

## Exploring Culturally Responsive Teaching Awareness in the Age of GenAI: Voices from Indonesian EFL Pre-Service Teachers

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**Abstract:** This study explores pre-service EFL teachers' awareness of integrating GenAI into CRT in West Kalimantan, Indonesia. Using a qualitative descriptive design, data were collected through semi-structured interviews with 35 final-semester pre-service EFL teachers and analyzed using Braun and Clarke's thematic analysis. Interview analysis reveals four interconnected dimensions of awareness: cognitive, pedagogical, critical/evaluative, and developmental. Participants recognized GenAI's limitations in representing local cultural knowledge, struggled to design culturally responsive prompts, and demonstrated the ability to identify cultural biases and inaccuracies in AI outputs. They also emphasized the need for practical training and institutional support to effectively integrate GenAI into culturally responsive learning. Based on these findings, this study proposes Culturally Responsive AI Literacy as a conceptual extension of AI literacy, positioning technical competence, critical evaluation, cultural knowledge, and pedagogical decision-making as integrated competencies.

**Keywords:** culturally responsive teaching, generative AI, AI literacy, pre-service EFL teachers, teacher education.

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### ■ INTRODUCTION

The rapid development of globalization, digital transformation, and intercultural communication has reshaped the objectives of English as a Foreign Language (EFL) education. English learning is no longer limited to developing learners' linguistic competence but is also expected to foster intercultural understanding and prepare students to communicate effectively in culturally diverse societies (Chen & Yang, 2014; Khomyshak, 2024; Lee et al., 2023). Since language reflects values, identities, and social practices, English teachers are expected not only to teach language skills but also to help students understand, appreciate, and negotiate cultural diversity (Byram, 2021; Kramsch, 1995; Sèna, 2025). This expectation highlights the importance of Culturally Responsive Teaching (CRT). This

instructional approach positions learners' cultural backgrounds, experiences, and identities as valuable learning resources rather than peripheral elements of the curriculum (Abdalla & Moussa, 2024; Gay, 2018; Ladson-Billings, 2014, 2021).

CRT is particularly relevant in Indonesia, a multicultural country characterized by diverse ethnicities, languages, and cultural traditions. Recent educational reforms through Kurikulum Merdeka further emphasize contextual learning, learner diversity, and the development of the Profil Pelajar Pancasila, all closely aligned with the principles of culturally responsive pedagogy (Cahya & Syafrizal, 2022; Ihsani & Prastikawati, 2024; Pratiwi et al., 2023). Nevertheless, implementing CRT in EFL classrooms remains challenging. English teaching materials remain dominated by Western cultural perspectives,

while local cultural resources remain underrepresented (Banaruee et al., 2023; Boonsuk et al., 2021; Madkur et al., 2024). In addition, teacher education programs tend to emphasize language proficiency and instructional methodology rather than preparing future teachers to integrate cultural diversity into English language teaching. Consequently, pre-service teachers need stronger awareness of culturally responsive pedagogy before entering professional practice.

The emergence of Generative Artificial Intelligence (GenAI) offers new opportunities to strengthen CRT implementation in English language teaching. By generating instructional materials, classroom activities, assessments, and feedback within seconds, GenAI can help teachers design more adaptive and culturally relevant learning experiences (Durán, 2026; Ijiri & Healy, 2025; Naidu & Sevnarayan, 2025; Weng & Fu, 2025). Rather than merely a technological tool, GenAI is increasingly viewed as a pedagogical partner that can help teachers contextualize instructional materials to learners' backgrounds (Berg, 2024; Kamaghe et al., 2024; Tafazoli, 2024). However, the educational value of GenAI largely depends on teachers' ability to evaluate, modify, and verify the cultural appropriateness of AI-generated content before implementing it in the classroom (Avadhanam & Kennedy, 2025; Hastomo et al., 2026; Mahmoudi-Dehaki & Nasr-Esfahani, 2026).

Previous studies have consistently reported the potential of GenAI to support teacher education. Research shows that GenAI can help teachers prepare lesson plans, generate learning materials, enhance instructional creativity, and improve teaching efficiency (Kasneci et al., 2023; Kılıçkaya, 2020; Yoanduanda et al., 2025). More specifically, Nyaaba et al. (2025) demonstrated that a CRT-based GPT model could generate lesson plans with greater cultural relevance than standard prompting. However, teachers still needed to review AI-generated

outputs to avoid cultural hallucinations. Similarly, Kong et al. (2022) emphasized that AI literacy, contextual adaptability, and culturally responsive teaching efficacy are important for successfully implementing GenAI in teacher education. Collectively, these studies suggest that GenAI has considerable potential to facilitate culturally responsive instruction while simultaneously requiring teachers to exercise professional judgment when using AI-generated materials.

Despite these promising findings, several issues remain unresolved. First, a substantial strand of recent empirical research on GenAI in language and teacher education has relied on quantitative survey designs to examine teachers' and pre-service teachers' perceptions, beliefs, acceptance, and intended use of AI technologies (Chung & Jeong, 2024; Mustroph & Steinbock, 2024; Wang et al., 2026). These studies provide valuable evidence regarding users' perceptions and adoption-related factors, but offer less insight into how pre-service EFL teachers interpret AI-generated instructional content and make context-sensitive pedagogical judgments. Second, although emerging research has begun to examine culturally responsive applications of GenAI, studies focusing specifically on pre-service EFL teachers in multicultural contexts such as Indonesia remain limited. Third, limited attention has been given to how pre-service EFL teachers identify cultural biases and inaccuracies in AI-generated materials and determine their cultural appropriateness for classroom use. Consequently, empirical evidence remains limited regarding how pre-service teachers develop awareness of the opportunities, challenges, and decision-making processes involved in evaluating AI-generated instructional materials from a culturally responsive perspective.

To address these gaps, this study adopts an adapted CRT–GenAI Awareness Framework synthesized from the AI Literacy framework (Ng et al., 2021), the AI Competency Framework

for Teachers (UNESCO, 2024), and the principles of Culturally Responsive Teaching (Gay, 2018; Ladson-Billings, 2021). The framework conceptualizes teachers' awareness through four interrelated dimensions: cognitive awareness, practical/pedagogical awareness, critical/evaluative awareness, and developmental awareness. These dimensions serve as the analytical lens for understanding how pre-service teachers perceive the opportunities, challenges, and professional support needed to integrate GenAI into culturally responsive English language teaching.

Accordingly, this study explores pre-service EFL teachers' awareness of integrating GenAI into Culturally Responsive Teaching. Specifically, the study seeks to answer three research questions: (1) How do pre-service EFL teachers demonstrate awareness of CRT in the era of Generative AI? (2) What challenges do they encounter when integrating GenAI into culturally responsive lesson planning, particularly in verifying the cultural appropriateness and accuracy of AI-generated content? (3) What forms of support and professional development do they perceive as necessary to strengthen their competence in integrating GenAI and CRT?

## ■ METHOD

### Research Design

This study employed a qualitative descriptive design to explore pre-service EFL teachers. The researchers used a qualitative descriptive design. The researchers believed this design was appropriate because the study's primary objective is to provide a comprehensive and straightforward account of participants' perspectives on integrating GenAI and CRT, rather than to generate abstract theory or highly interpretive explanations. Consistent with Creswell (Creswell, 2013), this design enabled the researchers to explore participants' meanings and identify patterns across their experiences

without adhering to a specific qualitative tradition such as phenomenology or grounded theory. Accordingly, this design was considered suitable for documenting how pre-service EFL teachers perceive, understand, and analyze the advantages and challenges of using GenAI in culturally sensitive teaching methods.

### Participant

The participants comprised 35 final-semester pre-service EFL teachers from a university in Pontianak, Indonesia, selected through purposive sampling. The inclusion criteria required participants to have repeated prior experience using Generative AI (e.g., ChatGPT) for instructional purposes (e.g., developing instructional materials or lesson plans), to have completed coursework in technology-enhanced instructional planning and pedagogy (e.g., ICT for EFL, AI for EFL), and to possess a foundational understanding of Culturally Responsive Teaching (CRT) acquired through coursework or teaching practicums (e.g., TEFL Methodology, Teaching Practice 1, and Teaching Practice 2). Rather than acquiring a specific duration of AI use, the researchers used participants' repeated instructional use of GenAI as the experience criterion, since this study did not systematically measure the duration of individual participants' GenAI use.

### Research Procedures

The research was conducted in four phases. The researchers then adapted ideas from AI literacy (Long & Magerko, 2020; Ng et al., 2021), the AI Competency Framework for Instructors (UNESCO, 2024), and the principles of Culturally Responsive Teaching (Gay, 2018; Ladson-Billings, 2021) to develop the CRT–GenAI research tools, which were validated by four academic experts in English language teaching (Reviewer 1 and 2), AI in education for clarity (Reviewer 3), and CRT (Reviewer 4) for

the relevance and alignment with the research objectives. Second, after obtaining ethical approval and informed consent, purposive sampling was used to recruit participants who met the inclusion criteria. Given that the participants were final-semester students at the researchers' university, participation was voluntary, and participants were informed that their decision to participate or withdraw would not affect their academic standing. To minimize potential social-desirability and acquiescence bias, the interviewer emphasized that there were no expected or preferred answers and encouraged participants to express their views freely. Third, semi-structured interviews were conducted for approximately 15–20 minutes per participant using five focused questions aligned with the four dimensions of the modified CRT–GenAI awareness framework. Fourth, transcripts were reviewed and coded iteratively (CRT-AI 01–CRT-AI 35) to identify recurring patterns and assess whether subsequent interviews contributed substantively new information to the emerging thematic structure, following Braun and Clarke (2006) and Xu (2026). Participants' confidentiality, voluntary participation, and reliable outcomes were ensured through informed consent

protocols, careful documentation, and participant codes.

### Research Instruments

Based on the modified CRT–GenAI awareness framework proposed in this study, a semi-structured interview protocol comprising five open-ended questions was designed to integrate the AI Literacy framework, the AI Competency Framework for Teachers, and the principles of Culturally Responsive Teaching. The interview protocol was aligned with the conceptual framework to ensure consistency between the research aims, data collection, and subsequent thematic analysis. Prior to data collection, the interview questions were reviewed by four academic experts with expertise in English language teaching and related areas to assess their clarity, relevance, and alignment with the research objectives and the conceptual framework. Their feedback was used to refine the wording and focus of the interviews before they were conducted. Following expert review, all five interview questions were retained as relevant, clear, and aligned with the research objectives and conceptual framework. The interview blueprint is presented in Table 1 below.

**Table 1.** Interview blueprint

| Theoretical Foundation                                                                                                               | Awareness Dimension              | Operational Definition                                                                                                             | Interview Focus                                                                    | Interview Question                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AI Literacy Framework (Ng et al., 2021); AI Competency Framework for Teachers (UNESCO, 2024); CRT (Gay, 2018; Ladson-Billings, 2021) | Cognitive Awareness              | Participants' understanding of GenAI's capabilities and limitations in supporting culturally responsive English language teaching. | Awareness of culturally responsive instructional materials and GenAI limitations.  | Q1. <i>When thinking about different types of English language teaching materials, what materials do you think would be most difficult to adapt or create using GenAI while maintaining cultural responsiveness? Why?</i> |
| AI Literacy (Use & Apply); UNESCO AI-enhanced Pedagogy; CRT                                                                          | Practical/ Pedagogical Awareness | Participants' awareness of pedagogical challenges encountered when integrating GenAI into CRT-oriented lesson planning.            | Practical experiences of using GenAI for lesson planning and material development. | Q2. <i>Can you describe any specific difficulties you might encounter when integrating GenAI into your lesson planning for CRT?</i>                                                                                       |

|                                                        |                                                   |                                                                                                                                    |                                                                         |                                                                                                                                                                |
|--------------------------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AI Literacy (Evaluate & Create); UNESCO AI Ethics; CRT | Critical/Evaluative Awareness                     | Participants' ability to critically evaluate AI-generated content for cultural appropriateness, accuracy, and potential bias.      | Verification of AI-generated materials before classroom implementation. | Q3. <i>What aspects of verifying the cultural appropriateness and accuracy of AI-generated content do you find most problematic?</i>                           |
| UNESCO Professional Learning; AI Literacy; CRT         | Developmental Awareness                           | Participants' awareness of the professional knowledge, training, and institutional support needed for effective GenAI integration. | Professional development and institutional support needs.               | Q4. <i>What kind of support or training do you think would be most helpful for pre-service teachers to overcome these challenges?</i>                          |
| Integrated CRT–GenAI Awareness Framework               | Overall Reflection ( <i>Supporting Question</i> ) | Participants' additional reflections beyond the four awareness dimensions.                                                         | Broader perceptions, concerns, and recommendations.                     | Q5. <i>Is there anything else you would like to add regarding your perceptions of integrating CRT materials with Generative AI that we have not discussed?</i> |

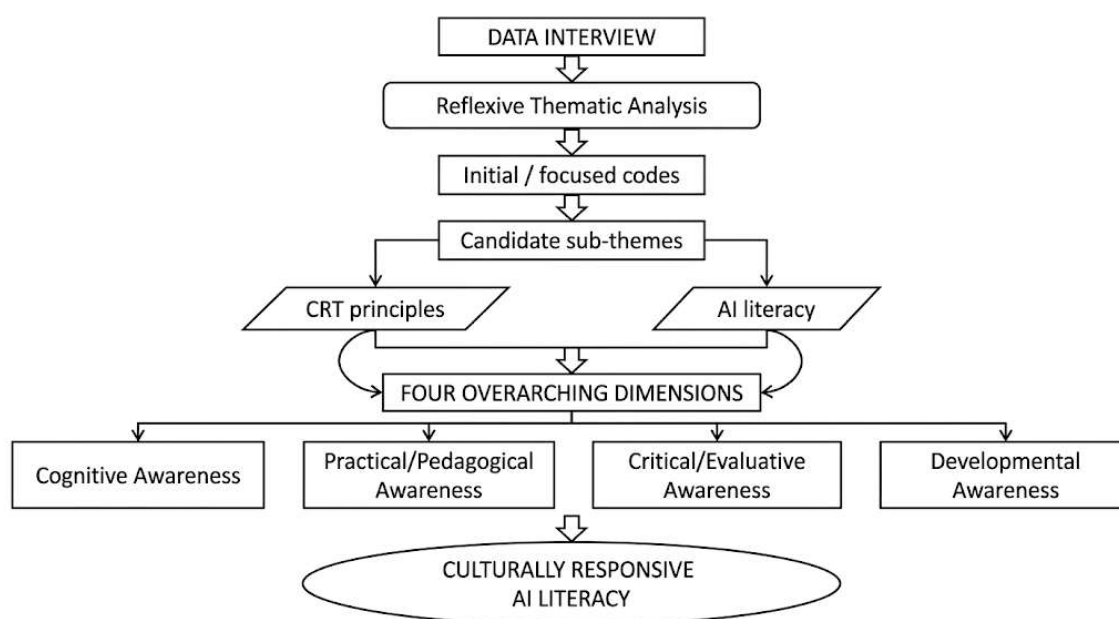
### Data Analysis Techniques

The interview data were analyzed using Reflexive Thematic Analysis (RTA) following Braun and Clarke's (2006) six-phase approach: familiarizing the researchers with the transcripts, generating initial codes, constructing potential themes, reviewing and refining themes, defining and naming the themes, and producing the final analytical account. Coding was conducted iteratively to identify patterns in participants' experiences and judgments regarding GenAI and culturally responsive teaching. The principles of Culturally Responsive Teaching (Gay, 2018; Ladson-Billings, 2021) and AI literacy (Long & Magerko, 2020; Ng et al., 2021) informed the interpretation of emerging patterns. Multiple coding was permitted when a participant's response reflected more than one sub-theme; therefore, frequencies were calculated at the participant level, were not mutually exclusive, and could exceed  $N = 35$ . Relationships among co-occurring codes were also examined to identify connections across sub-themes.

To strengthen the trustworthiness of the analysis, [X] interview transcripts were independently coded by two researchers, representing approximately [X%] of the dataset. Inter-coder agreement was assessed using [Cohen's Kappa/percentage agreement], and disagreements were discussed and resolved through consensus.

Following the RTA, the themes were conceptually interpreted through the CRT–GenAI framework and organized into four overarching dimensions: Cognitive Awareness, Practical/Pedagogical Awareness, Critical/Evaluative Awareness, and Developmental Awareness. Together, these dimensions informed the concept of Culturally Responsive AI Literacy, as illustrated in Figure 1.

As shown in Figure 1, the four dimensions capture complementary aspects of culturally responsive GenAI use: Cognitive Awareness concerns local cultural and linguistic knowledge; Practical/Pedagogical Awareness concerns the instructional use of GenAI; Critical/Evaluative



**Figure 1.** Conceptual map of culturally responsive AI literacy

Awareness concerns the evaluation of cultural relevance and accuracy; and Developmental Awareness concerns the development of competencies for responsible GenAI use.

## ■ RESULT AND DISCUSSION

This section presents the findings from the thematic analysis of semi-structured interview data collected from 35 pre-service EFL teachers. The analysis followed the six-phase thematic analysis process proposed by Braun and Clarke (2006, 2021). Four overarching dimensions emerged from the data: (1) Cognitive Awareness, which evaluates participants' conceptual understanding; (2) Practical/Pedagogical Awareness, which emphasizes the technical application of GenAI in curriculum development; (3) Critical/Evaluative Awareness, which emphasizes participants' ability to identify cultural biases and evaluate content accuracy; and (4) Developmental Awareness, which includes needs for training and institutional support. These dimensions reflect participants' awareness of GenAI's cultural knowledge limitations, challenges in integrating GenAI into culturally responsive teaching, the need to evaluate AI-generated content critically, and the professional

support required for responsible integration. The findings are presented below according to these four dimensions, with supporting subthemes, participant frequencies, and illustrative quotations.

### **Cognitive Awareness: Recognition of GenAI's Local Knowledge Limitations (RQ1)**

When asked to identify the types of English language teaching materials most difficult to adapt or create using GenAI while maintaining cultural responsiveness, participants demonstrated a clear awareness of GenAI's knowledge boundaries, particularly its inability to capture the hyper-local cultural knowledge of Pontianak's Dayak, Malay, and Chinese communities. Four sub-themes emerged: local literary texts ( $n = 16$ ), historical documents ( $n = 12$ ), local vocabulary lists ( $n = 5$ ), and grammar exercises with cultural referents ( $n = 2$ ). There are four sub-themes generated from the interview results related to this cognitive awareness, involving:

*Sub-theme 1: local literary texts as the most inaccessible material ( $n=16$ )*

The dominant sub-theme was the perception that it is impossible to produce locally

rooted literary works through GenAI, such as legends, traditional lyrical poetry (pantun), and oral traditions. Participants repeatedly noted that these resources are not available in the digital repositories accessible to large language models, resulting in unclear or incorrect AI-generated responses. According to the participants:

*"I believe local literary documents like traditional jampi would be difficult for the AI to gather and recreate." (CRT-P9)*

*"The Chinese from this region may have a different story. I think it is better talking to them rather than directly using AI tools. I am afraid it makes mistakes when it refers to literary documents." (CRT-P35)*

Several participants connected this limitation to their own incomplete cultural knowledge. One participant (CRT-P5) admitted that while they could review AI outputs when they possessed cultural knowledge, the risk of unknowingly accepting culturally inaccurate literary content was considerable when their own familiarity was limited.

This difficulty can be understood in relation to the uneven representation of culturally specific knowledge in the data available to GenAI models. Local literary works, oral traditions, historical narratives, and community-based cultural knowledge may be less extensively digitized or represented in widely accessible textual resources than more globally circulated cultural materials. The issue extends beyond AI's technical ability to generate language; it concerns the epistemic limitations of the knowledge represented in its training data. For pre-service EFL teachers, this limitation creates a need to treat GenAI outputs as provisional resources that require verification against locally grounded cultural knowledge rather than as authoritative representations of local literature or culture. From a CRT perspective, this finding matters because

culturally responsive teaching requires teachers to recognize and incorporate learners' local cultural knowledge rather than uncritically relying on externally generated representations.

#### *Sub-theme 2: historical documentation gaps (n=12)*

The second most important sub-theme was the challenges of creating culturally relevant and historically correct content. Participants admitted that by confusing local history with broader national or regional narratives, AI models often fail to capture the distinctive intricacies of Pontianak's historical sites, artifacts, and rituals. Unreliable documentation of historical knowledge was a major source of anxiety, even within local communities. CRT-P4 provided evidence for this point:

*"Historical documents of Pontianak, I believe is harder to create with generative AI. For one thing, it is already difficult for us, the local people, to know the exact history of our traditional clothes such as telok belanga and baju kurong; sometimes the history is merged with the history from Riau or other regions. I think the AI tools do not have complete data about this." (CRT-P4)*

Similarly, CRT-P14 noted the limitations of AI's knowledge base regarding local history. He/she said, "In my opinion, a historical document can be difficult to make. I know AI is a modern tool. These things do not know much about the local story. Indonesian, yes, but the local no." Another participant, CRT-P25, emphasized the reliance on older generations as the primary source of historical accuracy: "Historical stories from Pontianak are not all available online. When writing about historical stories, I go to older people. They know a lot more. AI tools are new; I do not think they know much." This sub-theme shows that participants believe GenAI cannot handle historical information that is prone to

regional confusion and lacks thorough digital documentation.

*Sub-theme 3: Locally specific linguistic and cultural referents (n=7)*

Participants highlighted the difficulty of using GenAI to develop locally specific linguistic and cultural materials, particularly when these materials involve vocabulary, idioms, and language exercises grounded in Pontianak's multicultural context. They noted that AI-generated resources may fail to distinguish local cultural references from broader Indonesian representations or misinterpret culturally embedded expressions. This concern was particularly evident in relation to Dayak, Malay, and Chinese cultural traditions. For example, CRT-P12 expressed distrust in AI-generated Dayaknese vocabulary, while CRT-P15 emphasized the complexity of representing Pontianak's mixed cultural heritage:

*"Local vocabulary, say Dayaknese vocabulary, cannot be gathered from these AI tools. They may understand the basic, but mistakes happen. I do not trust them."* (CRT-P12)

*"This region has a mixed culture of Malay, Dayaknese and Chinese. When talking about vocabulary lists, I do not think AI tools understand the complexity of the mixed culture."* (CRT-P15)

Similarly, CRT-P26 noted that AI may conflate local vocabulary with broader national cultural references, particularly when materials involve culturally specific objects, places, or practices. He/she said:

*"Local vocabulary list is important but not easy to create. This list can be about clothes, food, drinks, buildings, or cultural sites. AI tools can mix this with national culture lists."* (CRT-P26)

The challenge also extended to grammar activities when local idioms, people, historical

figures, or places were incorporated into English-language exercises. CRT-P2 observed that AI could misinterpret local references and consequently generate inappropriate grammatical forms, particularly pronoun choices, while CRT-P10 similarly reported difficulties when local idioms were unfamiliar to AI systems:

*"I think grammar tests are one of the teaching materials that are not easy to adapt or create by using generative AI, particularly because I use them for CRT teaching. Well, among many other types of material, grammar tests or practices are not very hard. However, they still cause me trouble, especially when it comes to references for local people or local/historical things/buildings. These AI apps can make mistakes when inferring the correct pronouns to use for local words."* (CRT-P2)

*"Grammar, I guess, is harder to make. For CRT, the exercise sometimes involves using local idioms that generative AI tools do not know; then, the exercise that is made is not suitable."* (CRT-P10)

Taken together, these findings suggest that locally responsive EFL materials require not only linguistic accuracy but also sensitivity to cultural specificity. Thus, while GenAI can support material development, local knowledge and human judgment remain essential for ensuring cultural appropriateness.

## **Pedagogical Awareness: Challenges in Integration (RQ2)**

The second theme, Practical/Pedagogical Awareness, focused on the specific challenges participants faced when incorporating GenAI into their lesson plans. Three sub-themes emerged from the thematic analysis: prompt engineering struggles (n = 28), dissatisfaction with iterative refinement (n = 3), and collaborative and peer

learning ( $n = 6$ ). These sub-themes highlighted considerable challenges with the technical mechanics of engaging with the AI.

*Sub-theme 1: prompt engineering struggles ( $n=28$ )*

The participants felt that creating effective prompts to produce desired instructional materials was the most daunting pedagogical issue. Participants complained that they could not create proper instructions, which often led to outputs that were erroneous, irrelevant, or too general. The vast majority of responders (28 out of 35) cited prompt engineering as the main technical challenge. According to CRT-P2 and CRT-P6:

*"I think making the prompts is most difficult. I am not sure why, but this AI tool like ChatGPT needs good prompts that I cannot make."* (CRT-P2)

*"Using the correct prompts is the hardest because I do not know how to create the best and correct one. I fail many times"* (CRT-P6)

The complexity of specifying cultural nuances within prompts was also highlighted. According to CRT-P7, difficulties arose when prompts contained highly specific cultural information or multiple, poorly structured instructions. This finding should not be interpreted to mean that specificity itself reduces the quality of GenAI responses. Rather, the difficulty appeared to concern how culturally specific information and multiple instructions were organized and communicated within the prompt. CRT-P23 similarly described the unpredictability of AI-generated responses despite attempts to provide detailed instructions. Several participants therefore identified prompt construction as one of the most difficult aspects of using GenAI with culturally sensitive material. This suggests their difficulty stemmed not simply from a lack of prompt specificity, but from limited knowledge of how to structure culturally complex information

into clear, sequenced, and contextually grounded instructions.

*Sub-theme 2: Iterative Refinement Frustration ( $n=3$ )*

Several participants highlighted how demanding the iterative process is for improving AI results. They noted that creating a single acceptable piece of content often required several rounds of edits and prompt improvements, which took time away from instructors who already had a lot on their plates. CRT-P11, CRT-P14, and CRT-P34 mentioned:

*"I do not think it is easy to make the right prompt. It takes some trying and often failures. I do not like it, but I have to try again."* (CRT-P11)

*"I do not like AI tools when it comes to prompts. I mean, many times my prompts are too general, and I get not so good result. Then I have to redo it. Very troublesome."* (CRT-P14)

*"I cannot make good prompts that work all the time. It works some times; it fails some times too."* (CRT-P34)

This sub-theme shows that the trial-and-error nature of prompt-based interaction with GenAI imposes significant cognitive and time burdens on pre-service teachers as they try to integrate the technology into their lesson planning.

*Sub-theme 3: collaborative and peer learning ( $n=6$ )*

Even though each participant had difficulties with prompt engineering, six participants acknowledged the importance of collaborative learning as a coping mechanism. Although they noted that peer-shared prompts were not always uniformly helpful because AI answers vary widely, they reported learning prompt tactics from peers. Although participants are aware of its limits, this sub-theme also implies that peer collaboration provides an informal but

useful framework for negotiating the technical challenges of GenAI integration. Several of the recorded responses are:

*"I learn from my friends about the best prompts to use for getting teaching materials, but they do not always work for me. I think generative AI can give different answers even with the same prompts, or maybe my approach is different from my colleagues'. I am not sure. I need some training or to attend a workshop."* (CRT-P4)

*"Creating prompts is my problem. I often copy my friends, but they are not helping me much. I think I have to read books about this."* (CRT-P12)

*"Can I just let someone do the prompts? Sometimes, I ask my colleagues to help. They understand these prompts better than I do."* (CRT-P16)

*"I do not know how to make prompts. The good ones, I mean. They are not easy to create alone. It takes some of us to discuss and make them. I by myself cannot do this alone."* (CRT-P19)

### **Critical / Evaluative Awareness: Culture Verification and Accuracy (RQ2)**

The third factor, Critical/Evaluative Awareness, assessed participants' capacity to examine the accuracy and cultural appropriateness of AI-generated content. Participants identified difficulties in determining whether AI-generated materials were consistent with local cultural norms and emphasized that AI outputs should not be used without human review. The interview data indicated several verification methods, including reviewing AI-generated content as teachers, checking its relevance against existing cultural knowledge, involving students or parents in evaluating the content, consulting school authorities, and seeking input from knowledgeable members of the local community. One participant specifically suggested consulting

a local leader or a knowledgeable person before accepting AI-generated cultural content for classroom use. These responses indicate that participants viewed cultural verification primarily as a human responsibility rather than as a fully automated process. Three sub-themes were identified within this dimension: critical pedagogical agency ( $n = 9$ ), accountability and governance in verification ( $n = 7$ ), and identification of cultural bias and hallucinations ( $n = 33$ ).

#### *Sub-theme 1: cultural bias, hallucinations, and verification concerns ( $n = 33$ )*

Participants demonstrated awareness that GenAI-generated materials may contain culturally inappropriate, inaccurate, or irrelevant information. The most explicit example of cultural bias was provided by CRT-P1, who observed that AI-generated dialogue could reflect Western norms of politeness that conflict with local expectations regarding how children address their parents:

*"I believe this AI tool often generates content that can be problematic. Sometimes, the output is inappropriate or offensive in our cultural context. For example, when I ask for a conversation between parents and children, the tool frequently uses the word 'you' too casually. In our culture, this is considered disrespectful; children are expected to refer to their parents as 'Dad' or 'Mom.' The AI primarily reflects Western cultural norms, whereas I expect dialogues that respect our local values, where using 'you' in this context is considered impolite. This highlights a misunderstanding of our cultural differences."* (CRT-P1)

Other participants highlighted concerns about inaccurate or irrelevant content, with CRT-P3 noting that AI-generated materials may incorporate information from other regions and

fail to represent Pontianak's culture accurately. At the same time, CRT-P4 and CRT-P10 emphasized the need for teacher review. Verification was the most prominent concern, with 33 participants (94.3%) referring to the need to check, evaluate, or validate AI-generated content.

However, 15 participants (42.9%) questioned whether this responsibility should rest solely with teachers or be shared with students, parents, school authorities, government, and local cultural knowledge holders. Table 2 summarizes the frequency of these concerns.

**Table 2.** Types of cultural concerns and verification issues

| Type of concern                                           | Evidence reflected in participants' responses                                                                                                                                 | n  | %      |
|-----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--------|
| Cultural bias / dominant cultural representation          | AI-generated content may reflect dominant or Western cultural norms that conflict with local cultural expectations.                                                           | 1  | 2.90%  |
| Cultural inaccuracy / invalid information                 | AI-generated information may contain mistakes or unreliable culturally related information.                                                                                   | 8  | 22.90% |
| Cultural irrelevance / inadequate cultural representation | AI-generated content may not adequately represent local cultural contexts or may conflate local and broader cultural representations.                                         | 11 | 31.40% |
| Need for verification/validation                          | Participants emphasized the need to review, evaluate, or validate AI-generated content before classroom use.                                                                  | 33 | 94.30% |
| Unclear or shared responsibility for verification         | Participants questioned whether teachers should verify content alone or share verification with students, parents, school authorities, government, or local cultural experts. | 15 | 42.90% |

*Sub-theme 2: accountability and governance in verification (n=7)*

A significant concern among participants was the lack of clear accountability and governance structures for verifying the cultural accuracy of AI-generated materials. Many teachers felt overwhelmed by the responsibility of checking every piece of AI-generated content and questioned who should ultimately be held accountable for errors. CRT-P9, CRT-P26, and CRT-P33 expressed this dilemma:

*"The aspects of observing, I think, are problematic. I mean, who will do this?." (CRT-P9)*

*"The teacher's role is problematic, I think; yeah, who will help the teacher to check the content?" (CRT-P26)*

*"Who will evaluate the content that is made by the teacher? Well, I guess it is a problem" (CRT-P33)*

*Sub-theme 3: critical pedagogical agency (n=9)*

The final sub-theme in this dimension focused on the critical pedagogical agency of teachers and students in filtering and validating AI-generated content. Participants emphasized the necessity of human intervention to ensure cultural relevance and appropriateness, framing verification as a shared responsibility among multiple stakeholders. This sub-theme demonstrates that participants conceptualize critical evaluation as a multi-layered, collaborative process that extends beyond the individual teacher. Some participants said:

*"In verifying the product created by generative AI tools, the teacher, the school's principal, parents, and also the students are involved. All of these are responsible to check the content of the product created. However, there is no*

*clear mechanism for this.” (CRT-P5)*

*“AI work is not always valid. Therefore, I believe that reviewing or checking the results of AI-generated content is essential to ensure it is culturally relevant for local students.” (CRT-P6)*

Additionally, a few participants emphasized the significance of student agency in this process. They stated that, when it comes to cultural appropriateness, pupils should develop critical thinking skills alongside teachers. Any product that was not appropriate for them may be filtered out or reacted to by both of them. Additionally, they suggested a workable alternative that makes use of local resources, which CRT-P22 recommends:

*“The next step after creating content via AI tools is to check whether it is good enough and suitable for students. In this case, teachers can ask for help from any local leader or any wise person to check it.” (CRT-P22)*

### **Developmental Awareness: Needs for Training and Support (RQ3)**

The fourth dimension, Developmental Awareness, reflected participants’ projected needs for training and institutional support to incorporate GenAI effectively into their teaching practice. The analysis produced three sub-themes: need for expert and institutional assistance ( $n = 8$ ), desire for hands-on practical training ( $n = 29$ ), and desire for self-directed learning motivation ( $n = 3$ ).

#### *Sub-theme 1: demand for practical, hands-on workshop ( $n = 29$ )*

Twenty-nine of the 35 participants explicitly preferred practical, hands-on training over predominantly theoretical seminars. Their responses emphasized the need to develop specific skills in prompt engineering, content verification, and designing culturally relevant instructional materials that could be applied directly in their teaching contexts. The

participants’ responses varied in emphasis, with some focusing on effective prompt construction, others on evaluating AI-generated materials, and others on obtaining practical resources that could be immediately adapted for classroom use. CRT-P8, for example, stated:

*“I guess a workshop is necessary, not only a seminar or an information session. A workshop where we, the teachers, can learn how to use effective prompts to design culturally relevant teaching materials for our class.” (CRT-P8)*

RT-P3 echoed this preference, emphasizing the need for training that could strengthen practical skills in using AI tools for culturally responsive teaching: “I want to get a workshop or a training to improve my skills about using these AI tools. The most important is to learn how to make effective prompts to create teaching materials for CRT class.” CRT-P3 further emphasized the value of extended, in-depth training, stating, “I believe a workshop is better than just a day seminar, and a workshop that is given for a week. There are so many things to discuss on this matter. I guess a longer period of workshop is necessary, or a week of training.”

CRT-P11 similarly highlighted the need for practical and immediately applicable resources: “I hope I can get a training that focuses on hands-on materials, easy tips that I can directly use for making my CRT lesson, and also help me to review students’ work.” Overall, these 29 participants consistently emphasized the value of practice-oriented training, particularly training that enables them to apply GenAI tools, construct effective prompts, evaluate AI-generated content, and develop culturally relevant instructional materials.

#### *Sub-theme 2: Requirement for expert and institutional support ( $n = 8$ )*

Participants also recognized the need for support from educational institutions, government bodies, and external experts to support the

adoption of GenAI in their teaching practices. They hoped for structured programs and resources provided by their schools or the broader educational ecosystem. Some participants said:

*"I think that support from experts and the government on how to make local culture information accessible to AI tools would be beneficial, allowing them to become familiar with the values and generate culturally relevant materials."* (CRT-P1)

*"I am expecting a response from the government to support teachers, such as providing training to be skillful in using AI tools."* (CRT-P7)

*"My colleagues and I need help from the school, training from experts to support us to be experts in using these AI tools for our teaching preparation."* (CRT-P9)

### *Sub-theme 3: self-directed learning motivation (n=3)*

Some students showed a high innate willingness to self-learn and adapt to new technologies, even in the face of hurdles and the need for external support. They admitted they had limitations at the moment, but they were determined to improve their talents via self-learning. This sub-theme suggests that although systemic support is necessary, some individuals have the agency and incentive to pursue professional development autonomously, demonstrating a resilient and adaptive disposition towards technological change. Said CRT-P27 and CRT-16:

*"I cannot live without these apps, right now, students are familiar with these things. So, I have to upgrade myself."* (CRT-P27)

*"I cannot stay like this, of course. I will join a course or a workshop about AI tools for teaching."* (CRT-P16)

The findings above indicate that pre-service teachers' awareness of GenAI extends beyond understanding the technology's functions or capabilities; it also includes awareness of the epistemic limitations inherent in AI models in representing local cultural knowledge. Participants consistently identified that GenAI struggles to generate learning materials related to the oral traditions, local history, regional insights, and cultural practices of the Dayak, Malay, and Chinese communities in West Kalimantan. These findings demonstrate that cognitive awareness within the context of integrating GenAI and Culturally Responsive Teaching (CRT) reflects not only an understanding of AI and CRT concepts, as outlined in the AI Literacy framework (Ng et al., 2021), but also the ability to recognize the limits of knowledge representation inherent in AI systems.

This interpretation extends prior research that primarily emphasized the benefits of GenAI in enhancing the efficiency of learning material development (Kasneci et al., 2023; Kılıçkaya, 2020; Zawacki-Richter et al., 2019). While these studies highlight the functional and pedagogical potential of AI, the present findings extend this perspective by showing that effective use of GenAI in EFL teaching also depends on teachers' awareness of the cultural limitations of AI-generated content. This finding is consistent with the emphasis on contextual and ethical dimensions in the AI competency framework for teachers (Ng et al., 2021), which positions teachers not merely as users of AI tools but as critical evaluators of AI-generated outputs. At the same time, these findings offer a more context-sensitive interpretation by showing how such evaluative awareness becomes particularly important when AI is used to represent local cultural knowledge in EFL classrooms.

In contrast, the findings here indicate that participants do not view GenAI as a neutral source of knowledge, but rather as a system

shaped by the uneven distribution of training data. Consequently, the limitations of GenAI are not merely technical issues; they stem from the fact that local knowledge, which is often oral, contextual, and under-documented, lacks adequate representation in large language models. This situation aligns with findings by Nyaaba et al. (2025) regarding the emergence of “cultural hallucinations” in AI-generated learning materials, as well as research by Xiao et al. (2025) highlighting “cultural vagueness” in AI content intended for local contexts. Taken together, these findings suggest that culturally responsive AI literacy requires teachers to combine AI use and evaluation competencies with contextual cultural knowledge, enabling them to identify when AI-generated materials may inadequately represent learners’ local cultural realities.

From a CRT perspective, these findings reinforce Gay (2018) and Ladson-Billings’ (2021) view that culturally responsive teaching requires teachers to examine who is represented and who is marginalized in instructional materials. In other words, the awareness demonstrated by the participants goes beyond a mere recognition of technological limitations; it constitutes a form of critical consciousness that enables teachers to question the legitimacy of AI-produced knowledge. Therefore, cognitive awareness in this study is best understood as the ability to recognize GenAI’s epistemic limitations in representing local cultural diversity.

Subsequent findings show that using GenAI in CRT-based instruction shifts the teacher’s role from a mere technology user to a pedagogical decision-maker responsible for ensuring the cultural validity of learning materials. While participants acknowledge GenAI’s ability to accelerate teaching-material preparation, they also recognize that AI-generated output cannot be used immediately without verification, modification, and contextualization to learners’ sociocultural backgrounds. This awareness is reflected in the challenges they face, from crafting

appropriate prompts to evaluating the cultural appropriateness of AI-generated content.

This finding suggests that successful integration of GenAI into Culturally Responsive Teaching (CRT) depends on more than teachers’ awareness and technical ability to operate AI tools or formulate effective prompts. Rather, it requires pedagogical judgment to determine whether AI-generated content accurately represents learners’ cultural experiences and supports meaningful learning. In culturally diverse classrooms, teachers therefore serve as pedagogical mediators who critically interpret, adapt, and contextualize AI outputs before incorporating them into instruction. From this perspective, GenAI functions not as an autonomous instructional resource but as a pedagogical partner whose educational value is ultimately shaped by teachers’ professional decision-making, as also being aligned with the UNESCO’S AI Competency Framework for Teachers (2024) and Gay’s concept of CRT (2018), which positions teachers as active agents responsible for connecting instructional resources with learners’ cultural identities and lived experiences.

This study’s primary contribution is the development of the concept of Culturally Responsive AI Literacy. Unlike the AI literacy frameworks developed by Ng et al. (2021) and Long and Magerko (2020), which focus on understanding AI concepts, technology use, evaluation, and ethics, this study shows that these competencies are insufficient when AI is used in culturally diverse language-learning contexts. Participants consistently emphasized the importance of verifying cultural accuracy, evaluating representational biases, and adapting AI materials to local contexts prior to classroom use. These findings indicate that cultural sensitivity is a competency not explicitly addressed in existing AI literacy frameworks.

Based on these findings, this study proposes Culturally Responsive AI Literacy as a conceptual extension of existing AI literacy frameworks. This

concept views AI literacy not merely as the ability to understand and use technology effectively, but also as the capacity to integrate cultural knowledge, critical reflection, and pedagogical decision-making into the process of using AI. In practice, teacher education can integrate Culturally Responsive AI Literacy through activities such as curriculum development and microteaching. For example, in a curriculum development course (e.g., ELT Curriculum, ELT Instructional Design), pre-service teachers can be required to evaluate AI-generated lesson plans or learning materials against local cultural values, identify culturally inappropriate representations, and revise the materials to reflect learners' sociocultural contexts. In microteaching, they can use GenAI to develop teaching materials or classroom activities, then conduct a cultural-appropriateness review before implementing them in a simulated classroom. Such activities require pre-service teachers to combine AI-related competencies with contextual cultural knowledge and pedagogical judgment. Consequently, AI literacy in language education should be understood as a competency that is simultaneously technological and sociocultural, particularly in multicultural contexts such as Indonesia.

These research findings have significant implications for teacher education programs. To date, AI training for prospective teachers has generally focused on mastering applications and enhancing instructional productivity. However, the results indicate that participants' most pressing needs lie in developing the ability to perform culturally responsive prompt engineering, evaluate the cultural accuracy of AI-generated materials, and understand the ethical responsibilities associated with AI use in the classroom. Therefore, AI training for pre-service teachers should not merely focus on technical skills but should also integrate Culturally Responsive Teaching (CRT) principles into every stage of AI

application. These findings also reinforce UNESCO's (2024) recommendation that teachers' AI competencies be developed through continuous, human-centered professional learning. In Indonesia's multicultural context, such training needs to incorporate local cultural examples, collaborative verification mechanisms, and partnerships among higher education institutions, schools, the government, and cultural communities. In this way, teachers will not only become technically competent users of Generative AI but also be able to make pedagogical decisions that are ethical, reflective, and responsive to cultural diversity.

## ■ CONCLUSION

This study explored pre-service EFL teachers' awareness of integrating Generative Artificial Intelligence (GenAI) into Culturally Responsive Teaching (CRT) in the multicultural context of West Kalimantan. The findings reveal that participants demonstrated cognitive, pedagogical, critical/evaluative, and developmental awareness, recognizing both the opportunities and limitations of GenAI in supporting culturally responsive instruction. Rather than viewing AI as a neutral educational tool, they emphasized the need for critical judgment, cultural verification, and contextual adaptation to ensure that AI-generated materials accurately represent local cultural identities.

The study contributes theoretically by proposing Culturally Responsive AI Literacy as an extension of existing AI literacy and AI competency frameworks, emphasizing the integration of technological competence with cultural knowledge, critical evaluation, and pedagogical decision-making. However, the findings are limited by the small, single-institution sample and reliance on self-reported interview data, which constrain generalizability and do not fully capture actual classroom practices. Future research should involve participants from multiple

institutions and contexts and employ longitudinal or observational designs to examine how Culturally Responsive AI Literacy develops and is applied in practice.

## ■ DECLARATION OF GENERATIVE AI USAGE IN THE WRITING PROCESS

During the research and manuscript preparation, the researchers used ChatGPT (GPT-5 by OpenAI) and Grammarly to enhance language clarity, ensure structural consistency, and refine the written presentation. The researchers did not use AI tools to analyze, code, interpret, or generate findings from the interview data. The researchers conducted the thematic analysis, interpretation, and development of the findings themselves. All AI-assisted language suggestions were critically reviewed and revised by the researchers to ensure accuracy, academic integrity, and consistency with the original research data.

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