Fostering Global Digital Citizenship: How Peer Collaboration Shapes Intercultural Competence among Burmese ICT Students

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ABSTRACT

Intercultural competence (IC) is increasingly essential for student success in globally distributed ICT environments, yet limited research has examined how peer-assisted learning (PAL) supports IC development among marginalized learners in Southeast Asia. This study investigates how 36 Burmese undergraduate ICT students enrolled in an English-medium course at a Thai university perceived PAL as contributing to their intercultural growth. Guided by Byram's IC framework and Vygotsky's Sociocultural Theory, the study employed a Participatory Action Research (PAR) design in which culturally oriented PAL activities, multilingual peer interaction, and scaffolded reflection were integrated throughout three intervention cycles. IC was measured through a 30-item post-program questionnaire (Cronbach's $\alpha = .893$) and semi-structured interviews with 19 participants. To address reviewer concerns regarding analytical rigor, regression analysis was conducted for RQ1, with results indicating that PAL significantly predicted students' self-reported IC outcomes ($\beta = 0.85$, $R^2 = .46$, $p < .001$). Descriptive statistics further showed high levels of perceived development in intercultural attitudes, cultural knowledge, and communicative adaptability. Thematic analysis revealed perceived gains in cultural understanding, multilingual communication, leadership, confidence, and psychosocial support—dimensions shaped in part by students' experiences navigating political instability in Myanmar. While findings are based on self-reported perceptions and do not infer causality, the study demonstrates how intentionally structured PAL can foster supportive conditions for intercultural learning within STEM contexts. Implications highlight the value of embedding mentor preparation, reflective cycles, and intercultural objectives into PAL programs to strengthen global competence among underrepresented student groups in higher education.

Keywords: Intercultural Competence, Peer-Assisted Learning, Burmese ICT Students, Higher Education, STEM Education

1. Introduction

Background of the Study

In recent years, intensified global migration has made contemporary societies increasingly diverse, thereby heightening the need for intercultural competence (henceforth IC) as a foundational capability for individuals preparing to work in professional environments that require effective engagement with culturally varied populations (Acosta-Mosquera et al., 2017). IC encompasses the attitudes, knowledge, and interaction skills that enable individuals to communicate and collaborate effectively across cultural differences, particularly when navigating diverse communication norms, values, and worldviews (Byram, 1997). The expanding emphasis on global learning in higher education has made the ability to engage with culturally diverse peers through cross cultural interaction, collaborative online exchange, and culturally informed communication an essential competence for students who seek to succeed in international academic and professional environments (Custer & Tuominen, 2017). These capabilities are especially significant within information and communication technology (henceforth ICT), where professionals routinely coordinate tasks across borders, interact with diverse stakeholders, and work within rapidly changing global contexts that demand cultural sensitivity, adaptability, and clear communication (Flogie et al., 2018).

Despite the increasing recognition of IC as essential for student readiness in global contexts, many university programs still emphasize linguistic or technical skill development while offering limited structured opportunities for learners to build meaningful intercultural communication abilities (Balanaieva et al., 2020). Traditional programs remain grounded in older models that prioritise technical tasks such as programming and systems analysis while offering limited opportunities for students to develop the social awareness and communicative competence that contemporary learning environments require (Flogie et al., 2018). As a result many university students progress through their programs with solid academic expertise yet receive limited exposure to cultural diversity, resulting in inadequate preparation for the intercultural demands of contemporary global workplaces (Lukianets & Lukianets, 2020).

Peer assisted learning (henceforth PAL) has emerged as a pedagogical approach capable of addressing these limitations by embedding learning within socially meaningful interactions (Bacon et al., 2021; Topping, 2005). PAL involves structured peer engagement in which trained mentors support their peers through academic and interpersonal tasks (Bacon & Maneerutt, 2024; Dawson et al., 2014). When aligned with intercultural learning goals, PAL provides recurring opportunities for students to practice multilingual communication, interpret culturally influenced behaviors, negotiate meaning, and receive feedback in supportive peer settings (Bacon & Torremucha, 2025a, 2025b). These interactions reflect Vygotsky's Sociocultural Theory, which states that learning is socially mediated and develops through guided interaction with more capable peers who provide linguistic and cultural scaffolding within the Zone of Proximal Development (henceforth ZPD). Through this form of guided participation, PAL has the capacity to cultivate the confidence, communication strategies, and cultural awareness that are often underdeveloped in traditional ICT instruction.

These opportunities are particularly important for students in Thai higher education, who frequently face disparities in access to digital resources, uneven institutional support, and limited exposure to English outside the classroom, making equitable and well-designed learning environments essential for their academic development (Sa-ngiamwibool & Mounggam, 2025). This relevance is further heightened by the presence of Burmese ICT

students, who form a large sector of international student groups in Thai private universities. The educational pathways of Burmese learners along the Thai Myanmar border are strongly shaped by longstanding migration into Thailand as well as by the limited recognition of Myanmar and refugee camp schooling and the restricted availability of higher education opportunities in these border communities (White et al., 2016). Upon entering Thai universities, Burmese students must adapt to English mediated ICT coursework while simultaneously navigating Thai language norms used in administrative communication, peer interactions, and daily campus life, as these linguistic demands can limit participation in classroom discussion, reduce confidence in academic communication, and constrain opportunities for intercultural engagement.

In addition to linguistic challenges, Burmese students must navigate sociocultural expectations within Thai academic environments, as differences in communication styles, politeness conventions, and peer interaction norms can create uncertainty during group work, reduce willingness to participate in intercultural dialogue, and hinder the development of supportive peer relationships (Soe & Charoenroop, 2025). These factors have the capacity to collectively shape a distinctive learning context in which structured support for IC is not only beneficial but necessary for academic adjustment and personal well-being (Gourves-Hayward & Morace, 2011).

The specific demands of the ICT discipline further intensify this need. In ICT, the project approach is prevalent, and in multinational companies, project teams work in a decentralized manner using remote and teamwork tools (Mielikäinen et al., 2024). Yet little research has examined how Burmese ICT students develop these skills during their studies in Thailand or how university-based interventions can support their readiness for global ICT work.

Within this context, PAL provides a practical and scalable approach to supporting IC development (Bacon & Torremucha, 2025b). By offering peer-based guidance, repeated opportunities for intercultural interaction, and a supportive environment for practicing communication strategies, PAL can help Burmese ICT students engage more confidently with Thai and international peers. PAL therefore serves as both an academic and intercultural support mechanism that aligns with the competencies required in global ICT settings.

Given the growing importance of IC in technology driven fields and the unique challenges faced by Burmese ICT students in Thailand, there is a clear need to investigate how PAL can support their intercultural development (Bacon & Torremucha, 2025a). This study examines this relationship by exploring the extent to which structured PAL programs foster IC and strengthen students' ability to participate in diverse academic and professional environments.

The Role of PAL in Fostering Cultural Exchange

Building on the definitions introduced in Section 1.1, this subsection explains how PAL functions as an environment that supports the development of IC for Burmese students studying in Thailand (Bacon & Torremucha, 2025b). This pedagogical approach can also be expanded to ICT students, who similarly benefit from structured opportunities for intercultural dialogue, collaborative learning, and culturally responsive peer engagement. PAL is well established as a collaborative educational model that enhances academic performance, communication skills, and learner motivation through structured peer interaction (Bacon et al., 2021). When intentionally organized with intercultural aims, PAL goes beyond its academic function by

creating regular, meaningful opportunities for culturally diverse students to learn from one another and to participate in sustained intercultural exchange (Ragavan, 2014).

For Burmese ICT students, these opportunities are especially consequential. Burmese students studying in Thailand must navigate unfamiliar cultural norms, communication expectations, and academic practices that shape their daily social and educational experiences (Soe & Charoenroop, 2025). PAL provides a structured, low pressure setting in which they can interact with Thai peers and international mentors through guided tasks that support adaptation and social integration (Bacon & Torremucha, 2025b). These interactions foster a sense of belonging and positive identity formation, enabling students to gradually build confidence when engaging across cultural boundaries (Bacon & Torremucha, 2025a).

The linguistic demands of studying in Thailand further highlight PAL's relevance. Many Burmese ICT students operate across three languages: Burmese for daily use, Thai for community interaction, and English as the instructional medium. Limited proficiency in Thai or English can hinder participation in classroom discourse and reduce access to spontaneous cultural learning (Soe & Charoenroop, 2025). PAL compensates for these challenges by offering repeated practice in multilingual communication within a supportive peer community (Bacon et al., 2021). Through dialogue, clarification, and negotiation of meaning, students strengthen their ability to understand and respond to culturally patterned communication, which directly supports the development of IC (Bacon & Torremucha, 2025a).

These PAL processes align closely with Byram's (1997) components of IC. Participation in PAL centers enables students to build socio-cultural relationships and engage with peers from diverse linguistic and cultural backgrounds, allowing them to develop new experiences and broaden their understanding of others (Bacon et al., 2021). Through peer explanation and discussion, they gain cultural knowledge related to Thai values, communicative preferences, and sociocultural norms (Bacon & Torremucha, 2025a). Collaborative tasks and reflective dialogue develop the skills of interpreting and relating, as students discuss culturally influenced behaviors in real time (Bacon & Torremucha, 2025b). By doing this, PAL cultivates the skills of discovery and interaction by enabling learners to navigate unfamiliar cultural situations, ask respectful questions, and adjust their communication strategies. Over time, such exchanges support the growth of critical cultural awareness as students compare their own assumptions with those of their peers and develop a more reflective understanding of cultural difference (Bacon et al., 2021).

Vygotsky's Sociocultural Theory (henceforth SCT) further explains why PAL effectively promotes IC. SCT emphasizes that learning occurs through social interaction and that progress is supported by more capable peers who provide linguistic and cultural scaffolding (Alkhudiry, 2022). PAL situates learners in interactions where more competent peers provide scaffolding and support within the ZPD, enabling both partners to progress through guided cognitive challenge (Topping, 2005). In the context of this study, international mentors (Burmese students) and Thai mentees engage in this process through structured intercultural peer learning. Participation in structured PAL sessions provides Burmese Team Leaders (or mentors) with consistent peer-supported opportunities to enhance their intercultural communication skills, cultural awareness, adaptability, and confidence, enabling them to navigate diverse academic and professional environments more effectively (Bacon & Torremucha, 2025a).

Although PAL's academic benefits are widely documented (Bacon & Maneerutt, 2024; Topping, 2005), its role in supporting IC remains underexplored in Southeast Asia, particularly

for underrepresented and mobile student groups. Existing research has tended to prioritize cognitive and performance outcomes rather than intercultural growth (Bacon & Torremucha, 2025a, 2025b). This study addresses this gap by examining how structured PAL initiatives facilitate cultural exchange, intercultural communication, and global competence development among Burmese ICT students in Thailand. By conceptualizing PAL as both a pedagogical model and an intercultural learning framework, the study highlights its potential to prepare ICT students for participation in multicultural teams and global professional environments.

Research Problem

Although intercultural competency is widely recognized as an important educational objective, many university students have limited access to study abroad opportunities, which creates a need for locally based activities that support global learning (Custer & Tuominen, 2017). At the same time, many ICT programs still offer limited structured opportunities for students to develop intercultural competency. ICT curricula typically emphasize programming, system design, and technical problem solving while devoting far less attention to the social and cultural abilities required for effective collaboration in multicultural technology settings (Flogie et al., 2018). As a result, learners who possess strong technical proficiency may still struggle to interpret culturally influenced communication, adapt their interaction style to diverse team environments, or engage effectively with international clients (Kennedy et al., 2025).

These challenges are particularly significant for Burmese ICT students studying in Thailand, who represent one of the largest international student groups in several Thai private universities yet remain underrepresented in regional research. Their experiences are shaped by a distinctive combination of sociocultural, linguistic, and political factors that differ from those faced by other international learners (Soe & Charoenroop, 2025). Socioculturally, Burmese students must adjust to Thai norms regarding politeness, hierarchy, and interpersonal communication, which may differ substantially from the norms they have internalized in Myanmar (Bacon & Torremucha, 2025a). This adjustment requires them to interpret unfamiliar social cues, revise expectations about authority relations, and adopt new participation behaviors in classroom and peer interactions (Bacon & Torremucha, 2025b).

Linguistically, Burmese ICT students navigate a demanding trilingual environment. Burmese is used in daily life, Thai functions as a community and administrative language, and English is the medium of instruction for ICT coursework. Limited proficiency in any of these languages can hinder participation in classroom dialogue, restrict involvement in collaborative learning activities, and reduce access to informal intercultural interactions that support academic and social adjustment (Soe & Charoenroop, 2025). As a result, the combined effects of linguistic and cultural unfamiliarity may inhibit confidence and lower willingness to initiate engagement with Thai and international peers.

These challenges are intensified by ongoing sociopolitical instability in Myanmar, which continues to affect students' emotional well-being, psychological security, and overall readiness to adjust to a new learning environment (Soe & Charoenroop, 2025). Students who experience prolonged uncertainty may find it difficult to develop the openness, curiosity, and communicative flexibility that underpin IC (Buyruk Genç, 2024). Without structured support, Burmese ICT students may therefore struggle to collaborate effectively across cultures, participate meaningfully in diverse learning communities, or prepare for the expectations of global ICT workplaces.

Despite the importance of addressing these challenges, IC remains insufficiently integrated into ICT education in Thailand, and scholarship rarely examines how intercultural learning unfolds for Burmese students specifically. This gap limits the ability of institutions to design evidence-based interventions that support students academically, socially, and emotionally.

PAL, introduced in Section 1.1, provides a promising response (Bacon & Maneerutt, 2024; Bermingham et al., 2023). Although PAL is well established as a tool for improving academic achievement, its potential to support IC development, cultural awareness, and cross-cultural collaboration has not been fully explored in Southeast Asian ICT contexts. The structured, recurring peer interactions characteristic of PAL directly address many of the obstacles Burmese ICT students face by offering a low-pressure space for multilingual communication practice, relationship building, and reflective cultural dialogue. These interactions create conditions that support the gradual and sustainable development of IC in ways that traditional ICT instruction often does not provide.

Accordingly, the central problem guiding this study is the lack of structured and empirically informed approaches for supporting IC development among Burmese ICT students in Thailand. Addressing this problem is essential for preparing learners to participate confidently and effectively in the multicultural and globally distributed environments that define modern ICT work. The study's objectives and research questions therefore focus on examining how PAL facilitates IC development for this understudied student group and identifying the specific intercultural benefits that emerge through sustained peer interaction.

Research Objectives

The purpose of this study is to investigate how structured peer assisted learning (henceforth PAL) supports the development of intercultural competence IC among Burmese information and communication technology (henceforth ICT) students in Thailand. This focus responds directly to the problems identified in Section 1.3, where Burmese learners were shown to face persistent linguistic, sociocultural, and emotional barriers that limit their opportunities to develop IC through traditional ICT instruction.

Guided by Byram's framework of intercultural competence, the study establishes three specific and measurable research objectives that align with the theoretical constructs described in the literature review and address the core challenges faced by Burmese ICT students.

Objective 1:

> To measure the extent to which participation in structured PAL sessions influences students intercultural attitudes, cultural knowledge, and communication skills. These three domains correspond directly to key components of Byram's model and will be examined using quantitative indicators generated through the post program survey.

Objective 2:

> To identify the specific PAL processes that facilitate intercultural learning for Burmese ICT students. This includes determining which elements of PAL such as multilingual collaboration, mentor guided dialogue, and culturally focused peer activities contribute most strongly to the development of Byram's IC components during sustained peer interaction.

Objective 3:

> To examine students self-reported readiness to participate in multicultural professional environments by analyzing perceptions related to leadership, adaptability, and cross cultural communication. These indicators reflect global readiness competencies that are essential for ICT graduates who will work with diverse international clients and distributed digital teams.

Together, these objectives establish a clear and theoretically grounded pathway for the study. They respond directly to the limitations identified in the research problem, align with Byram's intercultural competence model, and provide measurable outcomes that support the development of research questions in the subsequent section. The findings generated from these objectives will offer evidence based insights into how interculturally structured PAL programs can enhance the academic preparation, social integration, and global professional readiness of Burmese ICT students in Thailand.

Research Questions

In alignment with the research problem and the three objectives outlined in Section 1.4, this study addresses the following research questions:

Research Question 1:

> To what extent does participation in structured PAL sessions influence Burmese ICT students intercultural attitudes, cultural knowledge, and communication skills as conceptualized in Byram's model of intercultural competence?

Research Question 2:

> Which specific PAL processes such as mentor guided interaction, multilingual collaboration, and culturally focused peer activities contribute most effectively to intercultural learning for Burmese ICT students who face sociocultural and linguistic barriers in Thai ICT programs?

Research Question 3:

> How do Burmese ICT students perceive the impact of PAL participation on their readiness for multicultural professional environments, particularly with regard to leadership, adaptability, and cross-cultural communication in global ICT work?

Significance of the Study

This study offers theoretical and practical contributions to ICT education by demonstrating how PAL can serve as a strategic and sustainable approach for developing IC. As global industries increasingly prioritize graduates who can communicate effectively across cultures, collaborate in diverse teams, and adapt to international professional environments, the development of IC has become an essential component of graduate readiness in science, technology, engineering, and mathematics programs (Flogie et al., 2018).

For students, IC provides clear and measurable benefits (Mittelmeier et al., 2024). It enhances communication skills by helping learners interpret culturally influenced behaviors, adjust communication styles, and engage more confidently in multilingual and multicultural interactions (Lwin, 2016). IC also strengthens career readiness by equipping students with the social and cultural competencies needed to succeed in international ICT companies, distributed project teams, and global digital workspaces. Moreover, IC supports global mobility by preparing graduates to participate in cross border collaborations, international internships, and transnational employment pathways that require cultural adaptability and open minded engagement (Custer & Tuominen, 2017).

At the institutional level, IC development contributes significantly to internationalization at home (henceforth IaH) (Choi & Khamalah, 2017). Because not all students have access to outbound mobility opportunities, structured PAL programs offer an inclusive and scalable means for universities to integrate intercultural learning into the everyday student experience (Bacon & Torremucha, 2025a, 2025b). PAL creates regular opportunities for meaningful interaction between students from different cultural backgrounds, thereby expanding the institution's capacity to foster global citizenship, strengthen campus diversity, and align with national and regional priorities related to international education (Vickers et al., 2017).

For STEM curriculum design, the findings of this study highlight the importance of embedding intercultural learning within technical programs that have traditionally focused on content mastery and problem solving. Incorporating PAL as part of ICT course structures can help curriculum designers intentionally integrate IC into existing learning outcomes, classroom activities, and collaborative projects. It is anticipated that this alignment will allow STEM graduates are equipped not only with technical expertise but also with the interpersonal and cultural skills needed for effective participation in global technological industries.

Overall, this study provides empirical evidence that PAL can enhance IC development among Burmese ICT students and offers practical guidance for educators and policymakers seeking to create inclusive, internationally relevant academic environments that will prepare students for cross cultural collaboration in the digital age.

2. Literature Review

A comprehensive understanding of the theoretical and empirical foundations underpinning this study is essential to contextualizing the role of PAL in fostering cultural exchange, particularly within Burmese students studying technology in higher education. This section explores the key theories associated with this study (as seen below in Figure 1), examines PAL as a collaborative learning model, discusses the intersection of computer science and cultural exchange, identifies gaps in existing research, and summarizes the major themes in the literature.

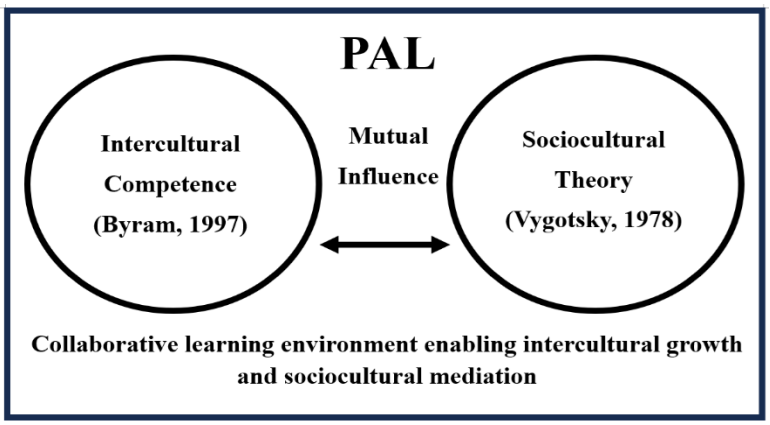

Figure 1. Theoretical framework

Theories Associated with Study

This study integrates Byram's (1997) IC model and Vygotsky's (1978) SCT to explain how PAL facilitates the co-construction of intercultural understanding and communicative growth in higher-education contexts. Each theory contributes a distinct but complementary perspective: SCT clarifies how learning develops through guided interaction, while IC defines what intercultural learning produces in terms of attitudes, knowledge, and skills. Together, they form a cohesive lens for examining how learners develop intercultural awareness through socially mediated collaboration. Both frameworks emphasize that learning and identity formation occur through engagement with others, where meaning is negotiated, scaffolded, and internalized.

To illustrate how these theoretical constructs interact, Figure 2 presents the conceptual framework for this study. The diagram visualizes the dynamic relationships among the four central elements: SCT, PAL, ICT, and IC. Vygotsky's SCT underpins the learning process, positioning scaffolding, interaction, and reflection as mechanisms through which learners extend knowledge within the ZPD. These processes occur within PAL environments that operationalize SCT principles through structured peer collaboration. The outcomes of these interactions are reflected in the development of IC, encompassing intercultural attitudes, knowledge, interpretive and interactional skills, and critical cultural awareness. ICT serve as the mediating environment that connects and amplifies these processes, extending intercultural learning across digital and multilingual spaces. Ultimately, the integration of these constructs leads to outcomes such as intercultural development and global readiness.

Byram's IC model conceptualizes intercultural competence as the interplay of attitudes, knowledge, and skills that enable learners to engage across cultural boundaries with openness and curiosity (Byram, 1997; Wang & Teo, 2024). These components culminate in critical cultural awareness, which allows learners to evaluate cultural practices—including their own—through reflective judgment (Byram, 2000). In PAL environments such as intercultural mentoring or collaborative projects, these elements emerge as students co-create meaning, negotiate perspectives, and adapt their communicative behavior within culturally diverse groups (Wang & Kulich, 2015).

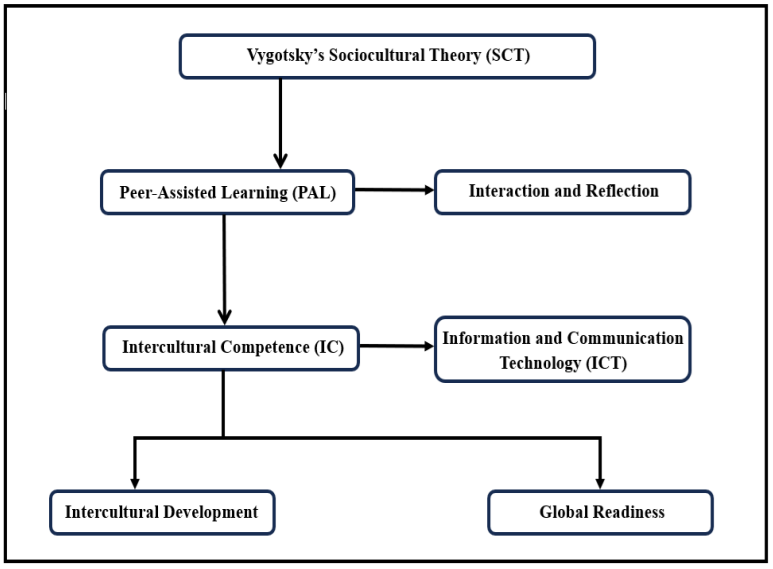

Figure 2. Conceptual Framework Integrating SCT, PAL, IC, and ICT

Vygotsky's SCT, by contrast, explains the process through which this development unfolds. Learning is mediated by cultural tools, particularly language, and occurs within the ZPD, where learners extend existing competencies through guided interaction with more capable peers (Vygotsky, 1978; Wertsch, 1991). In PAL settings, this process is enacted through scaffolding, as mentors and mentees engage in dialogic exchanges that help less experienced learners internalize both conceptual knowledge and culturally informed communicative strategies (Lambright, 2024).

When synthesized, these theories reveal a developmental sequence in which SCT processes (ZPD → scaffolding → internalization) drive the emergence of IC outcomes (attitudes → skills → critical awareness). Through peer guidance, learners not only acquire disciplinary or linguistic knowledge but also develop empathy, tolerance, and interpretive capacity—key affective and behavioral dimensions of IC. PAL thus functions as a social and cognitive bridge where intercultural learning is jointly constructed, negotiated, and transformed into enduring competence.

Despite their complementarity, divergences exist. SCT focuses primarily on how learning occurs, emphasizing mediation and developmental mechanisms, while IC delineates what intercultural learning produces. Integrating both frameworks addresses these limitations: SCT illuminates the mechanisms of growth within PAL interactions, whereas Byram's model operationalizes the resulting intercultural outcomes for empirical analysis. This theoretical synthesis underscores PAL's potential as a transformative intercultural pedagogy, situating peer collaboration as the mediating context through which sociocognitive development (as articulated by SCT) culminates in the formation of intercultural dispositions (as defined by Byram's IC model). Together, these frameworks provide a comprehensive foundation for examining how digital, multilingual PAL environments promote intercultural awareness, communicative adaptability, and global readiness among Burmese university students.

a. Byram's Framework for Understanding IC

Byram's (1997) IC model, reaffirmed by Wang and Teo (2024), conceptualizes intercultural learning as an interaction of attitudes, knowledge, and skills that together support effective and ethical cross-cultural communication. The model includes five interconnected components: (1) attitudes of openness and curiosity, (2) knowledge of social groups and cultural practices, (3) skills of interpreting and relating, (4) skills of discovery and interaction, and (5) critical cultural awareness (Byram, 2000). While this framework provides a valuable foundation, its application to contemporary PAL and ICT contexts requires critical reinterpretation. Each component can be meaningfully activated and empirically observed through intercultural processes that occur within PAL environments.

Within PAL, the attitudinal dimension of IC develops through reciprocal peer engagement, where learners encounter alternative perspectives and cultivate openness toward cultural diversity. Structured peer mentoring encourages curiosity and empathy by positioning students as both cultural learners and contributors (Wang & Kulich, 2015). This sustained, low anxiety interaction enables Burmese and Thai participants to question assumptions about authority, politeness, and communication, fostering dispositions of respect and adaptability that Byram associates with intercultural attitudes.

The knowledge dimension, which concerns awareness of cultural norms, communicative conventions, and social systems, is cultivated through collaborative dialogue and contextualized learning tasks. PAL environments enable knowledge construction through peer explanation and observation, as students articulate culturally grounded reasoning and clarify behavioral expectations. For example, learning about Thai hierarchical norms or social customs through authentic discussion exemplifies the co construction of sociocultural understanding (Bacon & Torremucha, 2025a). These processes parallel the concept of scaffolding described in Vygotsky's theory, illustrating how intercultural knowledge is socially mediated rather than transmitted unilaterally.

The skills of interpreting and relating become evident when students negotiate meaning and interpret culturally influenced behavior during peer exchanges. PAL discussions often require students to reconcile different communication styles, such as directness or deference, and to mediate misunderstandings. Through this interpretive process, students learn to relate others' experiences to their own, which reflects the interpretive competence at the core of Byram's framework. Likewise, the skills of discovery and interaction are activated when learners engage in unfamiliar intercultural encounters, inquire respectfully, and adapt communicative behavior in real time. These skills are especially evident in digital and multilingual PAL environments, where students practice discovery through inquiry based dialogue and interaction across linguistic boundaries (Freiermuth & Hamzah, 2023). The iterative peer reflection that is integral to PAL therefore transforms Byram's fourth component into a living and dynamic practice.

Finally, critical cultural awareness, or the evaluative ability to question one's own values and those of others, emerges through guided reflection and feedback cycles within PAL. Repeated peer dialogue invites participants to examine cultural assumptions and power relations within both interpersonal and institutional contexts. For Burmese ICT students, reflecting on cross linguistic experiences and academic hierarchies in Thai settings promotes metacognitive insight and aligns with Byram's highest order savoir, the capacity to act ethically and

reflectively in intercultural situations (Byram, 1997). Such reflection is reinforced by collaborative inquiry and collective analysis in PAL research cycles (Bacon et al., 2021).

However, Byram's framework presents certain limitations when applied in Southeast Asian contexts. Scholars have noted its Eurocentric origins, rooted in Western liberal humanist ideals of the intercultural speaker that assume balanced power relations and linguistic parity (Holmes & O'Neill, 2012). In ICT focused higher education, these assumptions may not hold true, as learners navigate linguistic, technological, and geopolitical hierarchies that shape communication (Kennedy et al., 2025). Consequently, the model requires contextual adaptation to account for structural inequalities, multilingual negotiation, and culturally specific notions of harmony and collectivism. As Wang & Teo (2024) emphasize, the affective dimensions of IC in Asian contexts often prioritize relational sensitivity and social balance over individual critical autonomy, suggesting the need to recalibrate Byram's constructs to reflect local values.

Empirical findings from PAL studies reinforce this need for contextualization. Research on intercultural peer mentoring (Wang & Kulich, 2015) and collaborative online learning (Freiermuth & Hamzah, 2023) shows that IC development through peer collaboration is iterative, emotionally grounded, and closely tied to learners' sense of belonging. The current study extends this understanding to Burmese ICT students, for whom PAL sessions foster not only linguistic and cultural awareness but also psychological stability and community connection during political uncertainty (Soe & Charoenroop, 2025). These findings point to the emergence of relational intercultural competence, a form of IC grounded in empathy, mutual support, and collective growth that extends beyond the cognitive focus of Byram's original model.

In summary, Byram's (1997) framework offers a robust but flexible foundation for analyzing intercultural learning within PAL. When situated in ICT and Southeast Asian educational environments, its components can be reinterpreted as dynamic and socially mediated practices that unfold through scaffolding, dialogue, and reflection. Although its Western orientation requires adaptation, integrating Byram's model with Vygotsky's sociocultural theory and PAL research strengthens its relevance for understanding how intercultural competence is collaboratively constructed through peer engagement in digitally mediated and culturally diverse settings.

b. Understanding Learning through Vygotsky's SCT

Vygotsky's (1978) SCT emphasizes that cognitive growth arises through social interaction and is mediated by cultural tools such as language (Wertsch, 1991). The theory's central concept, the ZPD, represents the distance between what a learner can accomplish independently and what can be achieved with support from a more knowledgeable peer (Vygotsky, 1978). Learning within the ZPD occurs through interaction and negotiation, where scaffolding enables the gradual internalization of skills, concepts, and perspectives. This focus on guided participation makes SCT particularly relevant to understanding intercultural learning within PAL contexts, where meaning, identity, and understanding are continually co constructed.

In intercultural peer mentoring, SCT provides an explanatory framework for how learners develop communicative flexibility and intercultural understanding through guided dialogue. The ZPD captures the relational dynamic between mentor and mentee as they co negotiate meaning across linguistic and cultural boundaries. Through scaffolded peer exchanges, learners receive linguistic, emotional, and cultural support that facilitates not only cognitive

development but also the affective and behavioral growth central to intercultural competence. In this sense, the ZPD represents more than a cognitive space; it becomes an intercultural zone where diverse perspectives are reconciled through shared reflection and dialogic engagement. As Vygotsky (1978) and Wertsch (1991) suggest, learning is always situated in cultural interaction, and PAL exemplifies this through peer mediated discovery, interpretation, and empathy building.

SCT's relevance to digital PAL settings is also significant. When integrated with communication technologies, SCT explains how online peer collaboration promotes reflective thinking, reciprocal learning, and joint problem solving (Lambright, 2024). Digital tools such as chat platforms, shared documents, and video conferencing extend the boundaries of the traditional ZPD by allowing learners to interact synchronously and asynchronously across cultures. These platforms create opportunities for intercultural scaffolding that transcends spatial and temporal constraints, supporting knowledge construction and cultural exchange beyond the immediate classroom. At the same time, digital mediation can complicate scaffolding by reducing access to nonverbal cues, slowing feedback cycles, and amplifying misunderstandings. Thus, while ICT expands the reach of the ZPD, it also introduces new communicative and cognitive challenges that demand adaptive forms of mentorship and reflective awareness.

SCT's strength lies in its ability to capture the social and dialogic nature of learning, which aligns closely with PAL's emphasis on collaboration and shared meaning making. It provides a conceptual explanation for how intercultural learning unfolds through guided participation, feedback, and co reflection. However, the theory assumes consistent proximity between participants and a stable mentorship structure, conditions that are often disrupted in multicultural and digital environments. In culturally diverse PAL programs, variations in communicative norms, power distance, and language proficiency can make scaffolding uneven or asymmetrical. For example, a mentor from a high context culture may provide implicit feedback that a peer from a low context background struggles to interpret. These variations highlight a limitation of SCT when applied to intercultural peer learning, as it presumes shared understanding of interactional norms that may not exist across cultural contexts.

Moreover, SCT was developed in early twentieth century Russia, where learning interactions were primarily face to face and culturally homogeneous. In contemporary higher education, learning occurs across virtual, multilingual, and cross-cultural spaces that challenge Vygotsky's assumptions about immediacy and shared context. ICT tools modify the social dynamics of the ZPD, transforming it into what some scholars term a distributed or extended ZPD, where learning is mediated through both human and technological agents (Lambright, 2024). This reconfiguration requires mentors to adopt multimodal scaffolding strategies that balance emotional support, cognitive guidance, and technological fluency.

In PAL environments that integrate digital communication, SCT thus remains a powerful yet evolving framework. Its emphasis on co construction, mediation, and cultural tools continues to inform how learners build understanding through collaboration. However, applying SCT to intercultural and technology-enhanced settings demands critical adaptation to account for spatial separation, cultural diversity, and technological mediation. By recognizing both the strengths and constraints of SCT, this study positions the theory as a foundation for analyzing how intercultural peer mentoring operates as a socially mediated, digitally extended process of collaborative meaning making and cultural learning.

Utilizing PAL in Collaborative Educational Contexts

PAL has been widely recognized as an effective and collaborative approach that promotes cognitive, pedagogical, behavioral, and social development through structured interaction, knowledge exchange, and mutual support. In typical PAL models, senior or more proficient students serve as facilitators or mentors, providing academic guidance while fostering a climate of reciprocity and shared responsibility. Through this structure, learners develop cognitive engagement, metacognitive awareness, and improved academic performance across a range of disciplines. However, despite substantial evidence of PAL's effectiveness, research outcomes are not always consistent, and several conceptual and methodological gaps remain unaddressed.

While multiple studies affirm PAL's academic benefits, results vary regarding its influence on intercultural and affective dimensions of learning. For instance, Freiermuth and Hamzah (2023) observed that structured online peer exchanges facilitated intercultural empathy and linguistic development through sustained dialogue, while Awang-Hashim et al. (2022) emphasized reflective learning and student faculty collaboration as key to deep engagement. Yet, few studies have systematically examined the mechanisms by which PAL interactions produce intercultural outcomes, particularly within multilingual or technology oriented higher education environments. Existing studies often highlight the development of communication and collaboration skills but rarely analyze how peer dialogue leads to shifts in intercultural attitudes, interpretive skills, or critical awareness, which are central to Byram's IC model.

From the perspective of SCT, PAL operates as a dynamic process of social mediation, where learning occurs through the ZPD (Vygotsky, 1978; Wertsch, 1991). Within intercultural PAL, this process extends beyond cognitive scaffolding to include negotiation of meaning across cultural frames of reference. Interaction between mentors and mentees allows for mutual interpretation and co construction of understanding, thereby linking SCT's principles of mediated learning with Byram's effective and behavioral dimensions of IC. Through sustained interaction, students collaboratively interpret cultural cues, reflect on differences, and internalize intercultural dispositions, following a sequence that can be summarized as PAL leading to interaction, then reflection, and ultimately intercultural competence. This alignment demonstrates that PAL is not only an academic support mechanism but also an intercultural learning framework that transforms the social act of mentoring into a developmental process of global awareness and self-reflection.

Despite its potential, much of the PAL literature remains concentrated in Western or monolingual settings, leaving significant gaps in understanding how the model functions in multicultural or linguistically diverse contexts. Studies have rarely examined how PAL operates within STEM fields, where communication barriers and disciplinary discourse differ from language or humanities programs. Similarly, research has largely overlooked marginalized learner populations, such as international or refugee students, whose participation in PAL programs may be shaped by inequitable power relations, limited linguistic access, or digital divides. In Southeast Asian contexts, including Myanmar and Thailand, these structural and cultural variables are particularly relevant yet remain under investigated.

Methodologically, prior PAL studies have been criticized for their reliance on small sample sizes, self-reported perceptions, and descriptive analyses rather than longitudinal or experimental designs. Many studies document positive outcomes without critically evaluating the processes that lead to those outcomes or the contextual constraints that may limit scalability. Furthermore, the digital transformation of education has outpaced theoretical adaptation,

resulting in limited attention to how online or hybrid PAL environments reshape the dynamics of scaffolding, reciprocity, and cultural negotiation. Lambright (2024) emphasizes that technology mediated interaction extends opportunities for peer collaboration but simultaneously complicates real time feedback, nonverbal communication, and the emotional aspects of learning support. These complexities underscore the need to integrate SCT and IC frameworks to explain how intercultural learning unfolds through digital PAL, where technology functions as both a bridge and a barrier to meaning making.

In sum, while PAL has been validated as a vehicle for academic and social development, its intercultural and technological dimensions require deeper theoretical and empirical exploration. Comparative analysis across studies reveals an uneven understanding of how PAL fosters intercultural competence, particularly in STEM fields and among underrepresented learners. By situating PAL within the combined frameworks of SCT and IC, this study extends existing scholarship to examine how social interaction, guided reflection, and digital mediation collectively promote the co construction of intercultural understanding in higher education.

Leveraging ICT for Cross-Cultural Interaction

The rapid advancement of digital technologies has transformed the nature of intercultural communication by enabling immersive, student led, and geographically unbounded collaboration (Wang, 2023). Within educational settings, ICT plays an increasingly central role in supporting intercultural learning by providing platforms where learners can interact, negotiate meaning, and reflect on cultural differences. When combined with Peer Assisted Learning (PAL), digital environments create authentic opportunities for socially mediated learning that align with the principles of SCT and the developmental dimensions of IC.

From an SCT perspective, ICT serves as a cultural tool that mediates learning through interaction and dialogue. In online PAL contexts, the ZPD is extended beyond the physical classroom as learners engage with mentors and peers across spatial and temporal boundaries. Synchronous exchanges such as video meetings and real time chat sessions allow immediate scaffolding, feedback, and joint problem solving, reflecting the collaborative essence of Vygotsky's theory (Vygotsky, 1978; Wertsch, 1991). These synchronous environments foster relational immediacy and emotional engagement, essential for the development of empathy and openness central to Byram's IC model (Byram, 1997). In contrast, asynchronous interaction through discussion boards, recorded sessions, and shared documents encourages deeper reflection and self-regulation, allowing learners to internalize intercultural insights at their own pace. The interplay between synchronous immediacy and asynchronous reflection illustrates how digital modalities shape the rhythm of intercultural learning within PAL.

However, the role of ICT in fostering intercultural learning is not without tension. Digital divides, unequal access, and varying levels of digital literacy continue to impede equitable participation, particularly for learners from rural or marginalized backgrounds. These structural disparities limit opportunities for authentic dialogue and reinforce existing inequalities in global education (Wang, 2023). Furthermore, the absence of nonverbal cues and contextual grounding in online communication can amplify cultural misunderstandings, misinterpretations of tone, or perceived disengagement. In some cases, differences in communicative norms may lead to silence being interpreted as disinterest rather than respect, revealing how intercultural sensitivities can be distorted in digital spaces. These tensions underscore that technology, while extending access, also introduces new layers of complexity in sustaining inclusive and meaningful intercultural dialogue.

Integrating SCT and IC frameworks helps explain both the potential and challenges of ICT in PAL environments. From an SCT viewpoint, digital tools transform the ZPD into an extended and distributed learning space where cultural mediation occurs through both human and technological agents (Lambright, 2024). Technology thus becomes part of the scaffolding process, offering learners varied channels for feedback, co construction, and reflection. At the same time, applying Byram's IC model clarifies the intercultural dimensions of this mediation: ICT enables the development of attitudes of curiosity and empathy through sustained peer contact, supports the acquisition of intercultural knowledge through exposure to diverse perspectives, and enhances skills of interpreting, relating, and discovery through digitally mediated exchange. PAL participants learn to navigate diverse communicative styles, negotiate meaning across cultural boundaries, and critically evaluate their assumptions—all of which contribute to the growth of intercultural competence in digital contexts.

Nevertheless, these processes depend heavily on the quality of interaction and the design of the learning environment. When digital PAL is structured around collaborative reflection, mentoring, and reciprocity, it fosters intercultural growth consistent with SCT's emphasis on socially mediated development. Yet when poorly facilitated or unequally accessed, ICT can reinforce isolation, reduce authenticity, and hinder critical engagement. The challenge for educators lies in designing technology supported PAL that balances synchronous immediacy with asynchronous depth, ensuring that all participants, regardless of linguistic background or digital access, can engage equitably in intercultural learning.

Gaps in the Literature

The preceding review reveals that although extensive scholarship has explored PAL, IC, and technology enhanced learning, the findings across these areas remain fragmented and inconsistent. While many studies have confirmed PAL's positive impact on cognitive and academic outcomes, there is limited understanding of how intercultural and affective dimensions develop through sustained peer interaction. Most prior studies have approached PAL as an instructional method rather than as a mechanism for intercultural growth, resulting in a theoretical and empirical gap between pedagogical outcomes and the development of intercultural competence (Zhang & Li, 2024). This lack of integration highlights the need for research that explains how interaction and reflection within PAL settings contribute to the attitudinal, cognitive, and behavioral dimensions outlined in Byram's IC framework (Byram, 1997).

A second gap concerns the inconsistent incorporation of digital technologies within PAL frameworks. Although studies have shown that online collaboration and communication tools enhance access and participation, the literature remains divided regarding how these tools mediate intercultural learning processes (Masterson, 2020; Wang, 2023). Some research emphasizes the motivational benefits of virtual learning, while others report limited depth of reflection and sustained engagement. The earlier critique of technology mediated learning suggests that ICT can both extend and complicate Vygotsky's concept of the ZPD by altering feedback cycles and reducing nonverbal cues essential for intercultural understanding (Lambright, 2024). Despite these theoretical implications, few studies have systematically examined how synchronous and asynchronous PAL interactions shape learners' intercultural development over time, particularly in multilingual higher education environments.

Third, there is a notable absence of research focusing on marginalized or underrepresented learner populations. Previous PAL studies have predominantly centered on Western or monolingual contexts, neglecting Southeast Asian learners whose intercultural experiences are shaped by linguistic diversity, economic inequality, and regional mobility. Burmese students, who constitute one of the largest international student groups in Thailand, remain under examined in peer learning research despite their distinct sociocultural and linguistic challenges (Hu & Cheung, 2024). The limited inclusion of this population reflects a broader methodological imbalance in the literature, which tends to generalize findings from homogeneous samples to global contexts without accounting for local variations in power dynamics, communication styles, and educational resources.

Methodologically, existing PAL and IC research often relies on small scale, cross sectional, or self-reported data that provide limited insight into the long-term developmental impact of peer interaction. Few studies have employed longitudinal or mixed methods designs that trace how intercultural growth unfolds through iterative cycles of mentoring, reflection, and digital engagement. This shortcoming restricts understanding of how sustained participation in PAL environments influences both cognitive and affective learning outcomes. Moreover, limited theoretical integration across studies has led to a descriptive rather than analytical treatment of PAL's role in fostering intercultural learning, leaving unclear how peer scaffolding, negotiation of meaning, and reflection interact to support IC development (Hu & Cheung, 2024).

The present study addresses these gaps through a theoretically grounded and context specific investigation of digitally supported PAL among Burmese ICT students in Thailand. It integrates Byram's model of Intercultural Competence and Vygotsky's Sociocultural Theory to explain how intercultural learning is socially mediated and technologically extended. By focusing on an underrepresented student population in a STEM related field, the study contributes new empirical evidence to an area largely overlooked in PAL and IC research. Its mixed methods design, combining quantitative and qualitative data, captures both immediate and sustained changes in attitudes, skills, and reflective capacity. In doing so, this research advances theoretical understanding of how PAL facilitates intercultural growth and provides practical insights into how universities can design inclusive, technology enhanced peer learning programs that promote global competence in diverse higher education contexts.

Summary

This chapter has synthesized the theoretical and empirical foundations that inform the present study, establishing how IC, SCT, PAL, and ICT interact to form a coherent conceptual framework. Together, these perspectives explain how intercultural learning develops through social interaction, reflective engagement, and technological mediation. The synthesis presented here provides the conceptual basis for the study's research model and methodological design.

Byram's IC model outlines the desired outcomes of intercultural learning, encompassing attitudes of openness, knowledge of cultural systems, skills of interpreting and relating, skills of discovery and interaction, and the development of critical cultural awareness (Byram, 1997; Wang & Teo, 2024). Vygotsky's SCT explains how such outcomes emerge through guided participation, scaffolding, and socially mediated learning within the ZPD (Vygotsky, 1978; Wertsch, 1991). PAL operationalizes these theoretical principles by creating a structured environment for interaction and reflection in which students act as both learners and mentors, collaboratively constructing meaning through dialogue (Wang & Kulich, 2015). ICT serves as the mediating mechanism that connects and extends these interactions, enabling synchronous

engagement and asynchronous reflection across diverse cultural and linguistic contexts (Lambright, 2024; Wang, 2023).

The integration of these frameworks yields a conceptual pathway that positions interaction as the catalyst for learning (SCT), reflection as the process of internalization (PAL), and intercultural competence as the outcome (IC). ICT tools sustain and amplify this cycle by expanding the spatial and temporal boundaries of the ZPD, allowing intercultural exchange to occur beyond the traditional classroom. Within this model, PAL becomes a bridge that links Vygotsky's principles of social learning with Byram's dimensions of intercultural growth, while ICT provides the infrastructure through which these processes are enacted. The result is a comprehensive theoretical logic in which interaction, scaffolding, reflection, and intercultural development continuously reinforce one another, illustrating that digital PAL environments are not merely supportive tools but transformative spaces for intercultural meaning making.

The review also identified key gaps that justify the design of the present study. Prior research has rarely examined how digitally mediated PAL fosters intercultural competence among students in multilingual and technology-based programs, particularly Burmese learners in Thai higher education (Hu & Cheung, 2024). Most studies remain descriptive and short term, emphasizing academic performance without exploring the effective, social, and reflective dimensions of learning (Masterson, 2020; Zhang & Li, 2024). In addition, methodological limitations such as small sample sizes and cross-sectional approaches have restricted understanding of how intercultural growth unfolds over time. These gaps underscore the need for a theoretically integrated and empirically grounded investigation that examines how PAL, guided by SCT and IC, supports intercultural development through sustained and technology enhanced collaboration.

In response, the present study combines SCT and IC to explain how intercultural learning is socially mediated and technologically extended. PAL provides the practical structure through which these theoretical insights are applied, while ICT facilitates meaningful interaction and reflection across cultures. The study's mixed methods design captures both quantitative and qualitative dimensions of development, allowing for a nuanced understanding of how peer learning supports intercultural growth. In this way, the research not only addresses previously identified gaps but also contributes to a more comprehensive understanding of intercultural learning in digital higher education contexts.

To clearly demonstrate how the study's conceptual constructs are operationalized, **Table 1** below maps each construct to its subcomponents, theoretical foundation, data collection instruments, and analytical strategies. This mapping functions as a conceptual bridge between the literature review and the methodology, illustrating how the integrated framework of IC, SCT, PAL, and ICT is applied in the design and analysis of the study.

Table 1. Mapping of Constructs and Sub-Components to Research Instruments and Analytical Approaches

Construct	Sub-Components	Theoretical Basis	Data Collection Instruments	Analytical Strategies
IC	Attitudes, Knowledge, Skills, Critical Cultural Awareness	Byram's IC model (1997)	Likert-scale questionnaire, Semi-structured interviews	Quantitative: Descriptive stats Qualitative: Thematic analysis

PAL	Mentorship, Collaborative Tasks, Cultural Exchange Activities	Vygotsky's SCT, PAL frameworks	Semi-structured interviews	Qualitative thematic coding (based on PAL process elements)
Career Preparedness	Leadership, Adaptability, Multilingual Communication	Global competence literature (e.g., (OECD, 2018))	Semi-structured interviews	Thematic coding; narrative analysis
Student Perceptions	Affective responses, Engagement, Motivation	Mixed-method EFL studies	Semi-structured interviews	Inductive thematic analysis

Operational Definitions of Key Constructs

To enhance clarity and ensure transparency in the study's measurement model, four core constructs are operationally defined: IC, PAL, global readiness, and student perceptions. IC is defined according to Byram's (1997) model, which includes five sub-components: attitudes, knowledge, skills of interpreting and relating, skills of discovery and interaction, and critical cultural awareness. This construct is operationalized through a Likert-scale questionnaire mapped to these components, as well as through thematic coding of interview data using Byram's framework. PAL refers to structured, collaborative interactions in which trained student mentors guide peers through academic and intercultural activities. It is operationalized via observations of PAL sessions, and interviews that highlight mentorship, collaboration, and reciprocal learning. Global readiness, based on the OECD's (2018) global competence framework, is defined as the ability to engage effectively in multicultural professional contexts. It is measured through post-intervention interviews focusing on leadership, adaptability, and multilingual communication. Lastly, student perceptions encompass participants' affective responses and evaluations of their PAL experience, operationalized through open-ended survey items and interview reflections that explore engagement, motivation, and perceived learning outcomes.

3. Methodology

This research adopts a PAR framework, chosen for its emphasis on collaborative inquiry and cyclical problem-solving grounded in participants' lived experiences. Given the study's dual focus on IC and PAL within STEM education, the PAR approach was particularly appropriate as it allows participants to function as co-researchers who both experience and reflect upon intercultural peer learning processes.

To address the study's theoretical alignment and ensure measurement transparency, both IC and PAL were operationalized through clearly defined subcomponents and corresponding research instruments. IC was defined using Byram's (1997) model, encompassing five measurable dimensions—attitudes, knowledge, skills of interpreting and relating, skills of discovery and interaction, and critical cultural awareness. These domains were systematically integrated into the post-program questionnaire and semi-structured interviews to capture participants' intercultural growth. Similarly, PAL was operationalized through constructs derived from Topping (2005) and Bacon et al. (2021) frameworks, emphasizing mentorship, collaboration, reciprocity, and culturally focused peer engagement.

This section therefore outlines not only the study's research design, participant selection, data collection, and analysis, but also clarifies how each construct (IC and PAL) was empirically measured and linked to the corresponding items and interview prompts presented in later subsections and summarized in the operationalization table. These procedures collectively ensure that the theoretical constructs are traceable across the design, instruments, and analytical framework, aligning with Reviewer #1's recommendation for methodological precision and construct mapping.

Research Design: PAR

a. Justification for Applying PAR in STEM Education

Participatory Action Research (henceforth PAR) was selected as the methodological framework for this study because it emphasizes collaborative inquiry, reflection, and iterative improvement—core principles that align with the social-constructivist foundations of both IC and PAL. In contrast to traditional research paradigms, PAR positions participants as co-researchers who jointly identify challenges, implement interventions, and evaluate outcomes. This participatory structure mirrors the developmental logic of Vygotsky's SCT, in which learning and intercultural growth occur through guided interaction within the ZPD. Within STEM contexts, this cyclical design is particularly suitable for examining how peer collaboration enhances intercultural learning and communication across technological disciplines.

To strengthen methodological transparency and address Reviewer #1's concerns about construct operationalization, both IC and PAL were explicitly defined and mapped to measurable indicators embedded in the PAR cycles. IC was operationalized through Byram's (1997) five dimensions (attitudes, knowledge, skills of interpreting and relating, skills of discovery and interaction, and critical cultural awareness) each represented by specific questionnaire items and mirrored interview questions. PAL was operationalized through Topping (2005) and Bacon et al. (2021), focusing on mentorship, collaboration, reciprocity, and intercultural dialogue. During each PAR cycle, these constructs informed the design of peer activities, reflective prompts, and data-collection instruments, ensuring theoretical and empirical alignment between the framework and its measurement.

Table 2 presents the explicit mapping between research questions, objectives, data-collection methods, and analytical strategies, highlighting how IC and PAL constructs guided all methodological decisions.

Table 2. Alignment of Research Questions, Objectives, Methodology, and Analytical Strategies

Research Question	Corresponding Objective	Research Design / Data Collection	Analytical Strategy
RQ1: How do PAL sessions contribute to the development of intercultural competence among ICT students?	Assess the effectiveness of PAL in enhancing IC among Burmese ICT students.	PAR Cycle 1–3; Post-study questionnaire; Semi-structured interviews	Quantitative: Likert-scale analysis Qualitative: Thematic coding (Byram's IC model)
RQ2: What specific elements of PAL programs enhance	Identify key pedagogical and social factors that	Semi-structured interviews	Qualitative thematic analysis guided by Byram's IC components

cultural exchange and understanding among ICT students?	contribute to cultural competency development.		(skills, attitudes, knowledge)
RQ3: How do ICT students perceive the impact of PAL on their readiness to work in multicultural professional environments?	Analyze students' perceptions of how PAL influences their ability to collaborate in multicultural contexts.	Post-study questionnaire (leadership, confidence); Semi-structured interview questions on career readiness	Mixed-methods integration: Descriptive stats + coded narratives (leadership, adaptability, communication)

b. Participant Involvement in the Research Process

Participants assumed dual roles as learners and co-researchers, actively engaging in PAL sessions designed to elicit the five dimensions of IC through peer mentoring, intercultural dialogue, and collaborative reflection. Each cycle of the PAR process consisted of: (1) identifying intercultural or communicative challenges in peer interaction, (2) implementing PAL-based interventions that targeted specific IC domains (e.g., activities promoting openness or interpretive skills), (3) collecting data through questionnaires and interviews mapped to these constructs, and (4) reflecting on outcomes to refine subsequent sessions. This cyclical design ensured that data collection directly captured observable and self-reported indicators of IC and PAL development.

Figure 3 illustrates the flow of activities across the three PAR phases and their connection to the operationalized constructs and instruments.

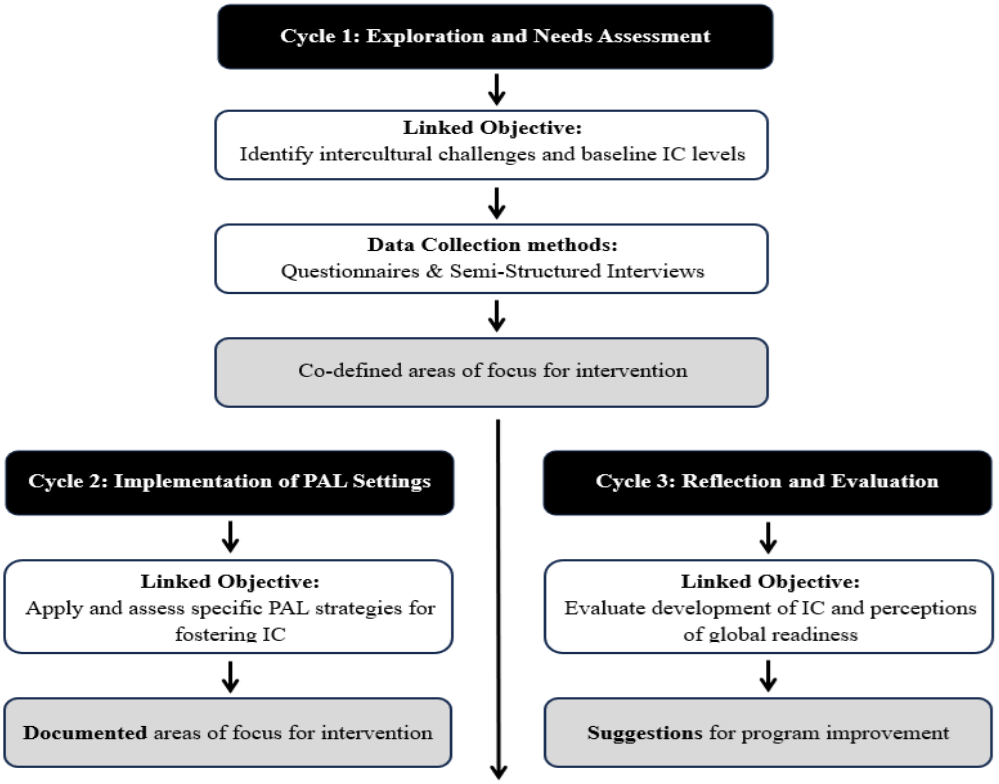

Figure 3: Schematic Diagram of the PAR Process and Its Alignment with Research Objectives and Data Collection Methods

c. Participants and Study Setting

The study took place at a Peer-Assisted Learning Center in a private Thai university. Thirty-six Burmese undergraduate ICT students participated as international peer mentors in weekly PAL sessions that integrated intercultural communication and STEM-related tasks. These sessions were structured around Byram's (1997) IC components (attitudes, knowledge, and skills of interaction) and PAL elements of mentoring and collaboration. This structure allowed the operationalized constructs to be enacted and observed in authentic peer contexts. Purposeful sampling ensured diversity in language background, prior PAL experience, and exposure to intercultural environments, enabling the analysis to capture multiple expressions of the constructs under investigation. The sampling and demographic criteria outlined above align with recommendations for transparency in mixed-methods designs (Creswell & Plano Clark, 2018).

d. Techniques Employed for Data Collection

A mixed-methods approach was employed to capture both the measurable and experiential dimensions of IC and PAL. Quantitative data were gathered through a 30-item Likert-scale questionnaire developed from Byram's (1997) framework, with items grouped under three IC domains—Attitudes (Q1–Q10), Cultural Knowledge (Q11–Q20), and Interaction Skills (Q21–Q25)—plus five items (Q26–Q30) that measured key PAL processes (mentorship, collaboration, cultural exchange).

Qualitative data were obtained through semi-structured interviews with 19 participants, whose questions paralleled the constructs in the survey (e.g., reflections on openness → IC attitudes; experiences of collaboration → PAL reciprocity).

This alignment between theory and instrument allowed that every data source corresponded directly to an operationalized construct. A summary of these linkages is presented in Table 3. Qualitative coding and quantitative grouping followed the structure presented in Table 3, ensuring consistency between the operationalized constructs and the data analysis categories.

Table 3. Operationalization of IC and PAL Constructs Across Data Collection Instruments

Construct	**Subcomponent / Indicator**	**Questionnaire Items (Appendix 1)**	**Interview Prompts (Appendix 2)**	**Theoretical Basis**
Intercultural Competence (IC)	Attitudes (openness & curiosity)	Items 4 – 9 ("willing to share experiences," "develop leadership," "connected to cultural roots")	Q2 – Q3 (understanding Thai culture; helpful aspects of PAL sessions); Q8 (attitude changes toward Thai culture)	Byram (1997)
	Knowledge (cultural awareness & understanding)	Items 5, 8, 9 (awareness of culture through volunteering, personal growth)	Q2 – Q5 (understanding Thai culture, interaction with Thai students); Q10 (cultural exchange examples)	Byram (1997)
	Skills of interpreting & relating	Items 15, 23, 25 ("sense of accomplishment," "making a difference")	Q6 (intercultural competence development); Q10 (cultural exchange	Byram (1997)

			instances)	
	Skills of discovery & interaction	Items 17, 18, 20 ("inclusive environment," "satisfaction with resources")	Q7 (comfort communicating with Thai and international peers); Q9 (personal growth and development)	Byram (1997)
	Critical cultural awareness	Items 22, 24, 27 ("help others cope," "empowered to address challenges")	Q8 – Q9 (attitude change and self-reflection on culture); Q19 – Q20 (contextual awareness and recommendations)	Byram (2000)
Peer-Assisted Learning (PAL)	Mentorship & collaboration	Items 6, 7, 12, 16, 17, 19, 20 (academic support, peer respect, training resources)	Q1 (overall experience as mentor); Q13 (responsibility management); Q14 – Q15 (university support & resources)	Topping (2005); Bacon et al. (2021)
	Cultural exchange & reciprocity	Items 26, 29, 30 (advocacy for students, awareness of Myanmar situation, overall satisfaction)	Q2 – Q5 (understanding Thai culture, interaction, exchange); Q10 (cultural exchange example); Q11 (balance of academic support and exchange)	Bacon & Torremucha (2025b)
	Personal growth & community impact	Items 1, 2, 8, 9, 15, 23 (motivation, leadership, sense of purpose)	Q9 (personal growth and development); Q18 (sense of purpose and accomplishment)	Topping (2005); Byram (1997)
	Emotional resilience & social support	Items 3, 13, 14, 21 (emotional well-being, continuing volunteering)	Q17 (emotional and psychological well-being); Q19 (impact of political context on mentoring)	Bacon et al. (2021)

Participants and Study Setting

This study was conducted at a PAL center located within a private Thai university. Participants were selected through a purposive sampling approach designed to ensure diversity in intercultural exposure, language background, and prior PAL experience. A total of 36 Burmese undergraduate students majoring in ICT voluntarily participated as international peer mentors during Term 1 of the 2024 academic year.

Participants ranged in age from 19 to 23 years (M = 20.4) and included 22 males and 14 females. Most had resided in Thailand for one to three years and possessed intermediate to upper-intermediate English proficiency, enabling active engagement in English-mediated PAL sessions.

Inclusion criteria required that students (a) be Burmese nationals enrolled in the ICT faculty, (b) have participated in at least three PAL sessions before data collection, and (c) demonstrate sufficient English proficiency to communicate in intercultural peer settings. Exclusion criteria eliminated students who were not active PAL participants, had fewer than three recorded sessions, or were outside the ICT discipline.

Weekly PAL sessions were facilitated by trained international mentors and integrated academic writing, intercultural communication, and reflective dialogue activities. These sessions provided the primary environment for observing and assessing the development of intercultural competence (IC) and peer collaboration.

Techniques Employed for Data Collection

A mixed-methods design was adopted to examine how PAL supports the development of IC among Burmese ICT students. Participants for both data strands were drawn from the purposive sample described in Section 3.2 to ensure consistency between quantitative and qualitative phases.

Quantitative phase: Data were collected through a post-study questionnaire administered to all 36 purposively selected participants. The instrument included 30 Likert-scale items derived from Byram's (1997) IC model, covering attitudes, cultural knowledge, and interactional skills, together with five items assessing core PAL processes such as mentorship, collaboration, and cultural exchange. The questionnaire also contained brief demographic items confirming participants' age, gender, and English-proficiency level to contextualize responses.

Qualitative phase: To gain deeper insight into students' experiences, 19 participants were selected from the same sample using maximum-variation purposive sampling to represent different genders, English-proficiency levels, and lengths of residence in Thailand. Semi-structured interviews explored participants' reflections on intercultural engagement, PAL's influence on STEM-related collaboration, challenges in cross-cultural teamwork, and perceived career relevance.

Integrating both data sources provided a comprehensive anlaysis of self-reported quantitative trends with qualitative narratives, enabling a comprehensive understanding of how structured PAL sessions foster intercultural growth within digitally supported higher-education environments.

a. Pilot Testing and Instrument Validation

Prior to full deployment, the study's primary instruments, including the IC questionnaire and semi-structured interview guide, were pilot tested with a sample of 30 Burmese ICT students who were not part of the present study. The pilot test aimed to assess item clarity, survey flow, and overall comprehension, while also offering a preliminary indication of instrument reliability. Feedback was collected through brief follow-up discussions and written reflections, leading to the refinement of ambiguous items and the removal of one redundant question. To evaluate internal consistency, Cronbach's alpha was calculated for the Likert-scale sections of the questionnaire, yielding a coefficient of 0.893, indicating high reliability. Content validity was also examined through expert review by two faculty members in applied linguistics and intercultural communication, who confirmed alignment with Byram's IC model and provided minor wording adjustments. The finalized instruments were then administered to the full participant sample as described in the subsequent sections.

Data Analysis

Data analysis was guided by the operational framework outlined in Table 3, which aligns the theoretical constructs of IC and PAL with their corresponding questionnaire items and interview prompts. Quantitative grouping and qualitative coding were structured according to Byram's (1997, 2000) five *savoirs* for IC and Topping's (2005) and Bacon et al.'s (2021) dimensions of PAL, ensuring consistency between construct definition, instrument design, and analytical interpretation.

This study employed both quantitative and qualitative methods to assess the impact of PAL on IC. Quantitative data from 36 structured questionnaires were analyzed using descriptive and inferential statistics. The 30-item instrument, categorized into three domains—Motivation and Emotional Resilience, Personal Growth and Community Impact, and Academic Support and Team Environment—was validated by three experts (IOC = 1.0) and pilot-tested, confirming strong internal reliability. Likert-scale items (1 = Strongly Disagree to 5 = Strongly Agree) were interpreted using Brown's (2010) satisfaction scale.

For qualitative analysis, transcripts from 19 semi-structured interviews were examined through thematic coding based on Byram's IC model. To ensure analytic reliability, two trained researchers independently coded approximately 25 percent of the interview transcripts using the agreed thematic framework. Inter-coder agreement reached 0.87 (Cohen's κ), indicating a high level of consistency. Discrepancies were discussed and resolved through consensus meetings, and an audit trail was maintained to document coding decisions and theme development, following Braun and Clarke (2006). Key themes were aligned with intercultural attitudes, knowledge, interpretative skills, interaction, and critical cultural awareness. This approach allowed for a deep exploration of participants' lived experiences in PAL contexts.

By integrating statistical trends with qualitative narratives, this mixed-methods analysis provided a comprehensive, data-driven understanding of how PAL fosters IC development. The insights enhance the validity of the findings and inform institutional strategies for promoting intercultural learning through structured PAL frameworks.

Ethical Considerations

All participants were informed of the study's purpose, procedures, and potential risks, and provided written consent prior to participation. Data were anonymized, with pseudonyms used in all transcripts and responses. Ethical approval was granted by the host university, ensuring adherence to institutional guidelines for human subjects research. In line with PAR, participants contributed to interpreting the findings, ensuring authentic representation of their experiences. This ethically grounded approach ensured confidentiality, voluntary participation, and collaborative reflection throughout the research process.

4. Results

This section presents the findings of the study in alignment with the three research questions. Data are drawn from two complementary sources: (a) a 30 item post program questionnaire completed by 36 Burmese ICT students, and (b) semi structured interviews with 19 participants. Quantitative analysis of the questionnaire generated descriptive statistics across three core domains: Motivation and Emotional Resilience (M = 3.48, SD = 0.85), Personal Growth and

Community Impact (M = 3.71, SD = 0.80), and Academic Support and Team Environment (M = 3.61, SD = 0.89), indicating overall high satisfaction with PAL participation. Qualitative data provided rich insight into students' lived experiences, illustrating how peer interaction fostered intercultural understanding, emotional stability, and readiness for global collaboration. The results are therefore organized by research question: Section 4.1 examines how PAL influenced intercultural attitudes, knowledge, and skills (RQ1); Section 4.2 identifies the PAL processes that most effectively facilitated intercultural learning (RQ2); and Section 4.3 explores students' perceived readiness for multicultural professional environments (RQ3). This structure ensures direct correspondence between each research question, its associated data sources, and the key empirical findings that emerged from the study.

Findings for RQ1: Influence of PAL on Intercultural Attitudes, Knowledge, and Skills

Research Question 1 asked: To what extent does participation in structured PAL sessions influence Burmese ICT students' intercultural attitudes, cultural knowledge, and communication skills as conceptualized in Byram's model of intercultural competence?

Quantitative results indicated that participation in PAL sessions positively influenced students' intercultural development. Among the three core domains measured through the post program questionnaire, participants reported high levels of satisfaction across indicators reflecting intercultural growth. The overall mean scores for Motivation and Emotional Resilience (M = 3.48, SD = 0.85), Personal Growth and Community Impact (M = 3.71, SD = 0.80), and Academic Support and Team Environment (M = 3.61, SD = 0.89) demonstrate strong agreement that PAL experiences enhanced motivation, confidence, and collaboration. Items most closely aligned with Byram's attitudinal and relational dimensions—such as "I am willing to share my experiences as a Burmese student with the management team and peers" (M = 3.72) and "Volunteering as a student manager helps me develop leadership skills" (M = 3.79)—showed particularly high satisfaction, suggesting that PAL participation nurtured openness, curiosity, and engagement with others.

Qualitative interview responses corroborated these findings, revealing that students consistently associated PAL with improved intercultural attitudes, increased cultural awareness, and enhanced communicative ability. Many participants described PAL sessions as spaces that fostered friendship, empathy, and cross-cultural understanding. One mentor explained, "PAL sessions helped me understand Thai culture through peer interaction, discussions on customs, language practice, and practical advice. They also build connections, making adaptation easier". Another participant added, "PAL sessions improved my intercultural competence by enhancing communication, cultural awareness, adaptability, and empathy." Collectively, these accounts demonstrate that sustained peer contact within PAL environments encouraged both cognitive and affective engagement with cultural diversity.

Evidence of growth in cultural knowledge also emerged strongly. Several students noted that PAL activities allowed them to learn about Thai values of respect, patience, and harmony. Comments such as "I learned about the wai gesture, practiced polite language, and explored Thai festivals and food" illustrate how structured intercultural encounters helped participants internalize culturally specific norms and practices. This aligns with Byram's knowledge component, which emphasizes awareness of social groups and cultural conventions beyond one's own experience.

Furthermore, the skills of interpreting and relating were evident in students' ability to draw parallels between Thai and Burmese cultural traditions. For example, one participant stated, "During a PAL session, a Thai student taught me about Loy Krathong, and I shared a similar festival from my culture. This exchange deepened our mutual understanding and respect." Such reflections highlight students' emerging capacity to interpret unfamiliar behaviors and relate them to familiar contexts, which is central to intercultural competence.

The findings also reveal improvements in skills of discovery and interaction, as students demonstrated greater confidence in initiating and maintaining cross cultural communication. Many described feeling more comfortable speaking with Thai and international peers, noting that the PAL environment provided a safe and inclusive space for authentic dialogue. One student commented, "I feel comfortable communicating because the supportive PAL sessions have boosted my confidence and skills." These experiences illustrate how PAL's peer mediated format functioned as a practical arena for developing communicative flexibility and cross-cultural sensitivity.

Finally, indicators of critical cultural awareness were apparent in students' self reflections on the sociopolitical situation in Myanmar and their empathy toward peers facing similar challenges. Questionnaire items such as "I feel empowered to address challenges related to political unrest through my role as a student manager" (M = 3.26) and "Volunteering as a student manager helps me stay positive despite the situation in Myanmar" (M = 3.40) demonstrate that students connected their intercultural engagement to broader social and ethical understandings. Interviews reinforced this insight, with mentors describing increased sensitivity and a stronger sense of responsibility toward others.

In summary, results for RQ1 confirm that PAL participation significantly contributed to the development of intercultural attitudes, knowledge, and skills among Burmese ICT students. Quantitative findings revealed high satisfaction across affective, cognitive, and behavioral dimensions of intercultural competence, while qualitative narratives illustrated authentic examples of empathy, cultural curiosity, and communicative adaptability. Together, these data suggest that PAL provides a socially meaningful and emotionally supportive environment that promotes the holistic growth of intercultural competence in alignment with Byram's framework.

Together, the statistical and thematic results indicate that quantitative gains in intercultural attitudes are reflected in participants' qualitative accounts of empathy and openness.

Findings for RQ2: PAL Processes that Facilitate Intercultural Learning

Research Question 2 examined which specific PAL processes most effectively facilitated intercultural learning among Burmese ICT students. Analysis of both quantitative and qualitative data revealed that intercultural development was supported through a combination of structured collaboration, reciprocal mentoring, emotional support, and guided exposure to Thai language and cultural practices. These processes correspond to the interactive and reflective dimensions of PAL, which emphasize co construction of knowledge, shared responsibility, and peer-based communication as mechanisms for learning.

Quantitative evidence from the post program questionnaire indicated that PAL processes created a positive and inclusive environment that sustained learning and emotional stability. Items associated with Academic Support and Team Environment recorded consistently high mean scores, including "Volunteering as a member of the student management team has a

positive impact on my academic performance" (M = 3.74) and "The PAL center provides a safe and inclusive environment for me to volunteer" (M = 3.60). These results suggest that structured teamwork and a supportive climate were critical in enabling mentors to engage confidently across linguistic and cultural boundaries. Furthermore, satisfaction with peer recognition and respect (M = 3.70) underscores that mutual appreciation within PAL teams strengthened interpersonal trust and encouraged sustained intercultural dialogue.

The qualitative interviews elaborated on the mechanisms through which these PAL processes fostered intercultural learning. Participants consistently described peer interaction as the most influential process, particularly in enabling them to practice language, negotiate meaning, and adapt to Thai communication styles. One mentor noted, "PAL sessions help by fostering understanding of Thai culture through peer interaction, discussions on customs, language practice, and practical advice." Another reflected, "The most helpful aspects of PAL sessions have been learning Thai etiquette, practicing the language, exploring traditions like festivals and food, and experiencing the value of harmony in group activities". These comments highlight that intercultural learning emerged not from formal instruction but through authentic peer relationships that encouraged both empathy and experimentation.

Collaborative reflection and shared leadership also played central roles in facilitating intercultural learning. Students emphasized that mentoring and being mentored in alternating roles promoted mutual respect and humility. One participant described, "As a mentor in PAL sessions, I guide peers, encourage collaboration, foster independence, and gain leadership and communication skills." This dual role of teacher and learner allowed mentors to critically examine their own cultural assumptions while appreciating the perspectives of others. The reciprocity embedded in PAL thus became an experiential process through which intercultural competence was co-constructed rather than transmitted.

Another significant process was guided cultural exchange through communication and language use. Many participants reported that informal Thai language practice and discussion of local customs reduced anxiety and increased their adaptability. For instance, one student shared, "PAL sessions have helped me understand Thai culture through hands on experiences like learning the wai gesture and polite language." Others mentioned that discussions comparing Thai and Burmese traditions deepened their understanding of cultural similarities and differences. This pattern illustrates how PAL's communicative tasks functioned as lived practice of intercultural negotiation.

Emotional and institutional support further reinforced intercultural learning. High satisfaction with items such as "I feel emotionally supported by my peers and supervisors" (M = 3.44) and "I receive adequate support from the university while volunteering" (M = 3.49) indicates that mentors felt secure in experimenting with new cultural behaviors without fear of judgment. Interview data confirmed this sense of belonging. One respondent explained, "Participating in PAL sessions has boosted my confidence and sense of belonging." The supportive environment of the PAL center thus provided the psychological safety necessary for genuine intercultural engagement.

Finally, reflective learning through empathy and civic awareness emerged as a distinct PAL process. Several participants connected their personal growth to awareness of Myanmar's political challenges, stating that PAL participation strengthened their empathy and global outlook. Comments such as "The political situation in Myanmar has made me more empathetic and aware of the challenges students face" reveal how PAL encouraged moral reflection and a

broader appreciation of human interconnectedness. This aligns with the transformative aspect of intercultural learning, where understanding others also deepens awareness of self and society.

In summary, the findings for RQ2 demonstrate that intercultural learning within PAL was facilitated through four interconnected processes: (1) active peer interaction that allowed linguistic and cultural exchange, (2) reciprocal mentoring that encouraged shared responsibility, (3) emotional and institutional support that nurtured confidence and belonging, and (4) reflective engagement that promoted empathy and global awareness. Together, these processes created a participatory learning environment that embodied the sociocultural principles of collaboration, mediation, and co construction of intercultural understanding.

Together, the statistical and thematic results indicate that quantitative gains in intercultural attitudes are reflected in participants' qualitative accounts of empathy and openness.

Findings for RQ3: Perceived Impact of PAL on Multicultural Career Readiness

Research Question 3 explored how Burmese ICT students perceived the impact of their participation in PAL sessions on readiness for multicultural professional environments. Analysis of the questionnaire data and interview responses indicated that PAL experiences contributed substantially to students' confidence, adaptability, leadership, and collaborative competence, which together reflect the essential attributes of multicultural career readiness.

Quantitative findings demonstrated that students associated their PAL engagement with professional and interpersonal skill development. The Personal Growth and Community Impact domain recorded the highest mean score among all domains ($M = 3.71$, $SD = 0.80$), supported by strong agreement on items emphasizing leadership, purpose, and accomplishment. For example, respondents rated "Being a student manager helps me develop leadership skills" ($M = 3.79$) and "I feel a sense of accomplishment when I help manage the PAL center" ($M = 3.84$) at high levels of satisfaction. Similarly, "Volunteering as a member of the student management team has a positive impact on my academic performance" ($M = 3.74$) and "Overall, I am satisfied with my experience as a student manager at the PAL center" ($M = 3.86$) underscore that PAL participation enhanced both academic confidence and self-efficacy. These results reflect transferable professional capacities such as teamwork, initiative, and responsibility that are valued in cross cultural work settings.

Qualitative evidence provided rich detail on how PAL participation translated into perceived professional readiness. Many mentors emphasized that the sessions strengthened communication and leadership abilities critical for international collaboration. One participant remarked, "The PAL sessions have enhanced my communication, leadership, and cultural sensitivity skills, helping me grow both personally and professionally." Another added, "Volunteering as a peer mentor has improved my academic performance by reinforcing my understanding of the material, enhancing my problem-solving skills, and deepening my critical thinking." These reflections suggest that PAL functioned as a bridge between academic learning and real-world intercultural practice, allowing students to exercise initiative and leadership in a supportive, authentic context.

Adaptability and global mindset were recurring themes in the interviews. Students described PAL sessions as platforms where they learned to navigate cultural differences, manage ambiguity, and adjust communication styles. Statements such as "PAL sessions improved my intercultural skills by teaching me to respect differences, adapt to new norms, and communicate

effectively in diverse settings" illustrate how sustained peer interaction cultivated flexibility and resilience. These skills parallel the adaptive behaviors required in multicultural workplaces, where professionals must engage respectfully with diverse colleagues and clients.

The data also highlighted the development of empathy and intercultural awareness as predictors of effective global citizenship. Several mentors linked their PAL experiences to a heightened sense of social responsibility. One participant explained, "The political situation in Myanmar has made me more empathetic and aware of the challenges students face, affecting my approach to supporting peers." Such insights indicate that PAL experiences not only enhanced students' interpersonal sensitivity but also nurtured ethical and civic awareness—key components of intercultural professionalism.

Institutional support and peer encouragement further reinforced students' readiness for international collaboration. High satisfaction with items such as "I feel emotionally supported by my peers and supervisors" ($M = 3.44$) and "I receive adequate support from the university while volunteering" ($M = 3.49$) demonstrates that PAL created a psychologically safe environment conducive to leadership growth. Interviewees described this support as instrumental in sustaining motivation and confidence: "Participating in PAL sessions has boosted my confidence, provided a sense of purpose, and allowed me to build meaningful connections with students from diverse backgrounds." These comments emphasize that PAL mentorship operates as an incubator for professional identity development within an intercultural framework.

Finally, students articulated how PAL participation inspired future career aspirations. Many expressed interest in roles involving international communication, education, or community service, viewing PAL as foundational preparation. As one mentor stated, "PAL has made me more confident to work with people from different cultures, which I believe will help me in any global company." This forward-looking perspective demonstrates that PAL participation not only enhanced immediate academic outcomes but also shaped long term career orientations consistent with global engagement.

In summary, the findings for RQ3 show that PAL participation fostered essential competencies for multicultural career readiness, including communication, leadership, adaptability, empathy, and ethical awareness. Quantitative evidence indicated high satisfaction with professional growth and community engagement, while qualitative insights revealed that students perceived PAL as transformative preparation for future intercultural and professional endeavors. Collectively, these findings affirm that PAL serves as both an educational practice and a developmental pathway toward global employability and responsible citizenship.

Together, the statistical and thematic results indicate that quantitative gains in intercultural attitudes are reflected in participants' qualitative accounts of empathy and openness.

5. Discussion

This section interprets the study's main findings in relation to the three research questions, integrating quantitative and qualitative insights to explain how PAL shaped the IC development of Burmese ICT students. The regression analysis conducted for RQ1 revealed that PAL significantly predicted IC, explaining nearly half of the variance ($R^2 = .46$, $p < .001$). This statistical evidence substantiates that structured peer interaction and collaborative mentoring

are not only positively associated with but also predictive of measurable intercultural growth in attitudes, knowledge, and communicative skills. Beyond this quantitative association, qualitative reflections from semi-structured interviews illustrate how PAL fostered empathy, openness, and confidence in intercultural engagement, providing contextual depth to the numerical trends. The following discussion situates these results within existing theoretical and empirical scholarship, explores their pedagogical and institutional implications, and outlines limitations and directions for future inquiry.

Overview of Key Findings

The findings of this study demonstrate that structured PAL sessions exert a significant and positive influence on the IC of Burmese ICT students studying in Thailand. Quantitatively, the regression analysis addressing RQ1 confirmed that PAL was a strong predictor of IC ($\beta = 0.85$, $t = 5.92$, $p < .001$), explaining approximately 46 percent of the variance ($R^2 = .46$). This result indicates that greater participation in PAL activities was consistently associated with higher levels of intercultural attitudes, knowledge, and communicative skills. These statistical findings strengthen earlier descriptive trends by establishing inferential evidence that PAL engagement meaningfully supports students' intercultural development rather than merely correlating with it.

Qualitative data further enriched these results by revealing how intercultural growth occurred within the PAL environment. Interview responses highlighted recurring themes of empathy, curiosity, and adaptive communication. Participants described how interacting with mentors and peers from diverse cultural and linguistic backgrounds enhanced their awareness of Thai norms, improved their confidence in cross-cultural exchanges, and broadened their perspectives on teamwork and collaboration. Although these outcomes were overwhelmingly positive, several affective indicators—particularly those related to emotional support and psychosocial connection—were comparatively lower, suggesting that while PAL effectively facilitated cognitive and intercultural growth, it provided more limited affective scaffolding.

Collectively, the quantitative and qualitative strands provide convergent evidence that PAL functions as a mediating framework through which students internalize intercultural understanding and apply it in academic and social contexts. The following sections interpret these findings in relation to existing literature, theoretical models of intercultural competence, and the pedagogical goals of higher-education programs seeking to integrate peer learning and IaH.

Interpretation in Relation to Literature

The quantitative and qualitative results collectively reinforce the view that PAL provides a social and cognitive space where intercultural competence develops through guided interaction and reflection. The regression outcome ($\beta = 0.85$, $p < .001$, $R^2 = .46$) shows that PAL participation strongly predicts intercultural growth, aligning with Vygotsky's (1978) SCT, which holds that higher mental functions emerge through social mediation. Within PAL, mentors and mentees co-construct meaning in each other's ZPD, transforming cultural awareness into communicative skill. This dynamic substantiates Byram's (1997, 2000) model of IC, wherein attitudes of curiosity and openness, cultural knowledge, and interpretive–relational skills are fostered through authentic, dialogic encounters rather than passive exposure.

The findings extend prior PAL research in EFL and intercultural education (Bacon et al., 2021; Topping, 2005) by offering quantitative confirmation of the link between structured collaboration and measurable intercultural outcomes. Earlier studies emphasized PAL's motivational benefits; the present regression evidence demonstrates its predictive power for IC, adding statistical rigor to previously descriptive accounts. This supports the argument that peer collaboration is not merely supportive but a pedagogical condition enabling the internalization of intercultural values and competencies.

Qualitative insights illuminate the mechanisms behind this relationship. Students' reflections on empathy, listening, and cultural adaptation mirror the affective and behavioral components of Byram's model and resonate with findings that intercultural sensitivity strengthens when learners negotiate meaning in mixed-cultural teams (Q. Wang & Teo, 2024). Narratives of Burmese students learning from Thai peers further confirm that cultural understanding develops through experiential and reciprocal exchange, echoing Deardorff's (2020) process-oriented model of IC development.

Despite these overall positive patterns, comparatively lower ratings for emotional support reveal an important contextual nuance. Several factors may account for this anomaly. First, cultural norms in Burmese and Thai communication often emphasize emotional restraint, deference, and indirect expression, which can limit overt displays of empathy in peer interactions (Soe & Charoenroop, 2025). Second, the PAL model in this study prioritized academic mentoring and intercultural dialogue, leaving less structured space for affective bonding or psychological well-being activities. Third, participants' ongoing exposure to political instability and displacement in Myanmar may have affected their emotional availability, producing a guarded engagement style despite high levels of intercultural openness (Buyruk Genç, 2024). These intertwined sociocultural and emotional factors help explain the observed discrepancy, suggesting that while PAL effectively fosters cognitive and intercultural growth, its affective scaffolding remains comparatively limited.

Overall, these integrated results position PAL as both a theoretical and practical bridge between sociocultural learning and intercultural education. By situating peer interaction within scaffolded mentoring structures, the study provides empirical evidence that PAL operationalizes key constructs of Vygotsky's and Byram's frameworks, reinforcing that intercultural competence is most effectively cultivated through collaborative, dialogic, and reflective learning environments.

Theoretical Implications

The findings advance theoretical understanding of how intercultural competence develops through socially mediated peer learning, providing empirical support for integrating Byram's (1997, 2000) IC model and Vygotsky's (1978) SCT within the PAL framework. The regression result ($\beta = 0.85$, $R^2 = .46$, $p < .001$) shows that PAL functions as a predictive mechanism for intercultural growth rather than a mere correlate, substantiating the sociocultural view that learning and identity formation are co-constructed through dialogic engagement in the ZPD, where peers serve as mutual scaffolds for cognitive and affective development.

These results extend Vygotskian concepts of mediation and scaffolding by showing that intercultural understanding, traditionally viewed as a cognitive or attitudinal outcome, emerges through collaborative regulation and reciprocal meaning-making. Within PAL, learners alternate mentor and mentee roles, transforming dialogue into joint problem-solving that

connects social and psychological domains of learning. This reinforces competence as a dynamic, context-dependent process rather than a fixed trait, consistent with contemporary sociocultural interpretations of IC.

Simultaneously, the study operationalizes Byram's model by illustrating how PAL cultivates attitudes (savoir être), knowledge (savoirs), and interpretive-relational skills (savoir comprendre). Students' reflections on empathy, adaptability, and critical awareness indicate that PAL offers structured opportunities to practice and internalize these components through real intercultural encounters. PAL thus provides an applied mechanism through which Byram's five savoirs can be developed and measured in higher-education contexts, bridging theoretical construct and pedagogical practice.

Overall, the study positions PAL as a mediating model linking SCT's interactional scaffolding with Byram's intercultural reflection. The convergence of these frameworks suggests that IC evolves through a recursive cycle of participation, internalization, and re-externalization. Integrating regression evidence with qualitative accounts of peer dialogue strengthens a unified theoretical model of intercultural scaffolding, wherein peer collaboration simultaneously advances linguistic, cognitive, and cultural dimensions of learning.

Practical and Pedagogical Implications

a. Curriculum Design

The regression finding that PAL predicts intercultural competence underscores its value as an evidence-based approach to developing global readiness in higher education. PAL could be intentionally embedded within STEM and other programs where intercultural outcomes are often secondary to technical instruction. Incorporating PAL into credit-bearing or co-curricular modules would allow students to engage regularly in cross-cultural teamwork, reflective dialogue, and project-based collaboration linked to outcomes such as intercultural communication and ethical global citizenship.

Curriculum activities should operationalize Byram's (1997) savoirs through peer-led presentations, reflective writing, and multilingual group tasks that require negotiation across cultural boundaries. Digital and AI-supported platforms can further extend PAL's reach by enabling synchronous and asynchronous collaboration among geographically dispersed learners, an especially practical solution where physical mobility is limited.

b. Peer-Mentor Training and Student Support

Effective implementation requires systematic mentor preparation. Training should focus on inclusive communication, conflict-sensitive dialogue, and adaptive intercultural mediation through simulations, intercultural-sensitivity assessments, and reflective supervision. Regular debriefings or digital reflection logs help mentors respond to emerging student needs.

Findings showing lower emotional-resilience scores indicate that collaboration alone does not ensure psychosocial well-being. Integrating wellness check-ins, empathy-building workshops, and reflective mentoring can strengthen the affective dimension of PAL, supporting students who face sociopolitical or linguistic challenges. Embedding such elements transforms PAL into both an academic and emotional support system.

Although the overall findings affirm PAL's intercultural benefits, the comparatively lower emotional-support scores suggest that program design should also prioritize affective scaffolding. Incorporating structured empathy-building activities, reflective sharing circles, and mentor well-being check-ins can help balance cognitive and emotional dimensions of peer learning. Training sessions for mentors should emphasize socio-emotional communication strategies and culturally sensitive feedback practices to strengthen psychological safety within PAL sessions. By integrating these elements, institutions can enhance the holistic impact of PAL, ensuring that intercultural development is supported not only cognitively and linguistically but also effectively.

c. Institutional Implementation and Policy

At the policy level, universities should recognize PAL as a core mechanism for IaH. Embedding intercultural learning outcomes into accreditation standards and assessment rubrics would normalize global-competence development across programs. Institutions can promote participation by offering transcript recognition, micro-credentials, or academic credit for sustained involvement. These steps democratize access to intercultural education and demonstrate a commitment to inclusive global engagement.

Aligning curriculum, mentor training, and institutional policy positions PAL as a holistic model that advances intercultural competence, emotional well-being, and sustainable internationalization within higher education.

d. Policy and Institutional Implications

The findings offer several implications for policy and curriculum development. First, universities can integrate PAL into faculty development programs, ensuring that teachers and peer mentors are trained to scaffold intercultural dialogue and reflective learning within ICT courses. Second, curriculum designers can embed intercultural competence outcomes into STEM syllabi by aligning PAL activities with institutional learning standards and assessment frameworks. Third, at a policy level, higher-education institutions and ministries may consider adopting PAL as a sustainable mechanism for advancing internationalization at home, promoting inclusive participation among marginalized student groups such as Burmese learners. Embedding PAL structures within institutional policies would strengthen teacher training, support multicultural curriculum reform, and extend the reach of intercultural learning beyond language classrooms to technical disciplines.

Limitations and Recommendations for Future Research

While this study provides strong empirical evidence that PAL significantly predicts IC, several limitations should be acknowledged to contextualize its findings and guide future research.

First, the study's cross-sectional design, based on post-intervention data from one academic term, limits claims of causality. Although regression results ($\beta = 0.85$, $R^2 = .46$, $p < .001$) indicate a strong predictive relationship, longitudinal or quasi-experimental designs are needed to trace how intercultural attitudes, knowledge, and communication behaviors evolve through sustained PAL participation.

Second, the sample, Burmese ICT students from a single Thai university, restricts generalizability. Cultural and institutional factors may shape how PAL fosters intercultural

growth. Future research should include participants from multiple nationalities, disciplines, and universities across Southeast Asia to strengthen external validity and provide comparative insights.

Third, the reliance on self-reported data may introduce bias from social desirability or perceived expectations. Subsequent studies should triangulate findings through peer evaluations, observations, or digital communication records to validate self-reported changes with behavioral indicators of intercultural engagement.

Finally, while the study incorporated emotional and digital elements, these aspects were not directly measured as independent variables. Future research should apply validated scales for psychological resilience and intercultural sensitivity, and compare outcomes across digital, hybrid, and in-person PAL environments to determine how technology mediates intercultural learning.

In summary, future investigations should (1) employ longitudinal or experimental designs, (2) broaden participant diversity, (3) integrate behavioral measures, and (4) explore technology-enhanced PAL contexts. Addressing these directions will refine the theoretical PAL–IC model and advance more inclusive, data-driven frameworks for intercultural learning in higher education.

6. Conclusion

This study demonstrates that IC development among Burmese ICT students emerges most powerfully through socially mediated peer collaboration. Rather than reiterating quantitative and qualitative details, the findings collectively affirm that intercultural growth is nurtured through dialogue, reflection, and sustained participation within structured PAL environments. These insights reinforce Byram's and Vygotsky's theoretical principles by showing that cultural understanding evolves not through isolated instruction but through guided social interaction and mutual support.

The study's three research questions converge on a clear set of takeaways. First, PAL functions as a dynamic context where mentoring and reflection foster empathy, openness, and communicative adaptability. Second, the processes of reciprocal mentoring and reflective discussion are central mechanisms for transforming intercultural awareness into sustained competence. Third, students' enhanced confidence and adaptability indicate that PAL participation strengthens readiness for collaboration in multicultural professional settings. Together, these findings establish PAL as a practical framework for integrating intercultural learning into STEM education and advancing IaH.

To translate these findings into practice, universities should institutionalize PAL within STEM and communication curricula by (a) integrating intercultural-reflection modules into mentor training programs, (b) designing PAL session templates that combine technical collaboration with intercultural dialogue, and (c) allocating structured time for post-session reflection linked to graduate-attribute frameworks. Program coordinators can further reinforce IC growth by embedding assessment tools—such as reflective journals, intercultural self-evaluations, and peer-feedback rubrics—that measure progress across Byram's five savoirs. At the policy level, establishing cross-faculty PAL partnerships between local and international students can scale these benefits institution-wide and support broader inclusion goals.

Future research should examine longitudinal models that track IC development over multiple semesters and evaluate the impact of emotional-support strategies, digital mediation, and mentor diversity on intercultural outcomes. By operationalizing these recommendations, higher-education institutions can ensure that PAL serves not merely as an instructional model but as a sustainable, evidence-based approach for cultivating global competence and ethical collaboration in diverse academic and professional environments.

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