The Development of Intercultural Competence in the Context of International Virtual Collaboration through Self-Learning via ChatGPT

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Abstract

As environments become more international and shift towards online platforms, developing intercultural competence has emerged as a crucial skill. In an era where AI (artificial intelligence) can either replace or collaborate with humans, utilizing tools like ChatGPT has become a strategic approach for fostering intercultural competence. This study adopts a mixed-method research approach with two main objectives: to study the patterns of self-development in intercultural competence through ChatGPT, and to evaluate learner satisfaction with this self-development process. The survey respondents included 250 foreign language teachers and individuals working with international personnel, all with experience using ChatGPT. The experimental learning group included 15 participants, aged 18-30, who were students or employees with prior experience working with foreigners. Data was analyzed using percentages, averages, standard deviations, variance analysis, and conversation analysis. The results revealed that the self-development of intercultural competence through ChatGPT followed a four-stage process: motivation, preparation, learning, and self-evaluation. Overall, learners reported the highest level of satisfaction. In the field of educational technology, these findings suggest that the four-stage process provides an effective framework for self-development programs. Moreover, AI can be seamlessly integrated into intercultural training programs, serving as a real-time conversational simulator, teaching assistant, virtual mentor and feedback provider.

Keywords: Intercultural competence, ChatGPT, Self-development, Self-learning

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Introduction

The World Economic Forum (2016) emphasized that proficiency in communication and awareness of social and cultural differences are essential competencies in the 21st century. Over the past three decades, intercultural competence and development approaches have gained significant attention, especially in the contexts of employment and business (Kuźmińska-Haberla, 2018). In the wake of globalization and Thailand's involvement in the ASEAN Economic Community (AEC), international collaboration has become increasingly seamless and more frequently observed. In today's world, technology plays a significant role in shaping work environments, which are increasingly situated in international contexts. Collaboration with multinational teams across different workspaces or countries has become common (Kuźmińska-Haberla, 2018). However, the absence of cultural competence can result in conflicts, discrimination, reduced recognition of team members' contributions, and barriers to achieving successful outcomes. Therefore, the development of intercultural competence is essential. Despite its significance, improving intercultural competence presents challenges and typically requires a prolonged effort rather than a quick resolution. The researcher analyzed research documents to identify the most effective methods for developing intercultural competence in an online work environment. This context is characterized by specific objectives, praxis, time management demands aligned with organizational roles and responsibilities, and the lifestyles of modern working-age individuals. On November 30, 2022, OpenAI introduced ChatGPT, an artificial intelligence model hailed as one of the most advanced mechanical brains to date (Zhai, 2022). This AI is anticipated to influence various fields, including education. Among ChatGPT's remarkable capabilities is its ability to craft articles with well-structured, coherent, and accurate information—tasks that typically demand significant skill and expertise. Additionally, ChatGPT leverages Natural Language Processing (NLP) paired with an extensive dataset, allowing it to deliver academically focused on a wide range of topics (Zhai, 2022).

This study aims to propose an alternative approach for developing intercultural competence in internet-based communication using ChatGPT, the latest conversational AI. The findings from this study are expected to lay a foundation for future AI research and applications in educational contexts. For instance, the results could inform the development of readiness programs for university students or serve as a framework for enhancing intercultural competence in organizational settings.

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Objective

This study explores how learners develop intercultural competence through ChatGPT and evaluates their satisfaction with this self-development process within an international virtual collaboration context.

Literature Review

AI in education

The integration of AI into education, particularly in fostering intercultural competence (ICC)**,** has garnered significant attention. AI-driven tools are increasingly utilized to improve intercultural communication skills among students**,** facilitating cultural bridging, promoting cross-cultural understanding, and nurturing global citizenship. However, while AI offers abundant opportunities for personalized learning and educational advancements**,** its application in ICC development also introduce unique challenges. Current discussions on AI in education often underscore its dual role as both an enhancer and a disruptor of traditional educational practices. On the positive side, holds the promise of personalizing learning experiences, automating routine tasks, and delivering real-time feedback**,** thereby elevating the quality and accessibility of education. On the negative side, concerns persist around data privacy, the reinforcement of cultural biases, and the diminishing opportunities for face-to-face interactions in education settings. (Klimova & Chen, 2024)

Intercultural Competence Frameworks

This study adopts the definition of intercultural competence from the INCA framework of the Intercultural Competence Assessment, developed by Kirchberger (2009). The framework is specifically designed to assess and enhance intercultural competence, particularly among young professionals in the engineering sector. Its objectives align with this research, which focuses on developing intercultural competence among university students and young professionals. The INCA framework identifies three key components of intercultural competence: Openness, Knowledge, and Adaptability. Openness encompasses respect for others and tolerance for ambiguity. Knowledge refers to the pursuit of information and empathetic understanding. Adaptability involves behavioral flexibility and awareness in communication contexts. Additionally, various methods to enhance intercultural competence proposed by Morris et al. (2014), can be integrated into self-directed intercultural development using ChatGPT. The following section outlines these proposed practices and their potential applications:

Studying

General knowledge, or declarative knowledge forms a vital foundation for further learning. While traditional tools such as books and classrooms remain essential in education, online tools have emerged as an increasingly effective medium for building general knowledge. These digital resources can provide structured instruction or interactive formats, benefiting both classroom-based and independent learning processes. Online exploration—through travel guides, newspapers, magazines, and articles—has become a primary means of learning about foreign cultures. These resources often convey cultural norms, highlighting what is acceptable or taboo in various societies, thus offering a rich context for social learning. For example, they effectively illustrate cultural contrasts, such as those between rural villages and urban communities. Foreigners and individuals interested in other cultures can access local knowledge via online platforms. A key strength of online research lies in its provision of up-to-date information, which reflects changing circumstances. This capability addresses the limitations of static or outdated content in books and reduces the risk of presenting distorted perspectives to learners in classrooms (Morris et al., 2014).

Attributional Learning

Training tools aimed at establishing appropriate cultural foundations have a longstanding history in psychology (Flanagan, 1954). Most research has focused on minimizing problematic attributions rather than fostering culturally insightful perspectives. One extensively studied tool is the cultural assimilator, which facilitates attributional learning for beginners, often with the assistance of cultural experts. The core objective of these training methods is to encourage learners of new cultures to reflect on and critically examine intercultural situations they may encounter. These tools also help learners interpret the behavior of hosts from the hosts' cultural viewpoint rather than their own cultural lens (Bhawuk, 1998).

Social Learning

The first step in social learning involves observing behavioral patterns in other cultures. Trainees are encouraged to reflect on routine interactions within ethnically diverse neighborhoods and document distinct behavioral trends. Prior to training, participants may be shown films featuring individuals from both the host culture and their own, enabling them to identify behavioral changes they might encounter. A recommended training approach emphasizes guided reasoning, encouraging participants to critically analyze observed behaviors. This process helps them systematically interpret cultural interactions and actions. The ultimate goal of social learning is to develop *procedural knowledge*—understanding how to act and respond appropriately in various cultural contexts—rather than merely accumulating *declarative knowledge* about cultural facts (Morris et al., 2014).

Conditioning

Cultural norms can be understood through verbal explanations of everyday situations that occur in different cultures. Simulated games, designed around daily life interactions, prove highly effective for training individuals across diverse contextual environments. These simulations allow learners to experience how habitual behaviors or basic decision-making processes can highlight cultural differences fostering trial-and-error learning. This process promotes both behavioral adjustments and situational understanding, ultimately cultivating a deeper sense of intercultural awareness (Savani et al., 2022).

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Labeling incidents after being presented

Expatriate training programs often focus on understanding cultural *Do's* and *Don'ts*—highlighting appropriate and inappropriate behaviors in different cultures. This training is typically presented using signs that outline *Do's* and *Don'ts*, followed by lists of actions (e.g., bowing to others). However, research indicates that implicit learning processes, such as showing participants examples after simulated scenarios, significantly accelerate the learning process. Consequently, even basic training tools can facilitate gradual yet meaningful changes in both behavior and understanding (Maddox et al., 2003).

ChatGPT capabilities

ChatGPT's qualifications as a tool for developing intercultural competence through self-learning, were examined through a literature review, leading to the following proposed insights:

Intercultural big data

In a research study by Azaria (2022) on the usage and limitations of ChatGPT, the model is described as a Large Language Model (LLM) capable of functioning effectively across a wide range of contexts. This AI model, developed and trained on extensive datasets with human feedback, is designed to generate responses similar to those of humans. For instance, when researchers asked ChatGPT about humans' most favored number, it identified '7' as the answer. This aligns with findings from Bellos (2014), which indicate that humans tend to prefer the number 7 and show a general dislike for the number 1. This example underscores the consistency of ChatGPT's responses with human perceptions and preferences, as demonstrated in the study.

ChatGPT is developed by OpenAI, an artificial intelligence research laboratory, and operates on a large-scale dataset comprising web-crawled text, books, and code. It is capable of answering a diverse range of questions. Refined and improved from GPT-3.5, ChatGPT incorporates a reinforcement learning system based on human feedback (RLHF). While it shares similarities with InstructGPT, it differs in its data collection approach. ChatGPT leverages a vast knowledge repository inherited from GPT-3.5 and is enhanced with reinforcement learning mechanisms that integrate human insights and expertise (Guo et al., 2023).

Interaction between learners and ChatGPT

ChatGPT is an AI chatbot designed to engage in conversational interactions with users. Through text input, users can receive guidance, making ChatGPT function as an article assistant or an advisory tool. This capability can be directly utilized by both instructors and learners (de Winter, 2023). ChatGPT's conversational abilities have diverse applications across multiple domains. Its interactive learning environment can enhance learner engagement and motivation. Furthermore, active interaction with the learning materials supported by ChatGPT has the potential to improve comprehension and retention. ChatGPT can support memory recall by allowing users to reinforce their knowledge of specific (general knowledge) topics through informational queries. By automating routine tasks, the model enables users to conserve mental energy, facilitating higher-order cognitive functions like creativity and problem-solving. This empowers learners to engage in more complex and meaningful educational activities. Additionally, ChatGPT can reduce pressure for learners, as some learners may find interacting with AI less intimidating than engaging with humans. This dynamic fosters a more relaxed educational environment, which can positively impact the learning process (Bai et al., 2023)

Natural Language Possessing

ChatGPT is an AI chatbot designed to provide responses that closely resemble human interactions (de Winter, 2023). It operates on a dataset of 570GB (referenced from GPT3.5), which includes books, websites, Wikipedia, articles, and other online resources, along with an additional repository of 300 billion words (Hughes, 2023). According to Guo et al. (2023), ChatGPT's ability to learn through human feedback equips it with Natural Language Processing (NLP) capabilities. The study concluded that, compared to humans, ChatGPT aligns more closely with a conservative group of experts, offering understandable and neutral responses. These responses are well-organized, clearly justified, and often focus on core concepts. ChatGPT also tends to provide long, detailed answers, as a result of its Reinforcement Learning from Human Feedback (RLHF) framework. However, users can request specific response conditions, such as "Explain this to me in one sentence." Notably, ChatGPT demonstrates minimal bias and avoids presenting risky information. It remains neutral, particularly on sensitive topics, and generally refrains from engaging in political discussions or answering questions lacking sufficient information.

Learning enhancement

Bai et al. (2023) found that ChatGPT can facilitate skill development in areas such as critical thinking, problem-solving, and communication. It achieves this by generating scenarios, providing feedback, and offering tailored suggestions. Additionally, AI functions as an effective study tool, assisting students in reviewing and recalling information through summarizing key points, generating study notes, and delivering clear and helpful explanations. ChatGPT has the potential to serve as a one-on-one tutor, guiding learners through complex topics at a personalized pace, providing instant feedback, and generating customized problem sets. This aligns with the concept of personalized learning, which aims to adapt lessons and information to each student's needs and skill level. Preliminary studies have demonstrated the efficacy of AI in improving learning outcomes, suggesting that AI-supported approaches can foster a more engaging and tailored educational experience. Ultimately, ChatGPT serves as a valuable tool for strengthening human learning and memory.

Learning through ChatGPT enables students to acquire knowledge by engaging in doing, reflecting, and applying the newly gained insights. It empowers students to become more autonomous and take greater responsibility for their own learning, making it especially suitable for advanced learners seeking in-depth content knowledge.

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Moreover, it enhances personalized learning experiences (Habeb Al-Obaydi et al., 2023). ChatGPT can also be seamlessly integrated into education to automate routine tasks, thereby enhancing the learning experience for students. Its integration not only boosts productivity and efficiency but also fosters adaptive learning approaches tailored to individual needs (Elbanna & Armstrong, 2024).

Accessibility

Over the past few years, despite the availability of various artificial intelligence formats, such as AI assistant systems, and chatbots, none have matched the power and user-friendliness of the Chat Generative Pre-trained Transformer better known as ChatGPT (Adamopoulou & Moussiades, 2020). ChatGPT features a user-friendly interface, the capability to respond to various types of questions, and the ability to generate varied and dynamic content (Ritson, 2022). Furthermore, it is regarded as a transformative core technology, potentially heralding significant transformations. Some have even likened it to the "Google of the future" or an internet-revolutionizing milestone (Ritson, 2022).

ChatGPT is effortlessly accessible by typing into the text box at https://chat.openai.com/chat to engage in interactions. It requires no prior coding knowledge and is free of charge, making it available to everyone within seconds. The AI platform provides users with access to diverse content in various formats and delivers interactive responses across multiple languages (Chui et al., 2022).

Summary: ChatGPT as a tool for intercultural competence development

A review of literature on intercultural competence and ChatGPT highlights features and functionalities that align closely with approaches to developing intercultural competence. Several key characteristics make ChatGPT a valuable tool for facilitating intercultural learning:

Firstly, ChatGPT functions as an information source**,** comparable to books, websites, or expert consultations. It provides learners with access to a vast repository of data, offering diverse cultural knowledge and perspectives. Secondly, ChatGPT enables real-time interaction**,** resembling the exchange of experiences or discussions with experts or peers. This interactive dimension significantly enhances the learning process by allowing learners to ask questions, seek clarification, and delve deeply into intercultural topics. ChatGPT's advanced Natural Language Processing (NLP) mechanisms facilitate human-like communication, allowing learners to engage in conversations that closely mimic real interactions. This capability supports detailed comprehension and fosters a nuanced understanding of intercultural concepts. Unlike traditional learning methods that rely on scheduled interactions with instructors or peers, ChatGPT provides instant feedback, eliminating waiting times. Learners can access ChatGPT anytime and from any location**,** using mobile devices, tablets, or computers**,** thereby promoting self-paced and autonomous learning. Its user-friendly interface allows learners to initiate educational exchanges by typing or speaking their queries. Additionally, its multilingual capabilities enable learners to study in their preferred language**,** further enhancing accessibility and inclusivity in intercultural education. Based on these attributes, the researcher anticipates that ChatGPT can effectively support the development of intercultural competence and emerge as an innovative educational technology in global learning environments.

Conceptual framework

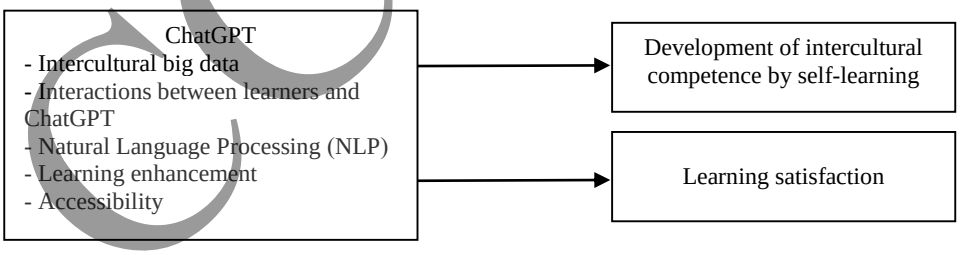


Figure 1 Conceptual Framework

Research methodology

This study employs a mixed-methods approach, divided into two phases**.** In phase 1, an online survey was conducted using Google Forms, with 250 participants sharing their perceptions of using ChatGPT for intercultural competence development**.** The survey aimed to capture general attitudes and opinions regarding AI-driven learning in this context**.** In phase 2, an experimental study was performed with 15 participants who engaged in self-directed intercultural competence development using ChatGPT over a one-week period**.** Participants interacted with ChatGPT through predefined simulated scenarios designed to facilitate intercultural learning**.** Following the one-week learning period, data collection included conversation logs, satisfaction questionnaire, and semi-structured interviews. ChatGPT logs, submitted via email, were analyzed to examine learning behaviors, cognitive domain levels, and linguistic patterns used in interactions with ChatGPT. The satisfaction questionnaire assessed participants' satisfaction with their intercultural competence development, while semi-structured interviews, conducted via Zoom, provided deeper insights into their learning experiences, engagement, and satisfaction with AI-driven intercultural learning. By integrating quantitative survey data and qualitative conversational and behavioral analysis, this research aims to offer

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a comprehensive understanding of how ChatGPT facilitates intercultural competence development and enhances learners' satisfaction.

Population and samples

Phase 1: The respondents of the online survey comprised of 250 individuals selected through purposive sampling based on the following qualifications: working with foreigners and serving as foreign language teachers with experience using ChatGPT. No restrictions were imposed on age and gender. The sample size of 250 respondents aligns with recommendations of Bartlett et al**.** (2001), who suggest that for quantitative and survey**-**based research, a sample size of 250 to 400 is appropriate to ensure generalizability in studies involving moderate to large populations. The selected respondents bring valuable perspectives due to their knowledge and experience in interacting with people from diverse cultural backgrounds or having previously collaborated in multicultural environments.

Phase 2: The experimental group included 15 participants, consisting of students and individuals working with foreigners, aged 18 to 30, irrespective of gender. Prior experience with ChatGPT was not a prerequisite for participation.

Research instrument

Phase 1*:*

A survey on opinions regarding ChatGPT was conducted to evaluate its qualifications in influencing the self-development of intercultural competence within the context of international virtual collaboration. The survey consisted of 25 questions—20 positive and five negative questions—alongside a six-question appended test for assessing intercultural competence based on the INCA framework (Kirchberger, 2009). This questionnaire was validated by three experts in chatbot technology and three experts in intercultural competence, achieving an Item-Objective Congruence (IOC) index of 0.9. A preliminary tryout was then conducted with a sample of 30 participants to minimize potential errors or variability in the variables. Finally, the survey's reliability was assessed using Cronbach's alpha, yielding a coefficient of 0.9.

Phase 2*:*

A *simulated intercultural scenario* was employed with 15 learners in the experimental group as part of a self-directed learning approach. The scenario was developed based on findings from the first phase of the study, which explored ChatGPT's qualifications for promoting the self-development of intercultural competence within the context to ensure content validity, achieving The Index of Item-Objective Congruence (IOC) index of 1.

A *learners' satisfaction assessment* was conducted to explore satisfaction levels with using ChatGPT for self-directed development of intercultural competence. The evaluation used a 5-point Likert Scale: Level 5 (highest satisfaction), Level 4 (high satisfaction), Level 3 (moderate satisfaction), Level 2 (low satisfaction), and Level 1 (lowest satisfaction). The questionnaire consisted of three sections. The first section collected general information about the respondents. The second section measured satisfaction with using ChatGPT for self-intercultural competence development within the context of international virtual corporation, focusing on three key dimensions: usability**,** information delivery, and learning/knowledge acquisition. The third section provided respondents with an opportunity to offer additional suggestions or feedback regarding their experiences with ChatGPT for intercultural competence development.

of international virtual collaboration. The instrument underwent validation by three experts in intercultural competence

A *semi-structured interview* was conducted to investigate participants' experiences in independently developing intercultural competence through ChatGPT. The interview questions focused on various aspects, including participants' overall perceptions of ChatGPT, its advantages and disadvantages, the reliability of the information provided, language usage, its role in facilitating learning, and ease or difficulty of use. Both the learners' satisfaction assessment and semi-structured interview were validated by three experts in educational and chatbot technology and three experts in intercultural competence to ensure content validity, achieving an Item-Objective Congruence (IOC) index of 0.9. Subsequently, a tryout of the three instruments was conducted with a sample of 5 participants to reduce potential errors or variability in the variables.

Data collection

Four types of data were collected using online platforms:

Phase 1*:*

Surveys were administered via Google Forms to analyze prevailing opinions.

Phase 2*:*

Conversation logs between learners and ChatGPT were submitted via email to examine learning patterns and behaviors, providing insights to support learner satisfaction results. *Satisfaction questionnaires* were gathered through Google Forms for data analysis. The *semi-structured interviews* were conducted through Zoom to explore participants' experiences.

Data analysis

Phase 1*:*

Findings from the literature review were synthesized to design the survey. Thereafter, responses from 250 participants were analyzed using percentage calculations to identify predominant opinions within the group. This analysis was conducted to assess the alignment between respondents' perceptions and the reviewed characteristics of ChatGPT, validating its suitability for fostering self-intercultural competence development. The findings further contributed to the creating of a self-intercultural competence development model utilizing ChatGPT.

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The final section of the survey featured an appended test for evaluating intercultural competence, analyzed using ANOVA to examine variance among groups with varying usage frequencies and levels of intercultural competence. The results provided a guideline for determining optimal self-learning duration in this context.

Phase 2 (following learners' engagement in self-learning via ChatGPT):

The conversation logs between learners and ChatGPT were analyzed with the following perspectives. First, learning sequences were synthesized in relation to the stages of the cognitive domain outlined in Revised Bloom's Taxonomy *(*Anderson & Krathwohl, 2001). Second, areas of interest were identified based on criteria provided by Filpisan et al. (2012), encompassing historical background, geography, economy, sociology, cultural facts, biases, discrimination, intercultural communication, case studies, problem-solving-based learning, discovery-based learning, stereotyping, comparing similarities and differences between cultures, sharing experiences, opinions, and practical approaches. Third, the conversations were analyzed based on linguistic forms, including declarative sentences, commands (or requests), questions, and words/phrases. Quantitative analysis involved calculating percentages, complemented by qualitative analysis, to explore key topics related to intercultural competence, the learners' cognitive domain levels as per Bloom's Taxonomy (Anderson & Krathwohl, 2001), and the linguistic structures employed during self-learning via ChatGPT.

The satisfaction assessment of learners in the experimental group regarding self-directed development of intercultural competence through ChatGPT was analyzed using mean scores and standard deviations. The satisfaction levels were interpreted based on the following criteria: most satisfied (mean score 4.51–5.00), highly satisfied (mean score 3.51–4.50), moderately satisfied (mean score 2.51–3.50), slightly satisfied (mean score 1.51–2.50) and least satisfied (mean score 1.00–1.50).

Semi-structured interviews were conducted to explore participants' direct experiences in developing intercultural competence through self-learning using ChatGPT.

Results

Phase 1:

Section 1 The twenty-question survey responses from 250 participants were analyzed using percentage calculations to identify the prevailing opinions within the group. Only opinions selected by more than 50% of respondents were considered for further analysis and used in designing intercultural learning steps. Figure 2 illustrates the predominant opinions on utilizing ChatGPT for the development of intercultural competence in the context of international virtual corporation.

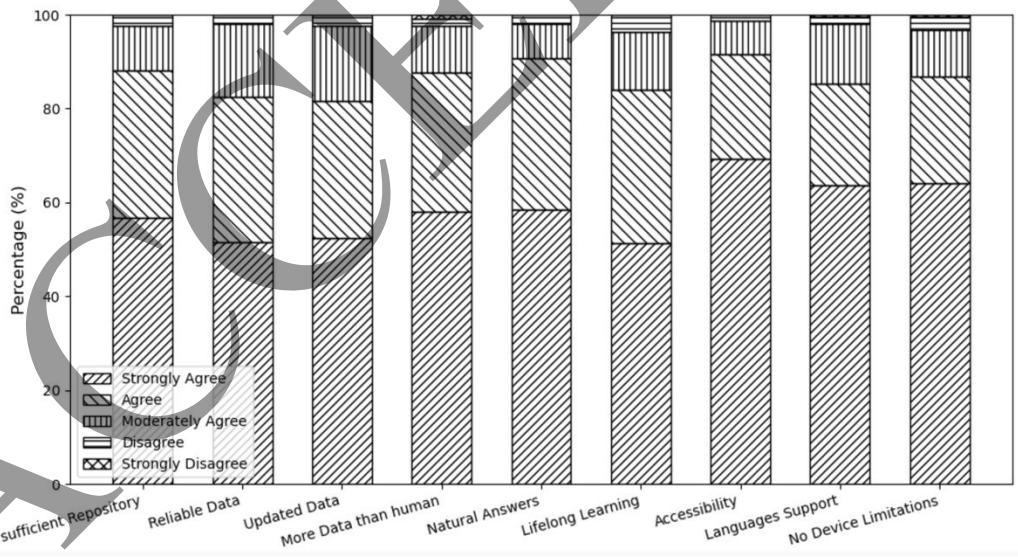


Figure 2 Prevailing opinions on the use of ChatGPT for developing intercultural competence in international virtual corporation

According to Figure 2, more than 50% of survey respondents strongly agreed with the following statements: ChatGPT possesses a sufficient and reliable intercultural repository, updated to reflect current global situations and changes. It holds a broader repository of intercultural data compared to individuals on a personal level. Additionally, ChatGPT provided responses to intercultural issues in a natural manner that closely resembles human interactions. Furthermore, ChatGPT promotes lifelong learning in the domain of intercultural knowledge. From an accessibility standpoint, obtaining intercultural knowledge through ChatGPT is highly convenient. Neither language nor device limitations pose a barrier to using ChatGPT for this purpose. The findings are consistent with the conclusions drawn from the literature review.

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Section 2 The results on the frequency of ChatGPT usage in self-intercultural competence development and its impact on levels of intercultural competence are summarized in the following table. In this section, the researcher included questions about the frequency of ChatGPT usage by learners to analyze its correlation with their intercultural competence levels.

Table 1 Variance analysis of the frequency of ChatGPT usage in self-intercultural competence development: Comparison between groups and within groups regarding its impact on levels of intercultural competence.

Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Between groups	76.795	3	25.598	68.369***	<.001
Within group	92.105	246	.374		
Total	168.900	249			

*** p <.001

The results of the Analysis of Variance (ANOVA) revealed that the between-group variance was 76.795 with a degree of freedom (df) of 3, while the within-group variance was 92.105 with a df of 246. The statistical significance was .001, which falls below the standard threshold of 0.05.

Table 2 Analysis of the impact of learners' ChatGPT usage frequency on their levels of intercultural competence.

Frequency of ChatGPT usage	mean	SD	1/month	1-2/week	3-6/week	daily
			3.67	**4.58**	**4.65**	**5.71**
1/month	3.67	.57				
1-2/week	4.58	1.39	.90			
3-6/week	4.65	.63	.99			
everyday	5.71	.51	2.04	1.13	1.06	

According to the table comparing the frequency of ChatGPT usage and its impact on learners' intercultural competence scores (out of 6), the following results were observed:

- Learners who used ChatGPT daily achieved the highest average score of 5.71.
- Learners who used ChatGPT 3–6 times per week had an average score of 4.65.
- Learners who used it 1–2 times per week scored an average of 4.58.
- Learners who used it once per month scored an average of 3.67.

**The mean difference is significant at the 0.05 level.*

Based on the LSD post hoc test, multiple comparisons of ChatGPT usage frequencies revealed the following significant differences ($p < 0.05$):

- 1/month vs. 1-2/week: Mean Difference = 0.90 ($p = 0.033$)
- 1/month vs. 3-6/week: Mean Difference = 0.99 ($p = 0.006$)
- 1/month vs. everyday: Mean Difference = 2.04 ($p < 0.001$)
- 1-2/week vs. everyday: Mean Difference = 1.13 ($p < 0.001$)
- 3-6/week vs. everyday: Mean Difference = 1.06 ($p < 0.001$)

The data reveal that daily ChatGPT users significantly outperform all other groups, achieving the highest mean score compared to those who use ChatGPT 1/month, 1-2/week, and 3-6/week. No statistically significant differences were found between 1-2/week and 3-6/week ($p = 0.736$), indicating similar impact on the outcome variable. The largest mean difference is between "daily" users and "1/month" users (Mean Diff = 2.04, $p < 0.001$), underscoring the substantial positive impact of frequent ChatGPT usage on intercultural competence development.

Based on the findings from Phase 1, a simulated scenario for self-intercultural competence development through ChatGPT was designed. In this scenario, motivated learners engage with ChatGPT daily over the course of seven days (a week) gathering information based on the assigned intercultural case studies. Learners have the flexibility to initiate their learning process based on their specific areas of interest, essential knowledge for their simulated scenarios, or their prior related knowledge. The duration of daily learning is not pre-determined, allowing learners to pause or conclude their study sessions at their convenience or satisfaction. For those who have never used ChatGPT, an onboarding process prior to engagement to familiarize them with the platform and its capabilities.

Phase 2*:*

Section 1 Conversation Analysis

After the experimental group completed the assigned simulated intercultural learning scenarios over the seven-day period, their conversations with ChatGPT were gathered for detailed analysis. The focus of the analysis included observing learning behaviors, evaluating their cognitive levels based on Bloom's Taxonomy (Anderson & Krathwohl, 2001), identifying areas of interest explored during the interactions, and examining the linguistic structures utilized, such as commands, questions, and declarative sentences. These findings will be further interpreted in relation to learners' reported satisfaction levels, providing insights into their self-learning experiences.

Through self-learning via ChatGPT on intercultural issues, as specified in the research, a total of 298 intercultural topics were generated by 15 participants. When these topics were analyzed and categorized according to the five levels of the cognitive domain in the Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001), the distribution was as follows: 73 topics (24%) fell under Remembering, 124 topics (42%) under Understanding, 49 topics (16.5%) under Applying, 26 topics (9%) under Analyzing, 19 topics (6.5%) under Evaluating, and 7 topics (2%) under Creating.

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These findings suggest that self-learning on intercultural topics via ChatGPT facilitates engagement across all cognitive domain levels in Bloom's Taxonomy (Anderson & Krathwohl, 2001). The highest level achieved by learners was Understanding, followed by Remembering, Applying, Analyzing, Evaluating, and Creating, respectively. This distribution aligns closely with the hierarchical structure of Bloom's cognitive domain (Anderson & Krathwohl, 2001); however, a notable distinction is observed during the initial stages of learning. In Bloom's Taxonomy (Anderson & Krathwohl, 2001), learning traditionally begins with Remembering before progressing to higher cognitive levels. In contrast, during self-learning via ChatGPT, learners often begin with pre-existing knowledge (Remembering) and quickly advance to Understanding before moving further up. Moreover, throughout the learning process, learners may revisit the Remembering stage when encountering new vocabulary or unfamiliar concepts introduced by ChatGPT, reinforcing their foundational knowledge.

An analysis of the conversations between learners and ChatGPT revealed the distribution of engagement with different types of information in the following proportions: Practical guidelines accounted for 93 topics (31%), followed by factual information at 87 topics (29%) and opinions at 49 topics (17%). Language and translation represented 23 entries (8%), while examples were covered in 22 topics (7%). Evaluations formed 12 topics (4%), comparisons constituted 9 topics (3%), and reason was represented by 3 topics (1%).

These findings indicate that, in the context of online collaboration with international colleagues, learners prioritize practical guidelines for intercultural collaboration above all other topics. This is followed by a focus on factual information about various countries and cultures, as well as seeking opinions from ChatGPT. Additional areas of interest include language and translation support, requesting examples, asking ChatGPT to evaluate situations, comparing cultural differences, and seeking reasoning or supportive explanations, respectively.

An analysis of learner-ChatGPT conversations revealed that learners primarily utilized four communication patterns: questions, requests/commands, declarative statements, and words/phrases. The distribution of these patterns was as follows: Questions accounted for 183 entries (61%), requests/commands comprised 29 entries (10%), declarative statements made up 19 entries (6%), and words/phrases contributed 67 entries (23%).

These findings indicate that questions were the most frequently used communication pattern in self-learning interactions with ChatGPT. Words and phrases ranked second, followed by requests/commands, and lastly, declarative statements, respectively.

Section 2 Learners' satisfaction with self-developing intercultural competence through ChatGPT was evaluated using a combination of satisfaction surveys and semi-structured individual interviews. The assessment focused on the following four key aspects: usability, information delivery, learning and knowledge/understanding.

Table 3 The learners' satisfaction with the self-development of intercultural competence through ChatGPT

List	mean	percentage	SD	evaluation
Usability				
Ease of use	4.87	97.33	0.34	highest satisfaction
Self-learning guidance	4.33	86.67	0.70	high satisfaction
Information Delivery				
Reliability of information	4.13	82.67	0.50	high satisfaction
Language clarity	4.53	90.67	0.72	highest satisfaction
Promptness of information delivery	4.73	94.67	0.44	highest satisfaction
Learning				
Self-learning experience	4.67	93.33	0.47	highest satisfaction
Case study provided for self-learning	4.73	94.67	0.44	highest satisfaction
Timeframe for self-learning	4.53	90.67	0.72	highest satisfaction
Knowledge/Understanding				
Knowledge and understanding of the studied topic	4.73	94.67	0.44	highest satisfaction
Self-studied knowledge applied to life	4.60	92.00	0.49	highest satisfaction

Overall, learners reported a high level of satisfaction with their experience in self-developing intercultural competence through ChatGPT. This positive feedback extended across aspects of usability, information delivery, learning, and knowledge/understanding.

Discussion

The discussion in this section will be structured according to the research objectives**.**

Pattern of intercultural competence development via ChatGPT

According to the literature review, survey findings and observation of learners' behaviors, the process of self-developing intercultural competence through ChatGPT has been organized into four sequential steps:

1. Motivation: This initial step focuses on the learner's expected outcomes or their perceived benefits of developing intercultural competence. Motivation acts as the driving force, inspiring the learner to begin and sustain the learning journey.

2. Preparation: For learners with no prior experience using ChatGPT, guidance is essential to familiarize them with its features and functionality. During this step, a learning framework is established, including identification of topics of interest that align with learners' expected outcomes. Additionally, setting a time frame for the learning process

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is encouraged to enhance focus and commitment. Daily self-learning sessions are recommended to foster consistency and engagement.

3. Learning Process: This step involves three key components: memory stimulation, communication, and investigation. Learners begin by recalling long-term memories related to intercultural issues to establish a foundation for further learning. Next, they engage in communication with ChatGPT using various linguistic structures, such as interrogative sentences, commands, declarative statements, and individual words or phrases. Learners have the flexibility to use any language and device they are most comfortable with, enhancing accessibility and convenience. During the investigation phase, learners verify their understanding of ChatGPT's responses. If the information provided is unclear, they have the option to request additional explanations or recommendations for further resources from ChatGPT to ensure clarity and depth of understanding.

4. Self-Evaluation: In this final step, learners engage in personal assessments to evaluate whether their learning progress and outcomes align with their initial expectations and goals. If they feel their development is sufficient, they may choose to pause the learning process. They can resume learning at a later time when new inspiration or goals emerge, thus initiating the cyclical repetition of the sequential steps outlined in the process.

The four-stage learning pattern observed among learners aligns closely with the three phases of self-regulated learning (SRL) as proposed by Zimmerman (1998), which include forethought, performance volitional control, and self-reflection. *Forethought* involves goal setting and strategic planning; while *performance volitional control* encompasses active engagement and self-monitoring throughout the learning process. *Self-Reflection* occurs when learners evaluate their performance and modify strategies as needed. Furthermore, the four-stage learning process correlates with the Information Processing Theory, which highlights the connection between self-regulation and metacognitive awareness—the ability to recognize and assess one's capabilities, interests, attitudes, task requirements, and strategies for achieving success (Gitomer & Glaser, 1987).

Analyzing the overall learning process of participants highlights that their motivation to enhance their competencies stems primarily from aspirations for career advancement. They devise strategies for self-improvement, operate within a clearly defined timeframe, establish clear expected outcomes, and participate in both physical and social environments conducive to self-development. These aspects align seamlessly with the six key components of self-regulated learning (SRL) as outlined by Zimmermann (1998): motivation, methods, time management, performance outcomes, physical environment, and social environment.

Observations and interviews suggest that learners begin the learning process by identifying areas of interest or knowledge gaps, influenced by their motivation and desire to enhance their understanding of other cultures. This reflective stage may involve internal thought processes, self-dialogue, or visual tools like mind mapping to organize their thoughts. Once this foundation is established, learners actively engage with ChatGPT by formulating questions and interacting in diverse ways. Throughout this process, they continuously evaluate their questioning strategies, refine their inquiries to elicit more accurate and relevant responses. They also assess whether the acquired knowledge meets their expectations and learning objectives. Additionally, learners consistently reflect on the adequacy of the information they have gained, particularly in relation to its application in effectively leading multicultural teams in professional settings.

Learners' Satisfaction

After the experimental group participated in self-intercultural competence development using ChatGPT, adhering to the four-step learning process outlined earlier, their conversation logs with ChatGPT were collected for analysis. The study examined their learning behaviors, cognitive domain levels, areas of interest, and communicative approaches when interacting with ChatGPT. Additionally, learners completed a satisfaction survey and participated in semi-structured interviews to provide insights into their experiences. The findings from conversation analysis and learners' satisfaction are summarized below, offering a comprehensive understanding of the impact of self-learning via ChatGPT.

Overall, learners expressed a high level of satisfaction with their experience of developing intercultural competence through self-learning using ChatGPT. This satisfaction spanned multiple dimensions, including usability, information delivery, learning, and knowledge/understanding. The findings suggest that learners were not only content with the learning process but also with the knowledge gained. They highlighted ChatGPT's convenience as a self-learning tool, the rapid delivery of information, and the perceived reliability of the content provided.

In terms of satisfaction with knowledge, which serves as a measure of learning effectiveness, most learners expressed contentment with the knowledge they had acquired and its practical applicability in their daily lives. Analysis of learners' conversation logs with ChatGPT revealed that their learning levels predominantly corresponded to the stages of Understanding and Remembering. These stages align with the Revised Bloom's Taxonomy (Anderson & Krathwohl, 2001), where Remembering and Understanding form the two foundational tiers of the pyramid. These levels are categorized as lower-order thinking skills (LOTS), providing a critical base for higher-order cognitive development. Although the sequence of these two cognitive levels occasionally alternates, learners demonstrated a stronger grasp of Understanding compared to Remembering. This observation is consistent with the findings of (Habeb Al-Obaydi et al., 2023), which highlight that learning via ChatGPT is particularly effective for advancing cognitive development. According to the study, learners often initiate their learning journey with foundational knowledge at the Remembering stage, which serves as a basis for progressing to a deeper level of Understanding. This progression underscores the platform's ability to support learning in achieving advanced learning outcomes. This concept aligns with Vygotsky's (1962) theory of the 'zone of proximal development' (ZPD) which posits that effective learning occurs when learners are provided with appropriate guidance or a supportive environment. The ZPD refers to tasks that learners cannot

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complete independently but can accomplish with assistance from a more capable guide, such as a teacher or peer. In this context, ChatGPT assumes the role of a supportive facilitator, enabling learners to perform tasks more effectively and independently. As learning progress, the ZPD evolves into a space for reflection and advanced learning, ultimately elevating the learner to higher levels of cognitive development. ChatGPT's ability to guide learners across all cognitive levels significantly enhances their satisfaction with the tool, particularly in fostering self-directed intercultural competence development.

In addition to the cognitive levels that support learners' satisfaction, the findings of this study regarding learners' self-development behaviors align with the *Information Processing Theory* (*IPT*) (Gitomer & Glaser, 1987). Specifically, learners activate relevant long-term memories by formulating questions or sending messages to ChatGPT. Upon receiving responses, they integrate the newly acquired information (ChatGPT's answers) into their working memory, enriching their understanding. This process also aligns with the *self-regulated learning theory* of Schunk and Zimmerman (2003), which emphasizes achieving learning outcomes through self-constructed knowledge and goal-directed behaviors. During their interactions with ChatGPT, exhibit core elements of self-monitoring comprehension, including posing questions, reflecting on their understanding, rereading content, verifying knowledge consistently, and interpreting responses. Learners frequently evaluate whether they understand ChatGPT's responses, identify further areas of inquiry, and evaluate the effectiveness of their strategies (Baker & Brown, 1984). These reflective and iterative practices significantly contribute to the satisfaction reported in the research findings, underscoring the value of ChatGPT as a self-learning tool.

Learning topics of interest to learners play a significant role in contributing to learners' high levels of satisfaction. ChatGPT effectively supports nine key areas of interest, including practices, factual information, opinions, language and translation, examples, situation evaluation, comparisons, and reasoning. This aligns with the study by Filpisan et al. (2012), which identified that intercultural learning activities should encompass a wide range of topics such as historical background, geography, economics, sociology, cultural facts, distinguishing biases, addressing discrimination, intercultural communication, case studies, problem-solving-based learning, discovery learning, stereotypes, cultural comparisons, and the exchange of experiences, opinions, and practices. Moreover, an analysis using *the cultural iceberg model* by Filpisan et al. (2012) demonstrates that the topics learners independently study are not confined to surface cultural elements like food, holidays, or clothing. Instead, they often explore deeper cultural dimensions, including body language, friendship-building, satisfaction in collaboration, social interactions, judgment, decision-making, leadership styles, subordination approaches, and career dynamics.

Overall, observations of learners' behavior from their conversation history with ChatGPT and interviews, suggest that their satisfaction with learning may largely stem from the absence of human-related pressure, such as that typically experienced with instructors or peers. Learners reported feeling free and confident to ask any questions they did not know or wanted to explore without fear of judgment. This phenomenon aligns with the conditioning/reinforcement theory or Operant Theory (Skinner, 1953), which emphasizes that learning is influenced by reinforcement patterns. Unlike traditional learning environments where learners might encounter negative reinforcement—for instance, being told, 'Why don't you already know this?' or 'This was already explained!'—ChatGPT does not impose negative reactions. Instead, it addresses learners' curiosity and questions in a supportive and neutral manner, fostering a judgment-free zone conducive to self-directed learning. ChatGPT demonstrates a unique ability to promote positive behavior, encouraging learners to engage with the platform more willingly compared to interactions with human instructors. While teacher feedback can influence learners' perception of self-efficacy, motivational messages can enhance it. Research by Schunk (1995) highlights that self-efficacy plays a crucial role in shaping learners' actions, including their job choices, persistence, effort, and achievement. According to the *social cognitive theory*, learners approach learning situations with specific goals and adjust their level of self-efficacy to pursue them effectively. During the performance volitional control phase, learners develop learning strategies that drive their motivation and directly impact their learning outcomes. In the self-reflection phase, learners perform self-evaluations (Zimmerman, 1998). ChatGPT's capability to facilitate these processes without imposing pressure creates a supportive environment for autonomous learning. This fosters both motivation and satisfaction, making it an effective tool for nurturing self-directed learning experiences.

The conversation analysis findings further support learners' confidence in asking questions and exploring intercultural information during self-learning with ChatGPT. Question sentences emerged as the most frequently used communication approach, accounting for 61% of interactions. This was followed by the use of words or phrases (23%), requests or commands (10%), and declarative sentences (6%). These results indicate learners leverage a variety of communicative approaches when engaging in self-intercultural learning with ChatGPT. The flexibility of these approaches allows learners to customize their interactions, enhancing their ability to acquire intercultural knowledge effectively and confidently.

In terms of learning satisfaction, learners reported the highest levels of contentment in three key areas: their overall self-learning experience, satisfaction with the case study provided, and the allocated time for self-learning. These findings strongly corroborate the effectiveness of the self-development model for intercultural competence through ChatGPT, demonstrating its ability to meet learners' expectations and create a positive learning environment tailored to individual needs.

Despite its strengths, certain limitations of ChatGPT may affect its effectiveness as a standalone tool for developing intercultural competence. One key limitation is the lack of direct engagement with individuals from diverse cultural backgrounds. While ChatGPT facilitates simulated conversations, these interactions may not capture the full complexity of human dynamics in real-world multicultural settings. Additionally, ChatGPT lacks genuine emotional

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intelligence, which may hinder its ability to accurately interpret cultural nuances, humor, or unspoken social cues. These limitations underscore the importance of complementing ChatGPT-based learning with real-life interactions to gain deeper insights and a more holistic understanding of intercultural competence.

Suggestions

The following recommendations are proposed as a framework for organizations or individuals seeking to independently enhance their intercultural competence:

Organizations aiming to develop cultural competence can effectively integrate ChatGPT as a reliable tool for self-directed learning. Introductory training should be provided to familiarize learners with its functionalities, including strategies for formulating effective questions to achieve meaningful answers and gain knowledge. Additionally, allocating a budget for learners to access the ChatGPT Plus version would further enhance learning opportunities, though the free version remains a viable option for supporting the development of intercultural competence. Structured learning activities could be designed, such as a week of self-directed learning via ChatGPT, followed by collaborative small group workshops to share insights or summarize independently studied intercultural topics. For organizations aiming to build a knowledge base, learners' conversation histories can be compiled, with frequently asked questions (FAQs) synthesized and stored in the organizational database for future reference. In operational settings, ChatGPT can support employees in developing intercultural competence prior to virtual collaborations or meetings. As a virtual cultural mentor, it can provide guidance on cultural etiquette and professional norms. Additionally, ChatGPT can simulate intercultural interactions, offering employees a safe space to practice cross-cultural communication. Furthermore, it can serve as a real-time language assistant, helping translate and refine messages for clarity and cultural appropriateness. AI-generated feedback on tone, politeness, and professionalism can further aid employees in honing their intercultural communication skills.

Individuals aspiring to develop intercultural competence independently can effectively use ChatGPT as a versatile learning tool. Learners may adopt a blended approach by combining various resources suited to their learning levels. For instance, they might begin by watching television to build familiarity and understanding, then delve deeper by utilizing websites or ChatGPT for further inquiries. Alternatively, learners can initiate their learning journey with questions directed at ChatGPT and complement it with exploration on other media. However, ChatGPT alone is viable option for self-directed learning. To ensure an effective study routine, learners should establish a structured timeframe, such as dedicating 15 minutes daily for a week. In the initial stages of engagement, learners may feel dissatisfied with the responses. To address this, they are encouraged to frame more specific or command-style questions, avoid generic statements, and provide relevant details or context about their queries. Over time, ChatGPT adapts to the learner's context and delivers increasingly contextual responses. In practical terms, ChatGPT can be used as a personalized learning tool for intercultural competence development. It can adapt learning materials based on learners' cultural background and language proficiency. Learners can engage in simulated intercultural interactions, such as AI-based role-playing activities, where ChatGPT acts as conversation partners representing diverse cultural contexts. Through these simulations, individuals can practice cross-cultural communication, etiquette, and problem-solving in realistic scenarios, including workplace misunderstandings and cultural differences. Learners can use ChatGPT to create quizzes and case studies to evaluate their cultural knowledge and receive immediate feedback. This iterative and interactive approach supports the continuous development of intercultural competence.

From an educational perspective, AI presents significant opportunities for integration into teacher training programs, enhancing educators' ability to navigate culturally diverse classrooms. ChatGPT, for instance, can serve as an AI-powered teaching assistant, aiding educators in the development of intercultural learning materials, the creation of inclusive curricula, and the promotion of intercultural understanding. Additionally, AI can also support the adaptation of instructional strategies to meet the needs of students from diverse cultural and linguistic backgrounds, ensuring more effective and equitable learning experiences. Educators may employ AI-driven cultural simulations, allowing students to complete tasks that require cross-cultural problem-solving in practical scenarios. For instructors utilizing ChatGPT to cultivate intercultural competence in the classroom, learners can be assigned to explore topics of interest on the platform within a structured framework provided by the instructor. Following this, learners can engage in classroom discussions to exchange insights and collaboratively summarize key intercultural issues studied independently. This method not only enriches the learning experience by introducing a variety of approaches but also encourages the integration of technology into education, supporting the development of learners' digital skills alongside intercultural competencies.

The following suggestions are proposed for future research direction:

1. Effectiveness of learning: Conduct a T-Test for two dependent groups (pre-test and post-test comparisons) to measure learning effectiveness. Follow this with interviews or focus groups to explore learners' experiences, challenges, and perceptions of intercultural learning.
2. Learning progression and retention: Examine learning progression, knowledge retention, and the long-term effectiveness of self-learning through ChatGPT to evaluate the development of learners' intercultural competence over specific time intervals (e.g., 3, 6, 9, and 12 months).
3. Influencing factors: Investigate factors within ChatGPT that influence the development of cultural competence using Exploratory Factor Analysis (EFA).
4. Optimal strategies for interaction: Explore strategies for using ChatGPT and methods of communication that maximize self-development or learning outcomes.

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5. Competence assessment: Assess the development of intercultural competence by evaluating learners' performance in role-playing activities or observing learners' behaviors in real-life scenarios.

6. AI literacy development: Research factors that contribute to the development of AI literacy skills to enhance user engagement with tools like ChatGPT.

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Conflict of Interest

The author declares that there are no financial, personal, or professional conflicts of interest that could have influenced the research, analysis, or publication of this article.

Declaration of Generative Artificial Intelligence Usage

During the preparation of this manuscript, ChatGPT was used for language support. The authors reviewed and approved the final manuscript and assume full responsibility for its accuracy and content.

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