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The AI-mediated cookbook: Bridging Thai and German cultures through COIL and AI literacy

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ABSTRACT: *This study examines Artificial Intelligence (AI) as a cultural mediator within an Internationalization at Home (IaH) framework and explores how technology facilitates cross-cultural collaboration and global competence. Through a six-week Collaborative Online International Learning (COIL) project, undergraduate students from Thailand and Germany co-created an AI-mediated intercultural cookbook. By utilizing recipes as a medium to negotiate cultural boundaries, participants synthesized collective culinary narratives. Employing a mixed-methods approach, including surveys, rubric evaluations and thematic analysis, the research revealed that AI, embedded within a Project-Based Learning (PBL) structure, effectively scaffolded multilingual communication and critical engagement with cultural authenticity. The results indicated significant quantitative advancements in multicultural competency and collaborative adaptability, whereas the qualitative data revealed a profound shift toward critical AI literacy. Ultimately, this study expands the discourse on internationalized curricula, demonstrating how AI-enhanced virtual environments can cultivate the essential cultural awareness and technical literacies required for global citizenship in the 21st century.*

Keywords: Internationalization at Home (IaH), AI-mediated communication, intercultural communicative competence, collaborative online international learning (COIL), critical AI literacy

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INTRODUCTION

Intercultural communication skills are vital for enhancing mutual understanding and collaboration among people from diverse cultural backgrounds. These skills are essential for global citizenship, enabling individuals to navigate the challenges of complex, multicultural environments in both social and professional settings (Deardorff, 2008). Consequently, higher education institutions are increasingly tasked with equipping students not only with academic and technical knowledge but also with global competencies, including cultural sensitivity, adaptability and collaborative problem solving. However, integrating meaningful intercultural communication training into higher education curricula remains a challenge, as traditional approaches often rely on resource-intensive physical student mobility or face-to-face engagement. Hence, institutions are increasingly adopting Internationalization at Home (IaH) strategies and virtual exchanges (VE), integrating technology to offer accessible avenues to co-construct meaning across cultural boundaries in digital spaces.

Artificial Intelligence (AI) is transforming the educational landscape, offering powerful tools that enhance learning through adaptive platforms, real-time feedback, automated content generation and creative support (Chen et al., 2023; Selvi, 2024; Wang et al., 2024). While AI has proven effective in personalizing instruction and fostering engagement, particularly in language learning contexts (Wei, 2023; Belda-Medina & Calvo-Ferrer, 2022; Jenks, 2024), most research on AI in education has focused on individualized academic improvement. This narrow focus overlooks AI's potential as a mechanism for facilitating cross-border collaboration and intercultural learning. This gap creates a significant opportunity to understand how AI can function not only as a cognitive tool but also as a cultural mediator to enhance intercultural competence within an internationalized curriculum.

The present study addresses this gap by integrating collaborative online international learning (COIL) and project-based learning (PBL) with AI. It investigates a collaborative initiative between Thai and German undergraduate students tasked with co-developing a cross-cultural cookbook using generative AI tools. Within this structured pedagogical framework, participants employed AI for visual design, language translation and content creation, generating recipes that reflect both distinct cultural heritage and cross-cultural innovation. This initiative challenges students in applying critical thinking and digital literacy, as they negotiate cultural meanings, communication styles and collaborative

challenges, simulating the demands of global mobility in a virtual, technological context.

Food, explored through recipes, was chosen as the medium for this collaboration because it provides a universally shared human experience and an accessible focal point for exploring cultural diversity. Recipes act as rich cultural narratives, reflecting societal values, historical traditions and specific identities. When geographically diverse students collaborate on AI-mediated recipe creation, they are not only exchanging culinary technical knowledge; they are engaging in a process where food serves as a powerful medium for navigating cultural differences, building empathy and fostering genuine intercultural dialog.

This research is guided by the following questions: 1) How do AI-mediated virtual exchanges facilitate cross-cultural collaboration and intercultural meaning-making among geographically diverse student populations? 2) In what ways does collaborative AI engagement impact students' development of global competencies, including intercultural communication and critical AI literacy?

This study contributes to the intersection of international education and educational technology by demonstrating how AI can simultaneously facilitate global cultural understanding and cultivate professional technical proficiency. By addressing existing research gaps, the findings offer transferable insights into how innovative pedagogical designs can prepare students for the demands of global citizenship, cross-border intercultural collaboration and technological literacy, which are essential in the 21st century landscape.

LITERATURE REVIEW

The integration of AI, intercultural competence and COIL provides a productive ground for developing innovative educational practices in global higher education. As traditional physical student mobility remains accessible primarily to the global elite, higher education institutions must adopt more inclusive approaches to cultivate international and intercultural perspectives among all learners. While these three domains have individually seen significant scholarly development, limited research has integrated them into a cohesive framework that simultaneously addresses the dual objectives of enhancing global competencies and developing technological proficiency.

Figure 1 presents the conceptual framework of the study, which operates at the intersection of four key pillars: IaH, COIL, PBL and critical AI literacy. This framework illustrates how the synergistic application of these components contributes to the development of key outcomes: global citizenship and intercultural competence. By integrating these specific pedagogical approaches and technological skills, the framework demonstrates a unique pathway for student development within a globalized learning context.

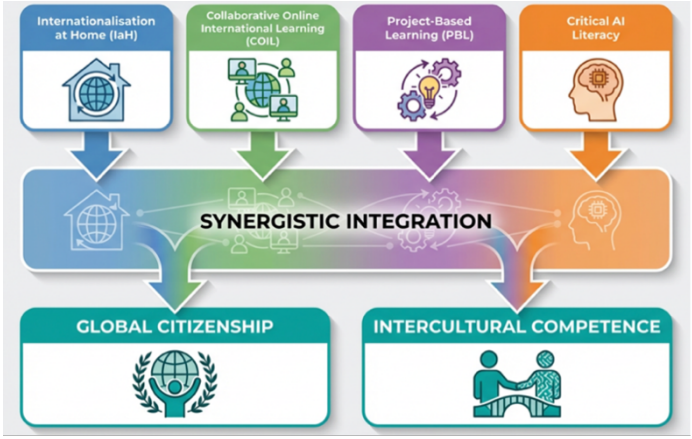

Figure 1: Conceptual Framework for Fostering Intercultural Competence and AI Literacy through Collaborative Online International Learning

Internationalization at Home (IaH) and Collaborative Online International Learning (COIL)

While physical study abroad programs provide deep cultural immersion, they remain resource intensive and inaccessible to a significant segment of the student population. Consequently, universities are increasingly adopting IaH strategies, utilizing digital pedagogies to broaden access to global learning experiences (Lally, 2022). While revenue-driven commercial models often guide Western internationalization agendas, emerging national initiatives are shifting the paradigm; for instance, Mukherjee and Kumari (2026) examine how the "Study in India" mission influences an IaH philosophy to build inclusive futures and nurture sustainable global citizenship for both domestic and international students without reliance on physical mobility. Within this context, VE, also known as telecollaboration or COIL, has emerged as a cost-effective and highly accessible approach to curriculum internationalization (O'Dowd, 2018; Dooly & Vinagre, 2022). By connecting learners across diverse geographic locations via everyday technology, VE facilitates sustained collaborative learning and meaningful intercultural interaction (O'Dowd et al., 2020, Lenkaitis, 2021, Lee et al., 2022).

The efficacy of these programs is well supported by empirical evidence. For instance, Cuevas Álvarez et al. (2024) demonstrated that VE pilots can successfully expose students to diverse cultures and enable impactful peer interactions even under institutional budget constraints. Furthermore, Higgins (2024) reported significant improvements in both intercultural communication and English language proficiency during an eight-week exchange, indicating that these gains persisted despite logistical hurdles such as time zone differences and technological limitations. Expanding on these outcomes, Rogler et al. (2026)

reported that while language barriers and unfamiliar online communication norms can initially hinder student confidence, structured group work and peer interactions within a VE effectively foster intercultural sensitivity and identity formation. Such initiatives are particularly effective in fostering cross-cultural engagement and enhancing students' self-efficacy within digital contact zones (Lally, 2022; Martinsen & Thompson, 2024).

However, as Gutiérrez et al. (2022) argued, educators cannot assume that students are naturally prepared to interact successfully with international partners online; they require structured pedagogical scaffolding to achieve higher-level cultural learning (Durko & Martens, 2021). While prior studies confirm the efficacy of human-facilitated VE in developing intercultural competence (Hauck et al., 2020; Ismailov, 2021; Heymans et al., 2024;), research into how AI technologies can systematically mediate these interactions is lacking. This gap highlights the unique contribution of the present study, which positions AI tools not only for logistical support but also as active cultural mediators within the cross-border creative process.

AI Literacy in Globalized Digital Spaces

AI literacy, as conceptualized by Long and Magerko (2020), encompasses the ability to understand, utilize and critically evaluate AI tools, extending beyond technical operations to include an awareness of AI biases and societal implications. In internationalized educational contexts, this literacy is essential, equipping students to critically navigate AI outputs and ensure ethical application amidst cultural diversity. Moreover, Edmett et al. (2024) highlighted the importance of co-designing AI tools with educators to ensure practical, inclusive applications in English language teaching. Given that AI offers significant potential for improving communication skills, targeting professional development is vital for empowering teachers to integrate these technologies effectively into their pedagogical practices.

UNESCO (2023) highlights the potential of generative AI to provide personalized, adaptive learning experiences that cater to learners' unique linguistic and cultural backgrounds (Xia et al., 2024; Crompton et al., 2024). AI tools streamline the design of telecollaboration tasks by bridging linguistic gaps and enhancing intercultural communicative competence (McCallum, 2023; Dai et al., 2024). However, most existing research focuses on individual academic outcomes and overlooks the collaborative, cross-border dimension. By integrating AI tools, such as multimodal translators and visual design platforms, directly into group COIL projects, this study demonstrates how students not only develop technical proficiency but also learn to critically evaluate AI output within culturally sensitive contexts, meeting the growing demand for digital competencies in a globalized workforce.

Intercultural Communication

Intercultural communication theory emphasizes the skills and attitudes necessary for effective interactions across cultural boundaries, which are essential for global citizenship. Deardorff (2008) identified empathy, cultural sensitivity and adaptability as core competencies, which are often developed through dialogic and experiential methods. These competencies align with Bloom's Taxonomy, progressing from foundational knowledge of cultural norms to higher-order skills such as critical evaluation and creative synthesis.

Furthermore, experiential learning theory (Kolb, 2015) provides a practical framework for fostering intercultural communication. Engaging students in immersive, hands-on activities promotes deep engagement with cultural differences. Food serves as a powerful medium for cultural exploration, reflecting societal values, traditions and identities (Counihan et al., 2019). Because traditional intercultural education methods can be inaccessible, AI-supported virtual tasks provide scalable, inclusive alternatives to physical exchanges (Xia et al., 2024; Lally, 2022). The co-creation of a cross-cultural cookbook in this study provides a tangible outcome that reflects students' negotiated intercultural understanding and shared global narratives.

Project-Based Learning for Cross-Border Collaboration

Project-based learning (PBL) emphasizes engaging students in authentic, real-world tasks that foster collaboration, critical thinking and problem-solving (Thomas, 2000). It is particularly effective in interdisciplinary, internationalized contexts where students must integrate diverse knowledge paradigms to achieve a shared goal. AI tools offer new opportunities to enhance PBL by supporting geographically diverse students in complex collaborative tasks. AI-driven platforms facilitate teamwork by providing language support, automating routine tasks and offering design suggestions (Singh et al., 2024). However, most applications of AI in PBL remain narrowly focused on logistical or academic outcomes and often fail to address global cultural learning objectives. This study advances the discourse by explicitly utilizing AI tools to mediate cultural learning and creativity within a cross-border PBL framework. By embedding Bloom's Taxonomy and pedagogical mentoring into the PBL structure, the project ensures a cognitive progression that advances students' technical, cultural and cognitive capacities, offering an interdisciplinary model for educational innovation in technology-mediated global learning environments.

METHODOLOGY

Research Design

This study employed a mixed-methods research design, specifically a convergent parallel design, to explore how AI tools mediate cross-border intercultural collaboration and creativity within an IaH framework. The approach allowed for

the triangulation of quantitative data, measuring shifts in global competencies and AI literacy, with qualitative data, capturing the experiential dimensions of intercultural communication and critical AI engagement. The design combined quantitative methods, including pre- and post-project surveys and rubric-based evaluations of the collaborative output, with qualitative methods, utilizing a thematic analysis of students' reflective discussions.

Participants

The participants involved in the six-week COIL cookbook initiative were 30 undergraduate students, with 15 voluntarily recruited from a university in Thailand and 15 from a university in Germany. To ensure readiness for the digital internationalization project, the selection criteria included basic digital literacy and English proficiency at the CEFR B1 level or higher, as English served as the lingua franca for all communication. The 30 participants were randomly assigned to five mixed international groups, each consisting of three Thai and three German students, ensuring a balanced cross-cultural collaborative structure.

Digital Tools for International Collaboration

The project required the integration of multiple digital technologies, with specific generative AI tools serving as the primary cultural mediators.

1. Generative AI Tools (Cultural Mediators):
    - Content and Narrative Generators (e.g., ChatGPT): Employed by groups for brainstorming fusion recipe concepts, drafting recipe descriptions and developing introductory cultural narratives.
    - Visual Asset Generators (e.g., DALL-E, Bing Image Creator, and AI features within Canva): Used to generate unique visual representations of the fusion dishes and culturally appropriate imagery for the cookbook layout.
2. Specialized AI-Powered Support Tools:
    - Multilingual Translators (e.g., DeepL, Google Translate): Essential for facilitating accurate translation of technical culinary terms between Thai, German and English, ensuring linguistic accessibility and mutual understanding.
    - Writing assistants (e.g., Grammarly, QuillBot): Writing assistants were used to refine language accuracy, vocabulary choice and coherence in the final English-language cookbook entries.
3. Essential Collaborative Infrastructure (Non-AI):
    - Communication and Project Management Platforms (e.g., Zoom, Padlet, WhatsApp): Facilitated synchronous weekly meetings, asynchronous team coordination and real-time cross-border communication across time zones.

Project Phases

The COIL cookbook initiative was executed over a structured six-week period, designed around experiential learning principles (Kolb, 2015) and divided into three developmental phases.

Phase 1: Preparation and scaffolding (Weeks 1-2): Participants attended synchronous virtual workshops. These sessions covered critical AI literacy, intercultural communication theory and detailed project guidelines. Learning objectives were mapped to Bloom's revised Taxonomy, progressing from understanding basic concepts to analyzing potential cross-cultural challenges using AI tools.

Phase 2: Implementation and Collaborative Creation (Weeks 3-5): Groups collaboratively developed fusion recipes, integrating culinary traditions from both nations. Students utilized generative AI tools to facilitate drafting and design. A critical pedagogical component was the weekly reflective Zoom discussion, where facilitators guided students in evaluating the AI-generated outputs for cultural accuracy, relevance and potential bias.

Phase 3: Synthesis and Evaluation: (Week 6): Groups finalized and submitted their completed intercultural cookbooks. Facilitators assessed the final output using a rubric. Individually, students completed the post-project surveys and participated in a final, synchronous, reflective discussion focusing on their collaborative experience and skill development.

Data Collection

To ensure a comprehensive understanding of the project's impact, a mixed-methods approach was employed, capturing both measurable shifts in competency and the nuanced experiences of the participants. Data were gathered through a combination of structured instruments and observational records to provide a holistic view of the six-week initiative.

- Pre- and Post-project Surveys: Quantitative data were collected via online surveys administered before and after the six-week initiative. The surveys employed 20-item, 5-point Likert scales adapted from the following established frameworks: intercultural competence (Deardorff, 2008) and critical AI literacy (Long & Magerko, 2020). Additionally, a new 5-item scale was developed to measure student confidence in cross-border digital collaboration.
- Cookbook Evaluation Rubric: The final collaborative output, the cookbook, was evaluated by two independent facilitators using a detailed rubric (1–5 scale). The rubric assessed five primary domains: 1) cultural representation and sensitivity, 2) reciprocal clarity and feasibility, 3) visual presentation and layout, 4) critical AI integration and 5) overall innovation.

- Qualitative Reflection Discussions: Qualitative data were derived from video and audio transcripts of weekly reflective Zoom discussions and the final debriefing session.

Data Analysis

The analysis phase was designed to triangulate the findings, seeking to validate statistical trends against the thematic depth found in participant reflections. By integrating both numerical and narrative data, the study aimed to establish a robust correlation between pedagogical interventions and student outcomes.

- Quantitative Analysis: Descriptive statistics (means, standard deviations) were calculated for all the variables. Inferential statistics were performed using SPSS, including paired t-tests to measure pre- to post-test changes, one-way ANOVA to compare outcomes across the five groups and Pearson correlation coefficients to explore relationships between AI literacy, cultural sensitivity and collaborative outcomes. A p-value of <0.05 was considered to indicate statistical significance.
- Qualitative Analysis: Transcripts underwent reflexive thematic analysis (Braun & Clarke, 2019) following a systematic six-phase process: familiarization, initial coding, searching for themes, reviewing themes, defining themes and reporting. To ensure rigor, two researchers performed the coding independently, resolving any discrepancies through discussion to identify recurring patterns in cultural adaptation, empathy development, critical engagement with AI tools and collaborative dynamics.

RESULTS

RQ1: How do AI-mediated virtual exchanges facilitate cross-cultural collaboration and intercultural meaning-making among geographically diverse students?

Language Accessibility and Cultural Negotiation

The integration of specialized AI translators significantly enhanced linguistic accessibility in the internationalized digital space. Survey data revealed that 87% of the students agreed that AI translators helped clarify complex cultural concepts, reducing perceived communication delays by an estimated 65%. However, the students emphasized the necessity of human intervention for contextual accuracy; a comprehensive summary of these AI tool applications and their specific contributions to global learning is provided in Table 1. This need for human oversight was reflected in the rubric assessments of the collaborative cookbooks, where the mean score for language clarity rose from the initial drafts (M=4.2/5 to 4.8 out of 5, SD=0.3) to the final submissions (M=4.8/5, SD=0.2). For example,

Thai students collaboratively refined AI translations of culturally embedded terms such as *Nam Prik* (Thai chili paste) and noted that while AI provided a literal translation, it could not convey the nuanced tradition of flavor, requiring students to actively explain their culture to their German peers.

Table 1: Summary of Generative AI Tool Applications and Global Learning Contributions

Tool Type	Function in Project	Contribution to Global Learning
Multilingual Translators	Facilitating translation of technical culinary terms and notes between Thai, German and English	Overcoming language barriers to bridge international communication gaps
Narrative and Content Generators	Generating initial fusion recipe concepts, descriptions and cultural narratives	Stimulating collaborative creativity while prompting critical dialog regarding cultural authenticity and appropriation
Visual Generators	Designing cookbook layouts and generating unique visual representations of dishes	Supporting critical analysis of visuals representation and challenging stereotypes in global media

Creative Synthesis in Global Workspaces

All the groups utilized generative AI content generators to construct the fusion recipes. In post-project surveys, 93% of students reported that AI-supported brainstorming inspired new culinary ideas, such as Green Curry Bratwurst and Tom Yum Schnitzel, that exceeded their initial expectations. However, 42% of the participants noted that some AI suggestions lacked cultural sensitivity, a tension that prompted crucial cross-cultural discussions regarding authenticity and respect. This dynamic reinforced higher-order AI literacy skills within the collaborative process.

Visual Presentation and Challenging Stereotypes

Groups employed generative AI visual tools for cookbook design, achieving high rubric scores for visual presentation (M=4.7/5, SD=0.2). Crucially, qualitative data revealed that students actively manually refined AI-generated images to avoid stereotypical or exoticizing representations such as adjusting the initial DALL-E's illustrations of Thai cuisine. One student explained, "*AI gave us nice images, but we needed to adjust them, so they didn't reinforce clichés*". In addition to student perceptions, the final collaborative cookbooks were evaluated by facilitators using a standardized rubric across five domains. A summary of these

objective evaluation scores, which achieved a high overall mean, is presented in Table 2.

Table 2: Final Collaborative Cookbook Rubric Scores

Rubric Category (1-5 Scale)	*M*	*SD*	Score range
Cultural Representation & Sensitivity	4.6	0.3	4.2-5.0
Recipe Clarity & Feasibility	4.3	0.4	4.0-5.0
Visual Presentation & Layout	4.7	0.2	4.5-5.0
Critical AI Integration	4.2	0.5	4.0-5.0
Recipe Innovation & Diversity	4.5	0.3	4.3-5.0

RQ2: In what ways does collaborative AI engagement impact students' development of global competencies, including intercultural communication and critical AI literacy?

To assess the impact of the collaborative AI initiative on student development, pre- and post-project surveys were analyzed. The results, summarized in Table 3, reveal highly significant growth ($p<0.001$) across all three measured domains—intercultural competence, critical AI literacy and collaborative adaptability—each with strong to very strong effect sizes.

Table 3: Pre- and Post-Project Survey Analysis

Category	Pre-Project *M* (*SD*)	Post-Project *M* (*SD*)	*t*(29)	*p* value	Effect Size (Cohen's *d*)
Intercultural Competence	3.2 (0.51)	4.5 (0.39)	6.12	<0.001	1.12
Critical AI Literacy	2.8 (0.48)	4.3 (0.41)	7.03	<0.001	1.30
Collaborative Adaptability	3.4 (0.45)	4.6 (0.36)	5.89	<0.001	1.07

Cultivating in Intercultural Competence

Pre- and post-project surveys indicated a highly significant ($p<0.001$) increase in students' self-reported intercultural competence (M-pre=3.2, SD=0.51; M-post=4.5, SD=0.39), with a strong effect size (d=1.12). Quantitative data analysis suggested that the number of students who co-developed fusion dishes, the process involving the highest degree of negotiated meaning-making across cultures, increased the fastest. This was reinforced qualitatively; a German student noted that understanding Thai ingredient choices fostered a realization of how the environment and history shape culture.

Cultivating Critical AI Literacy

Quantitative data revealed that critical AI literacy scores increased markedly (M-pre=2.8, SD=0.48; M-post=4.3, SD=0.41), with a highly significant change ($p<0.001$; $d=1.30$). This finding indicates a progression from passive trust to critical evaluation; 82% of the students reported that the project enabled them to critically assess AI-generated suggestions. Qualitatively, one participant highlighted that blind reliance on AI translations shifted to the realization that cultural subtleties required manual adjustment. This reflects advanced stages of critical and ethical AI engagement within an intercultural context. This development is reinforced by the results of the Pearson correlation analysis, which revealed a strong positive correlation between AI literacy scores and overall cookbook quality.

Development of Collaborative Adaptability

Survey data indicated that collaboration comfort improved significantly (M-pre=3.4, SD=0.45; M-post=4.6, SD=0.36). Additionally, 78% of the students agreed that AI tools increased both the inclusivity and the efficiency of their cross-border teamwork. Qualitative thematic analysis highlighted collaborative adaptability as a major theme, with students noting that AI provided a third language to bridge linguistic and conceptual gaps when native or target language proficiency reached its limits. By navigating communication and time-zone challenges through digital mediation, students reported feeling more prepared and confident in their ability to collaborate with diverse global teams in future professional contexts.

To further explore the potential relationships between these competencies, a Pearson correlation analysis was performed on the key variables of the project. The results revealed a strong positive correlation ($r=0.78$, $p<0.01$) between post-survey critical AI literacy and the overall quality of the final cookbook, suggesting that technical discernment directly translated into higher academic output. Furthermore, intercultural competence demonstrated a moderate positive correlation ($r=0.63$, $p<0.05$) with visual presentation scores, indicating that students with higher intercultural competence may have been more attuned to the aesthetic and communicative nuances required for a global audience.

DISCUSSION

This study explored the integration of AI tools within a virtual PBL framework to foster intercultural competence, critical AI literacy and collaborative creativity among geographically diverse student populations. These findings underscore the transformative potential of AI-enhanced PBL as a mechanism for IaH. This model addresses the dual educational challenge of developing essential technical proficiency and cultural awareness in a globalized context.

AI as a Digital Cultural Mediator in Global Workspaces

The findings confirm that generative AI tools functioned as effective cultural mediators, successfully bridging both linguistic and conceptual gaps during the co-construction of the intercultural cookbooks. AI translation platforms facilitated deeper intercultural dialog by significantly reducing language barriers and perceived delays. Furthermore, narrative and visual generation tools expanded students' creative capacities, enabling the conceptualization of innovative fusion recipes, such as the Green Curry Bratwurst, that blended Thai and German culinary traditions. However, the qualitative findings concerning the students' critical engagement, specifically their questioning of cultural appropriateness, highlight the absolute necessity for human oversight in culturally sensitive, cross-border contexts. This finding reinforces the core pedagogical imperative that AI literacy within international education involves ethical and contextual judgment over simple technical operations.

Development of Intercultural Competence and Global Empathy

The highly significant gains in students' self-reported intercultural competence validate that technology-mediated collaboration, when explicitly scaffolded within an IaH and PBL framework, can foster deep cultural empathy and adaptability. By actively negotiating culinary meaning across cultures, students internalized foundational intercultural competencies, including respect, openness and critical cultural self-awareness. The findings demonstrate that acquiring genuine intercultural understanding requires scaffolded reflection and structured dialog, most evident in the fusion recipe task, which compelled students to co-construct shared culinary narratives. In this globalized learning environment, AI did not replace human dialog, but it functioned as a powerful facilitator of richer reflection and collaborative meaning-making.

Enhancing Critical AI Literacy for Global Citizens

The significant growth in critical AI literacy indicates that experiential, collaborative digital projects can effectively foster these essential 21st century competencies. Students learned to view AI-generated outputs as provisional, requiring human interpretation, evaluation and manual adjustment, especially with respect to cultural representation. These findings significantly expand prior educational technology research, which often focuses in isolation on individual academic performance (Belda-Medina & Calvo-Ferrer, 2022; Harry, 2023; Zhai, 2021). By illustrating how collaborative, intercultural contexts uniquely drive deeper, ethical engagements with AI tools, this study demonstrates a robust pathway for technical fluency.

Synergies: Interdisciplinary Skill

The project's pedagogical design scaffolded students' cognitive progression from basic cultural knowledge to creative, cross-border innovation. AI tools supported this progression by automating lower-level tasks, such as basic translation and layout formatting, which allowed students to focus on higher-order skills of intercultural analysis, evaluation and creative synthesis. This strong relationship is powerfully validated by the quantitative correlations. The strong positive correlation between AI literacy and Cookbook quality ($r=0.78$, $p<0.01$) confirms that higher technological proficiency, when integrated with cultural purpose, directly results in superior collaborative outcomes. Furthermore, the moderate positive correlation between intercultural competence and visual presentation ($r=0.63$, $p<0.05$) supports the deep argument that deep cultural awareness enhances students' creative expression and esthetic judgment within a global design context. This convergence demonstrates that technical proficiency and intercultural competence mutually reinforce each other, leading to collaborative outcomes in internationalized settings for effective global citizenship.

Limitations and Future Research Directions

Despite these promising findings, several limitations must be acknowledged. The project's six-week duration and relatively small sample size limit the immediate generalizability of the statistical results to broader populations. Furthermore, the findings are derived from a specific Thai–German partnership, and cultural dynamics may vary across pairings. Future research is necessary to test the transferability of this AI-enhanced IaH model and PBL model across more diverse linguistic and cultural contexts. To better assess the longitudinal development of global competencies and ethical AI fluency, subsequent studies should investigate larger international cohorts and explore extended project timescales. Beyond student development, this research emphasizes that comprehensive professional development for educators remains critical. To effectively scaffold students' critical engagement with generative AI in complex, cross-border contexts, educators themselves must prioritize their own AI literacy and cultural sensitivity. As Idham et al. (2024) suggested, the successful integration of AI in English-language teaching requires the continuous professional development of both teachers and learners, ensuring that they remain adaptable to rapid technological shifts.

CONCLUSION

This study demonstrates the significant potential of integrating AI tools within a virtual project-based learning framework to enhance intercultural competence, critical AI literacy and collaborative creativity. By engaging Thai and German students in the co-creation of an intercultural cookbook, the project highlights how AI can function not only as a cognitive tool but also as a powerful cultural

mediator, enabling students to bridge linguistic gaps, negotiate complex meanings and produce culturally sensitive outcomes across borders. The findings provide an interdisciplinary, scalable model for IaH. The development of technical proficiency and global cultural awareness represents an innovative pathway for 21st-century education. By combining the collaborative potential of virtual exchange with the creative capabilities of generative AI, educators can create inclusive and engaging global learning experiences that prepare students for the complexities of a digitized, interconnected world. These insights offer important implications for designing future educational models that prioritize both technological proficiency and robust intercultural competence.

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