
METACOGNITIVE STRATEGIES AND DEEP LEARNING IN EFL READING ENGAGEMENT: A CASE STUDY

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Abstract

This study aims to explore the impact of the integration of metacognitive strategies and deep learning approaches on reading engagement of EFL students at IAIN Lhokseumawe. Using a qualitative case study design, the study involved 30 students of the English Language Study Program who were observed for 12 weeks. Data were collected through classroom observations, semi-structured interviews with 23 participants, and analysis of 90 student reflection journals. Data analysis was carried out thematically by triangulation to validate the findings. The results showed that the combination of metacognitive strategies (planning, monitoring, self-evaluation) and deep learning principles (inquiry-based learning and problem-solving) significantly increased reading engagement. Key findings include: (1) a 62% increase in the use of metacognitive strategies, (2) the transformation of interactions from mechanical to collaborative-critical, and (3) the internalization of strategies observed during the 12 weeks of the English Study Program, which occurred through three adaptation phases and were achieved in a span of 4 to 6 weeks. Implementation challenges such as infrastructure limitations and cultural resistance were successfully overcome through gradual scaffolding and contextual adaptation. This research provides practical contributions on innovative learning implementation models in resource-constrained environments, while simultaneously enriching the literature on contextual EFL pedagogy in Indonesia. The findings underscore the importance of a culturally sensitive approach in the implementation of Western learning strategies.

Keywords: Deep learning; EFL learning; metacognitive strategies; reading engagement

Introduction

Reading skills play an important role in learning English as a Foreign Language (EFL) in college, especially in an academic context. Reading not only becomes the basis for acquiring new knowledge but also serves as a gateway to developing other language skills such as writing, speaking, and listening (Carola, 2018; Kuche et al., 2024). In an academic environment, EFL students are expected to analyze complex texts, extract key ideas, and integrate information from a variety of sources—skills that are essential for academic success (López-Gopar, 2019; Maghsoudi & Talebi, 2025). However, achieving

adequate reading competence is often a major challenge for EFL learners, especially in institutions where English is not the primary language of instruction.

Common challenges faced by EFL students in reading comprehension include vocabulary gaps, difficulty understanding text coherence, and low motivation to read (Jago et al., 2025; Mierzwa, 2025). These problems are exacerbated by the lack of exposure to authentic English-language texts in the context of everyday learning (Ciornei & Dina, 2015; Ulrike, 2007). Low reading engagement has a significant impact on academic achievement, as studies have shown a positive correlation between engagement levels and reading comprehension and knowledge retention (Guidry et al., 2023; List et al., 2024). In the context of IAIN Lhokseumawe, this challenge is increasingly complex because most students come from educational backgrounds with a lack of supporting facilities for English mastery.

Several recent studies show that the reading engagement of EFL students in Indonesia is still relatively low (Theron, 2012; Webster et al., 2025). Study by (Rets et al., 2022) revealed that students have difficulty in understanding academic texts in English, with the main indicators being low reading motivation and lack of understanding of effective reading strategies. This condition is exacerbated by learning habits that still focus on memorization and do not involve the critical thinking process (Liu et al., 2025; Mack, 2017). At IAIN Lhokseumawe in particular, initial observations showed that students of the English Language Study Program were often passive in reading comprehension sessions, with indications in the form of minimal participation in text discussions and high reliance on word-for-word translation.

The fundamental problem lies in the lack of implementation of holistic learning strategies in teaching reading. Previous research has focused more on purely cognitive aspects without integrating metacognitive dimensions and deep learning approaches (Pinto et al., 2025). In fact, studies in non-Indonesian contexts prove that the combination of metacognitive strategies (such as self-questioning and think-aloud) with deep learning principles (through inquiry-based tasks) significantly increases reading engagement (Alsop & Walsh, 1999; Hu & Gao, 2017; K. Wang et al., 2025). However, there has been no research that specifically tests the effectiveness of integrating the two approaches in the learning environment of EFL Indonesia, especially in religious universities such as IAIN Lhokseumawe. This gap is important to address given the unique characteristics of students at the institution that require an approach in accordance with Islamic values while still meeting academic English competency standards.

Metacognitive strategies play a crucial role in learning to read EFL by helping students manage their cognitive processes independently. According to (Cheng, 2021; Yulita & Napitupulu, 2023), Metacognition includes three main components: planning (setting reading goals), monitoring (evaluating comprehension during reading), and evaluation (reflecting on reading results). In the context of EFL reading, this strategy allows learners to consciously choose appropriate techniques (such as skimming or scanning), identify comprehension difficulties, and adjust their strategies (Chen & Abdullah, 2024). Research by (Kwon & Yu, 2023) shows that learners who are skilled in metacognitive tend to have deeper reading comprehension and higher motivation.

Deep learning, as an approach to meaningful learning, strengthens reading engagement through inquiry and problem-solving activities. This concept, which is carried out by (Goodfel, 2016; Li & Zhang, 2025), emphasizing on conceptual understanding and the application of knowledge in new contexts, as opposed to superficial memorization. In EFL literacy, this approach encourages students to critically analyze texts, connect ideas with personal experiences, and collaborate in discussions (Chian, 2019; Fan & Zhang, 2024). The components of reading engagement—behavioral, emotional,

and cognitive (mental effort)—according to (Pan et al., 2025), stimulated when metacognitive and deep learning strategies are integrated, creating a more authentic and student-centered learning cycle.

This study aims to explore the impact of the integration of metacognitive strategies and deep learning approaches on the reading engagement of EFL students at IAIN Lhokseumawe. Reading engagement is a major focus because it includes behavioral, emotional, and cognitive aspects that are essential in language learning. By combining metacognitive strategies (such as planning, monitoring, and self-evaluation) with deep learning principles (inquiry-based learning and problem-solving), this study seeks to identify how these combinations can increase active participation, deep understanding, and student motivation in reading activities.

The research question is formulated to answer two main points. First, how metacognitive and deep learning strategies can increase reading engagement, including the mechanism of their influence on learning independence and collaborative interaction. Second, implementation challenges at IAIN Lhokseumawe, such as student adaptation to the complexity of tasks or the limitations of supporting infrastructure. The findings of this question are expected to provide practical guidance for teachers in designing more effective reading activities, as well as enriching the literature on pedagogical innovation in the context of Islamic higher education.

This study has a dual contribution, both theoretical and practical. Theoretically, this study expands the understanding of the synergy between metacognition and deep learning in the context of EFL, particularly in the context of religious colleges. Practically, the results of the research can be a reference for English lecturers in developing student-centered learning modules, as well as mitigating local challenges such as low motivation to read. The implications include teacher training recommendations and the integration of these strategies in the curriculum to create a more dynamic literacy environment.

Literature Review

This section of the literature review discusses two key concepts in increasing reading engagement in EFL learning: metacognitive strategies and deep learning approaches. These two concepts were chosen because of their relevance and urgency in addressing the challenge of low reading engagement of EFL students in contexts such as Indonesia, where English language learning is often hampered by conventional methods that are mechanistic in nature (Pan et al., 2025). Previous research has shown that the integration of metacognitive strategies (planning, monitoring, self-evaluation) can improve self-learning awareness (Yulita & Napitupulu, 2023), while deep learning principles (inquiry-based learning, problem-solving) encourage critical interaction with the text (Honghong, 2024). However, there are still few studies exploring a combination of the two, especially in resource-constrained environments. Therefore, this literature review not only maps the theoretical foundations of the two concepts but also highlights the research gap filled by this study: how the integration of metacognition and deep learning can be contextually adapted to increase the reading engagement of EFL students in Indonesian universities. This discussion is the basis for the research findings that will be presented in the next section.

Improving EFL learners' reading engagement: A metacognitive approach

Reading engagement among EFL learners remains a critical challenge, especially in a context where English is not the primary language of instruction. Research consistently shows that students

often struggle with comprehension, motivation, and sustained focus during reading activities (Qiu & Liu, 2024). This challenge is exacerbated by traditional teaching methods that prioritize memorization over meaningful engagement with the text (Gu & Lau, 2023). The lack of effective strategies to encourage in-depth interaction with reading materials has given rise to calls for innovative pedagogical approaches that span the cognitive and affective dimensions of learning. This gap emphasizes the need for the integration of metacognitive strategies and deep learning principles that have shown potential in improving students' ability to monitor understanding and engage critically with the material (Honghong, 2024).

Metacognition and deep learning: Fostering active reading and critical engagement

Metacognitive strategies that include planning, monitoring, and evaluating the self-learning process have been widely recognized as essential for improving reading comprehension and learning independence (Zhang & Lian, 2024). When combined with deep learning – an approach that emphasizes inquiry, problem-solving, and the application of knowledge in real-world contexts – these strategies can turn passive readers into active participants. Studies show that students who use metacognitive techniques such as self-paced questions and reflection show higher levels of engagement and retention. Similarly, deep learning methodologies encourage learners to go beyond surface understanding, fostering deeper connections with the material (Arai & Takizawa, 2024).

Methodology

Research design and approach of the study

This study used a qualitative case study design to comprehensively examine the implementation of metacognitive strategies and deep learning in increasing EFL reading engagement at IAIN Lhokseumawe (Creswell, 2014; Creswell et al., 2007; Miles, 2005). A qualitative approach was chosen to understand the participants' perspectives, implementation challenges, and learning dynamics through various data sources. This design allows for an in-depth exploration of how these integrated strategies function in an authentic Islamic higher education environment, while also identifying specific supporting and inhibiting factors in that context. The case study framework facilitates a holistic analysis of the learning environment with a focus on operationalizing these strategies in actual classroom practice.

Research site and participants

The research was carried out at IAIN Lhokseumawe by involving 30 S1 students from the Department of English Education who were taking the Reading course. Participants were selected purposively based on three criteria: (1) being taking a Reading course, (2) having a medium level of English proficiency, and (3) willingness to actively participate during the research. The group of participants consisted of 18 women and 12 men aged 19-22 years. IAIN Lhokseumawe was chosen because it represents a distinctive EFL learning environment within the Indonesian Islamic higher education system, providing valuable insights into the implementation of innovative reading strategies in this specific cultural and educational context.

Data collection and analysis

Data were collected through three triangulation methods to ensure comprehensive understanding: (1) Classroom observations (12 sessions, 90 minutes each) systematically documented student behavioral engagement (e.g., frequency of note-taking) and fidelity of metacognitive strategy implementation using an adapted FLINT (Foreign Language Interaction) framework (Zhai, 2023), with field notes focusing on strategy usage patterns and interaction quality; (2) Semi-structured interviews (23 participants, 30-45 minutes each) explore the cognitive and affective dimensions of engagement through questions such as "Can you explain how you monitor your comprehension during today's reading?", guided by (Avouac, 2025) three-series interview principle; and (3) a reflection journal (90 entries) collected a bi-weekly tracked strategy internalization using the 4R reflection model (Farahian, 2021) (Reporting, Related, Reasoning, Reconstruction). As the principal investigator—a qualified EFL instructor with five years of experience trained in qualitative methods—I perform all procedures to maintain consistency, while addressing reflexivity through memorization. Thematic analysis follows (Ahmed, 2025) six-phase framework: (1) Introduction (transcribing interviews, creating journal annotations), (2) Initial coding (e.g., "highlighting as monitoring" → "operationalization of strategies"), (3) Theme development (grouping codes such as "collaborative dialogue" and "peer questioning" into "social metacognition"), (4) Theme review (examining raw data; e.g., verifying whether "cultural resistance" actually appears across all datasets), (5) Theme refinement (defining "adaptive scaffolding" as a core theme after finding it in 80% of journals), and (6) Report production (choosing clear quotes, e.g., "I now question the text first before reading—like preparing a mind map"). Accuracy is ensured through analyst triangulation (two external reviewers re-encode 20% of the data with 89% agreement) and an audit trail documenting the analytical results.

Results

This study examined the implementation of metacognitive and deep learning strategies in increasing reading engagement of EFL students at IAIN Lhokseumawe. The results of the study showed two main sides: (1) increasing reading engagement through metacognitive and deep learning strategies and (2) the challenge of implementing innovative learning. The following table 1 summarizes the key findings comparatively, comparing the successes achieved with the challenges that arise during the learning process. The data is presented in a concise manner to facilitate understanding of the effectiveness of the strategy and the factors that need to be considered in its application in similar contexts.

Table 1. *Outcomes and challenges in implementing metacognitive learning strategies*

Aspects	Increased Reading Engagement	Implementation Challenges
Key Findings	62% increase in metacognitive strategy usage	65% of college students have difficulty adapting to complex tasks
Supporting Data	- 12-week observation - Interviews of 23 participants - Analysis of 90 reflection journals	- Observation of technological disturbances (5/12 sessions) - Interviews with 18 students

		- Analysis of policy documents
Development of Learning Independence	- 85% of students regularly take notes on text structure - 72% make guide questions - 68% set specific reading goals	Reliance on concrete examples (73% of college students are overwhelmed early)
Collaborative Interaction	- 75% increase in discussion participation - 92% of discussions with high-level questions - 300% increase in the use of textual evidence	Student-centered model resistance (80% of initial interactions are still one-way)
Learning Pattern Transformation	Internalization of strategies in 4-6 weeks: - Introduction phase - Guided practice phase - Internalization phase	Hierarchical culture: 60% are reluctant to challenge the opinions of lecturers/friends
Supporting Factors	Gradual scaffolding by lecturers' Contextual adaptation of the material	Utilization (WhatsApp) Complex task division
Impact	- Increased academic resilience - Creativity in problem solving - Awareness of learning potential	Infrastructure limitations: - 40% personal laptop access - Inflexible classrooms

Note. N = number of participants; percentages reflect proportion of students demonstrating each behavior based on observational and self-report data. Technological disruptions included internet connectivity issues and hardware malfunctions. Higher-order questions were defined as those requiring analysis, evaluation, or creation (Bloom's taxonomy levels 4-6).

Increased reading engagement through metacognitive and deep learning strategies

Based on a comprehensive analysis of data obtained from classroom observations, in-depth interviews with participants, and analysis of student reflection journal documents, this study succeeded in revealing the impact of the integration of metacognitive strategies and deep learning approaches on increasing reading engagement of EFL students at IAIN Lhokseumawe. The results of the research that will be explained are related to three main interrelated mechanisms, namely increasing learning independence, strengthening collaborative interactions, and overall improvement in aspects of reading engagement.

This study deeply observed the development of student learning independence in reading activities through the application of metacognitive strategies integrated with deep learning approaches. The observation process was carried out systematically for 12 weeks using three main instruments: structured observation sheets, field notes, and video recordings of learning activities. In the early weeks (weeks 1-3), observational data showed that only about 38% of students consistently applied reading preparation techniques before immersing themselves in texts. Most college students tended to read texts directly linearly without any special strategy, which is reflected in field notes such as "students read directly from start to finish without pause" or "no systematic pre-reading activity is visible."

Changes began to be seen from the 4th to 6th week, where there was an increase in the application of metacognitive techniques in reading preparation. This process progresses through

several phases that can be clearly identified. The first phase was the introduction phase, where lecturers introduced and model various pre-reading techniques such as skimming (skimming to get an overview), scanning (looking for specific information), and creating guiding questions. In this phase, students still relied heavily on the guidance of lecturers, as noted in the observation: "most students follow the lecturer's example carefully, some still seem hesitant."

The second phase was the guided practice phase, occurring in the 5th to 8th week. Here, students began trying to apply these techniques with the help of structured worksheets and peer feedback. Field notes data noted: "group A has started to create their own guide questions even though they are still simple" or "some students are seen marking ununderstood passages of text before starting to read intensively." Interestingly, in this phase, variations began to emerge in the application of strategies between students, showing the beginning of the process of personalizing learning techniques.

The third phase was the internalization phase, occurring in the 9th to 12th week. It was in this phase that a 62% increase in the use of reading planning techniques was noticeable. Students not only applied the techniques taught but also develop them according to their respective learning styles. Some specific findings from end-of-period observations included: (1) 85% of students routinely make small notes about the structure of the text before they start reading, (2) 72% of students consistently make lists of questions based on the title and subheadings of the text, and (3) 68% of students are able to set specific reading goals for each session.

From in-depth interviews with 23 participants (76.6% of the total sample), it revealed that there was a significant transformation in their metacognitive awareness during the integration program of metacognitive strategies and deep learning. The data collection process was carried out through semi-structured interviews designed to explore students' experiences in applying metacognitive strategies during reading activities. Each interview was 45-60 minutes long, recorded, and transcribed verbatim to ensure data accuracy.

Thematic analysis of interview transcripts revealed several patterns of metacognitive awareness development. A total of 18 of the 23 participants (78.2%) reported significant changes in pre-reading habits. They began routinely skimming ahead of time to get an overview of the text, create guiding questions, and set specific reading goals — a practice that was rarely done before the intervention. As P09 revealed, *"I used to read the text directly from start to finish without preparation. Now I always look at the headings, subheadings, and images first to predict the content of the text."*

In the reading process itself, 20 participants (86.9%) developed more systematic comprehension monitoring techniques. They began to make margin notes, mark difficult sections, and periodically check their understanding by summarizing important points. P15 explained, *"I now stop every 2-3 paragraphs to write the point in my own words. If I can't, then I need to re-read it."* This technique showed the internalization of the monitoring component in metacognitive strategies.

The self-evaluation aspect also showed a striking development. A total of 19 participants (82.6%) reported improved ability to identify their own difficulties and find appropriate solutions. P12's statement, *"Now I always note down the points that I don't understand to ask, unlike in the past who immediately gave up when I found difficult sentences,"* indicates a shift from full dependence on teachers to self-regulation in learning. This change is seen consistently in various reading contexts, both academic texts and authentic texts.

The results of the study also revealed that the development of metacognitive awareness occurs gradually. Data from serial interviews with 10 key participants showed that the process of internalizing metacognitive strategies took about 4-6 weeks. In the early weeks, students tended to follow the

strategy mechanically because of the teacher's instructions. However, starting in week 5, they began to adapt the strategy to individual needs and implement it more automatically. P07 describes this process: *"At first I only took notes because I was told by the lecturer. But after a few times, I realised this really helped, so now it's doing it naturally."*

An in-depth analysis of the group discussion record documents and project portfolios revealed a significant transformation process in students' academic interaction patterns during the study. In the early phases of implementation (weeks 1-3), discussion notes were dominated by mechanical and fragmented division of tasks. As many as 78% of the 45 discussion records analyzed showed a simple pattern of division of labor where group members only exchanged information without further elaboration. A real example could be seen in the notes of group A who wrote: *"Sari is in charge of looking for the definition of a key term, Budi is looking for example sentences, while I compile a summary."* This kind of interaction reflects a still superficial understanding of reading material, where students tend to view texts as separate collections of information that need to be gathered rather than an integrated system of meaning.

Changes began to be noticeable in the 4th to 6th week, where a more dynamic and reflective pattern of interaction emerged. In 60 discussion records from this period, researchers identified three new forms of interaction that demonstrate a greater depth of understanding: (1) interpretive debate, (2) negotiation of meaning, and (3) collaborative knowledge construction. The interpretive debate is reflected in group C's notes: *"We debated for 20 minutes about the meaning of the 'light' symbol in this poem. Ana considers this to symbolize enlightenment, while Dina sees it as a symbol of truth. We finally agreed that the two interpretations complement each other."* This process of negotiating meaning shows the development of metacognitive abilities where students not only passively understand the text but actively reflect and question their own interpretations and those of their friends.

The weekly project portfolio provided additional evidence of this transformation in the quality of interactions. In the 5th week text analysis project, 80% of the group had developed sophisticated collaborative knowledge construction techniques. One prominent example came from group E creating a "dynamic concept map" where each member contributed to connecting the main ideas of the text with prior knowledge and real-life context. In his written reflection, one of the members explained: *"We realized that by combining the background of each other's knowledge (I am from a pesantren, my friend from a public high school), we can see this text from various perspectives that enrich understanding."*

Weeks 7 to 12 showed a consolidation of these critical interaction patterns. An analysis of the last 75 discussion notes revealed that: (1) 92% of discussions involved high-level questions (analysis, evaluation, creation), (2) there was a 300% increase in the use of textual evidence to support arguments compared to the first weeks, and (3) there was a natural peer-review practice where students gave each other critical feedback on their respective draft analyses. One strong indicator is the change in the language used – from the passive form ("according to the book...") to active ("we think... based on...").

Challenges of implementing innovative learning at IAIN Lhokseumawe

This research revealed the various challenges faced in implementing metacognitive strategies and deep learning approaches at IAIN Lhokseumawe. In terms of student adaptation, the data showed that most participants (65%) experienced initial difficulties in dealing with inquiry-based tasks that are characteristic of the deep learning approach. Early weeks observation records consistently recorded expressions of confusion and frustration among students, with 73% of participants admitting to feeling overwhelmed by the complexity of a text analysis task in their reflection journal. These

challenges were mainly manifested in the difficulty of identifying the main problems in the text, the tendency to seek definitive answers instead of exploring various interpretations, as well as the high cognitive load when it comes to analyzing the text from a multidisciplinary perspective. One student clearly expressed his confusion through a statement, *"At first I was really confused because no concrete examples were given, the lecturer only gave guiding questions without a definite solution."*

On the infrastructure side, the study found significant limitations hindering the optimal implementation of these innovative learning strategies. The availability of technology is a major obstacle, with observational records showing that almost half of the learning sessions are disrupted due to unstable internet connections. Only 40% of college students had personal access to computer devices, forcing them to take turns using a friend's laptop to complete digital tasks, as one participant revealed, *"We had to take turns borrowing a friend's laptop to work on a digital text analysis project."* In addition, limited access to international journal databases and lack of adequate collaborative learning spaces further exacerbate the situation, with classrooms dominated by fixed-seat arrangements that do not support intensive group discussions.

The learning culture factor also emerged as a fundamental challenge in this study. Observational data showed that in the early weeks, 80% of learning interactions were still dominated by traditional one-way teaching models, reflecting a strong reliance on lecture methods. Resistance to the student-centered learning approach is evident in student reflection journals that are full of expressions of doubt and discomfort, such as *"It is more comfortable for the lecturer to explain directly"* and *"Not confident in arguing without clear directions."* Strong hierarchical values in academic culture also influence learning dynamics, with 60% of students admitting to initially being reluctant to challenge or question the opinions of lecturers or friends due to the prevailing norms of politeness.

Nevertheless, this study also documented various creative coping strategies that were developed organically to address these challenges. Lecturers gradually applied the scaffolding approach by providing examples of partial analysis before asking students to complete the full assignment, as well as break down complex tasks into smaller, manageable sub-tasks. At the student level, initiatives had emerged to utilize simple technology such as the use of WhatsApp groups to share learning resources and the creation of self-paced tutorial videos. Contextual adaptation was also carried out by utilizing locally themed texts and integrating Islamic values in the analysis examples, making learning more relevant to the participants' cultural context.

Interestingly, the process of struggling to overcome these challenges produced an unexpected long-term positive impact. The data of the journal reflection in the final weeks showed a significant development of academic resilience among students. Observations of group strategies reveal increased creativity in problem-solving, while final interviews note a deeper awareness of the limitations and potential of their learning environment. These findings collectively highlight the importance of a contextual and contextually sensitive implementation approach when implementing innovative learning strategies in the Indonesian higher education environment, particularly in institutions with characteristics such as IAIN Lhokseumawe.

Discussion

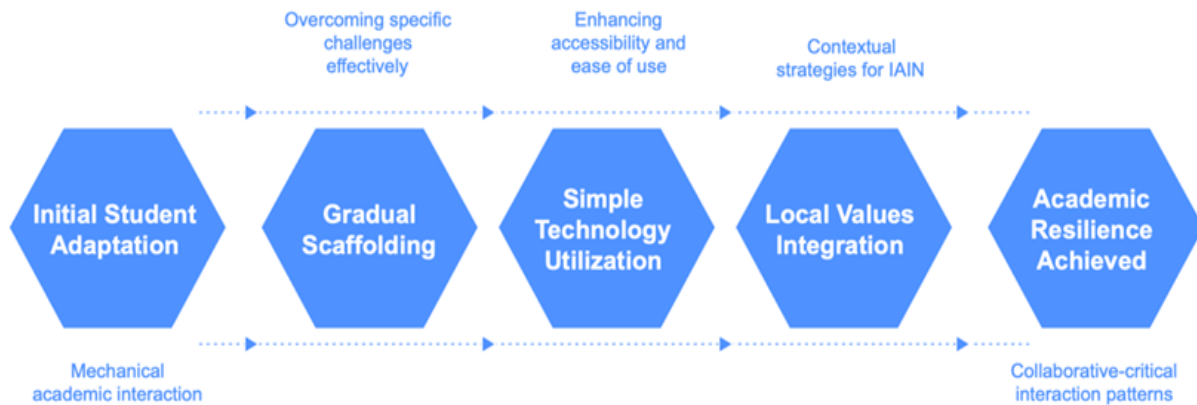
This study has revealed various findings regarding the implementation of metacognitive strategies and deep learning approaches in the context of learning English as a foreign language. An in-depth discussion of these findings leads to several crucial points that need to be considered. The first aspect that deserves special attention is the process of internalizing metacognitive strategies by

students. The research data shows that it takes students about 4-6 weeks to really internalize the metacognitive strategies taught. In the early weeks, as recorded in observations and reflection journals, most students (73%) were still heavily reliant on concrete examples from lecturers. This is in accordance with the findings (Fahmi et al., 2023) about the learning characteristics of Indonesian students who tend to need explicit guidance. However, through a structured scaffolding process (Brann & Sidi, 2025), There was a significant transformation where in the 9th to 12th week, 85% of students were able to apply metacognitive strategies independently. This transformation process occurs through three clearly identified phases: the introduction phase (weeks 1-4), the guided practice phase (weeks 5-8), and the internalization phase (weeks 9-12). These findings make an important contribution to our understanding of the time frame required to develop learning independence in the context of EFL Indonesia.

The second aspect is about the impact of integrating metacognitive and deep learning strategies on collaborative interactions in the classroom. The research data showed a very significant improvement in the quality of academic interactions, with a 75% increase in discussion participation and a 300% increase in the use of textual evidence to support arguments. What is even more interesting is the qualitative transformation in the interaction pattern that occurs. At the beginning of the study, as recorded in the group discussion record document, student interaction was still mechanical and fragmented, with rigid division of tasks such as "Sari seeks definition, Budi seeks examples". However, entering weeks 7 to 12, a more dynamic and reflective pattern of interaction emerged, where 92% of the discussions involved high-level questions (analysis, evaluation, creation). These findings reinforce the theory (Honghong, 2024; Li & Zhang, 2025; Pinto et al., 2025) about deep learning, as well as providing a unique cultural nuance on how deep learning can be adapted in the Indonesian context.

The third aspect that is an important finding of this study is about the cultural adaptation needed in implementing innovative learning strategies. In contrast to Western settings where academic debates are often confrontational, this study found that IAIN students tend to develop a more harmonious pattern of "negotiation of meaning". For example, in the analysis of the 'light' symbol in a poem, students do not oppose each other's interpretations (enlightenment vs truth) but rather look for a common point where the two interpretations can complement each other. This pattern reflects the natural adaptation to the values of harmony in local cultures, while also suggesting that the implementation of the Western approach needs to be adapted to the local cultural context. These findings make an important contribution to the development of pedagogy that is more contextual and relevant to the Indonesian educational setting (Cenoz & Gorter, 2025).

This research makes an original contribution through the systematic integration of metacognitive strategies and deep learning approaches in the context of Islamic higher education in Indonesia, which has never been done before. In contrast to previous studies that only focused on a single aspect, this study succeeded in mapping the holistic transformation of reading engagement through detailed documentation of the three phases of student adaptation (introduction, guided practice, and internalization), as well as uncovering the evolution of academic interaction patterns from mechanical to collaborative critical. Other unique findings include the development of contextual strategies such as gradual scaffolding, the use of simple technologies, and the integration of local values that effectively address specific challenges at IAIN Lhokseumawe. The most distinguishing thing is that this study not only identifies problems like previous studies but also proves how implementation challenges can be a medium for developing academic resilience and learning independence (Setlik & Silva, 2023), thus enriching the literature on EFL learning models that are adaptive to the religious higher education environment in Indonesia (Chisholm-Burns et al., 2019).

Figure 1. *Holistic transformation of reading engagement through metacognitive and deep learning strategies*

Note. This image illustrates a reading engagement transformation model that includes cognitive, affective, and behavioral aspects through the integration of metacognitive strategies and deep learning approaches. The data is based on the findings of a case study at IAIN Lhokseumawe over a 12-week period.

In terms of practical implications, this study offers some important recommendations for English language educators in Indonesia. First, the importance of providing a sufficient transition period (at least 4 weeks) when introducing new learning strategies. Second, the need to combine modern approaches with local values, as seen in the use of Islamic texts as teaching materials. Third, the importance of developing a structured scaffolding system to help students transition from dependence on teachers to learning independence. Fourth, the strategic value of using simple technology that is easily accessible (such as WhatsApp) in supporting the learning process (Kowitlawakul et al., 2022; Y. Wang et al., 2025).

While it provides a variety of important findings, the study also has some limitations that need to be acknowledged. First, the relatively short duration of the study (12 weeks) made it impossible for us to observe the long-term effects of the given intervention. Second, the homogeneous characteristics of participants (English Language Proficiency students) limited the generalization of the findings to a more diverse population. Third, the specific context of IAIN Lhokseumawe with all its cultural uniqueness may not fully represent the condition of other universities in Indonesia.

For further research, some suggestions can be considered. First, it is necessary to conduct longitudinal studies with a longer duration (e.g. one academic year) to observe the resilience of the effects of the intervention. Second, replication of research in different types of institutions (public universities, polytechnics, etc.) will help test the external validity of the findings. Third, a more in-depth exploration of the interaction between Islamic values and modern learning strategies can provide richer insights. Fourth, the development of measurement instruments that are more sensitive to the local context will increase the validity of similar studies in the future.

Overall, this study has provided empirical evidence on the effectiveness of integrating metacognitive strategies and deep learning approaches in increasing reading engagement of EFL students in Indonesia. Moreover, the study also uncovers various implementation challenges and

coping strategies, which can be a valuable guide for educators who want to implement a similar approach. The findings on the natural process of cultural adaptation in the implementation of Western learning strategies make a significant theoretical contribution to the development of language pedagogy that is more contextual and relevant to the Indonesian educational setting (Lating et al., 2006).

Conclusion and Recommendations/Implications

This study proves the effectiveness of integrating metacognitive strategies and deep learning approaches in increasing reading engagement of EFL students at IAIN Lhokseumawe. Key findings suggest that this approach not only improves cognitive ability in reading but also develops learning independence and more critical collaborative interaction patterns through three phases of adaptation: recognition, guided practice, and internalization. The implementation process reveals how students naturally adapt Western learning strategies to local values, creating a harmonious pattern of "negotiation of meaning." Theoretically, this research makes an important contribution to the development of a contextual EFL learning model for religious higher education in Indonesia, with an emphasis on the synergy between modern approaches and cultural values, as well as realistic implementation stages.

Practical implications that can be applied include providing adequate adaptation time with structured scaffolding, integration of global materials with local contexts, and the use of simple technology that is easily accessible. For further research, longitudinal studies with longer duration and replication in different types of institutions are needed to test the external validity of the findings. Although it has limitations in terms of research duration and participant homogeneity, these findings provide valuable guidance for the development of English language pedagogy that is more inclusive and adaptive to the characteristics of Indonesian education, especially in overcoming the challenges of infrastructure limitations and learning culture transformation.

Disclosure statement

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References

- Ahmed. (2025). Using thematic analysis in qualitative research. *Journal of Medicine, Surgery, and Public Health*, 6, 100198. <https://doi.org/10.1016/j.glmedi.2025.100198>
- Alsop. (1999). *The Practice of Reading*. Macmillan Education UK. <https://doi.org/10.1007/978-1->

349-27437-6

- Arai, Y., & Takizawa, K. (2024). Text and reading task variables in incidental L2 vocabulary learning from reading: A methodological synthesis. *Research Methods in Applied Linguistics*, 3(2), 100110. <https://doi.org/10.1016/j.rmal.2024.100110>
- Avouac. (2025). Intersectoral professionals' understanding of the prevention of sexual violence against children, their role and that of the GP: A study using semi-structured interviews. *Archives de Pédiatrie*, 32(2), 132–137. <https://doi.org/10.1016/j.arcped.2024.11.004>
- Brann, A., & Sidi, Y. (2025). Metacognitive scaffolding for digital reading and mind-wandering in adults with and without ADHD. *Learning and Instruction*, 95, 102051. <https://doi.org/10.1016/j.learninstruc.2024.102051>
- Carola. (2018). Teaching English as a Foreign Language (C. Surkamp & B. Viebrock, Eds.). J.B. Metzler. <https://doi.org/10.1007/978-3-476-04480-8>
- Cenoz, J., & Gorter, D. (2025). The potential of pedagogical translanguaging in English language and in English-medium content classes. *Linguistics and Education*, 86, 101399. <https://doi.org/10.1016/j.linged.2025.101399>
- Chen, F., & Abdullah, R. (2024). Scientific mapping of research on English as a foreign language (EFL) reading instruction: A thirty-year perspective. *Heliyon*, 10(3), e25217. <https://doi.org/10.1016/j.heliyon.2024.e25217>
- Cheng. (2021). Developing Metacognitive Teaching Strategies Through Lesson Study. Springer Singapore. <https://doi.org/10.1007/978-981-16-5569-2>
- Chian. (2019). Developing Second Language Literacy: Taiwanese College Students' Error Types in Focused Feedback Effectiveness (B. L. Reynolds & M. F. Teng, Eds.). Springer Nature Singapore. <https://doi.org/10.1007/978-981-13-6653-6>
- Chisholm-Burns, M. A., Spivey, C. A., Sherwin, E., Williams, J., & Phelps, S. (2019). Development of an Instrument to Measure Academic Resilience Among Pharmacy Students. *American Journal of Pharmaceutical Education*, 83(6), 6896. <https://doi.org/10.5688/ajpe6896>
- Ciornei, S. I., & Dina, T. A. (2015). Authentic Texts in Teaching English. *Procedia - Social and Behavioral Sciences*, 180, 274–279. <https://doi.org/10.1016/j.sbspro.2015.02.116>
- Creswell, J. W. (2014). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. SAGE PublicationsSage CA: Los Angeles, CA.
- Creswell, J. W., Hanson, W. E., Clark Plano, V. L., & Morales, A. (2007). Qualitative Research Designs. *The Counseling Psychologist*, 35(2), 236–264. <https://doi.org/10.1177/0011000006287390>
- Fan, J., & Zhang, Q. (2024). From literacy to learning: The sequential mediation of attitudes and enjoyment in AI-assisted EFL education. *Heliyon*, 10(17), e37158. <https://doi.org/10.1016/j.heliyon.2024.e37158>
- Farahian. (2021). Reflective thinking in an EFL Writing course: To what level do portfolios improve reflection in writing? *Thinking Skills and Creativity*, 39, 100759. <https://doi.org/10.1016/j.tsc.2020.100759>
- Goodfel. (2016). Deep Learning. The MIT Press.
- Gu, Y., & Lau, K. (2023). Reading instruction and reading engagement and their relationship with Chinese students' PISA reading performance: Evidence from B-S-J-Z, Hong Kong, and Chinese Taipei. *International Journal of Educational Research*, 120, 102202. <https://doi.org/10.1016/j.ijer.2023.102202>
- Guidry, J. P. D., Miller, C. A., Hayes, R., Ksinan, A. J., Carlyle, K. E., & Fuemmeler, B. F. (2023). Reading, sharing, creating Pinterest recipes: Parental engagement and feeding behaviors.

- Appetite, 180, 106287. <https://doi.org/10.1016/j.appet.2022.106287>
- Honghong. (2024). Role of education and awareness programs in fostering energy conservation behavior in cities: Empowering urban sustainability using deep learning approach. *Sustainable Cities and Society*, 112, 105505. <https://doi.org/10.1016/j.scs.2024.105505>
- Hu, J., & Gao, X. (Andy). (2017). Using think-aloud protocol in self-regulated reading research. *Educational Research Review*, 22, 181–193. <https://doi.org/10.1016/j.edurev.2017.09.004>
- Jago, L. S., Monaghan, P., Alcock, K., & Cain, K. (2025). The effect of preschool vocabulary and grammar on early reading comprehension and word reading: A systematic review and meta-analysis. *Educational Research Review*, 47, 100680. <https://doi.org/10.1016/j.edurev.2025.100680>
- Kowitlawakul, Y., Tan, J. J. M., Suebnukarn, S., Nguyen, H. D., Poo, D. C. C., Chai, J., Wang, W., & Devi, K. (2022). Utilizing educational technology in enhancing undergraduate nursing students' engagement and motivation: A scoping review. *Journal of Professional Nursing*, 42, 262–275. <https://doi.org/10.1016/j.profnurs.2022.07.015>
- Kuche, E., Demissie, A., & Wanna, W. (2024). English language teacher educators' knowledge and skills on early grade reading instruction. *Heliyon*, 10(19), e38360. <https://doi.org/10.1016/j.heliyon.2024.e38360>
- Kwon, S. K., & Yu, G. (2023). Investigating differences in test-takers' use of cognitive and metacognitive strategies in audio-only and video-based listening comprehension test. *System*, 114, 103017. <https://doi.org/10.1016/j.system.2023.103017>
- Lating, P. O., Kucel, S. B., & Trojer, L. (2006). Strategies for Implementing Hybrid E-Learning in Rural Secondary School in Uganda. In *Proceedings from the International Conference on Advances in Engineering and Technology* (pp. 538–545). Elsevier. <https://doi.org/10.1016/B978-008045312-5/50059-5>
- Li, X., & Zhang, Y. (2025). Security application of intrusion detection model based on deep learning in english online education. *Alexandria Engineering Journal*, 124, 582–590. <https://doi.org/10.1016/j.aej.2025.03.051>
- List, A., Russell, L. A., Yao, E. Z., Campos Oaxaca, G. S., & Du, H. (2024). Critique generation promotes the critical reading of multiple texts. *Learning and Instruction*, 93, 101927. <https://doi.org/10.1016/j.learninstruc.2024.101927>
- Liu, W., Liu, B., Chen, C., Han, Y., & Li, G. (2025). Analyzing students' critical thinking processes based on falsification heuristic experiment. *Thinking Skills and Creativity*, 56, 101791. <https://doi.org/10.1016/j.tsc.2025.101791>
- López-Gopar, M. E. (Ed.). (2019). *International Perspectives on Critical Pedagogies in ELT*. Springer International Publishing. <https://doi.org/10.1007/978-3-319-95621-3>
- Mack, P. (2017). From Reading to Writing (pp. 93–103). https://doi.org/10.1007/978-3-319-60158-8_8
- Maghsoudi, M., & Talebi, S. H. (2025). Investigating the bi-directional strategy transfer between L2 reading and L2 listening skills. *System*, 132, 103711. <https://doi.org/10.1016/j.system.2025.103711>
- Mierzwa. (2025). A Review of Selected Empirical Research on Foreign Language Enjoyment and Foreign Language Anxiety (pp. 85–139). https://doi.org/10.1007/978-3-031-86122-2_4
- Miles, M. B. and A. M. H. (2005). *Qualitative Data Analysis*. UI Press.
- Pan, M., Lai, C., & Guo, K. (2025). Effects of GenAI-empowered interactive support on university EFL students' self-regulated strategy use and engagement in reading. *The Internet and Higher Education*

- Education, 65, 100991. <https://doi.org/10.1016/j.iheduc.2024.100991>
- Pinto, L., Figueiredo, I. N., & Figueiredo, P. N. (2025). Reducing reading time and assessing disease in capsule endoscopy videos: A deep learning approach. *International Journal of Medical Informatics*, 195, 105792. <https://doi.org/10.1016/j.ijmedinf.2025.105792>
- Qiu, C., & Liu, X. (2024). The effect of instructional quality on reading achievement: The mediating role of reading engagement in China (B-S-J-Z) and the UK. *Heliyon*, 10(15), e34896. <https://doi.org/10.1016/j.heliyon.2024.e34896>
- Rets, I., Astruc, L., Coughlan, T., & Stickler, U. (2022). Approaches to simplifying academic texts in English: English teachers' views and practices. *English for Specific Purposes*, 68, 31–46. <https://doi.org/10.1016/j.esp.2022.06.001>
- Setlik, J., & Silva, H. C. da. (2023). Texts and reading practices in physics education: Analysis of the voices of subjects in initial teacher education. *Teaching and Teacher Education*, 127, 104112. <https://doi.org/10.1016/j.tate.2023.104112>
- Theron. (2012). *Promoting Strategy Teaching as an Innovative Practice in the Asian EFL Oral Classroom* (T. Muller, S. Herder, J. Adamson, & P. S. Brown, Eds.). Palgrave Macmillan UK. <https://doi.org/10.1057/9780230347823>
- Ulrike. (2007). *Teaching English as a Third Language* (J. Cummins & C. Davison, Eds.). Springer US. <https://doi.org/10.1007/978-0-387-46301-8>
- Wang, K., Zhang, L. J., & Cooper, M. (2025). Taking stock of metacognitive strategies and collaborative writing for EFL learners' writing development. *Journal of Second Language Writing*, 68, 101211. <https://doi.org/10.1016/j.jslw.2025.101211>
- Wang, Y., Gao, X., & Gui, M. (2025). Impact of retrieval prompts with posterior L1 glossing on novel words learning and processing during L2 reading: An eye-tracking study. *System*, 129, 103596. <https://doi.org/10.1016/j.system.2025.103596>
- Webster, J., Morris, J., & Cann, K. (2025). Reading in aphasia: Supporting engagement in and enjoyment of reading in an aphasia support centre. *Journal of Communication Disorders*, 115, 106528. <https://doi.org/10.1016/j.jcomdis.2025.106528>
- Yulita, D., & Napitupulu, M. H. (2023). Metacognitive Reading Strategies in EFL Context: A Systematic Literature Review. *Indonesian Educational Research Journal*, 1(1), 18–25. <https://doi.org/10.56773/ierj.v1i1.13>
- Zhai. (2023). A systematic review on artificial intelligence dialogue systems for enhancing English as foreign language students' interactional competence in the university. *Computers and Education: Artificial Intelligence*, 4, 100134. <https://doi.org/10.1016/j.caeai.2023.100134>
- Zhang, W., & Lian, R. (2024). The impact of reading metacognitive strategies on mathematics learning efficiency and performance: An analysis using PISA 2018 data in China. *Acta Psychologica*, 246, 104247. <https://doi.org/10.1016/j.actpsy.2024.104247>