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AI-Enhanced EFL Teaching: Evidence from an Ecuadorian Public High School

Enseñanza de inglés como lengua extranjera mejorada con IA: Evidencia de una escuela secundaria pública Ecuatoriana

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Resumen: Este estudio examina las percepciones de docentes de inglés como lengua extranjera (EFL) sobre la integración de la inteligencia artificial (IA) en una institución de educación secundaria pública en Santa Elena, Ecuador, mediante un diseño mixto secuencial explicativo. La Fase 1 consiste en una revisión sistemática de alcance (PRISMA-ScR) que sintetiza 21 estudios empíricos publicados entre 2020 y 2025 sobre la enseñanza de EFL asistida por IA, con énfasis en contextos con limitaciones de recursos y en América Latina. La Fase 2 reporta hallazgos descriptivos del instrumento ETPAIS, aplicado de forma censal a los ocho docentes de EFL de la Unidad Educativa Otto Arosemena Gómez (N = 8). Los resultados revelan actitudes positivas hacia la IA como herramienta pedagógica complementaria (D2: M = 4.13), pero percepciones de infraestructura institucional sustancialmente insuficiente (D3: M = 2.31). El desarrollo profesional emergió como la necesidad facilitadora más urgente (Ítem 22: M = 4.63). Estos hallazgos convergen con la evidencia internacional sobre conceptualizaciones positivas de los docentes, al tiempo que divergen significativamente respecto a la suficiencia de infraestructura, confirmando que las estrategias de adopción derivadas de contextos bien equipados no son directamente transferibles a la educación secundaria pública ecuatoriana. Se discuten implicaciones para la política educativa y la formación docente.

Palabras clave: inteligencia artificial, percepciones docentes, educación secundaria pública, Ecuador, métodos mixtos.

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Abstract:

This study examines EFL teachers' perceptions of artificial intelligence (AI) integration in a public secondary school in Santa Elena, Ecuador, employing a sequential explanatory mixed-methods design. Phase 1 consists of a systematic scoping review (PRISMA-ScR) synthesizing 21 peer-reviewed studies published between 2020 and 2025 on AI-enhanced EFL teaching, with emphasis on resource-constrained and Latin American contexts. Phase 2 reports descriptive findings from the EFL Teachers' Perceptions of AI Integration Survey (ETPAIS), a researcher-designed 24-item Likert instrument administered to all eight EFL teachers at the Unidad Educativa Otto Arosemena Gómez (N = 8; census sampling). Results reveal that teachers hold positive attitudes toward AI as a complementary pedagogical tool (D2: M = 4.13) but perceive institutional infrastructure as substantially inadequate for implementation (D3: M = 2.31). Professional development emerged as the most urgently demanded facilitating condition (Item 22: M = 4.63). These findings converge with international evidence regarding positive teacher conceptualizations of AI while diverging significantly regarding infrastructure sufficiency, confirming that adoption strategies derived from well-resourced contexts are not directly transferable to Ecuadorian public secondary education. Implications for educational policy and teacher training are discussed.

Keywords: artificial intelligence, teachers' perceptions, public secondary education, Ecuador, mixed methods.

1. Introduction

The rapid proliferation of artificial intelligence (AI) tools across educational settings worldwide has prompted a fundamental re-examination of how language instruction is designed, delivered, and experienced. In the field of English as a Foreign Language (EFL) teaching, generative AI platforms, automated feedback systems, and adaptive learning technologies have expanded the repertoire of pedagogical possibilities available to educators, offering prospects for personalized vocabulary support, real-time writing feedback, and interactive conversational practice at a scale previously unattainable through conventional instruction (Bauer et al., 2025; Bayaga, 2025). As these technologies become increasingly embedded in international discourse on educational innovation, questions about their practical relevance, accessibility, and transferability across diverse institutional contexts have acquired urgent theoretical and policy significance.

The existing literature on AI-enhanced EFL instruction has expanded considerably since the widespread adoption of large language models in educational contexts beginning around 2020. Empirical studies have documented measurable benefits for writing and reading skill development (Shafiee, 2025; Bauer et al., 2025), and

perception research has consistently found that both pre-service and in-service educators conceptualize AI as a complementary pedagogical resource rather than a threat to professional practice (Derinalp & Halife, 2025). These findings, however, derive predominantly from well-resourced institutional settings in Asia, North America, and Western Europe — contexts characterized by reliable digital infrastructure, systematic professional development pathways, and institutional policies that actively support technology integration. The extent to which this evidence base speaks to the realities of EFL instruction in under-resourced public secondary schools in Latin America remains, at best, uncertain.

Latin America presents a distinctive regional profile with respect to AI adoption in education. While gradual diffusion has been documented in higher education institutions with established digital infrastructure (Salas-Pilco & Yang, 2022; De la Torre & Baldeon-Calisto, 2024), systematic barriers persist across the broader educational landscape. Okoye et al. (2023) documented constraints including inadequate connectivity, insufficient device access, and limited professional development support as structural obstacles that transcend individual pedagogical resistance. Cruz et al. (2024) further identified uncertainty regarding AI appropriateness and limited institutional endorsement as compounding factors. These barriers manifest unevenly: well-resourced urban institutions and universities have made measurable progress in AI integration, while public schools serving non-affluent populations face compounded challenges that international adoption frameworks do not adequately address.

Within this regional landscape, Ecuador occupies a particularly underexplored position. Research on AI adoption has focused primarily on higher education contexts (Arce et al., 2025; Barredo-Ibáñez et al., 2021), leaving public secondary schools — which constitute the primary educational pathway for most Ecuadorian learners — without an empirical foundation from which to evaluate AI integration strategies. This absence is not a minor gap in the literature; it represents a structural blind spot with direct implications for educational equity. AI adoption policies developed without localized empirical evidence risk perpetuating a pattern in which innovation benefits concentrate in contexts that are already well-resourced, systematically excluding the populations that most depend on public secondary education.

The present study responds to this gap by providing empirical evidence on EFL teachers' perceptions of AI integration at a public secondary school in Santa Elena, Ecuador. Specifically, the Unidad Educativa Otto Arosemena Gómez serves as the institutional site for this investigation, offering a representative case of a public secondary school operating under conditions of genuine infrastructure constraint and limited professional development provision. The study employs a sequential explanatory mixed-methods design (Creswell & Creswell, 2018) structured in two phases. Phase 1 consists of a systematic scoping review following PRISMA-ScR guidelines (Tricco et al., 2018), synthesizing 21 peer-reviewed studies published between 2020 and 2025 on AI-enhanced EFL teaching, with particular attention to

resource-constrained and Latin American contexts. Phase 2 reports descriptive findings from the EFL Teachers' Perceptions of AI Integration Survey (ETPAIS), a researcher-designed 24-item Likert instrument administered census-wide to all eight EFL teachers at the institution (N = 8).

Literature Review

Key Concepts

Artificial Intelligence (AI)

Artificial Intelligence refers to computer systems performing tasks requiring human intelligence including machine learning and pattern recognition (Bauer et al., 2025). In educational contexts, AI encompasses both traditional computer-assisted approaches and emerging generative technologies that adapt to learner needs.

Computer-Assisted Language Learning (CALL)

CALL represents the systematic integration of technology in language instruction. Historically, CALL evolved from drill-and-practice software to more interactive, communicative approaches (Richards & Renandya, 2002). AI marks a paradigm shift—moving from predetermined, static interactions to adaptive systems personalizing instruction based on individual learner profiles and real-time performance data (Bayaga, 2025).

Generative AI in language teaching

Generative AI platforms like ChatGPT introduce transformative capabilities through large language models. These tools offer authentic language exposure, immediate feedback, and communicative practice at scale. Unlike traditional CALL, generative AI enables dynamic conversation, content generation, and diverse learning pathways customized to individual needs.

The implementation of AI in Ecuadorian public high schools remains

understudied despite the region's growing interest in educational technology. While research documents AI adoption challenges in Latin American contexts (Pérez-Campdesuñer et al., 2025), empirical evidence from secondary schools in Ecuador is remarkably scarce, particularly regarding teacher perceptions and implementation challenges in resource-constrained environments.

AI Tools and Their Application in EFL Teaching: Analytical Overview

Contemporary AI applications present multifaceted pedagogical opportunities with context-dependent efficacy. While generative AI platforms demonstrate documented benefits for language skills—including improvements in writing and reading comprehension—empirical evidence derives predominantly from optimal implementation contexts. The transferability of these findings to resource-constrained environments remains uncertain. Research documents positive effects on learner

motivation and autonomy in well-resourced institutional settings, yet such studies control for variables often absent in public contexts: adequate technical infrastructure, consistent connectivity, and institutional support systems. A critical analytical gap exists regarding implementation barriers in under-resourced settings. Riggs (2025) identifies structural obstacles in under-resourced K-12 classrooms, while Similar barriers characterize Latin American contexts, as documented by Okoye et al. (2023) regarding digital infrastructure constraints. However, these findings are geographically limited, leaving Ecuadorian contexts virtually unexplored. Teacher perceptions critically mediate outcomes. Research reveals that educators conceptualize AI as complementary rather than replacive technology, suggesting alignment with contemporary pedagogy (Derinalp & Halife, 2025). However, this perspective assumes adequate training and support—preconditions not universally available. Implementation also raises concerns. While AI tools facilitate personalized pathways and automated feedback, evidence of negative externalities including plagiarism facilitation, learning dependency, and digital equity disparities warrants attention (Winder et al., 2024). The Latin American context compounds these concerns: Okoye et al. (2023) document how digital inequities intersect with existing educational disparities. AI tool application demonstrates pedagogically defensible potential; however, the existing knowledge base insufficiently addresses implementation in resource-limited contexts characteristic of Ecuadorian public schools.

AI and Language Skills Development

The empirical literature examining AI's impact on English language skills reveals pronounced imbalances in research focus and geographic concentration. While evidence demonstrates efficacy in writing and reading (Shafiee, 2025; Bauer et al., 2025) predominantly from developed contexts spoken communication and listening remain largely absent from empirical investigation.

Writing Skills Development

AI-assisted writing tools demonstrate documented benefits for learner autonomy and metacognitive development (Bayaga, 2025). Real-time feedback mechanisms enhance students' ability to plan, monitor, and evaluate writing processes independently. This evidence suggests that AI's interactive features support self-regulated writing practices, foundational for sustained language learning (Richards & Renandya, 2002).

Reading Comprehension and Critical Literacy

AI intervention significantly enhances L2 reading comprehension through personalized vocabulary support and adaptive scaffolding (Shafiee, 2025). Research demonstrates that AI-powered questioning transforms passive reading into active inquiry, enabling students to develop stronger analytical reading skills. This evidence suggests AI's personalization capacity effectively supports reading comprehension across multiple dimensions.

Speaking and Listening Skills

A pronounced absence of empirical research characterizes AI's impact on oral communication competencies. While generative AI chatbots theoretically support conversational practice, empirical measurement of AI's efficacy for speaking skill development including pronunciation accuracy, fluency, or real-time communication competence remains virtually absent. Research documents that AI chatbots facilitate student engagement through interactive dialogue; however, engagement outcomes measured do not necessarily correlate with specific speaking or listening skill development (Bayaga, 2025). This gap is particularly pronounced in Latin American and Ecuadorian contexts, where research on any AI-enhanced language development is limited (Salas-Pilco & Yang, 2022; Okoye et al., 2023).

Implications of the Research Landscape

The documented evidence reflects both technological and research-priority patterns (Bauer et al., 2025). AI systems optimized for text-based interaction demonstrate clear pedagogical benefits for writing and reading skills amenable to asynchronous, feedback-intensive learning. Conversely, oral communication competencies requiring real-time interaction remain underexplored (Shafiee, 2025). This imbalance suggests that comprehensive AI implementation in EFL contexts must explicitly address whether current text-based AI tools adequately serve oral skill development, or whether implementation strategies require supplementary technologies targeting speaking and listening.

Teachers' and Students' Perceptions of AI in EFL Contexts

Teachers' and students' perceptions critically mediate implementation success, as stakeholder attitudes fundamentally shape integration outcomes (Derinalp & Halife, 2025). However, perception research exhibits pronounced geographic and contextual imbalances, with dominant representation from developed contexts and limited investigation in secondary school and resource-constrained settings (Okoye et al., 2023).

Teachers' Attitudes and Conceptualizations

EFL educators across diverse contexts conceptualize AI as a complementary pedagogical resource rather than replacive technology. However, teacher attitudes vary significantly based on context and prior experience with technology. Prospective teachers express greater optimism than in-service educators (Derinalp & Halife, 2025), while secondary school teachers in resource-constrained environments demonstrate more cautious, conditional perspectives. Teachers in resource-constrained contexts reveal more nuanced assessments. Riggs (2025) found that teachers in under-resourced K-12 classrooms recognize AI's potential while remaining realistic about barriers. Rural and resource-constrained educators across Latin America express similarly qualified perspectives shaped by limited connectivity and resources (Okoye

et al., 2023). These findings indicate that teacher perceptions are contextually situated understandings of feasibility, not individual dispositions.

Students' Perceptions

While teacher perception research provides substantial foundation, student perception research remains substantially limited, particularly in secondary school contexts. Available evidence derives almost exclusively from university-level students: Research documents that university-level students hold positive perceptions of AI-assisted writing tools (Derinalp & Halife, 2025), though secondary school contexts remain underexplored. However, secondary school student perceptions remain virtually absent. This gap is critically pronounced in Latin American and Ecuadorian contexts, where neither teacher nor student perception data on AI integration in EFL instruction exists (Okoye et al., 2023; Salas-Pilco & Yang, 2022).

Contextual Influences on Perceptions

Context-specific perception research reveals systematic patterns in how institutional constraints shape stakeholder attitudes. Secondary school teachers across various contexts recognize pedagogical possibilities while acknowledging institutional barriers including insufficient professional development and inadequate technical support. Riggs (2025) examined under-resourced K-12 classrooms, revealing that teacher perceptions are fundamentally shaped by recognition of infrastructure deficits and training limitations. These findings suggest that positive perceptions from well-resourced contexts may reflect context-specific conditions enabling implementation rather than universal teacher optimism. The absence of perception research from Ecuadorian contexts prevents understanding whether teachers and students in resource-limited public-school settings hold comparable attitudes or whether distinct barriers generate different perception patterns.

Students Engagement, Motivation, and Autonomy in AI-Enhanced Learning

Beyond measurable language skill outcomes, research increasingly examines how AI integration influences affective and metacognitive dimensions of language learning (Bayaga, 2025). Studies from well-resourced contexts document positive effects on learner motivation and autonomy through AI-mediated instruction. These psychological constructs are critical to sustained language development and have emerged as important indicators of AI's educational value in EFL contexts (Bauer et al., 2025). However, such studies derive from optimal implementation conditions where technology functions reliably and institutional support is adequate.

AI Adoption in Latin America and Ecuador; Regional Landscape and Local Context

While AI adoption in language education has expanded globally, Latin America presents a distinct regional profile characterized by uneven technological diffusion and context-specific barriers. Salas-Pilco & Yang (2022) conducted a systematic review of AI applications in Latin American higher education, identifying gradual adoption with

significant geographic variation. De la Torre & Baldeon-Calisto (2024) documented that GenAI applications concentrate in well-resourced institutions with established digital infrastructure. This concentration reflects access disparities and institutional capacity differences advantaging affluent, urban institutions over public and rural schools.

The Latin American landscape reveals systematic barriers to broader adoption extending beyond awareness or resistance. Okoye et al. (2023) documented constraints including infrastructure deficits, inconsistent connectivity, and inadequate professional development—structural obstacles transcending pedagogical innovation. Cruz et al. (2024) identified complementary obstacles including limited institutional support and uncertainty regarding AI appropriateness. These barriers manifest unevenly: well-resourced urban institutions progress while rural and public-school contexts face compounded challenges. Pérez-Campdesuñer et al. (2025) identified that adoption facilitators concentrate in formal sectors with adequate resources while obstacles accumulate in resource-constrained contexts—findings with direct implications for Ecuador's public secondary schools.

2. Metodology

Overall Research Design

This study employs a sequential explanatory mixed-methods design (Creswell & Creswell, 2018) structured in two sequential phases. Phase 1 consists of a systematic scoping review following PRISMA-ScR guidelines (Tricco et al., 2018), synthesizing existing empirical literature on AI integration in EFL teaching with emphasis on resource-constrained and Latin American contexts. Phase 2 consists of a quantitative survey-based inquiry examining EFL teacher perceptions of AI tools at a public secondary school in Ecuador. The two phases are integrated at the discussion stage, where locally generated empirical evidence is interpreted in light of the patterns and gaps identified in the systematic review.

A mixed-methods approach is methodologically appropriate for three reasons. First, the systematic review establishes the international evidence base and documents the critical absence of Ecuadorian secondary school data, thereby providing the theoretical warrant for local empirical inquiry. Second, quantitative perception data from Phase 2 allow direct comparison with findings from well-resourced contexts documented in Phase 1. Third, the sequential structure ensures that instrument development in Phase 2 is grounded in the constructs and dimensions identified through the review, enhancing content validity (Leavy, 2022).

Phase1: Systematic Scoping Review

Design and Rationale

A systematic scoping review design was selected to map the existing evidence base on AI-enhanced EFL teaching, identify implementation patterns, and document

barriers specific to resource-constrained educational environments. This design is particularly appropriate given: (1) the proliferation of AI-in-education literature requiring synthesis; (2) the identified gap regarding Ecuadorian and Latin American secondary contexts; and (3) the need to generate constructs that inform Phase 2 instrument development.

Research Questions (Phase 1)

The systematic review addresses four overarching research questions:

1. What empirical evidence exists regarding the efficacy of AI-enhanced instruction for EFL skill development (writing, reading, speaking, listening) across diverse educational contexts?
2. How do EFL teachers and students in various contexts perceive and conceptualize AI integration, and what contextual factors shape these perceptions?
3. What barriers and facilitators characterize AI adoption in language education, particularly in resource-limited and Latin American contexts?
4. What implementation strategies, recommendations, and theoretical frameworks emerge from existing literature as relevant to AI-enhanced EFL teaching in under-resourced public secondary school contexts?

Search Strategy and Information Sources

A comprehensive search strategy was developed to identify peer-reviewed empirical studies, literature reviews, and conceptual analyses published between 2020 and 2025. This temporal window captures the period coinciding with widespread AI adoption in education following the release of large-scale generative AI tools, ensuring contemporary relevance while identifying foundational work. Primary databases searched included ERIC, Web of Science Core Collection, Scopus, PubMed, and Google Scholar as a supplementary source for citation tracking. Search terms were applied in English and Spanish using Boolean operators (AND, OR, NOT) across primary, secondary, contextual, regional, and perception-focused term clusters.

Inclusion and Exclusion Criteria

Studies were included if they were peer-reviewed, published between 2020 and 2025, written in English or Spanish, and examined AI applications in language education contexts involving secondary, post-secondary, or adult learners or language educators. Studies were excluded if they examined AI outside language education, presented purely theoretical or opinion-based arguments without empirical grounding, focused exclusively on pre-primary learners, or lacked sufficient methodological detail for quality assessment.

Study Selection, Data Extraction, and Quality Assessment

A two-stage screening process was implemented by two independent reviewers: title/abstract screening followed by full-text evaluation. Disagreements were resolved through discussion or third-reviewer consultation. The selection process is documented using a PRISMA-ScR flow diagram. Data extraction employed a standardized form capturing bibliographic information, study design, sample characteristics, AI tools examined, language skills targeted, key findings, and contextual barriers or facilitators. Quality was assessed using GRADE criteria adapted for qualitative and mixed-methods research, informing synthesis rather than serving as exclusion criterion.

Phase 2: Quantitative Survey Study

Research Questions (Phase 2)

The quantitative phase addresses two specific research questions derived from the gaps identified in Phase 1:

1. What are the perceptions of EFL teachers at a public secondary school in Santa Elena, Ecuador, regarding the integration of AI tools in their pedagogical practice?
2. What institutional barriers and facilitators do these teachers identify as mediating their adoption or non-adoption of AI-enhanced instruction?

Setting

The study was conducted at the Unidad Educativa Otto Arosemena Gómez, a public secondary institution located in the canton of Santa Elena, Province of Santa Elena, Ecuador. This institution was purposively selected as representative of the public secondary school context described in the research gap: a resource-constrained, non-urban setting serving predominantly non-affluent student populations with limited digital infrastructure. This contextual profile aligns with the under-researched educational environment identified through Phase 1.

Participants and Sampling

The target population consisted of all EFL teachers currently employed at the institution during the 2024–2025 academic year. A census sampling approach was adopted, including all eight (N = 8) EFL teachers as participants. Census sampling is methodologically appropriate when the target population is small and fully accessible, as it eliminates sampling error and maximizes representativeness within the institutional context (Creswell & Creswell, 2018).

Instrument

Data were collected using a researcher-designed, close-ended questionnaire titled EFL Teachers' Perceptions of AI Integration Survey (ETPAIS). The instrument was developed in three stages: (1) item generation grounded in the four dimensions

identified through Phase 1 (AI efficacy for language skills, teacher perceptions and attitudes, institutional barriers and facilitators, and implementation strategies); (2) expert review by three specialists in EFL methodology and educational technology; and (3) pilot testing for clarity and internal consistency.

The final instrument comprises 24 items distributed across four dimensions, rated on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Table 2 presents the dimensional structure of the instrument.

3. Results

Xsions, reflecting distinct patterns of perception among EFL teachers at the institution. Dimension 2 (Teacher Attitudes and Conceptualizations) obtained the highest mean score (M = 3.98), interpreted as "Agree," while Dimension 3 (Institutional Barriers and Facilitators) recorded the lowest mean (M = 2.35), interpreted as "Disagree." Dimensions 1 and 4 obtained intermediate scores, interpreted as "Neutral" and "Agree," respectively.

Table 1
Descriptive Statistics by Dimension — ETPAIS (N = 8)

Dim.	Construct	M	SD	Interpretation
D1	AI Efficacy for Language Skills	3.04	0.42	*Neutral*
D2	Teacher Attitudes and Conceptualizations	3.98	0.26	*Agree*
D3	Institutional Barriers and Facilitators	2.35	0.27	*Disagree*
D4	Implementation Strategies	3.48	0.52	*Agree*

Note. M = mean; SD = standard deviation. Interpretation based on five-level scale: 1.00–1.79 Strongly Disagree; 1.80–2.59 Disagree; 2.60–3.39 Neutral; 3.40–4.19 Agree; 4.20–5.00 Strongly Agree (Authors, 2026).

Despite the small sample size, some heterogeneity is observable across participants, particularly in D3 where infrastructure perceptions vary most markedly.

3.1. Dimension 1: AI Efficacy for Language Skills

Dimension 1 obtained an overall mean of M = 3.04 (SD = 0.42), interpreted as "Neutral." Teachers expressed moderate perceptions regarding AI's pedagogical effectiveness for language skill development. As shown in Table 6, the highest-rated items within this dimension were Item 1 (AI writing tools; M = 3.50) and Item 5 (real-time feedback for self-regulation; M = 3.50), both reflecting existing awareness of AI's documented benefits in writing-related tasks. In contrast, Items 3 and 4 — addressing speaking practice and listening skill development — obtained the lowest means within the dimension (M = 2.75 and M = 2.38, respectively), consistent with the research gap identified in Phase 1 regarding the limited empirical evidence for AI's efficacy in oral communication. Item 6, which asked whether international research findings were

applicable to their students, obtained M = 2.63, suggesting cautious uncertainty regarding transferability to their specific context.

Table 2

Item-Level Descriptive Statistics — D1: AI Efficacy for Language Skills (N = 8)

Item	Statement (abbreviated)	M	SD	Interpretation
1	AI writing tools help my students improve their written production in English.	3.50	0.50	*Agree*
2	AI-powered reading platforms enhance reading comprehension through personalized vocabulary support.	3.50	0.50	*Agree*
3	AI chatbots provide meaningful speaking practice opportunities for EFL learners in my context.	2.75	0.66	*Neutral*
4	AI tools support listening skills development through authentic audio and interactive feedback.	2.38	0.48	*Disagree*
5	AI applications offer real-time feedback that helps students self-regulate their learning.	3.50	0.50	*Agree*
6	Benefits of AI documented in international research are applicable to my students.	2.63	0.48	*Neutral*
—	**D1 Dimension Mean**	**3.04**	**0.42**	***Neutral***

Note: M = mean; SD = standard deviation. Items rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) (Authors, 2026).

3.2. Dimension 2: Teacher Attitudes and Conceptualizations

Dimension 2 yielded the highest mean score across all dimensions (M = 3.98, SD = 0.26), interpreted as "Agree." This finding indicates that EFL teachers at the institution hold generally positive attitudes toward AI integration and conceptualize these tools as complementary to — rather than replacive of — their pedagogical practice. As shown in Table 7, Item 7 (AI as complementary resource; M = 4.50) and Item 9 (willingness to invest time in AI learning; M = 4.13) obtained the highest means within the dimension, suggesting strong alignment with the complementary conceptualization documented in international literature (Derinalp & Halife, 2025). Item 11, which addressed concern about AI-facilitated academic dishonesty, obtained M = 3.25 — a moderate score indicating that plagiarism-related concerns, while present, did not dominate teacher perceptions in this context.

Table 3

Item-Level Descriptive Statistics — D2: Teacher Attitudes and Conceptualizations (N = 8)

Item	Statement (abbreviated)	M	SD	Interpretation
7	I consider AI tools to be a complementary resource rather than a replacement for teaching.	4.50	0.50	*Strongly Agree*

8	I feel confident in my ability to integrate AI tools into my EFL lessons.	3.63	0.48	*Agree*
9	I am willing to invest time in learning how to use AI for language teaching.	4.13	0.60	*Agree*
10	I believe AI integration improves student motivation and engagement.	4.25	0.43	*Strongly Agree*
11	I am concerned that AI tools may promote academic dishonesty among my students.	3.25	0.66	*Neutral*
12	I believe AI-enhanced instruction fosters learner autonomy in my context.	4.13	0.60	*Agree*
—	**D2 Dimension Mean**	**3.98**	**0.26**	***Agree***

Note: M = mean; SD = standard deviation. Item 11 is negatively framed; higher scores indicate greater concern (Authors, 2026).

3.3. Dimension 3: Institutional Barriers and Facilitators

Dimension 3 recorded the lowest mean score of the instrument (M = 2.35, SD = 0.27), interpreted as "Disagree." This result constitutes the most striking finding of Phase 2 and indicates that teachers perceive the institutional environment as substantially inadequate for supporting AI integration. Item-level analysis (Table 8) reveals that Items 13, 14, and 15 — addressing infrastructure sufficiency, professional development, and technical support — all obtained means below 2.60, interpreted as "Disagree." Specifically, Item 14 (adequate professional development; M = 1.88) and Item 15 (institutional technical support; M = 1.88) were the lowest-rated items in the entire instrument. Conversely, Item 16 (limited access as a significant barrier; M = 4.50) obtained the highest score within the dimension and approached the "Agree" threshold, confirming that teachers explicitly recognize connectivity and device access as primary obstacles. Item 17 (student device access; M = 2.13) suggests moderate uncertainty regarding students' personal technology resources.

Table 4

Item-Level Descriptive Statistics — D3: Institutional Barriers and Facilitators (N = 8)

Item	Statement (abbreviated)	M	SD	Interpretation
13	Digital infrastructure at my institution is sufficient to implement AI tools in EFL classes.	2.13	0.60	*Disagree*
14	I have received adequate professional development to use AI tools in teaching.	1.88	0.60	*Disagree*
15	My institution provides technical support to resolve connectivity or device issues.	1.88	0.60	*Disagree*
16	Limited access to devices and internet is a significant barrier to AI integration.	4.50	0.50	*Strongly Agree*
17	My students have access to devices that allow them to use AI tools.	2.13	0.60	*Disagree*
18	Institutional policies clearly address the appropriate use of AI in the classroom.	1.63	0.48	*Strongly Disagree*

—	**D3 Dimension Mean**	**2.35**	**0.27**	***Disagree***

Note: M = mean; SD = standard deviation. Items 13–15 and 17–18 are negatively framed relative to AI adoption (lower scores = greater barrier); Item 16 is positively framed toward barrier recognition (Authors, 2026).

3.4. Dimension 4: Implementation Strategies

Dimension 4 obtained a mean score of M = 3.48 (SD = 0.52), interpreted as "Agree." Teachers expressed moderately positive perceptions regarding the feasibility of AI-enhanced instructional strategies in their context. Within this dimension (Table 9), Item 22 — which addressed the perceived benefit of structured professional development specifically focused on AI in EFL — obtained the highest mean (M = 4.50), approaching "Strongly Agree." This finding represents the most unequivocal result across the entire instrument and signals that professional development constitutes the primary facilitating need identified by teachers. Item 21 (adaptability of international AI strategies to local realities; M = 3.50) and Item 24 (relevance of published AI recommendations to Ecuadorian public secondary contexts; M = 3.50) obtained moderate scores, reflecting cautious but not negative assessments of external evidence transferability. Item 20, which asked whether teachers had already integrated an AI tool during the current year, obtained M = 2.88, consistent with the 50% prior use rate reported in Section 4.2.1.

Table 5

Item-Level Descriptive Statistics — D4: Implementation Strategies (N = 8)

Item	Statement (abbreviated)	M	SD	Interpretation
19	I am aware of specific AI tools designed for EFL teaching usable in my context.	3.50	0.50	*Agree*
20	I have already integrated at least one AI tool into my EFL teaching this academic year.	2.88	0.78	*Neutral*
21	AI-enhanced strategies can be adapted to the realities of my school.	3.50	0.50	*Agree*
22	I would benefit from a structured professional development program on AI in EFL.	4.50	0.50	*Strongly Agree*
23	It is feasible to implement AI-supported activities despite current resource limitations.	3.00	0.71	*Neutral*
24	AI integration recommendations are relevant to Ecuadorian public secondary EFL contexts.	3.50	0.50	*Agree*
—	**D4 Dimension Mean**	**3.48**	**0.52**	***Agree***

Note: M = mean; SD = standard deviation (Authors, 2026).

Summary of Phase 2 Findings

Three overarching patterns emerge from the Phase 2 descriptive analysis. First, EFL teachers at the Unidad Educativa Otto Arosemena Gómez hold consistently positive attitudes toward AI integration and conceptualize these tools as pedagogically complementary, despite limited prior experience with them. Second, institutional

infrastructure specifically device access, internet connectivity, professional development, and technical support is perceived as substantially inadequate and constitutes the primary barrier to AI adoption at this institution. Third, teachers express a clear and near-unanimous demand for structured professional development programs focused on AI in EFL teaching, identifying this as the most important facilitating condition for moving from positive attitudes toward actual implementation. These patterns are examined in relation to the Phase 1 systematic review findings in the Discussion section.

4. Discussion

Convergence: Positive Attitudes Despite Limited Experience

The most consistent finding across both phases is that EFL teachers conceptualize AI as a complementary pedagogical resource rather than a threat to their professional role. Phase 2 results show that Dimension 2 (Teacher Attitudes) yielded the highest mean score in the instrument (M = 4.13), with teachers expressing willingness to invest time in AI learning and confidence in its motivational potential. This pattern aligns closely with international evidence synthesized in Phase 1, where Derinalp and Halife (2025) documented similarly positive orientations among pre-service and in-service EFL educators across diverse contexts. Notably, this convergence holds even though half of the participating teachers reported no prior experience with AI tools, suggesting that positive attitudes are not contingent on prior use but may reflect broader awareness of AI's growing relevance in education.

Divergence: Infrastructure as the Critical Barrier

The most striking divergence between the local context and internationally published research emerged in Dimension 3 (Institutional Barriers), which recorded the lowest mean score across the entire instrument (M = 2.31, Disagree). Teachers at the Unidad Educativa Otto Arosemena Gómez perceive digital infrastructure — including device availability, internet connectivity, professional development, and institutional technical support — as substantially inadequate for AI integration. While Phase 1 identified infrastructure constraints as a recognized barrier in resource-limited Latin American contexts (Okoye et al., 2023; Cruz et al., 2024), the severity of these perceptions at the local level exceeds what is typically foregrounded in internationally published studies, which predominantly derive from well-resourced institutional settings. This divergence confirms Cruz et al.'s (2024) argument that AI adoption strategies grounded in optimal implementation conditions risk irrelevance when applied to under-resourced public schools, and provides localized empirical evidence for a gap that Phase 1 could only document theoretically.

Professional Development as the Central Facilitating Need

Across both phases, professional development emerged as the most critical facilitating condition for AI adoption. In Phase 2, Item 22 addressing the perceived need for structured AI-focused professional development obtained the highest mean score in the entire instrument (M = 4.63, approaching Strongly Agree), representing a near-unanimous consensus among participants. This finding extends the Phase 1 literature, which consistently identifies training deficits as a barrier (Riggs, 2025; Pérez-Campdesuñer et al., 2025) but rarely quantifies the perceived urgency of this need from teachers in resource-constrained Ecuadorian public schools. The implication is direct: positive attitudes toward AI integration will not translate into practice without deliberate, context-specific professional development investment. This conclusion is particularly significant for educational policymakers in Ecuador, where AI adoption in public secondary education remains structurally underserved

5. Conclusions

This study examined EFL teachers' perceptions of artificial intelligence integration at a public secondary school in Santa Elena, Ecuador, through a sequential explanatory mixed-methods design combining a systematic scoping review with descriptive survey data. The findings yield three principal conclusions with direct implications for educational policy, teacher training, and future research.

First, positive teacher attitudes toward AI do not require prior experience with the technology. Despite half of the participating teachers reporting no prior use of AI tools in instructional contexts, Dimension 2 (Teacher Attitudes and Conceptualizations) yielded the highest mean score in the instrument (M = 3.98), with near-unanimous conceptualization of AI as a complementary resource rather than a threat to professional practice. This finding converges with internationally published evidence (Derinalp & Halife, 2025) and suggests that affective readiness for AI integration exists within the institution independently of technical familiarity. Attitudinal receptivity alone, however, is insufficient to drive implementation; the study confirms that positive dispositions must be supported by structural conditions to produce meaningful pedagogical change.

Second, institutional infrastructure constitutes the defining barrier to AI adoption in this context. Dimension 3 (Institutional Barriers and Facilitators) recorded the lowest mean across the entire instrument (M = 2.35, Disagree), with inadequate professional development (Item 14: M = 1.88), absent technical support (Item 15: M = 1.88), and the lack of institutional AI policies (Item 18: M = 1.63) emerging as the most critical deficits. Teachers explicitly identified limited device access and internet connectivity as primary obstacles (Item 16: M = 4.50). This divergence from internationally published research—which predominantly documents positive infrastructure conditions—confirms Cruz et al.'s (2024) argument that adoption strategies derived

from well-resourced contexts are not directly transferable to Ecuadorian public secondary education. The severity of the infrastructure gap documented here exceeds what the existing literature typically foregrounds, providing localized empirical evidence for a structural barrier that theoretical discussions have described but rarely quantified in this regional context.

Third, structured professional development is the most urgently demanded and strategically viable pathway to AI adoption. Item 22—which assessed the perceived need for a structured professional development program on AI in EFL—obtained the highest mean score in the entire instrument (M = 4.50, approaching Strongly Agree), representing near-unanimous consensus among participants. This finding extends the Phase 1 literature by quantifying the urgency of this need from teachers operating under genuine resource constraints (Riggs, 2025; Pérez-Campdesuñer et al., 2025) and identifies professional development as the most actionable facilitating condition—one that can be pursued even where infrastructure investment is constrained by institutional or systemic limitations. Teachers at this institution express clear willingness to invest time in AI learning (Item 9: M = 4.13); the policy implication is that this readiness requires a formal institutional response.

These conclusions must be interpreted in light of the study's principal limitation: the small sample size (N = 8) precludes inferential analysis and restricts generalizability beyond the institutional context. The findings are descriptive and exploratory in nature, appropriate for an underresearched setting, but require replication with larger and more geographically diverse samples to support broader claims. The absence of student perception data represents a complementary gap that future research should address, as teacher and student perspectives jointly shape implementation outcomes.

Future studies should expand the empirical base through multi-institutional survey designs involving larger teacher populations across Ecuador's public secondary sector, incorporate student perceptions as a distinct analytical dimension, and examine the impact of targeted professional development interventions on actual AI integration practices. Longitudinal designs tracking the relationship between training provision, infrastructure improvement, and classroom implementation would substantially advance understanding of how adoption pathways develop under resource-constrained conditions. The present study provides a foundational empirical reference point for this agenda, contributing the first locally grounded evidence on AI integration perceptions in Ecuadorian public secondary EFL education—a context that existing international scholarship has systematically overlooked

CONFLICTO DE INTERESES

"Los autores declaran no tener ningún conflicto de intereses".

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