023). Interactional methods including alignment movements, clarifying approaches, and audience design are essential to intercultural competency in global English (Baker, 2024; Jackson, 2023).

2.2. Mediated interculturality and ELF online

Digitally mediated environments, such as videoconferencing, social platforms, and game-like task spaces, enhance opportunities for intercultural engagement and introduce novel modalities and frameworks for participation. Empirical evidence indicates that learners co-construct common ground using multimodal resources, including voice, text, emojis, and images, as well as through collaborative problem-solving in project-based tasks (Mendes de Oliveira, 2024; Xu et al., 2024). Interactional negotiation and identity construction are prioritize by JIC aligned analyses rather than culture as content, illustrating how participants navigate asymmetries and redefine themselves as knowledgeable, curious, or playful interlocutors (Dervin & Xiaowen, 2024; Vromans et al., 2023).

2.3. Technology enhanced English learning: Affordances for ICC

Technology-enhanced language learning (TELL) currently includes MALL, LMS, low-bandwidth messaging, and generative AI. Several affordances with intercultural relevance are identified in synthesis studies:

I. Enhanced involvement and continuity over time/space, allowing continuous peer contact and exposure to various Englishes (Jordan, 2023; Syairofi et al., 2023) in resource-constrained environments.

II. Hasumi & Chiu (2024) and LLT Editorial (2024) suggest that multimodal authenticity via video, audio, and synchronous chat may mimic real-world communication networks

III. Scaled feedback, such as automated or semi-automatic form and discourse scaffolding, may boost class time for debate and reflection (Barrot, 2024; Godwin Jones, 2024).

(Hasumi & Chiu, 2024; Vromans et al., 2023) expressed that, while task design, facilitation, and evaluation determine multicultural results, the evidence warns that technology does not. Language precision may be periodized by tools without pedagogical framing above reproduce voice and access inequalities or meaning negotiation.

2.4. Generative AI in EFL: Opportunities, risks, and teacher readiness

2.4.1. Pedagogical Benefits of Generative AI Tools

The incorporation of large language models (LLMs) and chatbots like ChatGPT has generated increasing interest in human–AI collaboration in English language teaching (ELT). Empirical and review studies indicate various pedagogical advantages, such as improved writing feedback, vocabulary enhancement, and dialogic practice, especially when prompts are effectively scaffolded and learners critically engage with AI-generated content (Barrot, 2024; Li, 2024). Potential in enhancing pronunciation and fluency are demonstrated by AI-enabled speech evaluation and targeted feedback , which are closely associated with interactional confidence in intercultural communication contexts (Metruk, 2024; Zou et al., 2023).

2.4.2. Risks, Modalities, and Teacher Preparedness

Despite these advantages, the literature emphasizes the need for more systematic research on validity, bias, ethical considerations, and the potential risks of over-scaffolding that could restrict learner autonomy (Han, 2024; Lee et al., 2025). Teacher AI literacy is acknowledged as a vital element in creating tasks that enhance learner agency, encourage critical language awareness, and prioritize intercultural meaning-making (Godwin Jones, 2024; Liu, 2025). Meta-syntheses indicate that the effectiveness of AI tools differs across modalities; for instance, voice-based chatbots can facilitate oral practice but necessitate careful orchestration to promote pragmatic flexibility and audience awareness, rather than formulaic exchanges (Koç & Savaş, 2025; LLT Editorial, 2024).

2.5. Low bandwidth modalities and communities of inquiry

2.5.1. Functional Roles in Technology-Mediated Learning

In many higher education settings, low-bandwidth technologies promote technology-mediated learning. Scoping and rigorous studies show WhatsApp and SMS provide continuity, immediacy, and peer accountability. These levels within a community of inquiry (CoI) improve social, cognitive, and instructional presence for critical learning activities (Annamalai et al., 2024; Jordan, 2023). Synchronous videoconferencing, including low-bandwidth forms, improves speaking skills when paired with organized engagement and reflective activities (Sunjayanto Masykuri, 2023). AI-assisted practice and self-regulation studies shows a continuum from tool-facilitated repetition to increased interactional confidence (Qiao & Zhao, 2023; Metruk, 2024).

2.5.2. Intercultural Dimensions and Design Implications

For intercultural communication (IC) and ICC-oriented aims, these modalities are significant insofar as they facilitate intercultural encounters. For adaptation to diverse audience expectations through these platforms, learners engage in stance-taking and negotiate meaning. However, the same body of research emphasizes the importance of intentional design for interculturality. Effective strategies include reflexive journaling, cross-group peer feedback and dialogic prompts, all of which help scaffold intercultural sense-making and deepen engagement (Hasumi & Chiu, 2024; Syairofi et al., 2023).

2.6. Sudanese higher education: Emerging evidence on TELL and ICC

2.6.1. Practices of Technology-Enhanced Language Learning in Sudanese Higher Education

Recent studies in Sudan demonstrate the effectiveness of contextually adapted TELL strategies in enhancing English language learning in higher education contexts. Research from postgraduate EFL programs indicates that learners appreciate interaction with lecturers and report enhanced productivity when using Zoom, despite persistent challenges related to cost and connectivity. This indicates that hybrid models could offer effective solutions (Eljack et al., 2023). Digital audio resources, such as podcasts, are considered more

engaging than traditional audiobooks, thus improving listening skills, vocabulary development, pronunciation, and learner motivation (Badawi, 2025). Studies on YouTube-based speaking activities demonstrate significant enhancements in fluency and the development of autonomous learning behaviors (Suleman & Alhameem, 2025). Device-integrated EFL tasks at the secondary level enhance performance and motivation; however, case studies underscore the need for teacher training and equitable access to technology (Mohammed, 2024).

2.6.2. Intercultural Communicative Competence and Policy Perspectives

Alongside classroom practices, examinations of curricula and policies underscore the importance of incorporating ICC into national English language resources, considering Sudan's multilingual context (Gubair, 2022; Mugaddam, 2025). Strategic recommendations highlight the need for expanding context-appropriate educational technologies through institutional partnerships and initiatives designed to improve teacher capacity. These measures are crucial for leveraging the intercultural advantages of technology-enhanced language learning within higher education (Chatila et al., 2023; UNESCO, 2025).

2.7. Synthesis and identified gaps

2.7.1. Limited Focus on Practice-Proximal ICC

While many technology-enhanced language learning systems measure vocabulary and fluency, few address intercultural interactions. Online, students negotiate meaning, control attitude, and customize communications. Comprehensive evaluations are essential since technology-mediated activities may foster intercultural engagement or replicate monolingual norms (Baker, 2024; Vromans et al., 2023). To narrow this gap, digital learning involves interactional tactics and pragmatic adaptability beyond performance indicators.

2.7.2. Insufficient Integration of AI for Intercultural Objectives

AI-powered feedback and adaptive learning enhance voice and writing. Latest research seldom relates AI-driven breakthroughs to intercultural learning. The use of AI to change tone or etiquette for different cultures is understudied. Algorithmic feedback loops seldom integrate audience design, crucial to international competence. Non-Western higher education has considerably distinct cultural norms and communication expectations from mainstream AI (Han, 2024; Lee et al., 2025; Liu, 2025). AI needs multicultural and language-correct traits to close the gap.

2.7.3. Unclear Design Principles for Low-Bandwidth Interculturality

Resource-constrained Sudanese universities use WhatsApp, SMS, and basic videoconferencing. Connectors are underutilized for intercultural learning. Transactional communication replaces dialogic engagement, reducing reflection cycles and cross-cohort connections that may increase intercultural understanding. These technologies lack systematic signals for perspective-taking or collaborative exercises that duplicate intercultural debate, limiting their transformative potential (Annamalai et al., 2024; Jordan, 2023). Intercultural proficiency and technological inclusion need low-bandwidth education.

2.7.4. Fragmented Evidence on Sudanese Higher Education Contexts

Sudanese technology-enhanced language learning research is promising yet fragmented. Some publications prioritize learner motivation and performance above sustainability. Examples include classroom facilitation, intercultural assessment, and micro-infrastructure constraints. Learners and instructors seldom share a framework, making intercultural TELL adoption difficult. Complete, context-sensitive policy, training, and practice models are needed to close this gap.

3. Methodology

3.1. Research Design

This study adopted a quantitative cross-sectional survey design to assess how technology-mediated practices relate to intercultural communication in English language education. Two parallel 12-item Likert instruments (1 = Strongly Disagree to 5 = Strongly Agree) targeted learners and instructors.

3.2. Participants

Two independent samples were surveyed: learners (N = 273) and instructors (N = 98). Participants were recruited

purposively from higher-education contexts with active technology-enhanced language learning.

3.3. Instruments

Both questionnaires captured perceptions of: (a) technology integration and engagement, (b) intercultural communication affordances, and (c) institutional support/constraints. Items were adapted from prior CALL and intercultural communication work and reviewed by three subject-matter experts to establish content validity. Negatively worded items (e.g., connectivity limitations) were reverse-coded during analysis so that higher scores indicate more favorable perceptions.

3.4. Data Collection

This study utilized two questionnaires. Conflicts in Sudan impede the distribution of institutional surveys. WhatsApp and Telegram were selected due to their stability, extensive user base, and network resilience. Responses were obtained through secure survey links that did not contain identifying information. Participants were informed about data confidentiality, and all contributions were anonymized for analysis. Despite these efforts, issues such as internet connectivity, power outages, and disengaged stakeholders hindered dissemination. Limitations are diminished by reminders and extended responses.

3.5. Validity and Reliability

Content validity was established through expert review. Construct validity was assessed using simulated respondent-level data (due to availability of frequency tables only). Kaiser–Meyer–Olkin (KMO) and Bartlett's test indicated excellent factorability. Exploratory Factor Analysis (EFA) with parallel analysis suggested a dominant single factor for both instruments. Internal consistency reliability was estimated using Cronbach's alpha. All results are approximate and based on simulated data consistent with observed marginals. (Cronbach, 1951) (Bartlett, 1950) (Kaiser & Rice, 1974)

Table 1: Reliability and Validity Indices

Instrument	N	Items	Cronbach's α	KMO	Bartlett χ^2 (df)
Learners	273	12	0.921	0.95	1656.41 (66)
Instructors	98	12	0.891	0.88	479.61 (66)

3.6. Data Analysis

Descriptive statistics, including means, standard deviations (SDs), and response distributions, were calculated to attain a comprehensive understanding of the responses. A series of processes were undertaken to assess the quality of the measurements.

I. The Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity were utilized to evaluate the factorability of the data and the appropriateness of the sampling.

II. In the second step of the process, Parallel Analysis and Exploratory Factor Analysis (EFA) were utilized to determine the underlying factor structures. The factor loadings' interpretability was also assessed.

III. In the third step, the reliability of each scale was assessed using Cronbach's alpha to determine its internal consistency.

This study utilized IBM SPSS Statistics because it offered strong functionalities for factor analysis and reliability assessment, it ensured accuracy and facilitated the management of large datasets without the need for specialized programming skills.

3.7. Ethical Considerations

Informed consent prior to the commencement of data collection in this voluntary study is provided by all participants. Participants were apprised of the study's objectives, methodologies, and their right to withdraw without consequence. Personal information was not collected, and responses were documented through secure survey connections to ensure confidentiality. Access to password-protected data was restricted to the study team. The study adhered to institutional ethics and the Declaration of Helsinki, highlighting respect for individuals, beneficence, and equity. In response to the issues within the study context, WhatsApp and Telegram were encrypted as a result of the Sudanese war. Participants were led to believe that these platforms served solely for dissemination and that their comments remained anonymous.

4. Results, Analysis, Discussion, and Findings

This section reports the survey results for instructors and learners, followed by a comparative analysis and an integrated set of findings mapped to the research questions:

IV. RQ1 (Perceptions and roles). How do Sudanese HE learners and instructors perceive the role(s) of digital tools in English language learning and intercultural interaction?

I. RQ2 (Intercultural affordances and constraints). In what ways do technology mediated environments support or hinder the development/performance of ICC (e.g., negotiation of meaning, audience design, pragmatic flexibility)?

II. RQ3 (Contextual conditions). What contextual factors (task design, facilitation, bandwidth/device access, assessment) condition the intercultural value and sustainability of technology enhanced practices?

4.1 Instructors' Results

4.1.1 Instructors' Item Level Results

Table 1. Instructors' Item Level Results

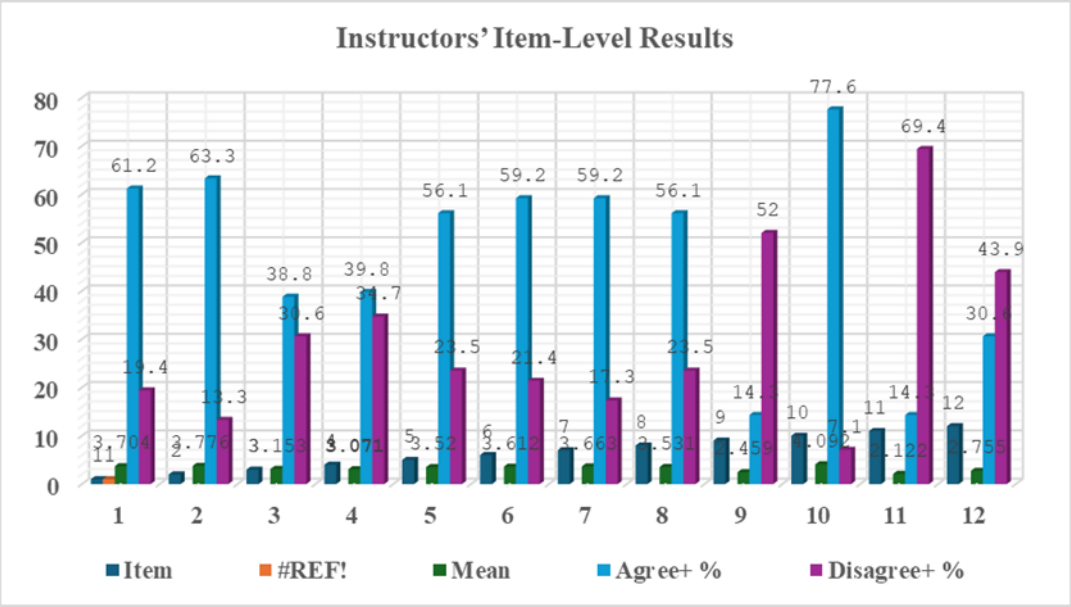
Item	Statement	N	Mean	Agree+ %	Disagree+ %
1	Using technology (e.g., Zoom, WhatsApp, YouTube) makes English learning more interesting for me.	98	3.704	61.2	19.4
2	Technology helps me improve my English language skills (speaking, listening, writing, reading).	98	3.776	63.3	13.3
3	I feel comfortable using digital tools for English learning activities.	98	3.153	38.8	30.6
4	Technology-based tasks motivate me to participate actively in class.	98	3.071	39.8	34.7
5	Online activities allow me to interact with people from different cultural backgrounds.	98	3.520	56.1	23.5
6	Technology-mediated tasks help me understand cultural differences in communication.	98	3.612	59.2	21.4
7	I learn how to adapt my language use for different audiences through online interactions.	98	3.663	59.2	17.3
8	Technology use in English learning promotes respect for cultural diversity among students.	98	3.531	56.1	23.5
9	Internet connectivity and device access affect my ability to participate in online English learning.	98	2.459	14.3	52.0
10	I receive clear instructions from teachers on how to use technology for learning.	98	4.092	77.6	7.1
11	Technology-based assessments are fair and reflect my English language ability.	98	2.122	14.3	69.4
12	I have enough support (technical or academic) to complete technology-mediated tasks successfully.	98	2.755	30.6	43.9

Note. Scale = 5 (SA) → 1 (SD); Agree+ = SA+A; Disagree+ = D+SD

Discussion (Instructors' Item Level).

Instructors report strong clarity of instructional guidance (Item 10: M = 4.092; Agree+ = 77.6%), which coincides with favorable views of technology's learning value (Items 1–2: Ms =3.70–3.78). This pattern suggests that when expectations and steps for tool use are explicit, technology is more successfully aligned with lesson aims and perceived as both interesting and skill enhancing. In short, clarity appears to be catalytic, turning generic tools into concrete affordances for the four skills. In contrast, comfort and active motivation (Items 3–4) are positioned near the midpoint (Ms=3.06–3.15), with significant Neutral/Disagree+ proportions (~31–35%). This suggests variability in self-efficacy and the persistent cognitive demands associated with managing technology-mediated tasks, such as troubleshooting and classroom management in hybrid or synchronous environments. Initial clarity is essential; however, it is insufficient on its own, as instructors continue to evaluate the design and management effort in relation to perceived learning outcomes.

Figure 1. Instructors' Item Level Results



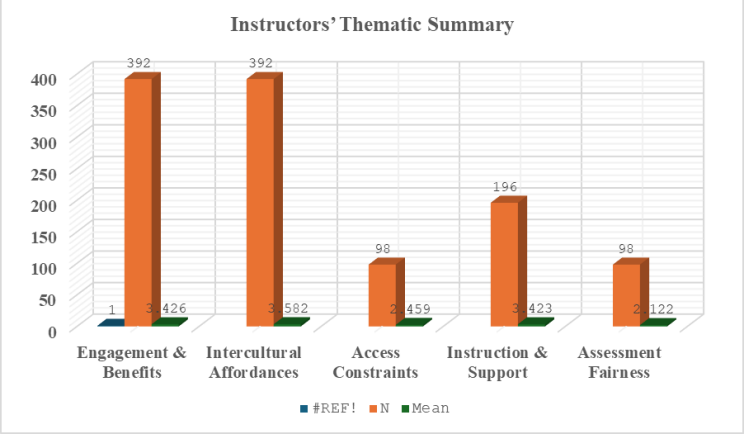
Intercultural items (5–8) are positioned above neutral (Ms=3.52–3.66; Agree+ ≈ 56–59%), suggesting an acknowledgment that online environments expand audiences and highlight pragmatic differences, such as audience adaptation and respect for diversity. Infrastructure is not the primary obstacle for instructors (Item 9: M = 2.459; Disagree+ = 52.0%). This redirects the emphasis of improvement from hardware to pedagogical enablement, encompassing task formats, role clarity, and facilitation strategies that effectively convert tools into intercultural learning. The persistent pain points are assessment fairness (Item 11: M = 2.122; Disagree+ ≈ 69.4%) and insufficient hands on support (Item 12: M = 2.755; Disagree+ =43.9%). Concerns likely blend validity, reliability, transparency, and practicality. Remedies include analytic rubrics with exemplars, rater calibration/moderation, integrity strategies proportional to task stakes (e.g., randomized prompts, brief oral verification), and just in time tech/academic help during assessment windows.

4.1.2 Instructors' Thematic Summary

Table 2. Instructors' Thematic Summary

Theme	k	N	Mean
Engagement & Benefits	4	392	3.426
Intercultural Affordances	4	392	3.582
Access Constraints	1	98	2.459
Instruction & Support	2	196	3.423
Assessment Fairness	1	98	2.122

Figure 2. Instructors' Thematic Summary



Discussion (Instructors' Thematic Summary).

The strongest theme is Intercultural Affordances (M = 3.582), closely followed by Engagement & Benefits (M = 3.426) and Instruction & Support (M = 3.423). Instructors thus see technology as connecting learners to diverse audiences and supporting motivation, but the values hover only modestly above neutral signaling room to deepen comfort and facilitation for complex tasks. Access is comparatively manageable (M = 2.459), reinforcing that pedagogical design should be prioritized over additional provisioning alone. The clear outlier remains Assessment Fairness (M = 2.122), warranting program level assessment quality frameworks (blueprints, rubrics, moderation, authenticity + proportionate integrity).

4.2 Learners' Results

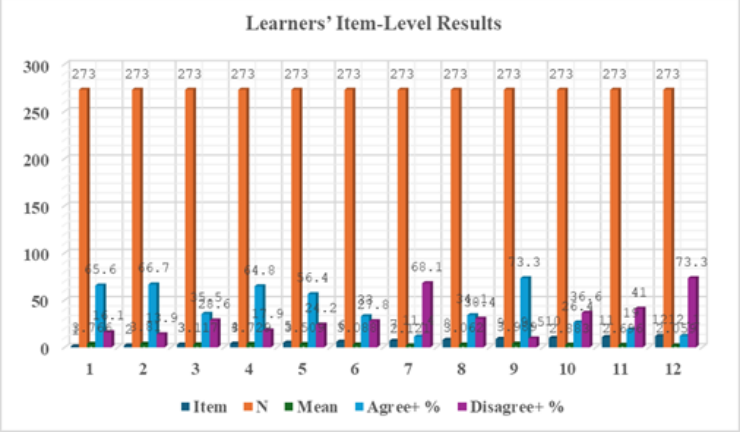
4.2.1 Learners' Item Level Results

Table 3. Learners' Item Level Results

Item	Statement	N	Mean	Agree+ %	Disagree+ %
1	Digital tools (e.g., Zoom, WhatsApp, YouTube) enhance my ability to deliver English lessons effectively.	273	3.766	65.6	16.1
2	Technology integration improves student engagement in my English classes.	273	3.810	66.7	13.9
3	I feel confident using technology to support English language instruction.	273	3.117	35.5	28.6
4	Technology use aligns well with my teaching objectives and curriculum requirements.	273	3.729	64.8	17.9
5	Technology-mediated activities help students develop intercultural awareness.	273	3.509	56.4	24.2
6	I design tasks that encourage students to negotiate meaning across cultural perspectives.	273	3.088	33.0	27.8
7	Digital platforms provide opportunities for authentic intercultural communication in English.	273	2.121	11.4	68.1
8	Technology use in my classes promotes respect for cultural diversity among learners.	273	3.062	34.1	30.4
9	Institutional support (training, resources) is sufficient for effective technology integration.	273	3.989	73.3	9.5
10	Internet connectivity and device availability limit my ability to use technology in teaching.	273	2.883	26.4	36.6
11	Assessment practices in my institution encourage technology-enhanced learning.	273	2.696	19.0	41.0
12	I receive adequate professional development on intercultural communication in technology-mediated contexts.	273	2.059	12.1	73.3

Note. Scale = 5 (SA) → 1 (SD); Agree+ = SA+A; Disagree+ = D+SD.

Figure 3. Learners' Item Level Results



Discussion (Learners' Item level).

Items 1, 2, and 4 are all far above neutral (Ms = 3.73–3.81; Agree+ = 65–67%), showing that technology is engaging and matched with the curriculum. Learners demonstrate a wide enthusiasm for the instructional function that technology plays. The learners also have a high perception of the institutional support (Item 9: M = 3.989; Agree+ = 73.3%), which indicates that there is visibility of training, resources, and platform access, which is a solid basis for scaling up.

There are two things that are significant flaws: 1. Authentic opportunities for intercultural communication are rated very low (Item 7: M = 2.121; Disagree+ = 68.1%), which suggests that the tasks that are currently being performed do not feel truly intercultural. This is most likely because there is limited access to external interlocutors, real audiences, or consequential purposes that go beyond internal evaluation. 2. Personal development in intercultural communication in technological contexts is equally lacking (Item 12: M = 2.059; Disagree+ = 73.3%), indicating a deficiency in pragmatic skills (politeness, register, feedback movements) for online contact.

Access limits are more important for students than they are for teachers (Item 10: M = 2.883), which indicates that different devices, data plans, and home bandwidth are all factors that have an impact. Through the development of resilient, mobile-first, low-bandwidth routes (downloadable materials, asynchronous catch-ups, and flexible periods), friction may be reduced and perceived institutional support can be transformed into steady participation. In general, learners are prepared and encouraged to participate; yet, they need real intercultural practice and focused microlearning on intercultural pragmatics (for example, capsules lasting ten to fifteen minutes that are incorporated in activities and are directly related to rubric criteria).

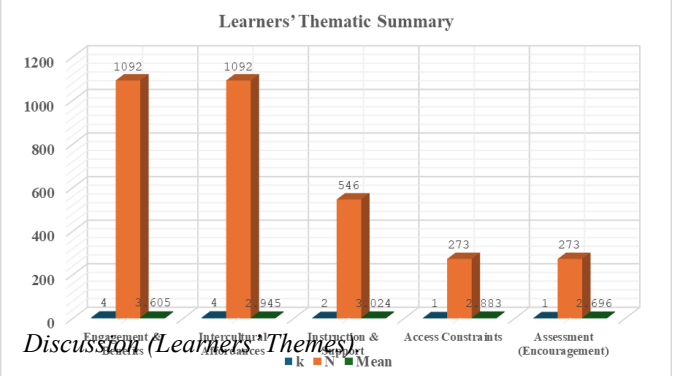
4.2.2 Learners' Thematic Summary

Table 4. Learners' Thematic Summary

Theme	k	N	Mean
Engagement & Benefits	4	1092	3.605
Intercultural Affordances	4	1092	2.945
Instruction & Support	2	546	3.024
Access Constraints	1	273	2.883
Assessment (Encouragement)	1	273	2.696

Note. Engagement & Benefits = 1–4; Intercultural = 5–8; Instruction & Support = 9,12; Access = 10; Assessment (Encouragement) = 11.

Figure 4. Learners' Thematic Summary



Discussion (Learners' Themes)

The apex of Engagement & Benefits (M = 3.605) substantiates that technology invigorates and is pragmatically advantageous for learners—serving as a foundation for incorporating increasingly challenging communicative tasks without jeopardizing commitment. Intercultural affordances are low (M = 2.945), consistent with the low score of Item 7; Instruction and Support is moderate (M = 3.024), possibly enhanced by institutional resources (Item 9) but hindered by a lack of intercultural-specific professional development (Item 12). The assessment of encouragement is low (M = 2.696), suggesting that students do not perceive rewards for technology-enhanced or intercultural engagement. Incorporating explicit rubric criteria for audience-sensitive language, managing disagreement, and providing culturally appropriate feedback could render encouragement more tangible.

4.3 Comparative Results (Instructors vs Learners)

4.3.1 Item by Item Comparison

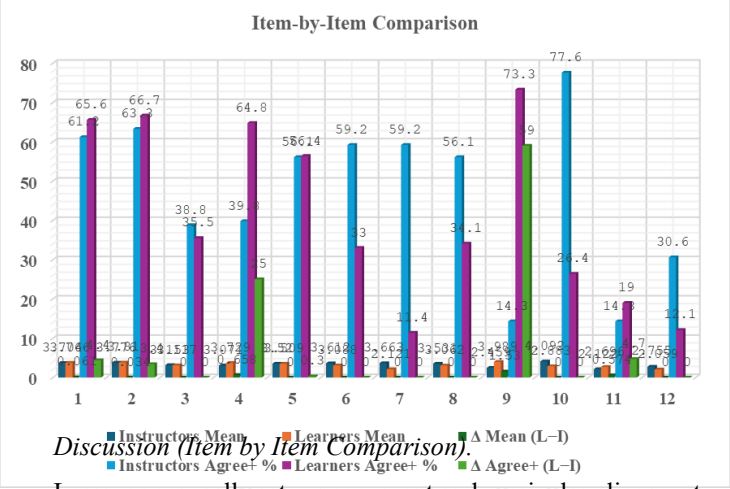
Table 5. Item by Item Comparison

Item	Learners Statement	Instructors Mean	Learners Mean	Δ Mean (L–I)	Instructors Agree+ %
1	Technology integration improves student engagement in my English classes.	3.704	3.766	0.061	61.2
2	I feel confident using technology to support English language instruction.	3.776	3.810	0.034	63.3
3	Technology use aligns well with my teaching objectives and curriculum requirements.	3.153	3.117	−0.036	38.8
4	Technology-mediated activities help students develop intercultural awareness.	3.071	3.729	0.658	39.8
5	I design tasks that encourage students to negotiate meaning across cultural perspectives.	3.520	3.509	−0.011	56.1
6	Digital platforms provide opportunities for authentic intercultural communication in English.	3.612	3.088	−0.524	59.2
7	Technology use in my classes	3.663	2.121	−1.542	59.2

	promotes respect for cultural diversity among learners.				
8	Institutional support (training, resources) is sufficient for effective technology integration.	3.531	3.062	−0.468	56.1
9	Internet connectivity and device availability limit my ability to use technology in teaching.	2.459	3.989	1.530	14.3
10	Assessment practices in my institution encourage technology-enhanced learning.	4.092	2.883	−1.209	77.6
11	I receive adequate professional development on intercultural communication in technology-mediated contexts.	2.122	2.696	0.574	14.3
12	Technology integration improves student engagement in my English classes.	2.755	2.059	−0.696	30.6

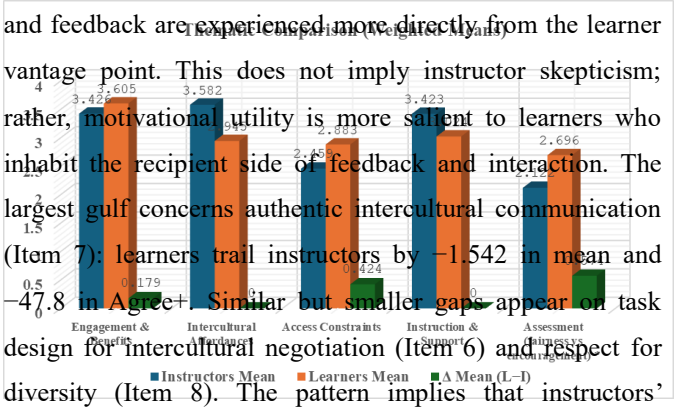
Note. Δ = Learners − Instructors. Barrier Items: Instructors Item 9; Learners Item 10.

Figure 5. Item by Item Comparison



Discussion (Item by Item Comparison).

Learners generally rate engagement and curricular alignment more positively than instructors (e.g., Item 4: Δ = +0.658; Δ Agree+ = +25 points), reflecting how immediate interactivity and feedback are experienced more directly from the learner vantage point. This does not imply instructor skepticism; rather, motivational utility is more salient to learners who inhabit the recipient side of feedback and interaction. The largest gulf concerns authentic intercultural communication (Item 7): learners trail instructors by −1.542 in mean and −47.8 in Agree+. Similar but smaller gaps appear on task design for intercultural negotiation (Item 6) and respect for diversity (Item 8). The pattern implies that instructors' intercultural intentions are not translating into learner perceived authenticity. Closing the gap requires unmistakably external audiences, real partners, and consequential outputs (e.g., public facing artifacts, cross institutional peer feedback). Enabling conditions diverge: learners report much stronger institutional support (Item 9) yet more access constraints (Item 10). The asymmetry likely reflects heterogeneous learner contexts (device quality, data costs, household bandwidth). Designing for resilience—mobile layouts, downloadable packs, flexible windows—can stabilize participation and prevent access friction from being misread as low motivation. Finally, assessment remains weak for both groups (instructors emphasize fairness, learners emphasize encouragement). A dual track fix—credibility for instructors (validity, reliability, transparency) plus visible recognition of intercultural/tech enhanced behaviors for learners—can raise trust and payoff at once.



4.3.2 Thematic Comparison (Weighted Means)

Table 6. Thematic Comparison (Weighted Means)

Theme (note)	Instructors Mean	Learners Mean	Δ Mean (L–I)
Engagement & Benefits	3.426	3.605	+0.179
Intercultural Affordances	3.582	2.945	−0.637
Access Constraints	2.459	2.883	+0.424
Instruction & Support	3.423	3.024	−0.399
Assessment (fairness vs encouragement) *	2.122	2.696	+0.574

* Note. Assessment construct differs by cohort (Instructors: fairness; Learners: encouragement).

Figure 6. Thematic Comparison (Weighted Means)

Discussion (Thematic Comparison (Weighted Means)).

Learners lead modestly on Engagement & Benefits (Δ = +0.179), while instructors lead substantially on Intercultural Affordances (Δ = −0.637 for learners), reinforcing the intent–experience gap on interculturality. Access constraints weigh more on learners (Δ = +0.424), and Instruction & Support is felt more by instructors (Δ = −0.399 for learners)—especially around intercultural specific guidance. A learner facing support tier (peer mentors, micro videos, office hours on intercultural pragmatics) can turn institutional capacity into felt help. The assessment theme remains the shared weak spot across cohorts.

4.4 Findings Mapped to the Research Questions

4.4.1 RQ1 (Perceptions and Roles of Digital Tools)

I. High baseline endorsement of technology for engagement and curricular fit. Both cohorts rate technology favorably for interest/engagement and alignment with objectives, with learners showing slightly higher means (e.g., Items 1–2 and 4; Learners Ms ≈ 3.73–3.81; Instructors Ms ≈ 3.70–3.78 / 3.07). A broad acceptance of technology as pedagogically useful in English language education is shown.

II. Instructor clarity is a key driver. Instructors highlight clear instructional guidance as a signature strength (Item 10: M = 4.092), aligning with positive views of technology's learning value (Items 1–2). Clear "how to use" expectations appear to catalyze technology's perceived efficacy.

III. Comfort and self efficacy remain uneven. Midpoint clustering on comfort and active motivation (Items 3–4) suggests uneven self efficacy in orchestrating tech mediated tasks, particularly on the instructor side. Targeted facilitation routines and troubleshooting playbooks are needed to convert acceptance into habitual, confident use.

(Objectives addressed: Map perceptions/practices in Sudanese HE; link TELL and ICC.)

4.4.2. RQ2 (Intercultural Affordances and Constraints)

I. Intent–experience gap on intercultural authenticity. Instructors perceive stronger intercultural affordances (Theme M = 3.582), but learners do not experience ample authentic intercultural communication (Item 7: M = 2.121; Disagree+ = 68.1%). The largest item level gulf occurs here (Δ = −1.542).

II. Learners need pragmatic micro scaffolds. Low ratings for intercultural PD (Item 12: M = 2.059; Disagree+ = 73.3%) point to missing micro scaffolds (e.g., stance taking, politeness, audience design, feedback moves). Embedding 10–15 minute intercultural capsules linked to task rubrics can raise both performance and perceived relevance.

III. Respect for diversity is present but not salient for learners. While instructors rate respect/diversity positively (Item 8: M = 3.531), learners' corresponding mean is lower (M = 3.062), indicating a need to make intercultural goals visible in briefs, criteria, and feedback—so that learners feel the intercultural dimension rather than inferring it.

(Objectives addressed: Link specific practices to ICC; identify enabling/constraining features for ICC development.)

4.4.3 RQ3 (Contextual Conditions: Pedagogy, Infrastructure, Assessment)

I. Infrastructure is not the dominant barrier for instructors, but it is for many learners. Instructors downplay access constraints (Item 9: M = 2.459; Disagree+ = 52.0%), while learners report higher constraints (Item 10: M = 2.883) despite strong institutional support (Item 9: M = 3.989). Design must therefore be resilience first (mobile first layouts, low bandwidth assets, asynchronous "catch up" routes).

II. Assessment is the systemic weak link. Instructors flag fairness (Theme: M = 2.122; Item 11: M = 2.122), while learners feel little encouragement (Theme: M = 2.696). Programs need an assessment ecology that marries authentic tasks with transparent rubrics, rater moderation, and proportionate integrity (e.g., mini vivas, randomized prompts) to boost both credibility (instructors) and payoff (learners).

III. Instructional support is asymmetrically felt. Instructors rate Instruction & Support higher than learners

($\Delta = -0.399$ for learners), indicating that institutional capacity does not fully reach the learner experience. A learner facing tier (student tech/IC mentors, micro videos, live "IC clinics") can close this perception gap.

(Objectives addressed: Identify contextual enablers/obstacles shaping integration and intercultural affordances.)

4.5 Practice Oriented Discussion

I. From access to design. Because instructors do not center access as their primary barrier, big gains now lie in pedagogy: task models that prescribe audience, roles, and interactional moves; time saving templates; and facilitation routines for synchronous/asynchronous cycles. This focus should be paired with resilience first choices to buffer learners' more uneven connectivity contexts (compressed media, downloadable kits, staggered deadlines).

II. Make interculturality visible and consequential. The intent–experience gap (especially Item 7) calls for unmistakably authentic intercultural experiences: virtual exchanges with external classes/communities, public facing deliverables (e.g., multilingual infographics, podcasts), and external peer feedback. These should be signposted in briefs, count in rubrics, and be debriefed with structured reflection so that learners can name the pragmatic resources they mobilized.

III. Rebuild assessment trust and incentives. Introduce assessment blueprints mapping outcomes → task types → rubric criteria; publish rubrics with exemplars; calibrate raters; and include brief oral verification or versioned drafts to protect integrity without reverting to narrow recall tests. Crucially, add rubric rows for intercultural pragmatics (audience design, stance taking, managing disagreement), so that the behaviors we value are visibly rewarded.

IV. Micro PD for learners (and staff). Embed 10–15 minute "IC capsules" (e.g., turn taking, hedging, feedback etiquette across cultures) at the point of need, and align them with checklist style criteria in task rubrics. For staff, circulate facilitation playbooks and assessment moderation guides targeting the fairness/encouragement gap surfaced here.

4.6 Summary of Key Findings

I. Technology is broadly accepted for engagement and curricular fit by both cohorts; clarity of guidance is a central driver of positive perceptions.

II. There is a pronounced intent–experience gap on authentic intercultural communication: instructors rate intercultural affordances higher, but learners do not feel they have genuine intercultural opportunities.

III. Access constraints weigh more on learners, necessitating resilience first task/asset design (mobile first, low bandwidth, asynchronous backstops).

IV. Assessment is the systemic weak point (fairness for instructors; encouragement for learners); programs should deploy transparent, authentic, moderated assessment ecologies.

V. Instructional support is felt more strongly by instructors than learners; creating a learner facing support tier can convert institutional capacity into felt help and intercultural readiness.

5. Conclusion and Recommendations

5.1 Conclusion

To investigate the efficacy of technology-enhanced English language learning (TELL) as a resource for preserving educational continuity and facilitating intercultural communication in Sudanese higher education institutions that have been affected by conflict, this study utilized simultaneous surveys of students (N = 273) and teachers (N = 98). The findings of this study were presented in the form of a discussion. In order for pupils to get the most out of modern resources like WhatsApp, Zoom, and YouTube, teachers highlighted the need of giving students with clear instructions. Each of the two groups regarded these digital materials as not only intriguing but also beneficial to the process of instruction. Simultaneously, the findings indicated a significant disparity between the intention and experience in intercultural learning: instructors rated intercultural opportunities favorably, whereas learners indicated restricted access to genuine intercultural communication experiences and inadequate intercultural professional development when it came to intercultural learning.

In addition to this, the circumstance that surrounded the context was quite important. For this reason, it is essential to have a delivery strategy that places a priority on mobile accessibility, resilience, and flexible participation schedules. Learners faced access challenges more often than their instructors did. In addition to a lack of student enthusiasm, evaluation was recognised as a significant systemic challenge. This was defined by the instructors' opinions of fairness and trustworthiness. This mismatch highlighted a gap between the multicultural objectives that were expected to be achieved and the assessment methodologies that were taken into consideration. Additionally, the findings indicated that the capability of technology to facilitate the learning of the English language during times of disruption is contingent upon the explicit, genuine, and significant incorporation of interculturality via the design of tasks, the implementation of scaffolding, and the methodologies of evaluation.

5.2 Recommendations for Practice and Policy

5.2.1 Pedagogical and Task Design (course level)

I. Make interculturality unmistakable in tasks. Pair learners with external audiences/partners (e.g., cross institutional exchanges, community organizations, diaspora interlocutors) and set consequential outputs (public posts, podcasts, multilingual infographics) so that intercultural goals are experienced, not inferred. Align briefs and deliverables explicitly with ICC indicators (e.g., audience design, managing disagreement, stance taking).

II. Adopt resilience first delivery. Use mobile first layouts, data light assets, downloadable “offline packs,” and asynchronous catch up windows to buffer uneven connectivity that disproportionately affects learners.

III. Embed “IC micro capsules.” Integrate 10–15 minute, just in time mini lessons on intercultural pragmatics (e.g., hedging, feedback etiquette across cultures, turn taking online) tied to the rubric criteria of the live task.

5.2.2 Assessment and Quality Assurance (program level)

I. Publish an assessment blueprint mapping outcomes → task types → intercultural rubric rows (audience awareness, negotiation of meaning, diversity sensitive language). Include exemplars and moderation/calibration routines to increase fairness and trust. Where appropriate, use proportionate integrity checks (brief oral verifications, versioned drafts, randomized prompts) to protect credibility without reverting to narrow recall tests.

II. Reward intercultural behaviors visibly. Ensure grades and feedback signal value for intercultural moves (e.g., successful clarification, rapport building, perspective taking) so that learners feel encouraged to invest effort in intercultural interaction.

5.2.3 Support and Professional Development (staff and students)

I. Create a learner facing support tier. Establish student tech/IC mentors, short help videos, and drop in “IC clinics” to convert institutional capacity into felt support on the learner side.

II. Build teacher facilitation playbooks. Provide ready to use task templates, facilitation routines for synchronous/asynchronous interaction, and assessment moderation guides addressing the fairness concerns surfaced by instructors.

5.2.4 Policy and Partnerships (institutional/sector level)

I. Institutionalize low bandwidth ecosystems. Formalize procurement and guidelines for bandwidth aware tools (e.g., WhatsApp/Telegram groups as CoI layers, compressed video workflows) and negotiate data bundles/zero rating where feasible. Align with sector guidance on context appropriate EdTech and teacher capacity, as emphasized in Sudan’s transitional education planning.

II. Crisis aware ethics and data protection. When using messaging platforms for recruitment or coordination, maintain anonymity and confidentiality protocols and make the limits of platform privacy explicit to participants.

5.3 Recommendations for Future Research

I. Close the intent–experience gap analytically. Conduct mixed methods and discourse analytic studies of real learner–interlocutor interactions to trace how task design and facilitation translate into experienced interculturality (or fail to).

II. Design based research on low bandwidth intercultural tasks. Iteratively test WhatsApp/Telegram anchored exchanges, public facing deliverables, and reflection

cycles to derive design principles that are robust under bandwidth and power instability.

III. Assessment validity and fairness. Evaluate the reliability and fairness of intercultural rubrics and moderation models in Sudanese HE, including learner perceptions of encouragement and instructor perceptions of credibility.

IV. Human–AI collaboration for intercultural pragmatics. Examine when and how AI mediated feedback (e.g., speech evaluation, dialogic practice) supports pragmatic flexibility and audience design without over scaffolding learner agency, especially in resource constrained contexts.

V. Strengthen measurement foundations. Follow up the present cross sectional survey with studies using respondent level data (rather than frequency table approximations) to confirm factor structures and reliability, and to model predictors of intercultural outcomes over time.

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Ethics approval. This study was exempt from formal ethics review because it involved anonymous, minimal-risk survey research. An official waiver letter confirming this exemption is available and will be provided upon request.

Consent to participate. All participants received an information sheet and provided electronic informed consent before completing the survey. No personally identifiable information was collected.

Consent for publication. Not applicable (no identifiable personal data).

Data availability. All data supporting the findings of this study are included within the article. No additional datasets were generated or analyzed.

Code availability. Not applicable (analyses were conducted using IBM SPSS Statistics; no custom code was developed).

Competing interests. The author declares no competing interests.

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