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A Four-Stranded Approach to AI-Assisted Pre-Class Learning Modules: EFL Teachers' Practices in Designing Daily Conversation Content for Flipped Classrooms

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Abstract

This study examines the integration of artificial intelligence (AI) tools with Nation's Four Strands Framework in the design of pre-class learning modules for English as a Foreign Language (EFL) flipped classrooms. Focusing on conversational skills development—a domain requiring balanced attention to meaning-focused input/output, language-focused learning, and fluency—the research addresses a critical gap in material design for technology-mediated flipped instruction. Employing a qualitative case study methodology, semi-structured interviews and focus group discussions were conducted with six Indonesian EFL teachers at the tertiary level. Data analysis revealed a four-phase pedagogical model wherein AI tools were systematically deployed to: (1) scaffold meaning-focused input (e.g., AI-generated transcriptions, text adaptation), (2) reinforce language-focused learning (e.g., grammar/vocabulary feedback systems), (3) facilitate meaning-focused output (e.g., conversational AI prompts), and (4) enhance fluency development (e.g., adaptive speaking drills). Key challenges emerged regarding AI's limitations in contextual appropriateness, feedback reliability, and the risk of pedagogical fragmentation, necessitating teacher mediation to preserve theoretical fidelity. The study contributes to literature on flipped learning by demonstrating how AI can operationalize SLA principles while affirming educators' central role in curricular decision-making. Practical implications for instructional design and teacher professional development are discussed, alongside recommendations for future research on AI's efficacy across diverse institutional contexts.

Keywords: *Artificial Intelligence, Flipped Classroom, Four Strands Framework, Pre-Class Modules*

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Introduction

The flipped classroom model has emerged as a transformative approach in English as a Foreign Language (EFL) education, gaining substantial empirical support for its effectiveness in promoting active learning and student-centered engagement. This pedagogical inversion, where traditional homework and lecture elements are reversed, creates opportunities for more meaningful face-to-face interaction during class time (Al Issa et al., 2024; Li & Li, 2022; Naing et al., 2023). Within this model, pre-class learning modules serve as the foundational component that prepares students for higher-order cognitive activities during in-person sessions. The quality and design of these preparatory materials directly influence the effectiveness of subsequent classroom interactions, making their development a crucial aspect of instructional planning (Sointu et al., 2023; Tomesko et al., 2022). Developing effective pre-class content presents particular challenges for daily conversation instruction, which requires careful attention to multiple linguistic dimensions simultaneously. Conversation skills demand balanced development across various competencies: receptive skills (listening/reading comprehension), productive skills (speaking/writing fluency), and linguistic accuracy (grammar/vocabulary) (Abbot-Smith et al., 2023). This multidimensional requirement creates significant design challenges for educators, who must create materials that address all these aspects cohesively. Traditional pre-class materials often struggle to provide this comprehensive coverage, frequently overemphasizing some elements while neglecting others.

Four Strands Framework offers a theoretically robust solution to this design challenge by advocating for balanced attention to four critical components: meaning-focused input, meaning-focused output, language-focused learning, and fluency development (Macalister & Nation, 2020). This framework proves particularly valuable for conversational EFL instruction because it mirrors the naturalistic conditions of language acquisition while maintaining systematic attention to formal aspects of language. The framework's emphasis on balancing these four elements makes it an ideal foundation for developing comprehensive pre-class materials that address the complex requirements of conversation skills development (Yeo & Newton, 2025). However, implementing the Four Strands Framework in pre-class modules presents practical challenges for educators. Creating materials that adequately address all four strands requires significant time investment and specialized pedagogical knowledge. This is where artificial intelligence (AI) tools are increasingly playing a transformative role. Advanced technologies like natural language processing (NLP) platforms and generative AI systems (Kohnke et al., 2023) offer promising solutions by automating certain aspects of content creation while enabling personalization at scale (Bahroun et al., 2023; Matz et al., 2024; Pesovski et al., 2024). These tools can generate authentic conversational dialogues, provide immediate feedback, and create adaptive learning pathways - all capabilities that align well with the requirements of the Four Strands Framework.

Despite these technological advancements, important challenges remain in effectively integrating AI tools with pedagogical frameworks like the Four Strands. Current AI systems often struggle with contextual nuance and cultural appropriateness in language generation, potentially compromising the quality of meaning-focused input and output (Brandt & Hazel, 2025; Jenks, 2025). There is also a risk of over-reliance on automated outputs, which may lead to materials that lack pedagogical coherence or fail to maintain the crucial balance between the four strands (Yang & Kyun, 2022). These limitations highlight the continued importance of teacher oversight and pedagogical expertise in the material design process, even when leveraging advanced technological tools.

The growing popularity of flipped classrooms further underscores the urgency of this research (Ozyurt, 2023). As institutions prioritize flexible, technology-enhanced learning, understanding how EFL teachers leverage AI to operationalize the Four Strands Framework—while addressing inherent challenges—can bridge the gap between theoretical ideals and practical implementation. This study thus examines:

RQ1: How do EFL teachers leverage AI tools in designing pre-class learning modules for daily conversation that incorporate Nation's Four Strands Framework in flipped classroom environments?

RQ2: How do EFL teachers navigate challenges in integrating AI tools with Nation's Four Strands Framework when developing pre-class learning modules for daily conversation instruction?

This study advances AI-assisted language teaching, flipped classroom design, and the digital application of Nation's Four Strands Framework. It examines teacher roles in using AI for conversational materials, refines pre-class module design, and explores how educators balance SLA principles with AI integration. These insights guide educators, material developers, and teacher trainers in aligning AI tools with evidence-based pedagogy.

Literature Review

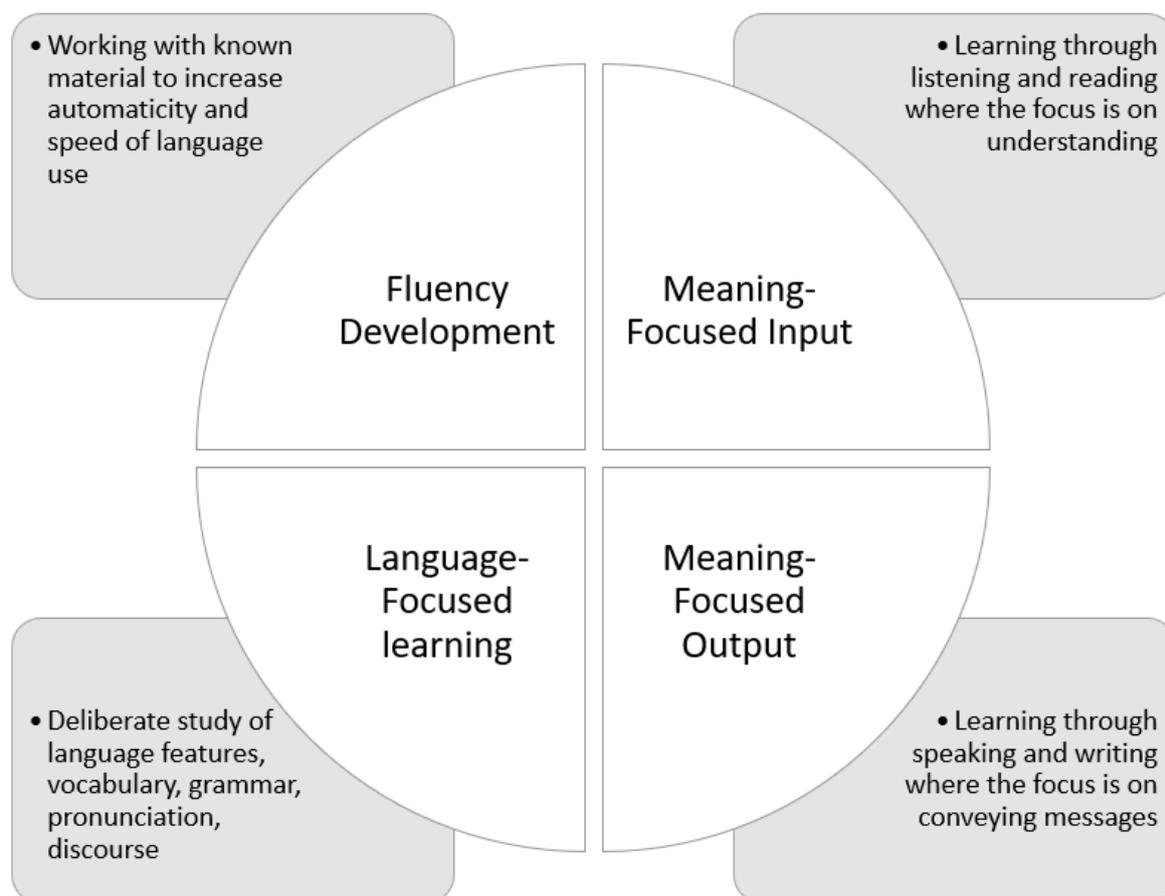
Nation's Four Strands Framework and its Pedagogical Significance

The Nation's Four Strands Framework is a foundational approach to language learning and teaching. It proposes that effective language acquisition requires a balanced curriculum that incorporates four essential strands: meaning-focused input, meaning-focused output, language-focused learning, and fluency development (Macalister & Nation, 2020). Each strand represents a distinct aspect of language learning, and together they ensure comprehensive development of linguistic competence.

Nation's Four Strands framework ensures balanced language learning. The first strand, meaning-focused input, emphasizes comprehensible and meaningful exposure through activities like extensive reading, videos, and storytelling (Tsang, 2023; Webb et al., 2023). The second strand, meaning-focused output, prioritizes communication through speaking and writing tasks, enhancing learners' ability to convey ideas (Canals, 2023; Vold, 2025). The third strand, language-focused learning, involves explicit instruction in grammar, vocabulary, and pronunciation to build accuracy (Khezrlou, 2023; Xu & Li, 2022). The fourth strand, fluency development, improves speed and confidence through activities like timed speaking and speed reading, fostering automaticity in real-world communication (Nation & Macalister, 2021; Nation & Waring, 2020; Newton & Nation, 2021).

Figure 1

Four Strands Framework



Each strand should receive roughly equal time and attention in a well-balanced learning program

Flipped Classroom Methodology in EFL Contexts

The flipped classroom model is widely recognized in EFL education for enhancing engagement, autonomy, and communicative competence (e.g., Izadpanah, 2022; Khosravi et al., 2023; Li, 2022; Mohammad & Khan, 2023; Ni et al., 2023). By shifting content delivery to pre-class activities, it aligns with language acquisition needs, yet research has largely focused on in-class implementation, overlooking the design of pre-class materials—particularly for conversational skills requiring a balance of input, output, accuracy, and fluency. While studies have explored flipped learning for grammar and reading (e.g., Alkhalaf, 2023; Diningrat et al., 2023; Keskin, 2023; Shafiee, 2023; Wang, 2023), challenges in pre-class conversation modules remain underexamined. This study fills that gap by integrating Nation’s Four Strands with AI-assisted material design to refine flipped EFL conversation instruction. Unlike conventional approaches that treat pre-class content as generic explanatory materials, this research examines its construction through pedagogical and technological lenses. By bridging flipped learning and AI applications, it establishes principles for optimizing pre-class design, ensuring pedagogical rigor while leveraging AI’s affordances.

AI Technologies in Educational Content Creation

AI technologies have rapidly evolved in language education, offering tools for generating dialogues, providing feedback, and personalizing grammar and vocabulary instruction (Abduljawad, 2025; Mejuh & Rehm, 2024; Msambwa et al., 2025; Strielkowski et al., 2024). In parallel, language pedagogy has increasingly emphasized integrated approaches to communicative competence, such as Nation's Four Strands Framework, which advocates a balanced focus on meaning-focused input, meaning-focused output, language-focused learning, and fluency development (Yeo & Newton, 2025). This framework serves as a principled guide for curriculum design, ensuring that all aspects of language acquisition—comprehension, production, accuracy, and automaticity—are addressed in equal measure. Despite this, much of the recent research on AI in education positions it as a student-facing or supplemental tool, rather than as an integrated component of pedagogically grounded material design (Burner et al., 2025; Cheung & Shi, 2024; Tutton & Cohen, 2025). Few studies explore how AI can be systematically aligned with frameworks like the Four Strands to support pre-class learning in flipped classrooms, where input and practice occur before face-to-face instruction. Furthermore, existing literature underrepresents the role of teachers as curriculum designers who critically mediate AI use to preserve theoretical coherence and contextual appropriateness (Abualrob, 2025; Atenas et al., 2025; Francis et al., 2025). Addressing these gaps, this study examines how EFL teachers use AI tools not merely as time-saving instruments, but as co-designers of learning modules that embody the Four Strands' pedagogical goals for flipped EFL classrooms. By investigating teacher practices in designing Nation-aligned materials with generative AI, the study provides both a conceptual and practical model for how AI can operationalize SLA-informed instruction. This integration foregrounds teacher agency, repositions AI as a collaborative pedagogical partner, and responds to recent calls to ground edtech innovation within established language learning theory (Wan & Moorhouse, 2024; Williyen et al., 2024).

Methodology

Research Design and Participants

This qualitative case study examined how six Indonesian EFL teachers used AI tools to develop pre-class learning modules for daily conversation in flipped classrooms. This approach enabled an in-depth, context-rich analysis of their experiences, focusing on AI integration in language learning (Gallagher, 2024). The study explores teachers' interactions with AI and the challenges of aligning these tools with Nation's Four Strands Framework. This study involved six Indonesian EFL teachers at the tertiary level, selected for their experience with AI-assisted language teaching and flipped classrooms. They taught daily conversation courses and actively integrated AI into their pedagogy. Their backgrounds varied, offering diverse insights into AI integration. Details are provided in Table 1 below.

Table 1*Criteria for Selecting EFL Teacher Participants*

Criteria	Description
Teaching Experience	Teachers with 3+ years of experience in EFL teaching.
Course Focus	Teaching daily conversation courses at the tertiary level.
Use of AI Tools	Active use of AI tools in language teaching, specifically for pre-class learning modules.
Flipped Classroom Experience	Experience in utilizing the flipped classroom model for language instruction.
Familiarity with Nation's Four Strands Framework	Awareness of or experience in integrating Nation's Four Strands Framework into their teaching.

In line with the study's objectives, purposive sampling was used to select teachers based on their experience in daily conversation courses, familiarity with AI tools, and use of flipped classrooms (Fraenkel et al., 2023). This ensured rich, relevant data on AI integration in pre-class module design, allowing for in-depth insights into their teaching practices. The six participants were university-level EFL teachers from a private university in Indonesia. They taught daily conversation courses to undergraduate English majors, with class sizes ranging from 25 to 35 students. The students' English proficiency levels were generally B1–B2 on the CEFR scale. All participants independently integrated AI tools into their teaching. Course content and pre-class modules were delivered through university-managed LMS platforms (e.g., Google Classroom, Moodle), and students accessed materials using personal devices. Teachers demonstrated intermediate to advanced digital literacy, often learning AI tools through self-directed exploration. These contextual factors and technological conditions shaped the way AI was implemented and mediated both teacher practices and student experiences.

Data Collection and Analysis

The data collection for this study was carried out in two stages. The first stage involved semi-structured interviews with the participants, using questions adapted from Nation's Four Strands Framework (Macalister & Nation, 2020). The interviews were designed to explore how the EFL teachers leveraged AI tools in designing pre-class learning modules for daily conversation that incorporated the principles of the Four Strands Framework. The interview questions were crafted to gain insights into their strategies and approaches in using AI in flipped classroom environments, while also examining how they navigated the challenges of integrating AI with the framework. The semi-structured nature of the interviews allowed participants to elaborate on their experiences in detail, and the responses were analyzed thematically to identify key patterns and themes related to both research objectives. The second stage of data collection involved focus group discussions (FGDs) to expand on interview findings. These discussions explored teachers' strategies for using AI in pre-class modules and the challenges of integrating AI with Nation's Four Strands Framework. FGDs allowed participants to validate their experiences, providing a comprehensive view of AI-assisted module development. Structured to address both research questions, the FGDs reinforced interview findings (Table 2).

Table 2*Interview and Focus Group Discussion Protocol Overview*

Protocol	Purpose	Format	Duration	Data Analysis
Interview	To explore how EFL teachers leveraged AI tools in designing pre-class learning modules for daily conversation incorporating Nation's Four Strands Framework while also examining how they navigated the challenges of integrating AI with the framework.	Semi-structured interviews with open-ended questions based on Nation's Four Strands Framework.	30-45 minutes	Thematic analysis of responses to identify common themes and patterns.
Focus Group Discussion (FGD)	To further explore and validate the findings from the interviews regarding the use of AI tools in pre-class learning modules and the challenges faced by teachers in integrating AI with Nation's Four Strands Framework.	Guided group discussions based on the interview findings, aiming to deepen insights and address any remaining questions related to the research objectives.	60-90 minutes	Thematic analysis to compare and strengthen interview findings, and to explore group consensus on key themes.

This study employed thematic analysis (Braun & Clarke, 2021) to examine interview and focus group data, identifying patterns in teachers' use of AI tools and related challenges. This flexible approach enabled a nuanced exploration of participants' perspectives. The analysis followed six phases, detailed in Table 3 below.

Table 3*Thematic Analysis Steps*

Step No.	Step	Description
1	Familiarizing with the data	Reading and re-reading the data to become immersed and familiar with its content.
2	Generating initial codes	Creating initial codes to identify meaningful data related to the research questions.
3	Searching for themes	Organizing codes into potential themes by grouping related codes together.
4	Reviewing themes	Refining themes through reviewing the coded data and ensuring they accurately represent the data.
5	Defining and naming themes	Defining and naming themes, ensuring they capture the essence of the data.
6	Producing the final report	Finalizing the analysis by compiling the report and interpreting the themes in relation to the research questions.

The data analysis began with familiarizing with interview and FGD transcripts, followed by coding meaningful segments aligned with research objectives. Codes were grouped into themes, refined iteratively through pattern recognition across responses. This process captured AI tool usage and integration challenges within Nation's Four Strands Framework. Themes were then analyzed in relation to the research objectives, highlighting teachers' practices and challenges in designing pre-class learning modules.

Findings

This section discusses two key findings. It examines how EFL teachers used AI tools to develop pre-class conversation modules aligned with Nation's Four Strands in flipped classrooms. It

also explores the challenges they faced in integrating AI with the framework and their strategies for overcoming them. These findings highlight both the benefits and limitations of AI-assisted pre-class instruction.

Research Question 1: Leveraging AI Tools in Designing Pre-Class Learning Modules for Flipped Classroom Environments

This study examines how EFL teachers used AI tools to design pre-class learning modules for daily conversation within Nation’s Four Strands Framework in flipped classrooms. Findings reveal a structured, four-stage approach aligning with Meaning-Focused Input, Language-Focused Learning, Meaning-Focused Output, and Fluency Development. By integrating AI at each stage, teachers enhanced engagement, personalization, and effectiveness, ensuring a balanced learning process that prepared students for real-world conversations.

Meaning-focused input (listening & reading for comprehension) – first stage

The first stage of Nation’s Four Strands framework emphasizes comprehensible input before productive language use. In flipped classrooms, this is crucial as students engage with input materials pre-class. AI tools proved invaluable in providing personalized, level-appropriate resources, enhancing comprehension, and preparing students for interactive in-class tasks. Details are provided in Table 4 below.

Table 4
AI Tools for Meaning-Focused Input in Pre-Class Learning Modules

Focus	AI Tools	Purpose/Use	AI Use in Pre-Class Learning Modules (Flipped Classroom)
Comprehensible input before productive tasks	<i>Otter.ai, Sonix, Descript</i>	AI-generated transcripts and captions for listening materials, enhancing comprehension and engagement.	Students listened to audio or video materials with AI-generated transcripts before class.
	<i>ChatGPT, QuillBot, LingQ, Claude, Deepseek</i>	Adapting authentic materials to different proficiency levels, ensuring all students can access appropriate input.	Texts were adapted for students based on their proficiency levels to be studied before class.
	<i>Quizlet, Perplexity AI, Eduaide</i>	Generating comprehension questions to deepen students' understanding of listening or reading materials.	AI-generated comprehension questions were assigned to students as pre-class tasks.
	<i>NaturalReader, CommonLit</i>	AI-powered reading assistants that provide personalized reading assistance and help students engage with texts.	Personalized reading assistance helped students process input before class discussion.

Teachers effectively used AI tools to create authentic, level-appropriate pre-class modules for daily conversation. AI-generated transcripts from *Otter.ai, Sonix, or Descript* enhanced listening comprehension, while platforms like *ChatGPT, QuillBot, and LingQ* adapted texts for different proficiency levels. Additionally, tools like *Quizlet, Perplexity AI, and Eduaide* helped generate comprehension questions to deepen student understanding. As noted in the interviews and FGD:

I use Otter.ai for transcription because it helps students follow along with the audio and makes it easier for them to catch the nuances of spoken language (Interview).

Quizlet is especially useful because it allows me to generate flashcards with vocabulary and questions that help students retain what they've just read or heard (FGD).

AI tools enhanced students' comprehension and provided accessible input in pre-class learning modules, but their impact depended on effective integration. By offering level-appropriate materials, supporting comprehension, and personalizing learning, AI played a key role in preparing students for language learning. Teachers used these tools to create dynamic and engaging pre-class activities, better equipping students for real-world communication.

Language-focused learning (form-focused instruction) – second stage

After receiving comprehensible input, the next step in Nation's framework emphasized language accuracy—grammar, vocabulary, and pronunciation—crucial in the flipped classroom model. AI tools supported this stage by providing grammar correction, vocabulary expansion, and pronunciation practice. Teachers integrated AI-driven, language-focused tasks into pre-class modules, offering structured practice and real-time feedback to reinforce accuracy before classroom engagement (Table 5).

Table 5

AI Tools for Language-Focused Learning in Pre-Class Learning Modules

Focus	AI Tools	Purpose/Use	AI Use in Pre-Class Learning Modules (Flipped Classroom)
Grammar and language accuracy	<i>Grammarly, QuillBot, LanguageTool, Writefull</i>	Generating examples of correct language usage, grammar explanations, and language patterns.	Students used AI tools for grammar and syntax correction, providing a foundation for productive language activities.
Vocabulary expansion and contextual use	<i>Wordtune, LingQ, DeepL, Writefull, ChatGPT</i>	Offering contextualized examples of vocabulary and usage in sentences.	AI tools provided students with vocabulary examples and contextualized usage to support language acquisition before classroom tasks.
Pronunciation improvement	<i>ELSA Speak, Speechling</i>	Analyzing and providing feedback on pronunciation.	Students practiced pronunciation using AI-powered tools that gave feedback and helped them perfect their speaking skills prior to in-class activities.
Structured language practice	<i>Grammarly, QuillBot, LanguageTool, Writefull</i>	Providing structured language exercises, including grammar and sentence formation tasks.	AI-powered platforms guided students in practicing grammar and sentence construction in a structured format before class discussions.
Personalized assessment and feedback	<i>Grammarly, QuillBot, LanguageTool, Writefull, ChatGPT</i>	Offering feedback mechanisms and assessment rubrics.	AI generated detailed feedback on students' language use and areas for improvement, allowing students to refine their accuracy before class activities.

Teachers designed AI-enhanced pre-class modules to reinforce language accuracy and conversational skills. Using tools like *Grammarly* and *QuillBot*, students corrected common

errors before class, while *Wordtune* and *DeepL* supported vocabulary building through contextual learning. Interviews and focus group discussions highlighted the effectiveness of this approach for conversation-focused pre-learning.

I encourage my students to use Grammarly before submitting their writing tasks. It provides instant feedback on their grammar and syntax, which allows them to improve their language skills on their own before they come to class (Interview). Wordtune is very helpful in helping students find alternative words or rephrase sentences in more appropriate ways, which is something they can practice before our class discussions (FGD).

The study found that the effectiveness of AI-powered pre-class modules depended on their integration. Students who engaged with these modules independently showed improved proficiency and confidence. While AI tools enhanced accuracy and personalized practice, their true value emerged when teachers strategically incorporated them before class. This approach fostered more accurate and confident language use in class, creating a more productive and engaging learning environment.

Meaning-focused output (speaking & writing for communication) – third stage

Nation’s Four Strands framework emphasized meaningful language output, such as speaking and writing, to develop communication skills. In the flipped classroom, this stage allowed students to apply prior learning through practical tasks. AI tools supported this process by providing personalized prompts, writing feedback, and interactive scenarios, helping students practice before class and build confidence. These AI-assisted strategies, detailed in Table 6, ensured students were well-prepared for interactive discussions.

Table 6
AI Tools for Meaning-Focused Output in Pre-Class Learning Modules

Focus	AI Tools	Purpose/Use	AI Use in Pre-Class Learning Modules (Flipped Classroom)
Speaking practice	<i>ELSA Speak, Speechling,</i>	Offering real-time feedback on pronunciation, fluency, and intonation.	Students engaged in speaking tasks and received AI feedback on their pronunciation and fluency before class activities.
Writing practice	<i>ChatGPT, Writefull, Grammarly, Trinkta, Jenni</i>	Providing writing prompts, generating sentence structures, and giving feedback on grammar and style.	AI helped students generate ideas, structure their writing, and receive feedback to improve clarity and coherence in written tasks before class.
Conversation practice	<i>TalkAI, Speakable AI, Talkpal</i>	Generating conversational prompts and dialogue scenarios.	AI generated dynamic role-play scenarios or conversation starters for students to practice before engaging in in-class discussions.
Interactive writing and speaking tasks	<i>ELSA Speak, Replika, Speechling</i>	Creating interactive writing tasks or conversation simulations for improved fluency.	Students practiced both writing and speaking tasks in AI-powered platforms that offered personalized exercises and real-time feedback.
Personalized speaking tasks	<i>Speechnotes, ChatGPT, Eduaide AI, Claude, Deepseek</i>	Tailoring speaking tasks to individual needs and language levels.	AI adapted speaking activities according to students' proficiency levels, helping them practice before presenting in class.

The teachers effectively integrated AI tools to enhance students' conversational skills through targeted pre-class modules. Using apps like *Speechling* and *ELSA Speak*, students practiced speaking independently with instant pronunciation feedback. Similarly, tools like *Grammarly* and *ChatGPT* improved their conversational writing by refining clarity and flow. Focus group discussions and teacher interviews confirmed the effectiveness of this pre-learning approach.

I have my students use ELSA Speak before class. It's great because they can work on their pronunciation and get instant feedback, which builds their confidence when they speak in class (Interview).

I've used ChatGPT to help students generate ideas for their writing tasks. They can experiment with different structures and get feedback before we dive into class discussions (FGD).

AI tools played a crucial role in the pre-class stage of flipped classrooms by providing personalized feedback and interactive tasks, enhancing students' confidence and fluency. Their strategic integration ensured students were well-prepared for meaningful in-class communication and collaboration.

Fluency development (enhancing speed & confidence) – fourth stage

The fourth stage of Nation's Four Strands framework, fluency development, reinforces language skills for greater speed and confidence. In the flipped classroom, this stage is vital as it allows self-paced practice before class interactions. AI tools support fluency through adaptive exercises, real-time feedback, and personalized learning paths, offering activities like speaking drills and listening exercises. By integrating AI into pre-class modules, teachers in this study fostered dynamic, personalized learning, enhancing students' confidence in real-life communication (Table 7).

Teachers designed AI-enhanced pre-class modules to support fluency in flipped classrooms. Students practiced conversational skills at their own pace using *ScribeSense* and *Eduaide AI*, while *NaturalReader* and *ElevenLabs AI* converted dialogues into audio for listening fluency. Adaptive tools like *Duolingo AI* and *Memrise AI* provided personalized conversation-building activities. Teachers detailed these approaches in interviews and focus group discussions.

Eduaide AI is great for fluency practice. It helps my students automate their learning, and I can see improvements in their language speed and accuracy over time (Interview).

We use tools like ElevenLabs AI to read the texts aloud to students. It's especially helpful for students who struggle with reading comprehension but are fine with listening (FGD).

With platforms like Duolingo AI, students can practice at their own pace and get immediate feedback, which helps build their confidence for when they need to speak in class (FGD).

Table 7*AI Tools for Fluency Development in Pre-Class Learning Modules*

Focus	AI Tools	Purpose/Use	AI Use in Pre-Class Learning Modules (Flipped Classroom)
Reinforcing and automating skills	<i>ScribeSense, Eduaide AI</i>	Offering adaptive exercises and learning paths to enhance fluency.	Students followed personalized AI learning paths that helped them practice fluency tasks before class.
Listening fluency	<i>NaturalReader, ElevenLabs AI, Google Text-to-Speech</i>	Converting written text to speech to improve listening comprehension.	Students engaged with AI-generated audio versions of texts before class to improve listening fluency.
Interactive speaking tasks	<i>Talkpal, Speakable AI, Speechling</i>	Transforming traditional speaking activities into interactive tasks.	AI platforms created engaging, interactive speaking exercises that students completed independently before class discussions.
Adaptive learning pathways	<i>Duolingo AI, Memrise AI, Kahoot!</i>	Adapting language activities to the learner's proficiency level.	Students used AI-powered platforms to practice language skills with adaptive exercises designed to meet their individual learning needs before class.
Conversational practice	<i>Replika, ChatGPT, TalkPal, SimSimi</i>	Using chatbots for real-time conversational practice.	Students practiced conversations using AI-powered chatbots that simulate realistic interactions before engaging in face-to-face conversations.

This study found that integrating AI into pre-class modules created a dynamic, student-centered environment that enhanced fluency. Practicing at home with immediate feedback and personalized adjustments helped students reinforce language skills and build confidence for real-time communication.

Research Question 2: Navigating Challenges in Integrating AI Tools with Nation's Four Strands Framework in Pre-Class Learning Modules

EFL teachers valued AI for enhancing pre-class conversation modules but faced challenges aligning it with Nation's Four Strands. Each stage—input, language learning, output, and fluency—posed unique difficulties, yet teachers devised strategies to maximize AI's benefits while mitigating its limitations.

Challenges and strategies in integrating AI tools for meaning-focused input

Teachers faced challenges in integrating AI tools into meaning-focused input activities in pre-class modules. While AI provided abundant reading and listening materials, ensuring their suitability for students' proficiency levels and cultural contexts was difficult. Maintaining engagement was another concern, as AI-generated content often lacked interactivity. To address these issues, teachers modified AI texts, adjusted complexity with supplementary tools, and added interactive elements. See Table 8 for details.

Table 8*Challenges and Strategies in Integrating AI Tools for Meaning-Focused Input*

Theme	Challenges	How Teachers Navigated the Challenges
Level Appropriateness of Materials	<ul style="list-style-type: none"> • AI-generated materials were often too complex or off-topic. • Limited cultural/contextual relevance for EFL learners. 	<ul style="list-style-type: none"> • Simplified texts using <i>Rewordify</i> or <i>QuillBot</i>. • Modified comprehension questions using <i>Eduaide</i>. • Manually selected more appropriate input.
Student Engagement with Input	<ul style="list-style-type: none"> • AI content lacked interactive elements and felt monotonous. • Students disengaged from passive materials. 	<ul style="list-style-type: none"> • Added tasks like prediction, summarizing, and peer discussion. • Used <i>LingQ</i> and other tools to add interactivity to AI content.

One of the primary concerns raised by teachers was the difficulty in ensuring AI-generated materials were suitable for their students' proficiency levels. To overcome this issue, teachers relied on AI-assisted tools such as *Rewordify* to modify text difficulty and ensure that the content remained accessible. In addition to level appropriateness, teachers also faced the challenge of keeping students engaged with AI-generated input. In the interview and FGD, the teachers explained:

Sometimes, AI provides texts that are too complex, even when I specify the difficulty level. I have to manually simplify the texts using tools like QuillBot or adjust the comprehension questions to match my students' level (Interview).

Students don't always stay engaged with AI-generated reading passages because they feel like it's just another text to read. So, I started adding discussion prompts and summarization tasks to make them interact with the content more actively (FGD).

By integrating prediction tasks, summarization exercises, and discussion prompts, teachers ensured that AI-generated input materials were not only comprehensible but also engaging. These strategies helped create a more dynamic and interactive pre-class learning experience, ultimately improving students' comprehension and preparation for in-class discussions.

Challenges and strategies in integrating AI tools for language-focused learning

AI tools provided grammar correction, vocabulary support, and pronunciation feedback in pre-class modules, but teachers faced limitations in language-focused learning. AI-generated corrections were sometimes rigid or contextually incorrect, and lacked tailored feedback, causing student confusion. To address this, instructors supplemented AI with direct explanations, structured practice, and clarifications for better accuracy and comprehension (Table 9).

Table 9*Challenges and Strategies in Integrating AI Tools for Language-Focused Learning*

Theme	Challenges	How Teachers Navigated the Challenges
Reliability of AI-Generated Corrections	<ul style="list-style-type: none"> • AI sometimes provided incorrect or overly rigid grammar/vocabulary suggestions. • Contextually inappropriate corrections. 	<ul style="list-style-type: none"> • Verified AI feedback before sharing with students. • Encouraged students to critically evaluate AI suggestions. • Used AI as a supplementary tool rather than a sole resource.
Lack of Personalized Feedback	<ul style="list-style-type: none"> • AI tools provided generic corrections without explanations. • Students struggled to understand why errors occurred. 	<ul style="list-style-type: none"> • Combined AI with teacher-led feedback sessions. • Encouraged students to use AI alongside grammar guides or reference materials. • Used AI to generate examples but explained them in class.

A significant issue teachers encountered was the inconsistency of AI-generated corrections. To mitigate this, teachers guided students to critically evaluate AI-generated corrections rather than relying on them entirely. In addition to reliability concerns, teachers also struggled with AI tools' inability to provide personalized explanations for grammar and vocabulary errors. During the interview and FGD, some teachers explained:

Sometimes, AI tools correct something that is actually already correct or suggest changes that don't fit the context. I always tell my students to double-check AI suggestions and not just accept them blindly (Interview).

AI can point out errors, but it doesn't explain why they're wrong in a way that helps students learn. I usually follow up in class with explanations or ask students to use grammar books alongside AI feedback (FGD).

Teachers combined AI tools with their own direct guidance, explanations, and structured practice sessions to ensure students did not just receive corrections but genuinely comprehended them. This comprehensive approach strengthened accuracy in students' language use prior to their participation in classroom discussions and activities. By merging technological assistance with traditional teaching methods, instructors created a system where students could develop proper language skills before applying them in interactive classroom settings.

Challenges and strategies in integrating AI tools for meaning-focused output

EFL teachers faced challenges in using AI for meaning-focused output activities, including concerns over prompt authenticity, limited interactivity, and student overreliance on AI responses. While AI could generate prompts and feedback, it often lacked spontaneity and real-world relevance. To address this, instructors supplemented AI-generated content with peer discussions and classroom debates (Table 10).

Table 10*Challenges and Strategies in Integrating AI Tools for Meaning-Focused Output*

Theme	Challenges	How Teachers Navigated the Challenges
Authenticity of AI-Generated Prompts	<ul style="list-style-type: none"> AI-generated topics sometimes lacked depth or cultural relevance. Prompts did not always reflect real-world interactions. 	<ul style="list-style-type: none"> Modified AI-generated prompts to align with students' experiences. Combined AI-generated prompts with teacher-created scenarios.
Limited Interactivity in AI-Driven Tasks	<ul style="list-style-type: none"> AI-based conversations were often scripted and unnatural. AI did not allow for genuine back-and-forth interaction. 	<ul style="list-style-type: none"> Encouraged peer-to-peer conversations alongside AI-generated practice. Used AI as a tool for scaffolding before real-life discussions.
Over-Reliance on AI-Generated Responses	<ul style="list-style-type: none"> Students depended on AI-generated writing without fully engaging in the creative process. AI-assisted writing sometimes lacked originality. 	<ul style="list-style-type: none"> Implemented guided writing tasks where AI was used only for brainstorming. Required students to justify and refine AI-generated responses.

One of the key concerns was that AI-generated prompts were sometimes too generic or lacked cultural relevance. Similarly, AI-driven conversation tools lacked spontaneity, making it difficult for students to develop authentic conversational skills. In the interview and FGD, the teachers shared their approach to addressing this limitation.

The AI-generated topics are useful, but they sometimes feel disconnected from students' lives. I have to adjust the prompts to make them more relevant and engaging (Interview).

AI-generated dialogues are helpful for structured practice, but real conversations don't follow a script. I encourage students to practice with their peers after using AI tools to make it more natural (FGD).

Teachers customized AI-created materials to more accurately represent student experiences while adding peer discussions to AI exercises, ensuring these tools served as beneficial resources rather than dependencies. This strategy promoted more meaningful student engagement with speaking and writing assignments, ultimately enhancing their real-world communication abilities. By carefully balancing AI assistance with interactive human elements, instructors helped students develop authentic language skills that would transfer effectively to genuine communication contexts.

Challenges and strategies in integrating AI tools for fluency development

In the final stage of Nation's Four Strands framework, fluency development helps students use language effortlessly. However, integrating AI tools posed challenges, including repetitive exercises, limited real-time adjustments, and students prioritizing accuracy over fluency. While AI-assisted tools like speech recognition and automated feedback provided practice, they lacked real-life unpredictability. To address this, teachers combined AI-driven exercises with human interaction and personalized activities (Table 11).

Table 11*Challenges and Strategies in Integrating AI Tools for Fluency Development*

Theme	Challenges	How Teachers Navigated the Challenges
Repetitive Nature of AI-Generated Exercises	<ul style="list-style-type: none"> • AI-generated drills lacked variety and became monotonous. • Exercises focused on fixed patterns rather than spontaneous speech. 	<ul style="list-style-type: none"> • Alternated AI-driven drills with open-ended speaking tasks. • Encouraged students to personalize responses rather than rely on rigid AI prompts.
Lack of Real-Time Conversational Adjustments	<ul style="list-style-type: none"> • AI chatbots provided pre-programmed responses without adapting to spontaneous speech. • AI tools could not replicate natural interruptions and turn-taking. 	<ul style="list-style-type: none"> • Used AI for initial fluency drills but integrated peer conversation practice for real-world interactions. • Designed classroom role-plays based on AI-generated scripts.
Overemphasis on Accuracy Instead of Fluency	<ul style="list-style-type: none"> • Students prioritized grammatical correctness over fluidity when using AI tools. • AI feedback often focused on small errors rather than overall speech flow. 	<ul style="list-style-type: none"> • Shifted focus from error correction to message delivery. • Encouraged timed speaking tasks where fluency was the priority.

One of the main concerns teachers faced was that AI-generated exercises often became predictable, reducing students' motivation to engage in fluency-building activities. Another major limitation was that AI chatbots could not replicate natural conversational dynamics, such as turn-taking and spontaneous topic shifts. As the teachers noted in the interview and FGD:

AI is great for structured practice, but the exercises become repetitive. I mix AI-generated drills with open-ended questions to keep students engaged (Interview).
AI chatbots are helpful, but they don't react the way real people do. After using AI, I have students practice conversations with classmates so they can experience more natural dialogue (FGD).

By balancing AI-driven fluency exercises with real-life interaction, teachers ensured that students developed both confidence and communicative competence. This approach allowed AI tools to serve as a supportive resource rather than a substitute for meaningful communication practice.

The integration of AI tools into pre-class learning modules presents both opportunities and obstacles for EFL teachers striving to align their instruction with Nation's Four Strands framework. While AI can enhance accessibility, personalization, and engagement, its limitations highlight the irreplaceable role of teachers in guiding, curating, and adapting AI-generated content to meet pedagogical goals. The findings from this study reveal that successful AI integration is not merely about adopting technology but about strategically navigating its challenges to ensure meaningful and effective language learning. As AI continues to evolve, educators must remain critical and adaptive, ensuring that technological advancements serve as a complement—rather than a replacement—for informed, teacher-driven instruction.

Discussion

This study reveals a comprehensive landscape of AI integration in EFL pre-class learning modules, where technological affordances intersect with pedagogical principles in complex

ways. Rather than simply demonstrating that AI tools can support Nation's Four Strands Framework, the findings illuminate the transformative potential and inherent tensions that emerge when artificial intelligence mediates established second language acquisition (SLA) theory. The emergence of a four-phase pedagogical model in this study represents more than mere technological adoption—it signals a fundamental shift in how SLA principles can be operationalized through digital mediation. The systematic deployment of AI across meaning-focused input, language-focused learning, meaning-focused output, and fluency development suggests that artificial intelligence functions not as a replacement for pedagogical expertise, but as a pedagogical amplifier that extends teachers' capacity to implement theoretically grounded instruction at scale. This finding aligns with Vygotsky's concept of mediation, where tools extend human cognitive capabilities (Troitsky et al., 2023). In the context of Nation's Four Strands, AI tools serve as cognitive artifacts that mediate the complex orchestration of balanced language learning opportunities. However, the data reveals a critical distinction: while AI can generate content aligned with each strand, the pedagogical coherence that binds these strands into a unified learning experience remains fundamentally dependent on teacher expertise.

A particularly significant finding relates to a recurring tension between efficiency and instructional coherence in AI-assisted language teaching. While AI tools proved highly effective in generating strand-specific content—such as transcripts for input, corrections for language focus, prompts for output, and drills for fluency—teachers consistently expressed concerns about sustaining pedagogical coherence across these elements. This tension highlights a central challenge in integrating AI into language education: the same efficiency that makes AI tools appealing can inadvertently undermine the integrated and balanced learning experiences promoted by frameworks such as the Four Strands. This risk emerges because AI systems, although advanced, typically function within narrowly defined parameters. They are capable of generating content for specific instructional purposes but lack the pedagogical awareness required to ensure alignment between various learning components (Davis & Lee, 2023)—for instance, connecting input activities meaningfully to output tasks or ensuring that form-focused exercises support the development of communicative fluency. Teachers in this study emphasized their role in maintaining instructional coherence, exercising professional judgment to integrate AI-generated content into cohesive and pedagogically sound lesson designs (Karataş et al., 2025)—an observation that challenges reductionist narratives suggesting that AI can replace the need for expert teaching.

This study extends previous research on Nation's Four Strands framework by demonstrating its applicability in technology-enhanced environments. While Macalister and Nation (2020) established the theoretical foundations for balanced language instruction across the four strands, this study's findings illustrate how this balance can be maintained when incorporating AI tools. This addresses a gap identified by Newton and Nation (2021), who noted the need for research on implementing the framework across diverse instructional contexts. The findings also align with Casillas's (2023) emphasis on meaning-focused input as the foundation for language development, but extend this work by showing how AI can enhance input accessibility through transcription and text adaptation. Similarly, this research builds on Qiao's and Zhao's (2023) work on language-focused learning by demonstrating how

AI can provide immediate feedback and personalized grammar practice, thereby reinforcing explicit instruction in flipped classroom environments.

This study contributes to the growing body of research on flipped classrooms in EFL contexts by specifically focusing on the pre-class component, which has received less attention than in-class activities. Previous studies by Li and Li (2022) and Naing et al. (2023) demonstrated the effectiveness of flipped approaches for language learning but provided limited insights into pre-class material design. The findings address this gap by offering a detailed examination of how pre-class modules can be structured using the Four Strands framework and enhanced with AI tools. Additionally, this research responds to Larson's and Linnell's (2023) call for more attention to the quality of pre-class materials in flipped learning. By documenting how teachers design comprehensive, theoretically-grounded pre-class modules for conversation instruction, this study provides practical guidance for enhancing what has often been the less examined component of the flipped approach.

The current research advances understanding of AI's role in language education beyond its technical capabilities to its pedagogical integration. While Ooi et al. (2025) and Williyen et al. (2024) highlighted AI's potential for content creation and personalization, our findings reveal the nuanced ways teachers navigate between AI affordances and pedagogical requirements. This addresses concerns raised by Pack (2023) and Wandera (2024) about contextual appropriateness and cultural relevance in AI-generated language materials. This research also extends Novoa-Echaurren's (2024) work on teacher agency in technology integration by documenting specific strategies teachers employ to maintain pedagogical coherence when incorporating AI tools. The findings suggest that successful AI integration depends not merely on the technology's capabilities but on teachers' abilities to critically evaluate, adapt, and supplement AI-generated content based on sound pedagogical principles.

The findings regarding cultural and contextual appropriateness point to a deeper theoretical concern: the disjunction between AI's tendency toward standardization and the inherently situated nature of language learning. While AI tools are capable of generating large volumes of content, teachers consistently reported the need to modify, adapt, or supplement this material to ensure alignment with the cultural backgrounds and lived experiences of Indonesian EFL learners (Williyen et al., 2024). This challenge reflects a broader pedagogical dilemma in AI-mediated language learning. Although AI-generated materials are often linguistically accessible—featuring appropriate levels of difficulty, clear organization, and consistent patterns—this accessibility frequently lacks meaningful cultural grounding. As a result, teachers are required to act as cultural mediators, contextualizing AI-produced content to make it relevant and resonant for their learners (Samuel et al., 2023). The implications of these findings extend beyond issues of content adaptation, raising fundamental questions about the relationship between cultural authenticity and pedagogical effectiveness. In AI-supported learning environments, authenticity emerges not as an intrinsic feature of the materials, but as a negotiated outcome that depends on the dynamic interplay between automated content generation and human pedagogical expertise.

Of particular significance, the study challenges dominant narratives suggesting that AI integration diminishes teacher agency. Instead, the findings indicate that the incorporation of AI in language instruction can expand and redefine teachers' professional roles, giving rise to emerging forms of expertise that may be understood as AI-pedagogical curation (Barrot, 2024;

Tutton & Cohen, 2025). Teachers did not appear as passive recipients of AI-generated content, but rather as reflective practitioners who actively engaged with AI tools while exercising critical pedagogical judgment (van den Berg & du Plessis, 2023). This expanded agency was demonstrated in several ways: teachers operated as prompt designers, crafting inputs to generate contextually appropriate outputs; they acted as content curators, selectively adapting AI-generated materials to align with specific instructional goals and learner needs; and they functioned as pedagogical integrators, ensuring that AI-supported activities across the four strands contributed to coherent and balanced learning progressions. This multifaceted engagement reflects an evolving form of technological pedagogical content knowledge (TPACK), adapted to the specific demands and affordances of AI-enhanced language teaching.

This study has several limitations. It focused solely on Indonesian tertiary-level EFL teachers, limiting generalizability to other cultural, educational, and institutional contexts. The findings reflect a specific technological moment (2024–2025), and may become outdated as AI tools evolve. The research emphasized teacher perspectives, with limited direct evidence of student learning outcomes, making it difficult to assess the true pedagogical impact of AI-enhanced instruction. Additionally, its focus on daily conversation courses may not apply to other domains like academic writing or business English. Finally, the study was conducted in resource-rich institutions, so its findings may not extend to settings with limited access to AI tools or technological support.

This study suggests some future research directions: longitudinal mixed-methods studies to assess student outcomes in AI-enhanced Four Strands instruction; comparative research across cultural and educational contexts to understand local influences on AI integration; focused investigations of specific AI technologies aligned with particular strands, such as chatbots for meaning-focused output or speech recognition for fluency; exploration of how teachers develop AI-pedagogical expertise to inform training programs; cost-effectiveness and scalability analyses considering both AI tool expenses and teacher preparation time; and collaborative research between AI developers and educators to create tools better aligned with pedagogical frameworks and promote more effective integration.

This study offers key recommendations for stakeholders in EFL education to effectively integrate AI in language teaching. Teachers should develop expertise in AI prompt engineering, critical evaluation of AI-generated content, and systematic approaches to maintain pedagogical coherence across the Four Strands, positioning themselves as orchestrators who adapt and contextualize AI outputs while fostering students' critical skills. Teacher training programs must include comprehensive modules on AI integration, emphasizing ongoing professional development, cultural adaptation, and collaborative knowledge-sharing communities. Curriculum developers and administrators should establish clear institutional guidelines addressing academic integrity, cultural relevance, and instructional coherence, provide sustained support and resources, and implement evaluation frameworks that consider pedagogical quality and teacher agency. For AI developers, aligning tools with pedagogical frameworks, enabling cultural customization, enhancing explanatory features, and collaborating closely with educators are essential to create technology that supports meaningful, contextually relevant language instruction.

Conclusion

The integration of AI tools with Nation's Four Strands Framework represents both a significant opportunity and a complex challenge for EFL education. This study demonstrates that successful integration requires not the replacement of pedagogical expertise with technological efficiency, but the strategic combination of AI capabilities with sophisticated teacher-mediated curation. As AI continues to evolve, the field must remain committed to research and practice that maintains the centrality of theoretically-informed, culturally-responsive pedagogy while leveraging technology's potential to enhance language learning opportunities. The future of AI in EFL education lies not in choosing between human expertise and artificial intelligence, but in understanding how these can work together to create more effective, accessible, and meaningful language learning experiences.

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References

- Abbot-Smith, K., Dockrell, J., Matthews, D., Sturrock, A., & Wilson, C. (2023). Towards an evidence-based approach to fostering collaborative conversation in mainstream primary classrooms: Response to commentators. *First Language*, 43(6), 660–667. <https://doi.org/10.1177/01427237231209805>
- Abduljawad, S. A. (2025). Investigating the impact of ChatGPT as an AI tool on ESL writing. *International Journal of Computer-Assisted Language Learning and Teaching*, 14(1), 1–19. <https://doi.org/10.4018/IJCALLT.367276>
- Abualrob, M. M. (2025). Innovative teaching: How pre-service teachers use artificial intelligence to teach science to fourth graders. *Contemporary Educational Technology*, 17(1), ep547. <https://doi.org/10.30935/cedtech/15686>
- Al Issa, A., Amirian, Z., & Ketabi, S. (2024). The effect of teaching discourse markers through flipped model on Iraqi EFL learners' writing performance. *Language Teaching Research Quarterly*, 45, 123–139. <https://doi.org/10.32038/ltrq.2024.45.07>

- Alkhalaf, M. (2023). Flipped classroom approach in EFL context: Implementing self-regulated learning to improve students' performance in use of grammar. *International Journal of English Language and Literature Studies*, 12(3), 238–253. <https://doi.org/10.55493/5019.v12i3.4869>
- Atenas, J., Havemann, L., & Nerantzi, C. (2025). Critical and creative pedagogies for artificial intelligence and data literacy: An epistemic data justice approach for academic practice. *Research in Learning Technology*, 32. <https://doi.org/10.25304/rlt.v32.3296>
- Bahroun, Z., Anane, C., Ahmed, V., & Zacca, A. (2023). Transforming education: A comprehensive review of generative artificial intelligence in educational settings through bibliometric and content analysis. *Sustainability*, 15(17), Article 12983. <https://doi.org/10.3390/su151712983>
- Barrot, J. S. (2024). Leveraging ChatGPT in the writing classrooms: Theoretical and practical insights. *Language Teaching Research Quarterly*, 43, 43-53. <https://doi.org/10.32038/ltrq.2024.43.03>
- Brandt, A., & Hazel, S. (2025). Towards interculturally adaptive conversational AI. *Applied Linguistics Review*, 16(2), 775–786. <https://doi.org/10.1515/applirev-2024-0187>
- Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE Publications Ltd
- Burner, T., Lindvig, Y., & Wærness, J. I. (2025). “We should not be like a dinosaur”—Using AI technologies to provide formative feedback to students. *Education Sciences*, 15(1), 58. <https://doi.org/10.3390/educsci15010058>
- Canals, L. (2023). Modified output and metalanguage during conversational interaction: A qualitative look at interactional feedback. *Studies in Second Language Learning and Teaching*, 13(3), 601–626. <https://doi.org/10.14746/ssl1t.31128>
- Casillas, M. (2023). Learning language in vivo. *Child Development Perspectives*, 17(1), 10–17. <https://doi.org/10.1111/cdep.12469>
- Cheung, L. M. E., & Shi, H. (2024). Co-creating stories with generative AI. *Australian Review of Applied Linguistics*, 47(3), 259–283. <https://doi.org/10.1075/ara1.24101.che>
- Davis, R. O., & Lee, Y. J. (2023). Prompt: ChatGPT, create my course, please! *Education Sciences*, 14(1), 24. <https://doi.org/10.3390/educsci14010024>
- Diningrat, S. W. M., Setyosari, P., Ulfa, S., & Widiati, U. (2023). The effect of an extended flipped classroom model for fully online learning and its interaction with working memory capacity on students' reading comprehension. *Journal of New Approaches in Educational Research*, 12(1), 77–99. <https://doi.org/10.7821/naer.2023.1.1073>
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2023). *How to design and evaluate research in education*. McGraw-Hill Higher Education.
- Francis, N. J., Jones, S., & Smith, D. P. (2025). Generative AI in higher education: Balancing innovation and integrity. *British Journal of Biomedical Science*, 81. <https://doi.org/10.3389/bjbs.2024.14048>
- Gallagher, J. R. (2024). *Case study research in the digital age*. Routledge. <https://doi.org/10.4324/9781003402169>
- Izadpanah, S. (2022). The impact of flipped teaching on EFL students' academic resilience, self-directed learning, and learners' autonomy. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.981844>
- Jenks, C. J. (2025). Communicating the cultural other: Trust and bias in generative AI and large language models. *Applied Linguistics Review*, 16(2), 787–795. <https://doi.org/10.1515/applirev-2024-0196>
- Karataş, F., Eriçok, B., & Tanrikulu, L. (2025). Reshaping curriculum adaptation in the age of artificial intelligence: Mapping teachers' AI-driven curriculum adaptation patterns. *British Educational Research Journal*, 51(1), 154–180. <https://doi.org/10.1002/berj.4068>
- Keskin, D. (2023). Implementation of flipped model in EFL reading classrooms. *Turkish Online Journal of Distance Education*, 24(3), 261–279. <https://doi.org/10.17718/tojde.1132888>
- Khezrlou, S. (2023). The role of task-supported language teaching in the development of explicit and automatized explicit knowledge and learners' task engagement: Does practice meet perceptions? *Language Awareness*, 32(3), 387–420. <https://doi.org/10.1080/09658416.2023.2177659>
- Khosravi, R., Dastgoshadeh, A., & Jalilzadeh, K. (2023). Writing metacognitive strategy-based instruction through flipped classroom: An investigation of writing performance, anxiety, and self-efficacy. *Smart Learning Environments*, 10(1), 48. <https://doi.org/10.1186/s40561-023-00264-8>
- Kohnke, L., Moorhouse, B. L., & Zou, D. (2023). ChatGPT for Language Teaching and Learning. *RELC Journal*, 54(2), 537-550. <https://doi.org/10.1177/00336882231162868>
- Larson, M. P., & Linnell, J. (2023). Are students coming to class prepared? The importance of pre-class learning in a flipped classroom. *Issues in Accounting Education*, 38(3), 183–205. <https://doi.org/10.2308/ISSUES-2021-099>
- Li, F. (2022). The impact of the flipped classroom teaching model on EFL learners' language learning: Positive changes in learning attitudes, perceptions and performance. *World Journal of English Language*, 12(5), 136. <https://doi.org/10.5430/wjel.v12n5p136>

- Li, Z., & Li, J. (2022). Using the flipped classroom to promote learner engagement for the sustainable development of language skills: A mixed-methods study. *Sustainability*, 14(10), Article 5983. <https://doi.org/10.3390/su14105983>
- Macalister, J., & Nation, I. S. P. (2020). *Language curriculum design*. Routledge. <https://doi.org/10.4324/9780429203763>
- Matz, S. C., Teeny, J. D., Vaid, S. S., Peters, H., Harari, G. M., & Cerf, M. (2024). The potential of generative AI for personalized persuasion at scale. *Scientific Reports*, 14(1), Article 4692. <https://doi.org/10.1038/s41598-024-53755-0>
- Mejeh, M., & Rehm, M. (2024). Taking adaptive learning in educational settings to the next level: Leveraging natural language processing for improved personalization. *Educational Technology Research and Development*, 72(3), 1597–1621. <https://doi.org/10.1007/s11423-024-10345-1>
- Mohammad, T., & Khan, S. I. (2023). Flipped classroom: An effective methodology to improve writing skills of EFL students. *World Journal of English Language*, 13(5), 468. <https://doi.org/10.5430/wjel.v13n5p468>
- Msambwa, M. M., Wen, Z., & Daniel, K. (2025). The impact of AI on the personal and collaborative learning environments in higher education. *European Journal of Education*, 60(1), e12909. <https://doi.org/10.1111/ejed.12909>
- Naing, C., Whittaker, M. A., Aung, H. H., Chellappan, D. K., & Riegelman, A. (2023). The effects of flipped classrooms to improve learning outcomes in undergraduate health professional education: A systematic review. *Campbell Systematic Reviews*, 19(3). <https://doi.org/10.1002/cl2.1339>
- Nation, I. S. P., & Macalister, J. (2021). *Teaching ESL/EFL reading and writing*. Routledge. <https://doi.org/10.4324/9781003002765>
- Nation, I. S. P., & Waring, R. (2020). *Teaching extensive reading in another language*. Routledge. <https://doi.org/10.4324/9780367809256>
- Newton, J. M., & Nation, I. S. P. (2021). *Teaching ESL/EFL listening and speaking*. Routledge. <https://doi.org/10.4324/9780203891704>
- Ni, A., Cheung, A. C. K., & Shi, J. (2023). The impact of flipped classroom teaching on college English language learning: A meta-analysis. *International Journal of Educational Research*, 121, Article 102230. <https://doi.org/10.1016/j.ijer.2023.102230>
- Novoa-Echaurren, Á. (2024). Teacher agency in the pedagogical uses of ICT: A holistic perspective emanating from reflexive practice. *Education Sciences*, 14(3), 254. <https://doi.org/10.3390/educsci14030254>
- Ooi, K.-B., Tan, G. W.-H., Al-Emran, M., Al-Sharafi, M. A., Capatina, A., Chakraborty, A., Dwivedi, Y. K., Huang, T.-L., Kar, A. K., Lee, V.-H., Loh, X.-M., Micu, A., Mikalef, P., Mogaji, E., Pandey, N., Raman, R., Rana, N. P., Sarker, P., Sharma, A., ... Wong, L.-W. (2025). The potential of generative artificial intelligence across disciplines: Perspectives and future directions. *Journal of Computer Information Systems*, 65(1), 76–107. <https://doi.org/10.1080/08874417.2023.2261010>
- Ozyurt, O. (2023). Empirical research of emerging trends and patterns across the flipped classroom studies using topic modeling. *Education and Information Technologies*, 28(4), 4335–4362. <https://doi.org/10.1007/s10639-022-11396-8>
- Pack, A. (2023). Potential affordances of generative AI in language education: Demonstrations and an evaluative framework. *Teaching English With Technology*, 23(2), 4–24. <https://doi.org/10.56297/BUKA4060/VRRO1747>
- Pesovski, I., Santos, R., Henriques, R., & Trajkovik, V. (2024). Generative AI for customizable learning experiences. *Sustainability (Switzerland)*, 16(7), 1–23. <https://doi.org/10.3390/su16073034>
- Qiao, H., & Zhao, A. (2023). Artificial intelligence-based language learning: Illuminating the impact on speaking skills and self-regulation in Chinese EFL context. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1255594>
- Samuel, Y., Brennan-Tonetta, M., Samuel, J., Kashyap, R., Kumar, V., Krishna Kaashyap, S., Chidipothu, N., Anand, I., & Jain, P. (2023). Cultivation of human centered artificial intelligence: Culturally adaptive thinking in education (CATE) for AI. *Frontiers in Artificial Intelligence*, 6. <https://doi.org/10.3389/frai.2023.1198180>
- Shafiee, H. (2023). Flipping in a microlearning way: Effects on EFL learners' achievement and motivation in a grammar course. *Teaching English With Technology*, 23(1), 58-79. <https://doi.org/10.56297/BKAM1691/DFGF8748>
- Sointu, E., Hyypiä, M., Lambert, M. C., Hirsto, L., Saarelainen, M., & Valtonen, T. (2023). Preliminary evidence of key factors in successful flipping: Predicting positive student experiences in flipped classrooms. *Higher Education*, 85(3), 503–520. <https://doi.org/10.1007/s10734-022-00848-2>
- Strielkowski, W., Grebennikova, V., Lisovskiy, A., Rakhimova, G., & Vasileva, T. (2024). AI-driven adaptive learning for sustainable educational transformation. *Sustainable Development*, 33(2), 1921–1947. <https://doi.org/10.1002/sd.3221>

- Tomesko, J., Cohen, D., & Bridenbaugh, J. (2022). Using a virtual flipped classroom model to promote critical thinking in online graduate courses in the United States: A case presentation. *Journal of Educational Evaluation for Health Professions*, 19, 5. <https://doi.org/10.3352/jeehp.2022.19.5>
- Troitsky, Y. L., Maksimova, N. V., & Albul, L. G. (2023). L.S. Vygotsky's idea of mediation: Semiotic and educational projections. *Cultural-Historical Psychology*, 19(2), 18–26. <https://doi.org/10.17759/chp.2023190203>
- Tsang, A. (2023). "The best way to learn a language is not to learn it!": Hedonism and insights into successful EFL learners' experiences in engagement with spoken (listening) and written (reading) input. *TESOL Quarterly*, 57(2), 511–536. <https://doi.org/10.1002/tesq.3165>
- Tutton, M., & Cohen, D. (2025). Reconceptualizing the role of the university language teacher in light of generative AI. *Education Sciences*, 15(1), 56. <https://doi.org/10.3390/educsci15010056>
- van den Berg, G., & du Plessis, E. (2023). ChatGPT and generative AI: Possibilities for its contribution to lesson planning, critical thinking and openness in teacher education. *Education Sciences*, 13(10), 998. <https://doi.org/10.3390/educsci13100998>
- Vold, E. T. (2025). Learner spoken output and teacher response in second versus foreign language classrooms. *Language Teaching Research*, 29(2), 751–785. <https://doi.org/10.1177/13621688211068610>
- Wan, Y., & Moorhouse, B. L. (2024). Using Call Annie as a generative artificial intelligence speaking partner for language learners, 0(0). *RELC Journal*. <https://doi.org/10.1177/00336882231224813>
- Wandera, D. B. (2024). Skewed artificial intelligence: Flagging embedded cultural practices in children's stories featuring "Alice and Sparkle." *Reading Research Quarterly*, 59(4), 651–664. <https://doi.org/10.1002/rrq.572>
- Wang, Y. (2023). Enhancing English reading skills and self-regulated learning through online collaborative flipped classroom: A comparative study. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1255389>
- Webb, S., Uchihara, T., & Yanagisawa, A. (2023). How effective is second language incidental vocabulary learning? A meta-analysis. *Language Teaching*, 56(2), 161–180. <https://doi.org/10.1017/S0261444822000507>
- Williyan, A., Fitriati, S. W., Pratama, H., & Sakhyya, Z. (2024). AI as co-creator: Exploring Indonesian EFL teachers' collaboration with AI in content development. *Teaching English With Technology*, 24(2), 5–21. <https://doi.org/10.56297/vaca6841/LRDX3699/RZOH5366>
- Xu, J., & Li, C. (2022). Timing of form-focused instruction: Effects on EFL learners' grammar learning. *Studies in Second Language Learning and Teaching*, 12(3), 405–433. <https://doi.org/10.14746/ssllt.2022.12.3.4>
- Yang, H., & Kyun, S. (2022). The current research trend of artificial intelligence in language learning: A systematic empirical literature review from an activity theory perspective. *Australasian Journal of Educational Technology*, 38(5), 180–210. <https://doi.org/10.14742/ajet.7492>
- Yeo, M. A., & Newton, J. M. (2025). The four strands: A simplified approach to SLA for CLIL. *TESOL Journal*, 16, e887. <https://doi.org/10.1002/tesj.887>