LLT Journal, e-ISSN 2579-9533, p-ISSN 1410-7201, Vol. 29, No. 2, October 2026, pp. 790-816

LLT Journal: A Journal on Language and Language Teaching
http://ejournal.usd.ac.id/index.php/llt
Sanata Dharma University, Yogyakarta, Indonesia

READING COMPREHENSION, METALINGUISTIC AWARENESS, AND AFFECTIVE OUTCOMES THROUGH JIGSAW READING AND PEDAGOGICAL TRANSLANGUAGING

Roderick Julian Robillos
Khon Kaen University, Thailand
rodero@kku.ac.th
correspondence: rodero@kku.ac.th
https://doi.org/10.24071/llt.v29i2.1279
received 04 June 2026; accepted 29 October 2026

Abstract
This study examined reading comprehension, metalinguistic awareness, and affective outcomes under integrated Jigsaw reading and pedagogical translanguaging compared with English-only Jigsaw instruction among Thai university EFL learners. A mixed-method quasi-experimental design involved 56 students in experimental (n = 28) and control (n = 28) groups. Data were collected through reading comprehension tests, successive reading tasks, grammaticality judgment tasks, affective questionnaires, and semi-structured interviews. Results indicated comparable baseline reading comprehension performance between groups. Following the intervention, both groups improved, but the experimental group showed substantially greater reading gains and a more sustained developmental trajectory, whereas control-group improvement was more modest. For metalinguistic awareness, the experimental group maintained higher overall detection performance, although detection trajectories did not differ significantly; grammatical explanation, however, developed more strongly in the experimental group. The experimental group also showed greater gains in motivation, self-efficacy, and participation, while the control group demonstrated smaller affective changes. Qualitative findings indicated stronger meaning negotiation, grammatical reasoning, confidence, and engagement among experimental learners. The study extends previous research by examining how Jigsaw reading and strategically structured multilingual support jointly relate to reading, metalinguistic, and affective development over time.

Keywords: affective and cognitive development, jigsaw reading, metalinguistic awareness, pedagogical translanguaging, reading comprehension

Introduction
In many EFL classrooms, reading instruction is shaped by a tension between procedural task completion and meaningful learner engagement (Robillos, 2025). Instruction frequently guides learners through texts using predetermined procedures while offering limited opportunities to negotiate meanings, construct interpretations, and articulate understanding (Chavangklang & Suppasetseree, 2018). This constraint is intensified in English-only contexts, where learners must process and

This work is licensed under CC BY-SA.
Creative Commons Attribution-ShareAlike 4.0 International License

clarify complex ideas solely through the target language (Kani & Igsen, 2022). Under such conditions, reading may become oriented toward completing tasks rather than constructing meaning, potentially limiting deeper cognitive processing (Pressley et al., 2023). This pattern is evident across diverse educational contexts, where learners in countries such as South Africa (Hungwe, 2019), the Philippines (UNICEF, 2023), and Thailand (OECD, 2019) continue to experience persistent difficulties in comprehension and meaningful engagement with English texts. These difficulties are not exclusively cognitive, as limited opportunities to negotiate meaning may also constrain learners' motivation, confidence, and willingness to participate in reading-related interaction.

These conditions are further complicated by the dual demands placed on EFL learners, who must construct meaning while operating in a second language. Successful comprehension therefore depends not only on linguistic knowledge but also on learners' capacity and willingness to engage with texts. Affective factors such as motivation, self-efficacy, and participation shape reading performance (Saeed, 2024), while metalinguistic awareness supports learners' ability to attend to and analyze linguistic form (Robillos, 2025). Engagement with texts can, in turn, strengthen such awareness, suggesting a reciprocal relationship between comprehension and metalinguistic reflection (Sah & Li, 2024). Yet these cognitive, metalinguistic, and affective dimensions are often addressed separately, limiting opportunities to connect meaning construction, reflection on form, and sustained engagement within the same learning experience.

In response, collaborative approaches such as Jigsaw reading offer a structured shift from individual task completion toward interactive meaning-making (Aronson & Patnoe, 2011). By distributing responsibility and requiring learners to explain and reconstruct textual information, Jigsaw promotes peer scaffolding, engagement, and comprehension (Ayu et al., 2021). However, collaboration alone may be insufficient when interaction is restricted to the target language, as learners may still struggle to articulate complex interpretations and resolve misunderstandings (Kani & Igsen, 2022). Pedagogical translanguaging provides complementary support by allowing learners to draw strategically on their linguistic repertoires for clarification, interpretation, and cross-linguistic comparison (Cenoz & Gorter, 2021). The rationale for integration therefore rests on differentiated functions: Jigsaw structures interdependence and collaborative meaning construction, translanguaging supports comprehension within that interaction, and pedagogical translanguaging extends multilingual mediation into explicit language analysis and metalinguistic reflection. Their integration thus represents a coordinated instructional design rather than a simple combination of techniques.

This rationale is especially relevant in Thai university EFL contexts, where learners engage with increasingly demanding English texts but often have limited opportunities for meaningful English use beyond the classroom (Chavangklang & Suppasetseree, 2018). English-only expectations may also leave learners' existing linguistic resources underused, even when these could support clarification, collaborative reasoning, and reflection on form-meaning relationships. The pedagogical issue, therefore, is not simply whether L1 use should be permitted, but how multilingual resources can be strategically positioned to support English

reading development without displacing sustained engagement with the target language.

Despite these complementary affordances, Jigsaw reading and pedagogical translanguaging have largely been examined separately (Cenoz & Gorter, 2021; Ra'no, 2025), leaving limited evidence on their deliberate integration. In particular, little research has examined translanguaging for collaborative meaning construction in Jigsaw reading alongside pedagogical translanguaging for explicit linguistic analysis in grammaticality judgment tasks. This distinction is theoretically important because multilingual resources may serve different functions across tasks, supporting collaborative comprehension during reading while enabling more explicit metalinguistic reflection during grammatical analysis. The present study therefore addresses this gap by examining these functionally differentiated yet interconnected practices within a single instructional design.

Accordingly, this study investigates cognitive outcomes, particularly reading comprehension and metalinguistic awareness, and affective dimensions, including motivation, self-efficacy, and participation, among Thai university EFL learners receiving Jigsaw-based instruction with and without strategically differentiated multilingual support. By examining both developmental outcomes and learners' experiences, the study seeks to clarify how collaborative structure, translanguaging during reading, and pedagogical translanguaging during grammatical analysis relate to cognitive and affective development in a multilingual EFL context. The study was guided by the following research questions:

1. How do students' reading comprehension performances differ between the experimental and control groups?
2. How do students' reading comprehension trajectories develop across the intervention period within each group?
3. How do students' metalinguistic awareness outcomes, particularly in terms of error detection and grammatical explanation, differ across groups?
4. How do students' motivation, self-efficacy, and participation differ following the intervention across groups?
5. How do students perceive their learning experiences in relation to reading comprehension, metalinguistic awareness, and learner engagement across groups?

Literature Review

Reading comprehension in EFL from an SCT perspective: Cognitive and affective mediation

Reading comprehension in EFL contexts has traditionally been viewed as a cognitively demanding process involving decoding, inferencing, vocabulary integration, and strategic monitoring. However, emerging perspectives argue that comprehension is also shaped by affective conditions regulating learners' engagement with texts (Urrutia et al., 2024). Reading is therefore more accurately understood as a cognitive-affective process in which motivation, confidence, and anxiety influence both the efficiency and depth of meaning construction. Lin (2025) and Nachshon and Horowitz-Kraus (2019) argue that anxiety constrains higher-order processing, while MacKinnon and Hoey (2021) contend that affect also directs cognition, with positive affect supporting broader and more integrative processing. Jannah and Juniardi (2025) further suggest that observable performance

may not necessarily reflect the quality of cognitive engagement. These competing perspectives position affect not merely as a supportive or disruptive factor but as a mediational mechanism shaping reading processes. Yet affect continues to function primarily as an explanatory construct rather than an instructional concern.

This limitation becomes more apparent through SCT, which conceptualizes learning as a socially mediated process occurring within ZPD (Vygotsky, 1978). SCT positions language as a mediational tool for constructing cognition, self-regulation, and meaning-making (Cui et al., 2025), while affective dimensions such as confidence and engagement are likewise shaped through interaction (Lantolf, 2006). However, applications often privilege cognition over affect. While Gani et al. (2016) emphasize collaboration for comprehension and strategy use, Banaruee et al. (2025) highlight its role in reducing anxiety and supporting engagement. Williams and Rhodes (2023) similarly argue that affect is frequently treated as a facilitating rather than co-constitutive process. A similar tension appears in multilingual contexts, where monolingual practices may restrict available mediational resources (Kani & Igsen, 2022). Although concerns regarding multilingual use persist (Turnbull, 2018), alternative perspectives view learners' linguistic repertoires as cognitive and affective resources rather than interference (Cummins, 2007). These competing views suggest that SCT-informed pedagogy remains incomplete unless social interaction and multilingual resources function as complementary mechanisms supporting reading comprehension and learner engagement.

Pedagogical translanguaging: Cognitive scaffolding and metalinguistic awareness

Pedagogical translanguaging represents a planned instructional approach in which multiple language resources are purposefully integrated to promote learning (Cenoz & Gorter, 2017). It is often argued that guiding learners to compare languages promotes metalinguistic awareness, or the ability to notice, analyze, and explain language (Robillos, 2025), thereby supporting deeper linguistic processing. However, Hu (2022) argues that L1 use may reduce target-language exposure and limit learning opportunities, revealing a theoretical tension between viewing pedagogical translanguaging as a resource for language analysis or as a potential constraint on development. This disagreement extends to empirical research. Studies report that pedagogical translanguaging improves communication, motivation, and reduces anxiety (Saeli et al., 2023), yet Turnbull (2018) questions whether such gains reflect deeper language development or simply reduced reliance on the target language. Thus, improved performance does not necessarily indicate enhanced linguistic awareness.

This issue becomes more problematic because most studies emphasize general performance rather than metalinguistic outcomes. Although Cenoz and Gorter (2017) highlight the potential of pedagogical translanguaging, limited research explains how it can be structured to promote noticing and language analysis (Teng & Zhang, 2025). This gap is particularly evident in reading contexts, where instruction often prioritizes comprehension over linguistic reflection. Since metalinguistic awareness develops through noticing and explaining language (Cui et al., 2025), learners may understand texts without developing the ability to analyze how language works (Robillos, 2025). Consequently, pedagogical translanguaging

requires more deliberate implementation as a structured scaffold for language analysis rather than as support for comprehension alone.

Jigsaw reading as collaborative cognitive - affective mediation

Jigsaw reading, grounded in cooperative learning and social interdependence theory (Aronson & Patnoe, 2011), is commonly presented as a structure that promotes comprehension through distributed expertise and peer explanation. However, attributing learning gains solely to task structure is problematic. While studies report improvements in reading and communication (Charernnit et al., 2021; Ra'no, 2025), Johnson and Johnson (2008) argue that positive interdependence and accountable interaction, rather than structure itself, drive learning. Similarly, Robillos (2025) contends that explanation quality, not mere participation, predicts conceptual gains. These positions suggest that Jigsaw effectiveness is not inherent but contingent upon how interaction is cognitively and linguistically mediated.

This tension extends to affective outcomes. Although Jigsaw is often associated with reduced anxiety and increased cohesion (Banaruee et al., 2025), Kani and Igsen (2022) show that English-only conditions may heighten anxiety when learners lack sufficient linguistic resources for explanation. Thus, accountability without linguistic support may suppress participation and constrain processing depth, challenging assumptions that collaboration is inherently supportive. Yet research has largely emphasized comprehension while overlooking whether Jigsaw fosters metalinguistic awareness and sustained engagement (Huang & Chalmers, 2023). Consequently, what remains underexplored is how collaborative structure interacts with linguistic mediation to support not only comprehension but also analytical reflection and engagement.

A unified jigsaw-translanguaging instructional approach

The integration of pedagogical translanguaging and Jigsaw reading is often assumed to be complementary; however, this assumption rests on unresolved theoretical tensions. Pedagogical translanguaging emphasizes linguistic flexibility by enabling learners to mobilize multiple languages for meaning-making (Cenoz & Gorter, 2021), whereas Jigsaw reading relies on structured collaboration where accountability and precise peer explanation are central (Aronson & Patnoe, 2011). Although both are grounded in sociocultural mediation, they operate through different mechanisms: one expands linguistic resources, while the other regulates interaction to ensure accuracy. This creates a tension, as linguistic flexibility may either support conceptual clarity or reduce attention to target-language form. Consequently, their effectiveness cannot be assumed but depends on how linguistic mediation and collaborative structure are aligned.

Empirical research provides limited clarification of this issue. Pedagogical translanguaging has been associated with reduced anxiety and increased confidence (Saeli et al., 2023; Song et al., 2022), while Jigsaw reading promotes motivation and deeper processing (Banaruee et al., 2025). However, these outcomes are often treated as mutually reinforcing without examining how the approaches interact. Such interpretations remain problematic, as affective gains do not necessarily indicate improved cognitive or linguistic processing. It remains unclear whether pedagogical translanguaging enhances explanation quality within Jigsaw activities or merely redistributes cognitive effort away from the target language. Likewise,

few studies examine whether their integration promotes metalinguistic awareness, particularly learners' ability to detect and explain linguistic form.

Integrating jigsaw reading and pedagogical translanguaging: Theoretical-conceptual synthesis

Grounded in Sociocultural Theory (SCT), the framework conceptualizes learning as socially mediated within the Zone of Proximal Development, where interaction and language function as tools for meaning construction and development (Vygotsky, 1978). Cooperative Learning and Social Interdependence Theory further explain how such mediation can be structured through positive interdependence and individual accountability (Johnson & Johnson, 2008). Jigsaw reading was therefore selected because its information-distribution structure makes each learner responsible for contributing knowledge to collective comprehension, creating sustained opportunities for peer explanation, clarification, and co-construction (Aronson & Patnoe, 2011). Yet interaction alone does not guarantee productive learning; its value depends on the quality of clarification, elaboration, and reformulation that occurs during collaboration.

Pedagogical translanguaging extends this account by positioning learners' linguistic repertoires as mediational resources for meaning-making and cross-linguistic reasoning (Cenoz & Gorter, 2017; 2021). The rationale for integration lies in differentiated functions rather than simple co-presence: Jigsaw structures interdependence and peer accountability, translanguaging within collaborative reading broadens the resources available for negotiating meaning, and pedagogical translanguaging deliberately supports cross-linguistic analysis and metalinguistic reflection. Linguistic flexibility alone does not ensure elaborated explanation, just as collaborative structure alone may not provide sufficient linguistic access. Their coordination therefore links socially organized interaction with multilingual mediation rather than treating either as independently sufficient.

The distinctive contribution of the framework lies in specifying these forms of mediation as functionally differentiated but reciprocally connected. Multilingual support is not treated as a uniform resource: during Jigsaw reading it supports clarification, meaning negotiation, and comprehension monitoring, whereas in grammaticality judgment tasks pedagogical translanguaging supports linguistic noticing, cross-linguistic comparison, and explicit grammatical explanation. Affective processes, particularly motivation, confidence, self-efficacy, and participation, are likewise positioned as mediating conditions rather than merely outcomes, because they may shape learners' willingness to engage in collaborative and metalinguistic activity. The framework thus moves beyond an additive Jigsaw-plus-translanguaging model toward an account in which social, linguistic, metalinguistic, and affective mediation interact dynamically.

As represented in Figure 1, Jigsaw reading pedagogy and pedagogical translanguaging feed into coordinated collaborative processes, affective mediation, and metalinguistic awareness. These interconnected pathways are associated with three developmental outcomes: improved reading comprehension, enhanced metalinguistic awareness, and stronger affective development. The relationships are conceived as reciprocal rather than strictly linear, such that gains in comprehension, grammatical reasoning, confidence, or engagement may reinforce subsequent participation in collaborative and multilingual learning.

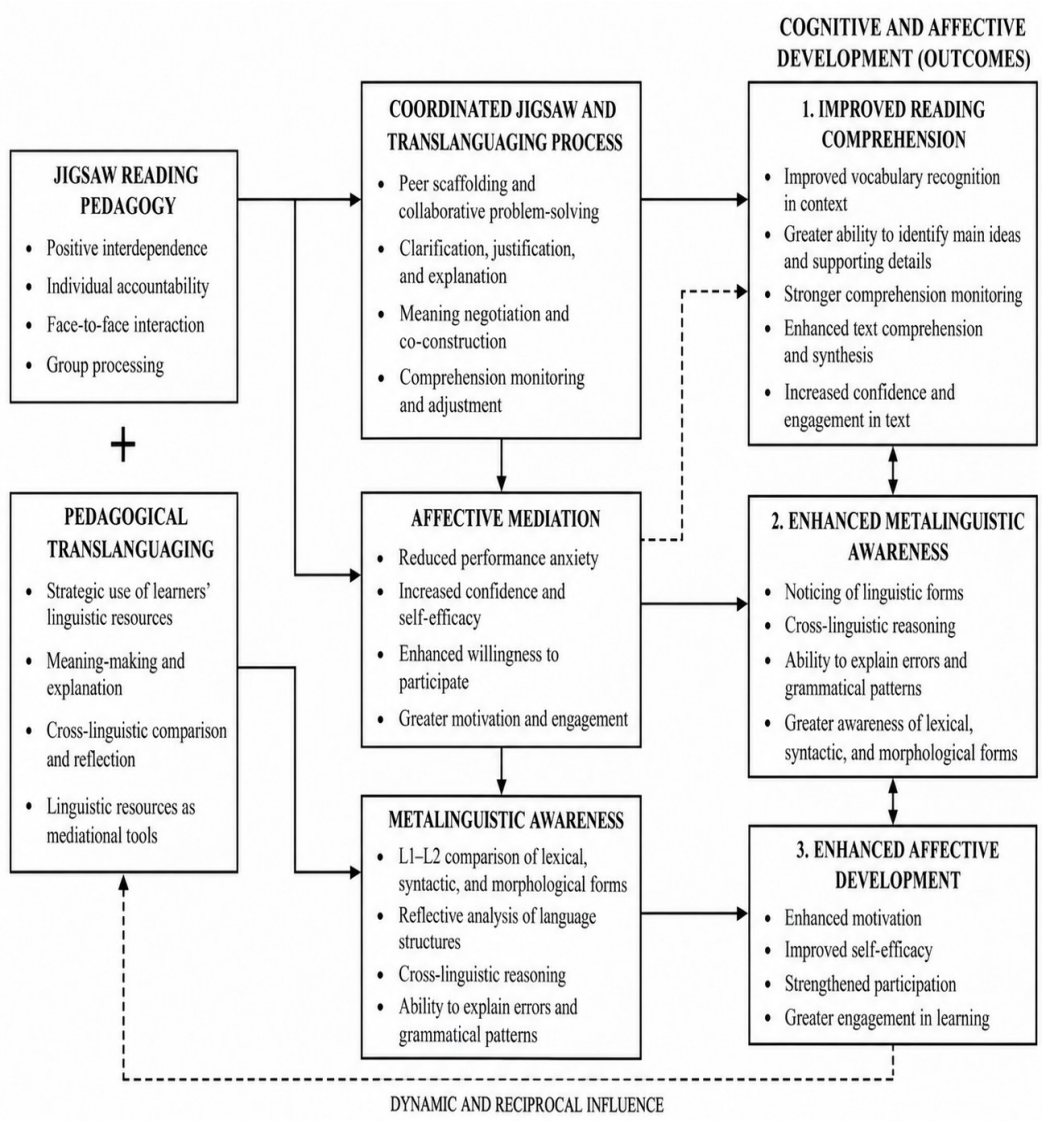


Figure 1. Study's conceptual framework

Method

Design

The study employed a sequential explanatory mixed-methods design (Creswell & Creswell, 2018), in which quantitative data examined changes in reading comprehension, metalinguistic awareness, and affective engagement, followed by qualitative inquiry to explain the mechanisms underlying the observed outcomes. The quantitative strand therefore established patterns of performance and development across the experimental and control groups, whereas the subsequent qualitative strand was used to elaborate and contextualize these patterns through learners' reported experiences. The two strands were connected sequentially through the common outcome domains of reading comprehension, metalinguistic awareness, and affective engagement and were subsequently integrated during interpretation to identify areas of convergence, complementarity, or divergence between the statistical and qualitative evidence.

To evaluate intervention effects, data were collected before and after implementation with the experimental group receiving integrated Jigsaw reading and pedagogical translanguaging instruction and the control group participating in Jigsaw-based instruction under an English-only condition. Both groups followed identical schedules, materials, and assessments within the same course context. To strengthen internal validity, procedural controls included parallel pre- and post-test forms, standardized instructional delivery, stable group composition, and consistent testing conditions.

Participants

The participants comprised 56 Thai university EFL students, divided into an experimental group (n = 28; 11 males, 17 females) and a control group (n = 28; 10 males, 18 females), aged 19 - 20 years. All were identified as English users within the B1-B2 proficiency band of the CEFR, reflecting independent language ability. Participants were drawn from existing intact classes relevant to the study context, as learners at this level commonly experience difficulties in reading comprehension and demonstrate limited metalinguistic awareness.

The study involved students taking the *Integrating Academic Content and Language Awareness* course, a core component of their program emphasizing collaborative reading and discussion. A non-randomized intact-group assignment was employed because participants were already enrolled in existing course sections, making individual random assignment impractical within the instructional setting. Pre-intervention analyses indicated no significant differences between groups, supporting baseline comparability prior to the intervention. Participants received information regarding the purpose and voluntary nature of the study prior to providing informed consent. Participants provided informed consent; confidentiality, de-identification, withdrawal rights, and academic non-penalty were ensured under institutional minimal-risk procedures throughout the study.

Instruments and data collection

Pre-and post-reading comprehension tests

These tests were administered to assess changes in reading performance at two measurement points, prior to and following implementation. Pre-intervention scores were used to determine learners' initial performance levels, while post-intervention results reflected changes that occurred following the instructional period. Both tests consisted of four short passages aligned with classroom topics and were developed as parallel forms to ensure comparable content, difficulty, and format. To establish validity and reliability, three content experts evaluated the items using the Index of Item-Objective Congruence (IOC), followed by revisions and pilot testing with a comparable sample. The tests demonstrated high internal consistency ($\alpha = .87$). Guided by a test blueprint, each test contained 20 items across four task types: main idea identification, cloze reading, vocabulary meaning determination, and overall text comprehension (five items each). Each correct response received one point.

Reading comprehension quizzes

These quizzes were administered as formative measures to monitor students' progress throughout the intervention. The quizzes were evaluated by three English

language experts, with content validity established through IOC and revisions made based on expert feedback. Reliability analysis indicated strong internal consistency (α = .89). The quizzes were developed as parallel forms to maintain comparable difficulty, format, and content. Guided by a test blueprint, four quizzes were administered during the intervention, each consisting of 20 items equally distributed across main idea identification, cloze reading, vocabulary meaning determination, and overall text comprehension. Each correct response received one point.

Sentences' grammaticality judgment tasks

These tasks were administered to assess participants' metalinguistic awareness, particularly their ability to identify sentence well-formedness and evaluate linguistic acceptability. The tasks were adapted from Kemp (2001), modified by the researcher, and validated by three language experts. The tasks were administered during the second session of each instructional cycle. Before individual completion, a teacher-guided modeling phase using one sample item demonstrated error identification and justification procedures. In the experimental group, this phase incorporated pedagogical translanguaging to analyze grammatical forms and co-construct explanations, whereas the control group followed the same procedure under an English-only condition. Translanguaging was limited to the modeling phase and was not permitted during individual task completion.

Task items were derived from intervention reading passages and covered singular/plural agreement, comparatives and superlatives, modals and modal-like expressions, verb tenses, and countable/uncountable nouns and articles (two items each). Responses were evaluated using a dual-metric scoring system: detection rate assessed correct identification of ungrammatical sentences (1 point), whereas explanation rate evaluated the accuracy and clarity of justifications (1 = accurate; 0 = absent, unclear, or irrelevant). This approach enabled assessment of both error recognition and metalinguistic reasoning. All tasks were completed individually to ensure response validity.

Language learning motivation questionnaire (LLMQ)

A five-point Likert-scale instrument, adapted from Dörnyei (1994), was utilized to examine learners' motivation and modified to align with students' proficiency levels and the collaborative nature of the intervention. The instrument comprised 12 items across four subscales: intrinsic motivation, extrinsic motivation, persistence/task engagement, and translanguaging motivation (three items each). A five-point response format was used, with scores ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was implemented at two measurement points, prior to and following the intervention, to examine motivational changes. Expert judgment was employed to evaluate the appropriateness and representativeness of the instrument content (IOC = 0.80 to 1.00), followed by pilot testing with a comparable sample. Reliability analysis demonstrated satisfactory internal consistency (α = .87).

Foreign language reading self-efficacy scale (FLRS).

Students' reading self-efficacy was assessed using a 5-point Likert-scale questionnaire adapted from Saito et al. (1999) and modified to align with students' proficiency levels and the collaborative nature of the intervention. The instrument

comprised 10 items across three subscales: understanding texts (4 items), explaining content to peers (3 items), and participation in collaborative reading (3 items), with responses ranging from 1 (not confident) to 5 (very confident). The questionnaire was administered before and after the intervention to examine changes in reading self-efficacy. Content validity was established through expert evaluation (IOC = 0.80 to 1.00), followed by pilot testing with a comparable sample. Reliability analysis demonstrated acceptable internal consistency ($\alpha = .79$).

Participation questionnaire.

Students' participation was assessed using a 5-point Likert-scale questionnaire adapted from Fredricks et al. (2004) and modified to align with students' proficiency levels and the Jigsaw context. The instrument comprised 10 items across three subscales: willingness to engage (4 items), frequency of contribution (3 items), and active involvement (3 items), with responses ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was implemented at pre- and post-intervention stages to identify shifts in learners' participation across the study period. The relevance and appropriateness of its content were subsequently verified through expert review (IOC = 0.80 to 1.00), followed by pilot testing with a comparable sample. Reliability analysis demonstrated acceptable internal consistency ($\alpha = .82$).

Semi-structured interviews.

To obtain deeper insights into learners' experiences, interviews were conducted with participants drawn from both groups one day after the intervention to examine learners' experiences related to reading comprehension, metalinguistic awareness, and engagement. A semi-structured format with guiding questions and follow-up probes was used to facilitate richer participant accounts while preserving consistency throughout the interview process. The interview questions were aligned with the same cognitive, metalinguistic, and affective domains examined quantitatively, thereby facilitating subsequent integration of evidence across the two strands. The interview protocol was piloted with non-participating students of a comparable academic level to ensure clarity and appropriateness.

Research procedure and experimental framework

The research was organized around a quasi-experimental pretest-posttest structure using non-randomized intact groups. Prior to the intervention, baseline assessments, including reading comprehension and affective measures (motivation, self-efficacy, and participation), were administered to establish initial equivalence. Across ten instructional sessions, both groups participated in parallel Jigsaw reading activities using identical materials and instructional procedures. The key distinction involved the intervention condition: the experimental group implemented Jigsaw reading integrated with pedagogical translanguaging, whereas the control group followed an English-only Jigsaw condition. Throughout the intervention, reading comprehension quizzes and grammaticality judgment tasks monitored learning progression. Following the intervention, post-tests, affective measures, and follow-up interviews were carried out to provide a mixed-methods evaluation of the intervention. This sequencing established an explicit connection between the two strands: quantitative measures documented the magnitude and

trajectories of development, while the subsequent interviews provided learner-based explanations and contextual information for interpreting those patterns. A visual representation of the study workflow and experimental structure is shown in Figure 2.

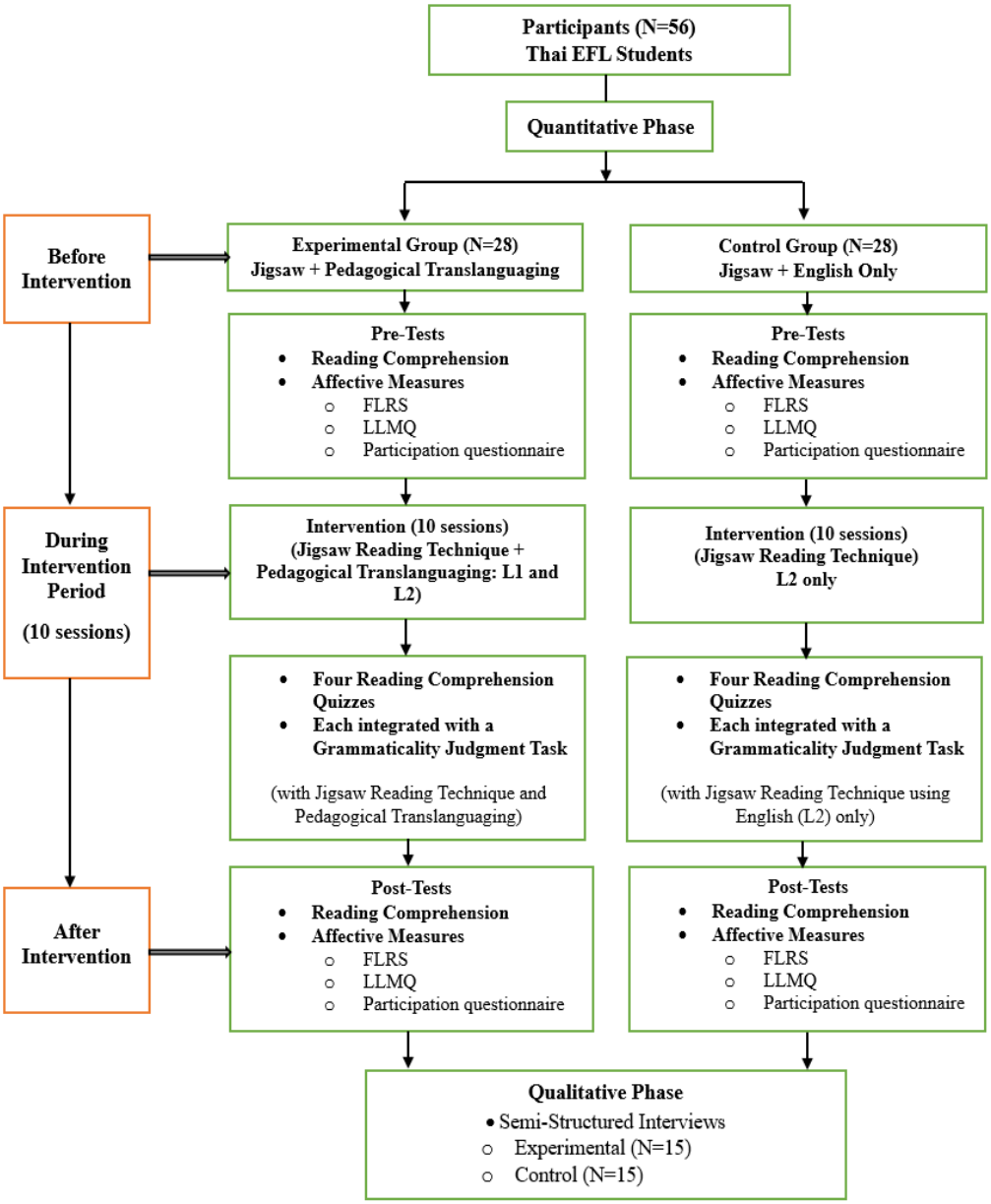


Figure 2. Research procedures and experimental framework

Instructional treatment

The instructional treatment (Figure 3) consisted of two phases: the Jigsaw Reading Phase and the Grammaticality Judgment Task Phase. During the Jigsaw Reading Phase, both groups followed the same collaborative sequence involving lesson segmentation, home and expert group discussions, and information sharing. The key distinction occurred during home-group interaction, where the experimental group employed pedagogical translanguaging for clarification and meaning negotiation, whereas the control group followed an English-only condition.

Both groups subsequently completed the Grammaticality Judgment Task Phase to assess individual metalinguistic awareness. Although the procedure remained consistent across groups, pedagogical translanguaging in the experimental group was incorporated during modeling and discussion to support cross-linguistic comparison and reflective explanation. In contrast, the control group maintained English-only interaction, while all task responses were completed individually in English.

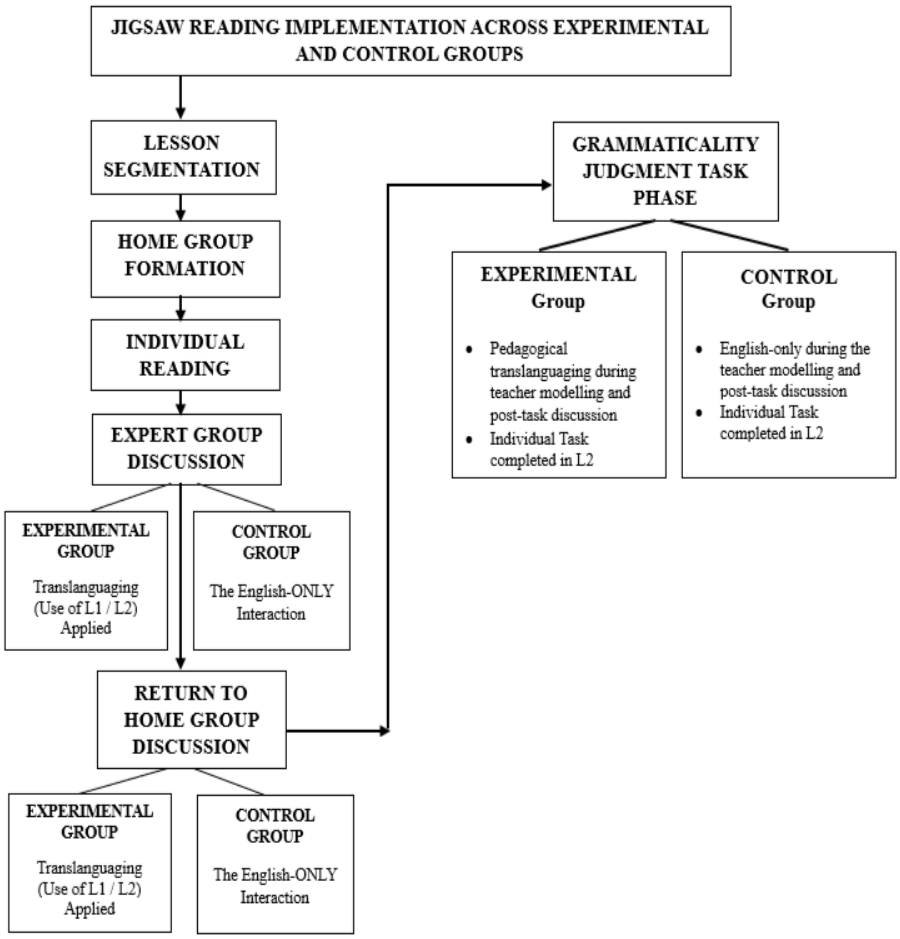


Figure 3. Instructional treatment across groups

Data analysis

Descriptive and inferential analyses were utilized to examine participants' performance across all measures. Baseline equivalence between the experimental and control groups was assessed using independent-samples t-tests. Mixed-design ANOVAs were then employed to examine Time, Group, and Group × Time effects. A 2 × 2 mixed-design ANOVA was conducted for pre- and post-test reading comprehension, with Time as the within-subjects factor and Group as the between-subjects factor. For the four reading comprehension tasks, a 2 × 4 mixed-design repeated-measures ANOVA examined developmental trajectories across groups. Separate 2 × 4 mixed-design repeated-measures ANOVAs were likewise conducted for grammaticality detection and grammatical explanation. Greenhouse-Geisser corrections were applied when sphericity was violated, and follow-up comparisons

were conducted where appropriate. Statistical significance was set at $p < .05$, with partial eta squared (ηp^2) reported for ANOVA effect sizes and additional standardized effect-size estimates where appropriate.

Qualitative interview data were analyzed thematically through iterative coding and theme development. Initial codes were grouped into broader cognitive, metalinguistic, and affective themes, with interpretations repeatedly checked against the transcripts to strengthen trustworthiness. Themes were compared across participants and instructional conditions, and data saturation was reached. Representative quotations were retained to preserve links to participants' accounts. During interpretation, qualitative themes were examined alongside the quantitative findings to explain, complement, or qualify the statistical patterns and provide a fuller account of learner development.

Results and Discussion

Results

Students' reading comprehension performances across experimental and control groups

Table 1 presents the pre- and post-test reading comprehension performance of both groups. At pre-test, the experimental group ($M = 12.68$) and the control group ($M = 12.71$) demonstrated comparable initial performance. Following the intervention, the experimental group increased to $M = 16.86$, representing a mean gain of 4.18 points and a very large within-group effect ($d = 2.52$). The control group also improved, from $M = 12.71$ to $M = 13.57$, but the magnitude of change was smaller, with a mean gain of 0.86 points and $d = 1.13$.

Table 1. Descriptive statistics for pre- and post-test reading comprehension

Group	Pre-test		Post-test		Mean	Cohen's
	M	SD	M	SD	Gain	*d*
Experimental	12.68	1.16	16.86	1.11	4.18	2.52
Control	12.71	0.98	13.57	0.79	0.86	1.13

Table 2 presents the mixed-design ANOVA results examining whether the magnitude of change from pre-test to post-test differed between groups. A significant main effect of Time was observed, $F(1, 54) = 214.12$, $p < .001$, $\eta p^2 = .799$, indicating substantial overall improvement across the two measurement points. More importantly, the Group × Time interaction was significant, $F(1, 54) = 93.15$, $p < .001$, $\eta p^2 = .633$, demonstrating that the magnitude of improvement differed significantly between the experimental and control groups. Thus, the greater post-intervention performance of the experimental group reflected a substantially stronger pattern of change over time.

The qualitative findings complemented the quantitative results by indicating that learners in the experimental group experienced deeper comprehension and more effective meaning construction during collaborative reading, whereas control group learners reported greater difficulty expressing and negotiating ideas in English. These qualitative patterns therefore provided explanatory support for the stronger reading-comprehension gains observed in the experimental group.

Table 2. Mixed-design ANOVA for pre- and post-test reading comprehension

Effect	F	df	*p*	ηp²
Time	214.12	1, 54	<.001	.799
Group × Time	93.15	1, 54	<.001	.633

Students' reading comprehension trajectories across the intervention period within each group

Table 3 presents the descriptive trajectories of reading comprehension across the four successive reading tasks. The experimental group demonstrated a clear and sustained upward pattern, increasing from M=14.18 in Task 1 to M = 15.46 in Task 2, M = 16.36 in Task 3, and M = 17.32 in Task 4. In contrast, the control group showed a more modest pattern, increasing from M = 13.46 in Task 1 to M = 14.00 in Task 4, with only limited fluctuation across the intermediate tasks. The progressively widening separation between the groups indicates a steeper and more sustained reading comprehension trajectory in the experimental group. Figure 4 shows a consistently upward reading comprehension trajectory for the experimental group across the four tasks, while the control group demonstrates only modest improvement with a slight decline in Task 4. The widening gap between groups indicates increasingly stronger performance in the experimental group over time.

Table 3. Descriptive statistics for reading comprehension across four tasks

Group	Task 1		Task 2		Task 3		Task 4	
	M	SD	M	SD	M	SD	M	SD
Experimental	14.18	0.94	15.46	0.84	16.36	0.73	17.32	0.72
Control	13.44	0.92	14.00	0.77	14.18	0.86	14.00	0.94

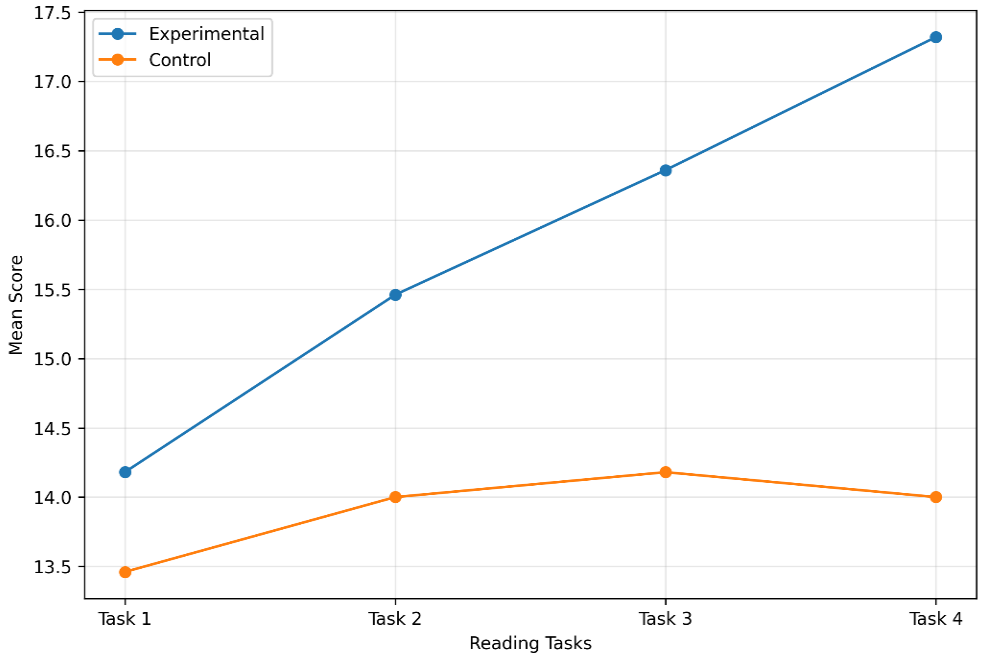


Figure 4. Reading comprehension trajectories across four successive tasks

Table 4 presents the mixed-design repeated-measures ANOVA results used to determine whether the observed trajectories differed statistically between groups. A significant effect of Time was found, $F(2.38, 128.76) = 79.84$, $p < .001$, $\eta p^2 = .597$, indicating significant change across the four reading tasks. The Group effect was also significant, $F(1, 54) = 134.85$, $p < .001$, $\eta p^2 = .714$, demonstrating an overall difference in reading performance between the two groups. Most importantly, the Group × Time interaction was significant, $F(2.38, 128.76) = 38.74$, $p < .001$, $\eta p^2 = .418$, confirming that the pattern of development across the intervention differed significantly between groups. The experimental group therefore exhibited a substantially stronger developmental trajectory than the control group.

The qualitative findings complemented these trajectory results by indicating that learners in the experimental group experienced increasingly manageable meaning construction and greater continuity in collaborative comprehension across successive tasks. In contrast, learners in the control group reported more persistent difficulty expressing and verifying ideas in English, providing explanatory context for the weaker and less sustained trajectory observed quantitatively.

Table 4. Mixed-design repeated-measures ANOVA for reading comprehension trajectories

Effect	*F*	df	*p*	ηp^2
Time	79.84	2.38, 128.76	<.001	.597
Group	134.85	1, 54	<.001	.714
Group × Time	38.74	2.38, 128.76	<.001	.418

Students' metalinguistic awareness outcomes in terms of error detection and grammatical explanation across groups

Table 5 presents the descriptive patterns for error detection and grammatical explanation across the four grammaticality judgment tasks. For detection, the experimental group increased from M = 7.00 in Task 1 to M = 7.75 in Task 4, whereas the control group showed a smaller overall increase from M = 6.46 to M = 6.86. A more pronounced divergence was evident in grammatical explanation. The experimental group progressed from M = 7.21 to M = 8.11, whereas the control group remained comparatively stable, changing from M = 6.61 to M = 6.68. The descriptive pattern therefore suggests that the experimental condition was associated with a clearer developmental advantage in grammatical explanation than in error detection. Figure 5 shows that both detection and explanation scores increased more consistently in the experimental group across the four tasks. The divergence was more pronounced for grammatical explanation, while the control group remained comparatively stable, indicating that the strongest developmental advantage emerged in learners' ability to explain grammatical judgments

Table 5. Descriptive statistics for detection and explanation across four grammaticality judgment tasks

Measure	Group	Task 1		Task 2		Task 3		Task 4	
		M	SD	M	SD	M	SD	M	SD
Detection	Experimental	7.00	0.86	7.21	0.83	7.39	0.79	7.75	0.80
	Control	6.46	1.10	6.29	0.76	6.61	0.79	6.86	0.85
Explanation	Experimental	7.21	0.92	7.50	0.92	7.93	0.98	8.11	0.92
	Control	6.61	0.79	6.54	0.84	6.68	0.77	6.68	0.82

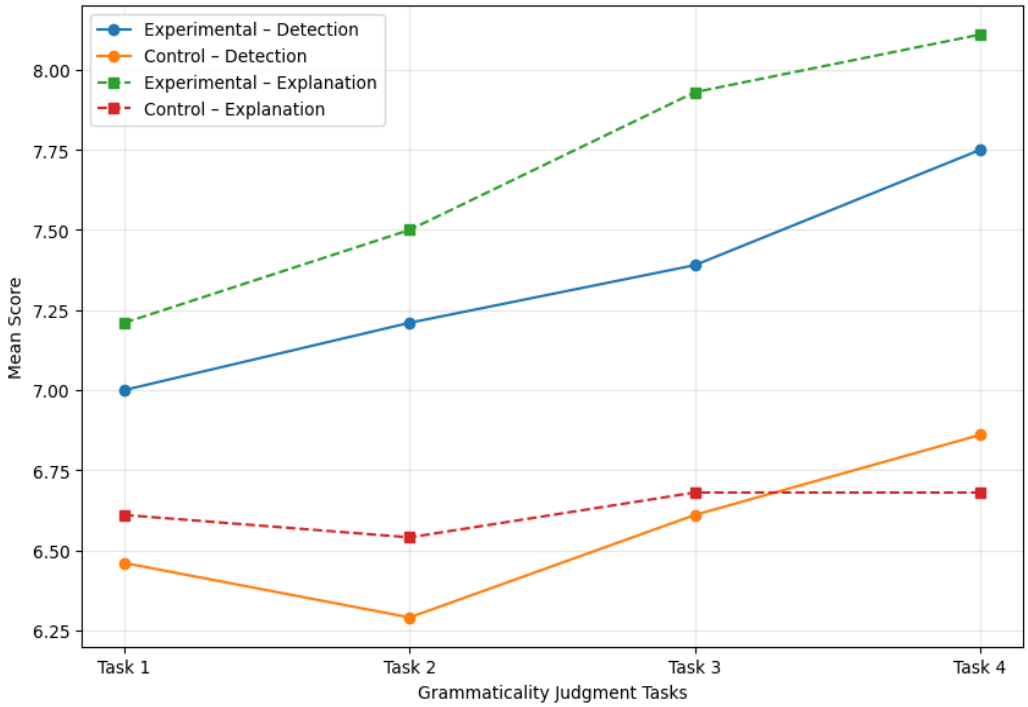


Figure 5. Metalinguistic awareness trajectories across four grammaticality judgment tasks

Table 6 presents the mixed-design repeated-measures ANOVA results for error detection and grammatical explanation. For detection, significant main effects were observed for Time, $F(2.43, 131.18) = 12.23$, $p < .001$, $\eta p^2 = .185$, and Group, $F(1, 54) = 17.90$, $p < .001$, $\eta p^2 = .249$. However, the Group × Time interaction was not significant, $F(2.43, 131.18) = 1.34$, $p = .265$, $\eta p^2 = .024$, indicating that although the experimental group performed at a higher overall level, the rate of change in detection did not differ significantly between groups. In contrast, grammatical explanation showed significant effects of Time, $F(2.38, 128.49) = 9.79$, $p < .001$, $\eta p^2 = .153$, and Group, $F(1, 54) = 29.54$, $p < .001$, $\eta p^2 = .354$. Crucially, the Group × Time interaction for grammatical explanation was significant, $F(2.38, 128.49) = 6.01$, $p = .002$, $\eta p^2 = .100$, demonstrating that the groups developed differently over time. Thus, the strongest metalinguistic advantage of the experimental condition was evident in learners' capacity to explain and justify grammatical judgments rather than merely detect grammaticality.

The interview evidence provided further context for this distinction between detection and explanation. Across the experimental group, learners' accounts reflected greater use of cross-linguistic comparison and explicit reasoning about grammatical form, whereas control group accounts more often indicated difficulty articulating the basis for their grammatical judgments.

Table 6. Mixed-design repeated-measures ANOVA for detection and grammatical explanation

Measure	Effect	*F*	df	*p*	ηp^2
Detection	Time	12.23	2.43, 131.18	<.001	.185
	Group	17.90	1, 54	<.001	.249
	Group × Time	1.34	2.43, 131.18	.265	.024

Measure	Effect	*F*	df	*p*	ηp²
Explanation	Time	9.79	2.38, 128.49	<.001	.153
	Group	29.54	1, 54	<.001	.354
	Group × Time	6.01	2.38, 128.49	.002	.100

Students' pre- and post LLMQ results

Pre- and post-assessment LLMQ outcomes for the two groups are summarized in Table 7. In the experimental group, significant gains were observed across all motivational subscales. Among these, intrinsic motivation (t = 8.92, p<.001, d=1.68) and translanguaging-related motivation (t = 10.54, p < .001, d = 1.82) recorded the highest statistical values among the measured subscales. In contrast, the control group demonstrated a less consistent pattern across subscales, with non-significant changes in intrinsic motivation (t = 1.21, p = .235) and translanguaging-related motivation (t = 0.42, p = .676), while persistence showed a significant increase (t = 3.12, p = .004).

Table 7. Pre-post changes in LLMQ by subscale

Subscale	Group	Before Intervention		After Intervention		*t*	*p*	*Cohen's d*
		M	SD	M	SD			
Intrinsic	Experimental	2.65	1.19	4.33	1.13	8.92***	<.001	1.68
	Control	2.67	1.79	2.92	1.63	1.21	.235	0.15
Extrinsic	Experimental	2.72	1.20	3.83	1.22	6.41***	<.001	1.05
	Control	2.52	1.72	2.97	1.63	2.02*	.052	0.28
Task Engagement	Experimental	2.05	1.40	3.93	1.39	9.77***	<.001	1.74
	Control	2.30	1.36	3.23	1.24	3.12**	.004	0.66
Translanguaging Motivation	Experimental	2.67	1.25	4.35	1.03	10.54***	<.001	1.82
	Control	1.87	1.35	1.93	1.29	0.42	.676	0.05

Note. ***p < .001, **p < .01, d: 0.20 = small, 0.50 = moderate, 0.80 and up = large effect size

Pre–post changes in FLRS across subscales

Table 8 presents pre–post changes in foreign language reading self-efficacy across subscales. In the experimental group, significant gains were observed across all dimensions, with the highest t-values found in explaining content to peers (t = 26.62, p < .001, d = 2.03) and participation in collaborative reading (t = 25.21, p<.001, d=2.56). In contrast, the control group showed a less consistent pattern, with no significant change in understanding texts (t = 1.00, p = .326, d = 0.19), while the remaining subscales showed significant gains.

Table 8. Pre–post changes in FLRS across subscales

Subscale	Group	Before Intervention		After Intervention		*t*	*p*	*Cohen's d*
		M	SD	M	SD			
Understanding Texts	Experimental	2.81	0.25	4.52	0.57	14.48***	<.001	2.54
	Control	2.89	0.16	2.90	0.18	1.00	.326	0.19

Subscale	Group	Before Intervention		After Intervention		*t*	*p*	*Cohen's d*
		M	SD	M	SD			
Explaining Content to Peers	Experimental	2.64	0.19	4.50	0.31	26.62***	<.001	2.03
	Control	2.55	0.17	2.71	0.27	3.44**	.002	0.65
Participating in Collaborative Reading	Experimental	2.52	0.31	4.55	0.32	25.21***	<.001	2.56
	Control	2.61	0.33	2.96	0.28	4.55***	<.001	0.86

Note. ***$p < .001$, **$p <. 01$, *d*: 0.20 = small, 0.50 = moderate, 0.80 and up = large effect size

Students' pre- and post- participation results

Table 9 presents pre–post changes in students' participation across subscales. In the experimental group, all participation dimensions showed significant and relatively consistent gains, with the highest t-values observed in active involvement ($t = 17.45$, $p < .001$, $d = 2.31$) and frequency of contribution ($t = 16.92$, $p < .001$, $d=2.00$). Willingness to engage also showed a similarly strong increase ($t = 15.87$, $p < .001$, $d = 2.59$). In contrast, the control group demonstrated a more moderate pattern, with significant but smaller gains across all participation dimensions.

Table 9. Pre-post changes in students' participation across subscales

Subscale	Group	Before Intervention		After Intervention		*t*	*p*	*Cohen's d*
		M	SD	M	SD			
Willingness to Engage	Experimental	2.43	0.40	4.32	0.41	15.87***	<.001	2.59
	Control	2.61	0.45	3.14	0.50	4.12***	<.001	0.78
Frequency of Contribution	Experimental	2.64	0.36	4.28	0.39	16.92***	<.001	2.00
	Control	2.68	0.42	3.05	0.44	3.25**	.003	0.61
Active Involvement	Experimental	2.52	0.38	4.36	0.37	17.45***	<.001	2.31
	Control	2.34	0.41	2.89	0.46	4.38***	<.001	0.83

Note. ***$p < .001$, **$p < .01$, *d*: 0.20 = small, 0.50 = moderate, 0.80 and up = large effect size.

Learners' experiences of reading comprehension, metalinguistic awareness, and engagement

The qualitative analysis generated three themes for each instructional condition reflecting learners' experiences in relation to reading comprehension, metalinguistic awareness, and learner engagement. For the experimental group, the themes included: (1) reading comprehension through meaning negotiation and collaborative processing, (2) enhanced metalinguistic awareness through cross-linguistic processing, and (3) learner engagement through motivation, confidence, and participation.

For the experimental group, participants described reading comprehension as a process involving collaborative clarification and meaning negotiation. One learner noted that *"…The Jigsaw technique revealed new viewpoints and interpretations I had not encountered before"* (P13). Experiences related to

metalinguistic awareness reflected cross-linguistic comparison and reflective language processing, as illustrated by *"…When we compare both languages, I understand why one structure is correct"* (P16). Learners also reported active engagement characterized by motivation, confidence, and participation, as reflected in *"…I am less afraid because I can check my ideas in L1 first"* (P8).

For the control group, the themes consisted of: (1) reading comprehension through structured collaboration, (2) metalinguistic awareness in English-only interaction, and (3) learner engagement and participation experiences. Participants reported positive experiences related to collaborative support during Jigsaw activities, with one learner stating that *"…Working in groups helped me understand the text better"* (P6). Responses associated with metalinguistic awareness reflected difficulty in elaborating language explanations, as indicated by *"…I know it is wrong, but it is hard to explain the reason in English"* (P14). Learners also described engagement experiences influenced by participation patterns and communication demands, reflected in *"…Some students speak more, and others just listen"* (P2).

Discussion

Cognitive development in reading comprehension under two instructional conditions

The experimental group demonstrated substantially greater improvement in reading comprehension than the control group following the intervention. From a sociocultural perspective, this difference may be understood through mediated learning within the ZPD (Vygotsky, 1978), where Jigsaw structured collaborative meaning negotiation while translanguaging allowed learners to draw on broader linguistic resources. Rather than indicating a direct reduction in cognitive constraints, the findings imply that access to these resources may have eased some processing demands involved in clarifying and negotiating meaning. This interpretation is supported by learners' accounts: experimental participants reported that *"Focusing on my section helped me grasp key concepts deeply,"* whereas control learners stated, *"We could not fully express our ideas,"* indicating that English-only interaction may have constrained their ability to articulate and refine interpretations.

This pattern corroborates evidence that Jigsaw promotes comprehension through peer interaction (Ayu et al., 2021) and that translanguaging facilitates meaning construction (García & Wei, 2015), while extending these findings by distinguishing the functions of collaborative structure and multilingual mediation. Jigsaw organized interdependence, accountability, and peer explanation, whereas translanguaging expanded the resources available for clarification, reformulation, and meaning negotiation. The larger gains observed in the experimental group also exceeded the moderate effects commonly reported in EFL reading interventions (Wang, 2024), suggesting that the quality of linguistic mediation within collaborative work may be as important as the collaborative structure itself. Thus, rather than establishing a unique causal effect, the findings refine sociocultural accounts of mediation by indicating that social interaction and multilingual resources may contribute through related but distinguishable pathways.

The control group's improvement nevertheless confirms the instructional value of Jigsaw reading through information sharing and active processing

(Aronson & Patnoe, 2011). However, learners' difficulty explaining ideas and resolving misunderstandings in English accords with Kani and Igsen's (2022) observation that English-only interaction may increase processing demands when linguistic resources are constrained. By contrast, experimental learners' accounts indicate that translanguaging may have supported the verification of interpretations and sustained collaborative meaning construction, although this remains a plausible explanation rather than a directly measured cognitive mechanism. The convergence of quantitative and qualitative evidence therefore identifies linguistic accessibility as an important condition within collaborative reading. Pedagogically, translanguaging may be incorporated selectively during expert-group clarification, vocabulary negotiation, and comparison of interpretations before learners reformulate and report key ideas in English, thereby supporting comprehension while maintaining sustained target-language engagement.

Developmental trajectories of reading comprehension

The reading comprehension quizzes showed progressive improvement across the intervention for both groups, although the experimental group demonstrated a more sustained upward trajectory, whereas change in the control group was modest and less consistent. The significant Group × Time interaction confirms that the pattern of development differed between the two instructional conditions, indicating that the experimental advantage accumulated across successive tasks rather than emerging only at a single measurement point. This pattern suggests that repeated collaborative engagement supported incremental reading development, while access to translanguaging may have helped experimental learners maintain and refine meaning construction across tasks. This interpretation corroborates evidence that Jigsaw promotes comprehension through distributed reading demands and peer-supported meaning construction (Ayu et al., 2021), while translanguaging facilitates comprehension monitoring and meaning negotiation through access to learners' available linguistic resources (Wuttiphan et al., 2025). The present trajectory evidence extends these findings by indicating that multilingual mediation may support not only immediate comprehension but also the continuity of collaborative meaning construction across repeated reading experiences.

The differing trajectories can be interpreted through related but distinct instructional processes. Jigsaw promoted accountability and elaborative processing in both groups, whereas translanguaging provided experimental learners with additional resources for clarifying vocabulary, checking textual relationships, and rehearsing ideas before reformulating them in English (Huang & Chalmers, 2023). Although these practices may have eased some linguistic processing demands, cognitive load was not directly measured. The theoretical contribution therefore lies not in claiming that two mechanisms operated simultaneously, but in showing that socially organized interaction and multilingual mediation may function at different levels of collaborative reading: one structures participation, while the other broadens the resources available for meaning negotiation. This distinction gives greater specificity to sociocultural explanations of reading development by showing how the form of mediation available during collaboration may shape sustained engagement over time.

The less consistent trajectory of the control group further indicates that collaborative structure alone may not account for developmental change. Although

learners benefited from shared responsibility, their continuing difficulty expressing and verifying ideas in English is consistent with Turnbull's (2018) observation that English-only conditions can restrict available mediational resources and with Kani and Igsen's (2022) argument that linguistic limitations may increase processing demands during reading. In contrast, experimental learners described meaning construction as becoming easier across successive tasks, providing a plausible qualitative explanation for the widening quantitative difference without positioning translanguaging as its sole cause. Pedagogically, translanguaging may therefore be reserved for linguistically demanding points in the Jigsaw cycle, such as resolving competing interpretations, clarifying unfamiliar vocabulary, or verifying relationships among ideas, before learners communicate their consolidated understanding in English. Such sequencing positions multilingual resources as a scaffold for sustained target-language engagement rather than its replacement.

Metalinguistic development: From recognition to explanation

The metalinguistic findings revealed a clear distinction between error detection and grammatical explanation. Although the experimental group maintained higher overall performance in both dimensions, only grammatical explanation showed a significantly different developmental trajectory between groups. The nonsignificant Group × Time interaction for detection indicates that the rate of change was not reliably different across conditions, whereas the stronger explanation trajectory points to greater development in learners' ability to articulate the reasoning underlying grammatical judgments. This interpretation is reinforced by the qualitative evidence: experimental learners reported that cross-linguistic comparison helped them "understand why one structure is correct," while control learners often identified errors but struggled to explain them. Taken together, the findings indicate that pedagogical translanguaging was more closely associated with the development of explicit grammatical reasoning than with error recognition alone.

This distinction refines previous work on cross-linguistic comparison. Cenoz and Gorter (2017) and Kemp (2001) emphasize the value of drawing connections across languages, but the present findings suggest that its contribution depends partly on what learners are required to do with linguistic knowledge. In the grammaticality judgment tasks, learners were not merely permitted to move between languages; they compared forms, verbalized grammatical relationships, and justified their judgments. Cross-linguistic resources therefore appeared to function as tools for making grammatical reasoning explicit rather than simply facilitating task completion. Consistent with Leonet et al. (2020), this finding suggests that pedagogical translanguaging may contribute more strongly to explicit grammatical explanation than to metalinguistic awareness uniformly.

The findings also underscore the distinction between possessing grammatical knowledge and being able to operationalize it through explanation. Although both groups engaged with the same content, the experimental group developed more strongly in explaining grammatical judgments, suggesting that opportunities to compare, articulate, and refine linguistic reasoning may support more explicit metalinguistic awareness (Robillos, 2025). This does not establish mediated interaction as the sole source of development, but it indicates that metalinguistic knowledge may become more accessible when learners are required to make their

reasoning visible through structured cross-linguistic analysis (Cenoz & Gorter, 2021). Pedagogically, grammaticality judgment tasks may therefore sequence learners from identifying a problematic form, to comparing relevant structures across languages, to justifying the judgment using both linguistic repertoires where useful, and finally to formulating the explanation in English. Such sequencing preserves the analytical role of pedagogical translanguaging while maintaining explicit target-language articulation.

Affective development in jigsaw reading with and without pedagogical translanguaging

The findings demonstrate that the experimental group, which engaged in the integrated Jigsaw reading and pedagogical translanguaging intervention, exhibited substantially greater gains across motivation, reading self-efficacy, and participation than the control group. The findings revealed statistically meaningful gains with large effect estimates, suggesting a broader transformation in engagement rather than a gradual increase over time. In contrast, the control group showed smaller and less consistent gains, suggesting that collaborative structure alone may initiate but not sustain affective development. Qualitative evidence clarifies this contrast: experimental learners reported increased confidence through the ability to "check ideas in L1 before speaking," whereas control group learners expressed anxiety and hesitation in English-only interaction, often limiting participation and depth of involvement. This pattern indicates that affective development depends not merely on interaction, but on the conditions that enable meaningful participation.

These findings align with research identifying translanguaging as a facilitator of motivation and reduced anxiety (Saeed, 2024) and collaborative learning as a driver of engagement (Wuttiphan et al., 2025), while extending this work by demonstrating that their integration transforms engagement from obligation-driven participation to confidence-driven involvement. Rather than treating motivation and self-efficacy as isolated outcomes, the findings suggest they are co-constructed through the combined availability of social and linguistic resources, forming a self-reinforcing affective orientation toward learning. From a sociocultural perspective, this reflects a dual-mediational process in which Jigsaw reading structures interaction and pedagogical translanguaging enhances linguistic accessibility within the ZPD, thereby reducing anxiety and strengthening perceived competence. In this view, affective development emerges as a product of mediated participation rather than a byproduct of cognitive success, whereas English-only conditions constrain this process by limiting learners' ability to express and validate understanding, leading to hesitation and uneven engagement.

Qualitative insights into reading comprehension, metalinguistic awareness, and learner engagement

The qualitative findings from the experimental group suggest that the integration of Jigsaw reading and pedagogical translanguaging enabled learners to engage more actively in meaning negotiation, cross-linguistic reflection, and collaborative learning. Participants frequently described reading as a process of clarifying meanings, negotiating interpretations, and comparing linguistic structures through the flexible use of L1 and L2 resources. These findings support

perspectives that translanguaging functions as a mediational resource facilitating meaning construction and deeper linguistic awareness (Cenoz & Gorter, 2021). More importantly, the findings suggest that these benefits became pedagogically stronger when pedagogical translanguaging was integrated within the collaborative structure of Jigsaw reading. While Jigsaw supported peer interaction and shared responsibility, translanguaging appeared to further facilitate clarification, reflective explanation, and metalinguistic noticing. Participants also described increased motivation, confidence, and active participation, supporting arguments that translanguaging serves not only cognitive functions but also socio-affective functions that reduce anxiety and strengthen engagement during collaborative learning (Wang, 2024). However, learners' reports of occasional over-reliance on L1 suggest that translanguaging requires careful scaffolding to balance linguistic support and opportunities for L2 production.

In contrast, the qualitative findings from the control group suggest that although Jigsaw-only instruction supported collaborative interaction and reading comprehension through structured peer discussion, learners' engagement with metalinguistic processing and elaborative meaning negotiation appeared more constrained. Participants frequently emphasized support from group interaction and collaborative discussion but also described difficulties explaining ideas and linguistic forms through English-only interaction. These findings align with cooperative learning perspectives suggesting that Jigsaw structures interaction and supports shared learning responsibilities (Aronson & Patnoe, 2011). At the same time, the findings reflect concerns that interaction conducted exclusively through L2 may constrain learners' opportunities to clarify understanding and engage in deeper language reflection, particularly when linguistic resources are limited (Kani & Igsen, 2022). Learners' reported participation constraints and uneven interaction patterns further support perspectives suggesting that collaborative structure alone may not fully ensure active engagement without additional mediational support.

Conclusion

This study shows that the value of integrating Jigsaw reading with multilingual support lies in the differentiated functions these practices serve within EFL learning. Jigsaw provided the collaborative structure for shared meaning construction, translanguaging supported comprehension during reading, and pedagogical translanguaging strengthened explicit grammatical reasoning. The findings therefore extend existing research by showing that multilingual support should not be treated as a single instructional mechanism, but as a set of functionally distinct resources that can support cognitive, metalinguistic, and affective development in different ways.

At the same time, the findings should be interpreted cautiously because the study used intact groups and a quasi-experimental design. Even so, the stronger reading development and grammatical explanation observed in the experimental condition indicate the pedagogical value of strategically coordinating collaboration with multilingual mediation. In practice, translanguaging may be used selectively during meaning negotiation in Jigsaw reading, while pedagogical translanguaging may be reserved for explicit cross-linguistic analysis in grammaticality judgment tasks. Such coordination offers a principled way of supporting multilingual learners without reducing sustained engagement with English.

Despite these contributions, some methodological constraints remain. First, the study focused on reading comprehension and metalinguistic awareness, operationalized through comprehension tests and grammaticality judgment tasks, which may not capture broader dimensions of language development. Second, although procedural controls were implemented, including parallel test forms, standardized instruction, stable group composition, and consistent testing conditions, the use of non-randomized intact groups limits causal inference because pre-existing group characteristics and interactional dynamics could not be fully controlled. Accordingly, the observed between-group differences should be interpreted as intervention-associated patterns rather than unequivocal causal effects.

Additionally, repeated exposure to similar task formats and variations in classroom interaction may have influenced both engagement and performance. Finally, the findings are context-bound to Thai tertiary EFL learners at the B1-B2 level in structured small-group settings and may not generalize across proficiency levels, instructional contexts, or language policies. Further studies could extend this line of inquiry by employing randomized or stronger quasi-experimental designs, larger and more diverse samples, multi-site replication, and longer-term follow-up measures to examine whether the observed patterns are sustained across contexts. Future research should also investigate how the distinct functions of translanguaging in collaborative reading and pedagogical translanguaging in metalinguistic tasks contribute separately and interactively to learner development.

Declaration of AI-assisted technologies in the writing process

The author used *Grammarly* to improve readability and language quality and subsequently revised the manuscript. The author assumes full responsibility for the final content.

References

Aronson, E., & Patnoe, S. (2011). *Cooperation in the classroom: The jigsaw method* (3rd ed.). Pinter & Martin Limited.

Ayu, C., Rianti, W., & Asilestari, P. (2021). Using jigsaw technique for improving reading skills. *Journal of English Language and Education, 6*(1), 141-147. https://jele.or.id/index.php/jele/index

Banaruee, H., Farsani, D., & Khatin-Zadeh, O. (2025). Empowering teacher education with jigsaw techniques: Insights from language learners' listening tasks. *Frontiers in Education, 10*, Article 1503888. https://doi.org/10.3389/feduc.2025.1503888

Cenoz, J., & Gorter, D. (2017). Translanguaging as a pedagogical tool in multilingual education. In J. Cenoz, D. Gorter, & S. May (Eds.), *Language awareness and multilingualism* (3rd ed., pp. 309-321). Springer. https://doi.org/10.1007/978-3-319-02240-6_20

Cenoz, J., & Gorter, D. (2021). *Pedagogical translanguaging*. Cambridge University Press. https://doi.org/10.21832/9781788927383

Charernnit, K., Alhourani, A. Q., Arcinas, M. M., & Velasco, L. G. (2021). Cognitive and attitudinal effects of Jigsaw technique as a collaborative learning strategy in literature teaching in the Philippines. *Asian EFL Journal, 28*(3.2), 267–285.

Chavangklang, T., & Suppasetseree, S. (2018). Enhancing Thai EFL university students' reading comprehension through a flipped cooperative classroom. *PEOPLE: International Journal of Social Sciences, 4*(3), 238-261. https://doi.org/10.20319/pijss.2018.43.238261

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Cui, G., Ren, Y., & Zhou, X. (2025). Language as a modulator to cognitive and neurological systems. *Acta Psychologica*, *254*, Article 104803. https://doi.org/10.1016/j.actpsy.2025.104803

Cummins, J. (2007). Rethinking monolingual instructional strategies in multilingual classrooms. *Canadian Journal of Applied Linguistics, 10*(2), 221-240. https://journals.lib.unb.ca/index.php/CJAL/article/view/19743

Dörnyei, Z. (1994). Motivation and motivating in the foreign language classroom. *The Modern Language Journal, 78*(3), 273-284. https://doi.org/10.1111/j.1540-4781.1994.tb02042.x

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*(1), 59-109. https://doi.org/10.3102/00346543074001059

Gani, S. A., Yusuf, Y. Q., & Susiani, R. (2016). Progressive outcomes of collaborative strategic reading to EFL learners. *Kasetsart Journal of Social Sciences, 37*(3), 144-149. https://doi.org/10.1016/j.kjss.2016.08.004

García, O., & Wei, L. (2015). Translanguaging, bilingualism, and bilingual education. In W.E. Wright, S. Boun, & O. Garcia (Eds.), *The handbook of bilingual and multilingual education* (pp. 223-240). Wiley-Blackwell. https://doi.org/10.1002/9781118533406

Huang, X., & Chalmers, H. (2023). Implementation and effects of pedagogical translanguaging in EFL classrooms: A systematic review. *Languages*, *8*(3), Article 194. https://doi.org/10.3390/languages8030194

Hungwe, V. (2019). Using a translanguaging approach in teaching paraphrasing to enhance reading comprehension in first-year students. *Reading & Writing, 10*(1), Article a216. https://doi.org/10.4102/rw.v10i1.216

Hu, H. (2022). Factors pertinent to first language use in foreign language classroom: A case of content and language integrated learning. *Arab World English Journal, 13*(2), 177-191. https://doi.org/10.24093/awej/vol13no2.12

Jannah, A., & Juniardi, Y. (2025). Anxiety vs. understanding: How reading stress affects language learners' comprehension? *Journal of English Language Teaching, Linguistics, and Literature (JETLEE), 5*(1), 106-120. https://doi.org/10.47766/jetlee.v5i1.5069

Johnson, D. W., & Johnson, R. T. (2008). Cooperative learning: Successful integration of theory, research, and practice. *The Annual Report of Educational Psychology in Japan, 47*, 4-8. https://doi.org/10.5926/arepj1962.47.0_4

Kani, Z. G., & Igsen, H. (2022). Bilingual English teachers' perspectives on "English-only" policies in an EFL setting. *Educational Policy Analysis and Strategic Research, 17*(1), 127-141. https://doi.org/10.29329/epasr.2022.248.7

Kemp, C. (2001). *Metalinguistic awareness in multilinguals: Implicit and explicit grammatical awareness and its relationship with language experience and language attainment* (Unpublished doctoral dissertation), University of Edinburgh.

Lantolf, J. P. (2006). Sociocultural theory and L2: State of the art. *Studies in Second Language Acquisition*, *28*(1), 67-109. https://doi.org/10.1017/S0272263106060037

Leonet, O., Cenoz, J., & Gorter, D. (2020). Developing morphological awareness across languages: Translanguaging pedagogies in third language acquisition. *Language Awareness, 29*(1), 41–59. https://doi.org/10.1080/09658416.2019.1688338

Lin, Y. (2025). A reflection of learners' motivation to read, self-assessment, critical thinking, and academic well-being in extensive and intensive reading offline instruction: A focus on self-determination theory. *Learning and Motivation, 89*, Article 102093. https://doi.org/10.1016/j.lmot.2024.102093

MacKinnon, N. J., & Hoey, J. (2021). Operationalizing the relation between affect and cognition with the somatic transform. *Emotion Review, 13*(3), 245–256. https://doi.org/10.1177/17540739211014946

Nachshon, O., & Horowitz-Kraus, T. (2019). Cognitive and emotional challenges in children with reading difficulties. *Acta Paediatrica, 108*(6), 1110-1114. https://doi.org/10.1111/apa.14672

OECD. (2019). *PISA 2018 results (Volume I): What students know and can do*. OECD Publishing. https://doi.org/10.1787/5f07c754-en

Pressley, T., Allington, R. L., & Pressley, M. (2023). *Reading instruction that works: The case for balanced teaching* (5th ed.). Guilford Press.

Ra'no, T. U. (2025). Jigsaw technique as a tool for developing reading skill. *Spanish Journal of Innovation and Integrity, 40*, 326-329. https://sjii.es/index.php/journal/article/view/368

Robillos, R. J. (2025). The impact of using jigsaw reading technique with pedagogical translanguaging on students reading comprehension and metalinguistic awareness. *PASAA: Journal of Language Teaching and Learning in Thailand*, *70*, 371-410.

Saeed, M. A. (2024). Anxiety in learning English as a foreign language: Causes, effects, and coping strategies. *Humanities Journal, 6*(2), 89-93. https://doi.org/10.33545/26649799.2024.v6.i2b.95

Saeli, H., Rahmati, P., & Koltovskaia, S. (2023). Teachers' translanguaging practices in providing written corrective feedback: An exploratory study of learners' affective engagement with feedback. *Feedback Research in Second Language, 1*, 129-148. https://doi.org/10.32038/frsl.2023.01.08

Sah, P. K., & Li, G. (2024). Toward linguistic justice and inclusion for multilingual learners: Implications of selective translanguaging in English-medium instruction classrooms. *Learning and Instruction, 92*, Article 101904. https://doi.org/10.1016/j.learninstruc.2024.101904

Saito, Y., Garza, T. J., & Horwitz, E. K. (1999). Foreign language reading anxiety. *The Modern Language Journal, 83*(2), 202-218. https://doi.org/10.1111/0026-7902.00016

Song, J., Howard, D., & Olazabal-Arias, W. (2022). Translanguaging as a strategy for supporting multilingual learners' social emotional learning. *Education Sciences, 12*(7), Article 475. https://doi.org/10.3390/educsci12070475

Teng, M. F., & Zhang, L. J. (2025). Development of metacognitive knowledge and morphological awareness: A longitudinal study of ethnic minority multilingual young learners in China. *Journal of Multilingual and Multicultural Development*, *46*(10), 3274-3290. https://doi.org/10.1080/01434632.2022.2052301

Turnbull, B. (2018). The potential impact of cultural and educational background on foreign language teachers' use of the L1. *Journal of Language Teaching and Learning, 8*(1), 53-70. https://doi.org/10.66887/jltl.v8i1.57

UNICEF. (2023). *The state of the world's children 2023: For every child, vaccination*. https://digitallibrary.un.org/record/4011900?v=pdf

Urrutia, M., Mariángel, S., Pino, E. J., Guevara, P., Torres-Ocampo, K., Troncoso-Seguel, M., Bustos, C., & Marrero, H. (2024). Impact of affective and cognitive variables on university student reading comprehension. *Education Sciences, 14*(6), Article 554. https://doi.org/10.3390/educsci14060554

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wang, J. (2024). *Effects of translanguaging in reading instruction on Chinese undergraduate students' English reading comprehension* (Master's thesis, Chulalongkorn University). https://digital.car.chula.ac.th/chulaetd/74386

Williams, D. M., & Rhodes, R. E. (2023). Guidelines for assessment of affect-related constructs. *Frontiers in Psychology, 14*, Article 1253477. https://doi.org/10.3389/fpsyg.2023.1253477

Wuttiphan, N., Geng, J., & Robillos, R. J. (2025). Enhancing Chinese as a foreign language (CFL) learners' listening comprehension skills through translanguaging within a pedagogical cycle. *Pertanika Journal of Social Sciences & Humanities, 33*(3), 1217-1238. https://doi.org/10.47836/pjssh.33.3.13