



Investigating Critical Thinking in the Interactive Learning Environment for EFL Learners

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Received 12/11/2024	ABSTRACT The main purpose of this paper is to investigate and discuss the main characteristics of project-based learning (PBL) to promote learners' critical learning skills after reading business texts in a course titled Critical Reading in Business. A mixed-methods research design was used to investigate a total of 54 students. The research instruments in this study were 1) reading logs, 2) a four-level stance questioning form and 3) the student project. Data was collected from the reading logs, four-level stance questioning forms, and projects. Semi-structured interviews were conducted with the five participants who had the most reading logs to verify the effect of reading business texts on learners and collect additional data. Quantitative data was analyzed using percentages, while qualitative data was analyzed through content analysis. The study reveals that there is a pattern between the number of reading logs, students' ability to ask more complex questions, and their tendency to use a higher level of vocabulary, suggesting stronger reading comprehension skills. Secondly, the study also demonstrates
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	that undergraduate students who have a higher number of reading logs tend to exhibit a higher percentage of credibility judgments in reading business texts. Keywords: critical thinking skills, project-based learning, reading log, questioning
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Background of the Study

In an era characterized by rapid technological advancements and the proliferation of information, the ability to think critically has become increasingly important. Critical thinking enables individuals to question assumptions, evaluate evidence, and form sound judgments. For undergraduate students, particularly those pursuing a degree in business English, this skill set is indispensable. It supports academic success by empowering students to engage deeply with complex texts, analyze data, and construct well-reasoned arguments. Moreover, critical thinking is a valuable asset in the professional world, enabling individuals to solve problems effectively, make informed decisions, and adapt to changing circumstances. (Persoff, 2016; Song, 2019).

Within this context, in English as a Foreign Language (EFL) reading classrooms, traditional read-and-answer practices frequently increase student anxiety by raising emotional and psychological barriers. These methods often promote passive learning, which impedes students' ability to retain specialized vocabulary and transfer critical thinking skills to future professional contexts. At the core of the curriculum, reading functions as the primary foundation for English learning. Students must engage with discipline-specific texts and extend the critical reading skills they acquire to other subjects throughout the program. The curriculum's content and pedagogical activities are structured to develop these skills, encouraging students to apply gained insights toward designing successful business models and using valuable knowledge in real-world contexts. These goals align with the rationale for project-based learning (PBL) as an effective pedagogical approach to teaching English as a second language (ESL) (Butler et al., 2017; Stoller, 2006). PBL involves using real-life tasks as a basis for language learning, promoting collaboration and communication among students to build confidence and fluency. Additionally, researchers highlight the role of questioning as a critical source of both input and output in language learning (Song, 2019; Tofade et al., 2013). Classroom questioning aims to develop students' critical thinking abilities by encouraging them to think critically and express their opinions. Furthermore, questioning techniques help verify students' engagement with reading material, especially

when new activities facilitate comprehension (Bell, 2010; Holm, 2011; Poonpon, 2011). A skilled reader applies verbal reasoning to logically verify their understanding, linking main ideas to their reasoning process and to their practical projects based on the text.

Therefore, this study aims to investigate how project-based teaching promotes the thinking skills of undergraduate students and to examine how critical thinking skills support learners in reading business texts.

Literature Review

Recent educational reforms in Thailand have emphasized learner-centered pedagogy and communicative language teaching to prepare students for global success. This paradigm shift prioritizes authentic language use over formal grammar drills, aiming to foster communication and critical engagement. Yet, reading instruction often remains dominated by test-oriented practices, where comprehension is reduced to decoding exercises for standardized assessments. Such practices undermine reform goals by restricting reading to rote performance rather than cultivating meaning-making, inquiry, and authentic engagement with texts.

This review examines three key constructs that underpin the study: project-based learning (PBL), critical thinking, and questioning strategies. PBL provides the instructional framework; critical thinking is the central cognitive outcome; and questioning strategies serve as the primary pedagogical mechanism linking the two. Each variable is discussed in terms of its theoretical foundations, empirical significance, and relevance to EFL business reading contexts.

Project-Based Learning as a Pedagogical Framework

Project-Based Learning (PBL) has gained recognition as an innovative instructional model rooted in constructivist principles. While traditional, teacher-centered approaches dominate some classrooms, PBL shifts the focus to emphasize student autonomy, experiential learning, and collaborative decision-making. As students engage in authentic projects, they apply skills to real-world contexts; consequently, both cognitive and affective outcomes are enhanced. (Bell, 2010; Miller et al., 2012; Poonpon, 2011). Moreover, research shows that PBL fosters higher-order thinking, teamwork, and communication skills. Aligned with the 21st-century learning framework—which prioritizes the "4Cs": critical thinking, communication, collaboration, and creativity—these competencies collectively prepare students for lifelong learning and help them address complex global challenges. (Poonpon, 2011; Sirisrimangkorn, 2018; Stevkovska & Macedonia, 2023).

Recent studies highlight PBL's potential to boost critical thinking in EFL classrooms. By engaging in project work, students analyze, evaluate, and synthesize information in real contexts. (West, 2018; Wongdaeng & Hajihama, 2018). As a result, this approach fosters independent thinking and soft skills such as teamwork and communication. When compared with Problem-Based Learning and Guided Inquiry, PBL demonstrates unique strengths. Specifically, Problem-Based Learning has students define and solve real-world problems collaboratively, while Guided Inquiry uses structured questioning with more facilitator support. In contrast, PBL stands out for building long-term independence, reflection, and sustained engagement. Ultimately, by connecting classroom theory to real issues, PBL builds transferable skills beyond academics. (Abad & Villafuerte-Holguín, 2025; Cahyono et al., 2024; Chachiyo & Chachiyo, 2024; Song et al., 2025)

Several studies demonstrate that, for EFL/ESL learners, systematic approaches such as SQ6R and PBL are more effective than unplanned or extensive reading. These models underscore the value of teaching reading in explicit, sequential steps. Visual tools, including mind maps and graphic organizers, facilitate student comprehension. Research indicates that these structured reading programs yield significant classroom gains, and even brief interventions of five to eight weeks can produce measurable enhancements in student performance. (Dokmaithong & Art-in, 2019; Pansaeng & Nualprasert, 2021; Phanthukul & Art-in, 2022; Pumpachart & Tiangtrong, 2024)

Questioning Strategies and Reading Comprehension in English as a Foreign Language Classrooms

Numerous studies emphasize the importance of questioning as an effective reading comprehension instruction strategy in English as a Foreign Language (EFL) classroom, as it increases student engagement, promotes deeper cognitive processing, and enhances language acquisition. Although reading comprehension has been extensively researched, questioning remains central due to the multifaceted nature of comprehension, which involves skills such as word recognition, memory use, inference-making, vocabulary knowledge, and the application of prior knowledge (Perfetti et al., 2005; Snow, 2002). Research indicates that reading comprehension instruction is most effective for both L1 and L2 learners when educators employ clear, systematically planned questions—an established reading and writing strategy (Cotton, 2000; Persoff, 2016). According to Bloom's Taxonomy (Anderson & Krathwohl, 2001), such questions range from simple to complex thinking tasks (Aeni & Ariyani, 2025). As a fundamental pedagogical tool, strategic questioning specifically mediates language learning and student engagement, directly promoting active participation, stimulating critical thinking, enhancing

comprehension, and facilitating positive learning outcomes (Mercer & Howe, 2022; Syaripudin, 2025).

Current research highlights that structured, student-centered questioning is essential for developing critical thinking and participation in EFL classrooms. Techniques like the Question Formulation Technique (QFT) and Questioning the Author (QtA) repeatedly demonstrate that well-designed questioning strategies lead to better comprehension, more effective recall, and higher student engagement (Syaripudin, 2025; Beck & McKeown, 2002). Measurable learning improvements occur when teachers scaffold responses in real time (Alzahrani, 2025; Beck et al., 1996; He, 2025). However, the effectiveness of questioning hinges on teacher scaffolding, curriculum support, and the availability of time and materials. Consequently, effective questioning is not just a pedagogical tool but the linchpin of EFL classroom success, dependent on skilled instruction and institutional backing (Aeni & Ariyani, 2025; Astrid et al., 2019; Rahman et al., 2024).

The selection and application of questioning strategies are central to effective EFL instruction for promoting student engagement and learning. Specifically, the four primary question types—factual, higher-order, probing, and divergent—not only support distinct learning outcomes but also span a spectrum from reinforcing knowledge to encouraging creative reasoning (Aeni & Ariyani, 2025). Furthermore, open-ended questions, according to He (2025), elicit more complex responses than closed questions, highlighting the significant impact of question type on classroom cognitive processes. In addition, Rahman et al. (2024) emphasized that techniques such as repetition, rephrasing, simplification, decomposition, and probing are crucial for adapting to students' language abilities and fostering meaningful classroom interaction. Therefore, questioning remains fundamental in maximizing the effectiveness of EFL teaching.

Scaffolded Project-Based Learning and Reading Comprehension in EFL Learners

The integration of structured scaffolding within Project-Based Learning (PBL) is essential for developing advanced reading and writing skills. West (2018) demonstrates that students who use organizing templates to synthesize their reading prior to discussions generate higher-quality insights and participate more actively than those without such support. Guiding learners through deliberate inquiry stages, including questioning, researching, drafting, and presenting, enables PBL frameworks to substantially improve reading comprehension and writing proficiency, especially for students who struggle with self-directed learning (Ahmed Abdel-Al Ibrahim et al., 2023). The collaborative dimension of PBL further enhances this development;

pursuing a collective project goal fosters peer accountability and motivates students to engage more thoroughly with texts. Additionally, small-group interactions facilitate integrating individual reading notes with peers' diverse interpretations, thereby expanding overall comprehension. PBL ultimately redirects attention from superficial recall to critical literacy, requiring students to interrogate new information and relate it to existing knowledge. Through semester-long "writing-to-learn" assignments, PBL establishes a purposeful, social context that transforms literacy into a means for deep, meaningful inquiry. (Cahyono et al., 2024; Gebremariam & Weldeyohannes, 2025; Song et al., 2025)

Within this framework, questioning strategies promote higher-order thinking. Foundational studies demonstrate that strategic questioning enables learners to interrogate texts, connect concepts, and engage in evaluative or divergent thinking (Mueller, 1972; Song, 2019; Van der Meij, 1993). Recent research encourages students to generate questions at different cognitive levels. These questions serve as clear indicators of engagement (Cotton, 2000; Persoff, 2016). Questioning acts as a tool for comprehension and a catalyst for critical evaluation. It pushes learners beyond surface-level understanding. Theories ranging from Bloom's taxonomy (1956) to Anderson and Krathwohl (2001) identify questioning as essential for language acquisition and developing complex thought.

Project-based learning (PBL) and questioning strategies build students' critical thinking skills. PBL provides a collaborative space for learners to share ideas and conduct inquiry into text-gathering and evaluation sources. Questioning strategies give learners clear tools to interrogate ideas and texts. Together, these methods make literacy a process of exploration and evaluation. They also help students develop advanced language skills and critical thinking.

Research Gap: Business English Reading in Thailand

Despite the growing body of literature on PBL, collaboration, metacognition, and questioning strategies, relatively few studies have examined their intersection within Business English reading courses at the tertiary level in Thailand. Specifically, little is known about how sustained reading engagement—captured through reading logs—relates to the development of higher-order questioning skills, vocabulary use, and source credibility judgment. While prior studies have documented pre-post gains in critical thinking through structured PBL cycles (Pansaeng & Nualprasert, 2021) none has investigated these relationships in the context of Business English reading. To address this gap, the present study explores how structured PBL task cycles can foster critical thinking through reading log frequency, hierarchical

questioning, and credibility evaluation among university-level students by using the following methodological approach.

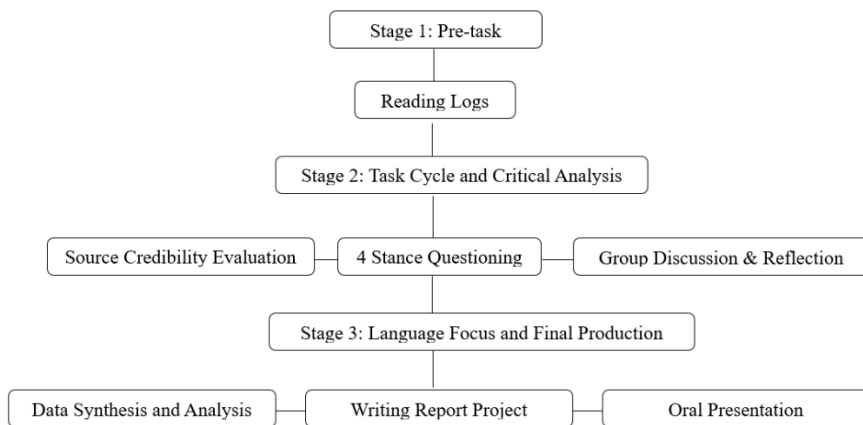
Research Methodology

Framework of the Study

Figure 1

Framework of the Study

A Three-Stage Framework for Developing Critical Thinking in EFL Project-Based Learning



Note. Adapted from Holm (2011) and Burns (2010)

Stage 1: Pre-task Phase (Weeks 1–5) [Cycle 1]

This phase built foundational business knowledge and academic vocabulary. Students learned about the final project objectives and explored their areas of interest in business. Students summarized business articles, identified new vocabulary, maintained reading logs, and joined group discussions to reflect on their reading progress through rubrics and checklists based on Bloom’s Taxonomy. Assessment focused on clarity, vocabulary use, organization, summary skills, and reflective ability.

Stage 2: Task Cycle and Critical Analysis (Weeks 6–10) [Cycle 2]

The second stage emphasized the development of analytical and evaluative skills. In Week 6, the teacher introduced the “four stance

questioning” technique to facilitate self-assessment (Seenak, 2017). During Weeks 7 and 8, students learned to evaluate the reliability of sources, explain the credibility of selected articles, and evaluate the difficulty of the questions.

In Weeks 9 and 10, students systematically gathered and filtered information, excluding content that was not directly relevant to their final project. They practiced integrating their specialized vocabulary into short essays to prepare for the next phase. Reading log data from Stages 2 and 3 together correspond to the Cycle 2 results reported in Table 1 and Table 2.

Stage 3: Language Skill and Final Report (Weeks 11–15) [Cycle 3, continued]

In the final stage, students combined their texts to organize their final project. During Weeks 11 and 12, they used new vocabulary in short essay writing to show their ability to support arguments and demonstrate language accuracy.

From Weeks 13 to 15, students worked collaboratively, giving feedback, learning from peer reports, and compiling reading logs and vocabulary lists for their final projects. Assessment was triangulated from teacher evaluations, peer feedback, and self-evaluations. (Seenak, 2017)

Population/Participants

The study involved 54 third-year Business English Program students enrolled in the Critical Reading in Business course. For in-depth qualitative analysis, a purposive sub-sample of five students was selected. These participants were chosen because they produced the most reading logs, demonstrated questioning, and showed strong idea expression during group discussions, providing the richest evidence of engagement with the PBL task cycle.

Research instruments

The research instrument in this study is a reading log adapted from Smith's (2012) reading model. The log records details of the reading process: total pages read, information sources, vocabulary summaries, and comprehension summaries. Over 7 weeks, the researcher will collect this data to analyze participants' reading proficiency, reading frequency, and the criteria for choosing content.

Figure 2*The Four-Stance Question Framework for Reading Comprehension*

Initial Response	Initial Understanding	Developing Interpretation	Developing a Critical Stance
What is your opinion on this topic? Does this selection appeal to you? Did you enjoy reading it? Of what events does this remind you? How did this selection affect you? Does the author say anything with which you can identify? Does this description make sense in relation to your experiences? Did you get a sense of character for any of the people involved or was the information purely factual?	What are the main points or events? What does this selection tell you about the topic? How are the ideas or story organized? What is the author's purpose? What does the author think about the topic? What is the selection's overall message? Does it appeal to the emotions? Intellect? Both? Is this selection based upon fact or opinion? Has the author done anything in particular to bring the subject matter to life?	What qualities of the author's style can be identified (e.g., word choice, rhetorical questions, anecdote, narrative, use of dialogue, commentary)? What is the author's tone (e.g., personal, objective, a combination)? What picture of the author emerges? Is the treatment sympathetic? Balanced? Biased? Does the selection shed light on social and political realities? What literary devices did the writer use to communicate the ideas (e.g., flashback, parallelism, irony, images, repetition)?	Why did the writer consider the subject worthy to write about? Is this information useful? Accurate? Why has the writer said this about the subject? Do you trust the information? Was it accurate? Up-to-date? Is the author qualified to write about this topic? Is this a good piece of prose? Why or why not? What does the selection not address?

Note. Adapted from Thomson, 1987

The four-stance question framework structures reading responses. It assesses students' reading comprehension with guided questions. This promotes critical thinking. The framework was adapted by Thomson (1987). It presents four levels of stance in the questioning dimensions.

The initial response stance requires students to express immediate personal and emotional reactions to the text. This stance fosters affective engagement, establishes a personal connection, and activates prior knowledge, thereby facilitating deeper comprehension.

The initial understanding stance emphasizes literal and organizational comprehension. At this stage, questions focus on main ideas, text structure, authorial purpose, and distinguishing fact from opinion. This scaffolds learner engagement and prepares them for more advanced analysis.

The developing interpretation stance moves from comprehension to deeper analysis. This stance leads readers to consider the author's style, mood, writing techniques, and the historical and societal context.

The developing critical Stance involves assessing a text's credibility, accuracy, relevance, and completeness. Identify omissions. This stage prompts students to use metacognitive and evaluative processes. These help them grow into independent, critical readers.

Data Collection and Analysis

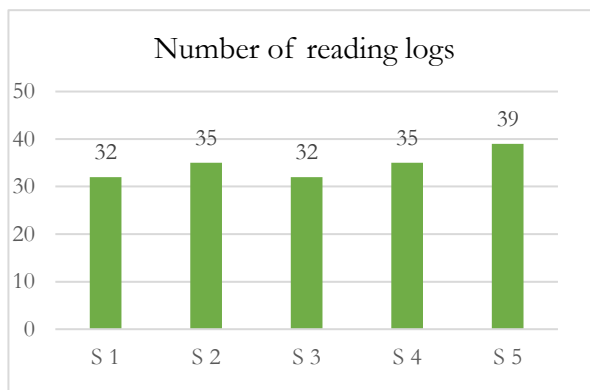
Data were collected from three sources: (1) reading logs completed across the 15-week course, (2) four-stance question forms submitted during Weeks 6–10, and (3) the final report project. Semi-structured interviews were conducted with the five participants. Quantitative data were analyzed using descriptive statistics (frequencies and percentages) to identify patterns in reading log counts, questioning levels, and vocabulary use. Qualitative data from the semi-structured interviews were analyzed through thematic content analysis.

Research Results

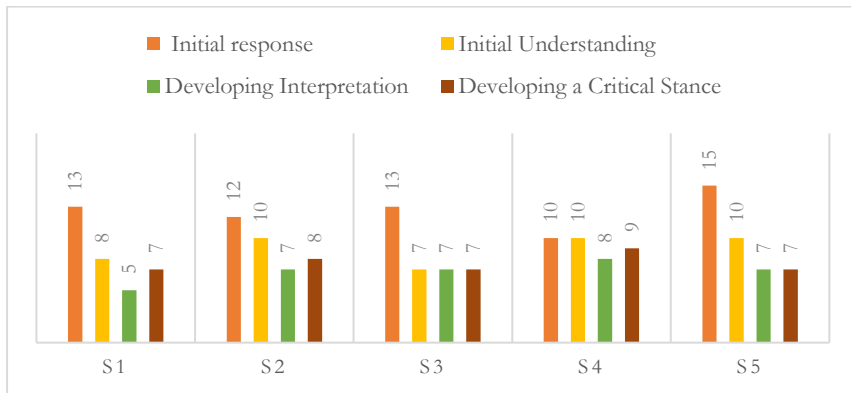
The data reveal a descriptive pattern in which students who completed more reading logs tended to produce questions at higher levels of the four-level stance questioning framework and to use a broader range of vocabulary. These represent descriptive tendencies, not statistically verified correlations. The results are presented below:

Figure 3

Number of Reading Logs



The analysis of the five key participants (S1–S5) revealed a positive descriptive pattern between task frequency and cognitive depth. Figure 3 displays the total number of reading logs completed with the 7-week period. Participant S5 achieved the highest engagement with 39 logs, while S1 and S3 completed 32 logs each.

Figure 4*Four-Stance Questioning*

The data presented in figure 4 illustrates the frequency of four levels of stance questioning across five participants (S1–S5). The results reveal that while S5 produced the greatest total number of responses, S4 demonstrated the highest engagement quality.

Data gathered from semi-structured interviews with five participants suggest that four stances questioning significantly enhances critical thinking. Their individual perspectives are described as follows:

“...produced 32 reading logs and demonstrated solid vocabulary comprehension (predominantly at the A2 level). This student showed strength in ‘developing a critical stance’ with the highest number of responses in this category...” (S1). S1’s high reading log count appears to have provided sufficient exposure to business texts to support the development of Level 4 (critical stance) questioning, despite vocabulary remaining predominantly at the A2 level. This suggests that reading frequency, rather than vocabulary level alone, may be a factor enabling higher-order questioning.

“...demonstrated the highest total vocabulary comprehension at A2 (90). While their ‘initial response’ was strong, their ‘developing interpretation’ score was slightly lower than others in the sample...” (S2). S2’s profile is notable in that a high A2 vocabulary count did not automatically produce the highest interpretation scores, indicating that vocabulary breadth and questioning depth are related but distinct dimensions of critical thinking that developed at different rates across Cycles 1–2.

“...showed potential in developing a critical stance and initial response but exhibited room for growth in the ‘initial understanding’ area...” S3’s case illustrates that critical stance questioning can emerge even when foundational comprehension (Level 1) is not fully consolidated, suggesting that the

scaffolded PBL task cycle supported higher-order engagement beyond sequential mastery.

“... notable score was in the B2 vocabulary comprehension where they outperformed the rest of the sample. They also had the highest response count in the ‘developing a critical stance’ category...” (S4). S4 is the clearest case in the sub-sample of the relationship between advanced vocabulary acquisition (B2) and high-level critical questioning co-occurring. This aligns with the Cycle 2 intervention that specifically scaffolded higher-order questioning through Bloom’s Taxonomy prompts and reinforces the study’s first research finding.

“... student had the highest ‘initial response’ count along with strong vocabulary comprehension across the board. ...” (S5). S5’s broad vocabulary strength across CEFR levels, combined with a dominant Level 1 response pattern, suggests a reader who is still transitioning from comprehension to higher-order interpretation. This profile adds important nuance to the sub-sample findings: strong vocabulary alone does not guarantee advanced questioning, underscoring the role of the cycle-based instructional intervention in facilitating this transition.

Figure 5

Vocabulary Comprehension Results by CEFR Level of the Five Top-Performing Students

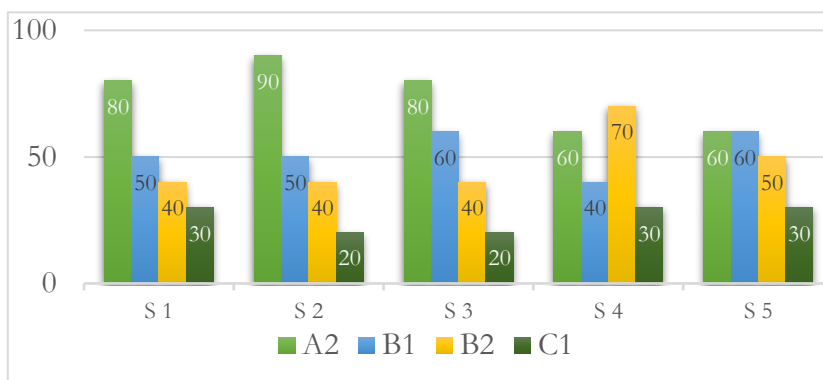


Figure 5 shows the vocabulary comprehension results of a 200-word essay assignment on entrepreneurship that the students completed. The five top-performing students effectively integrated pertinent vocabulary and concepts associated with their final project. Their writing incorporated CEFR words at the B2-C1 levels, encompassing a vocabulary range of 30 to 50 words.

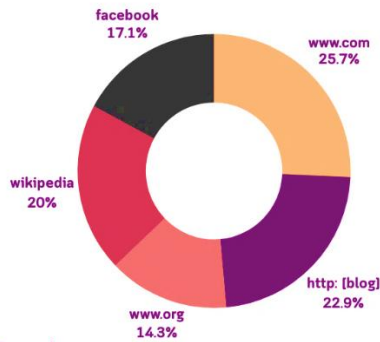
Figure 6*Resources Used for Information Retrieval*

Figure 6 explicitly found that a significant portion of the information retrieved came from websites and web blogs (42.8%) and social media (20%). On the other hand, a relatively small portion of the information retrieved came from academic websites (.org) (14.3%) and Wikipedia (17.1%). This may be due to the fact that academic websites are often more difficult to understand than websites and web blogs. Additionally, Wikipedia may not be seen as a credible source of information by some students.

During week 10-15, which was the post task stage of the study, the researcher conducted semi-structured interviews with the five highly skilled students where they shared their perspectives on the benefits of project-based teaching. They provided valuable insights into how an integrated learning classroom facilitates learning and the development of strong skills in analyzing business texts for their credibility, reliability and trustworthiness, as shown in the following transcription:

...By learning to identify and report on trustworthy business texts in our reading logs, we can better discuss our final projects. This allows for deeper analysis of the texts and helps us gain valuable insights. Additionally, performing a SWOT analysis clarifies the objectives of our final projects. With the guidance of teachers and classmates, we can explore reliable resources through classroom discussions. Analyzing and questioning business texts in class allows us to refine our projects for strong outcomes at the end of the semester...

(S1)

.... Reading logs are a powerful tool for gathering reliable references. Before using a source, it's crucial to investigate its credibility and any certifications to ensure our projects are built

on solid information. Carefully examining business texts expands our vocabulary, deepens our understanding of key concepts, and strengthens our project outcomes...

(S2)

...Our class began with a teacher-led discussion about effective questioning and constructive feedback. We were given a reading log template and guiding questions to help us analyze business texts. Next, we chose specific 'How to do... business' project topics and prepared oral presentations for the following week. Personalized instruction supported us throughout this process. Initially, we hesitated to give feedback to our peers. However, the teacher demonstrated how to provide constructive comments, creating a safe and supportive atmosphere. Working together and offering feedback helped us develop strong final report outlines...

(S3)

...At first, we struggled to determine the reliability of information found online. The vast amount of information made it difficult to discern trustworthy sources. However, through group discussions, we learned valuable skills for evaluating sources. Our classmates assisted in verifying credibility, and our teacher provided excellent guidance on finding trustworthy articles. These weekly discussions, along with debates, built our confidence in working with information. By the time of the final presentation, we felt well-prepared. We appreciate the teacher's support in navigating online information, which helped us develop skills in group collaboration, brainstorming, and presenting diverse solutions. Our ultimate goal was to gain a deep understanding of the concepts involved in the project. Reading and critically analyzing business texts, facilitated by paired and small-group discussions, was a meaningful way to achieve this goal....

(S4)

...Our project began with forming groups and selecting unique topics. The teacher guided us in connecting relevant texts to our chosen topics. Once we grasped the core concepts, we received valuable resources for writing our business plans. During progress reports, the teacher provided guidelines for constructive peer feedback. We discussed our drafts in different groups, then revised our work based on feedback. Initially, conducting an independent literature review and presenting information for group discussions felt challenging. However, by the end, we had gained confidence. The feedback helped us further develop our ideas. This process helped me achieve the critical thinking skills emphasized during the first week of orientation...

(S5)

Discussion

The present study investigated the extent to which reading logs and four-stance questioning facilitated deeper content analysis and comprehension among students engaging with authentic business articles. Several descriptive patterns emerged from the data. Students who accumulated greater numbers of reading logs tended to produce questions at higher levels of the four-level stance questioning framework, suggesting that reading frequency may support the development of higher-order critical thinking skills. Notably, students with higher log frequencies, specifically S5 and S2, demonstrated a more frequent use of Level 4 questions in the four-level stance questioning framework. These results suggest that consistent reflective practice correlates with the development of higher-order questioning skills. With a minimum of 200 words for the final-project writing task, students were able to demonstrate that they could perform research, establish logical connections, and synthesize information even within a limited scope. In this stage, teachers could assess vocabulary comprehension by evaluating students' ability to understand and accurately apply terminology in their writing. Additionally, students could strengthen their grasp of fundamental grammar, punctuation, and citation practices.

The findings of this study reveal that reading frequency, as measured through reading logs, promotes higher-order critical thinking more than vocabulary proficiency. Students who engaged consistently with authentic business texts—especially S5 and S2, who had higher log volumes—demonstrated a greater capacity to formulate Level four-stance questions. This reflects their ability to critically evaluate textual ideas, rather than simply retrieve information. This study aligns with Beck et al.'s (2020) assertion. They argue that active questioning strategies foster comprehension by engaging learners in meaning-making rather than just passive decoding. The analysis also consisted of Pansaeng and Nualprasert (2021). Their research findings show a process of critical thinking through structured PBL cycles. This study identifies sustained reading engagement and reading autonomy of EFL learners.

Questioning is a crucial strategy that enhances students' interaction and supports their critical thinking. It also engages them to activate prior knowledge, and using logical prompts deepens understanding. In PBL classroom discussions, frequent questioning—highlighted in semi-interview results—strengthens students' critical thinking, especially during group presentations and report writing. This process encourages ongoing revision until completion. Researchers (Aeni & Ariyani, 2025; Beck et al., 2020; He, 2025; 2021; Persoff, 2016; Song, 2019; Tofade et al., 2013) agree that four-stance questioning is essential to comprehension, critical thinking, and English proficiency in EFL classroom settings.

The finding also indicates that students with limited foundational vocabularies can nonetheless reach a critical stance, highlighting a non-linear trajectory of learning growth within PBL contexts. It is likely that the inquiry-based design of the reading log task—requiring students to evaluate source credibility, formulate stance questions, and document their reflective process—activated metacognitive strategies that compensated for lower lexical resources. This interpretive account is further supported by the observation that students with extensive vocabulary but absent or minimal reflective engagement remained at the initial-response stage, underscoring the primacy of task design over linguistic prerequisites. (Pansaeng & Nualprasert, 2021)

The study also indicates that instructional models appear to be a key mechanism through which learning gains become visible and measurable. Across the reviewed studies, structured repetition is embedded at the core of each framework. For example, Dokmaithong and Art-in (2019) and Pansaeng and Nualprasert (2021) both employ cyclical Plan–Act–Observe–Reflect sequences; in contrast, Phanthukul and Art-in (2022) apply the SQ6R strategy across three repeated spirals. Chachiyo and Chachiyo (2024) and Pumpachart and Tiangtrong (2024), meanwhile, build repetition into their respective multi-step PBL and GDL metacognitive frameworks. Drawing these examples together, one observes that by repeatedly engaging with content and skills in each cycle, teachers and learners can observe gradual progress at every stage. Such an approach enables ongoing monitoring of how knowledge and skills improve, rather than assessing only a single final result. Ultimately, this iterative design not only facilitates learning but also makes growth visible and recordable throughout the teaching and learning process. This is consistent with Holm's (2011) framework, which emphasizes procedural sequencing and authentic tasks as core conditions for cognitive development in PBL contexts. (Mujiono et al., 2023; Poonpon, 2011; Sirisrimangkorn, 2018). These findings suggest that students require explicit guidance in evaluating the credibility of online sources, particularly in distinguishing between academic and non-academic materials. The relatively low use of .org and Wikipedia sources indicates an opportunity for instructors to scaffold source evaluation skills as an integral component of the PBL task cycle.

Conclusion

This study examined how reading logs and four stance questioning, embedded within a PBL framework, influenced the development of critical thinking and text comprehension of EFL business students. The findings indicate that reading frequency is a stronger predictor of higher-order critical engagement than vocabulary breadth alone, and that reflective documentation through reading logs supports students' ability to evaluate text credibility and

adopt analytical stances toward authentic texts. Moving from passive reading to active inquiry emerges as a primary mechanism for reducing learning anxiety and promoting sustained academic growth.

The use of reading logs as both a pedagogical tool and a data source proved effective in capturing evidence of students' evolving engagement with texts over time. The four-level stance questioning framework offered a principled and transparent basis for assessing critical thinking progression. The PBL task cycle served as a productive structure within which questioning and reflective documentation could be meaningfully embedded, allowing for observation of naturally occurring development rather than isolated performance on discrete tasks. Based on the finding of the study, it is suggested that EFL instructors prioritize reading frequency and structured inquiry over vocabulary-first instructional sequences. Classroom tasks should be designed to require active engagement with texts—through questioning, credibility evaluation, and reflective documentation—rather than treating reading as a preparatory stage for subsequent linguistic activities. Teachers may facilitate this by selecting texts relevant to students' broader project goals, thereby maintaining student motivation for continued reading engagement.

The implications of this study suggest specific benefits for EFL pedagogy to promote critical thinking. The findings show that using reading logs, questioning, and group discussions can help learners move from surface-level comprehension to deeper critical thinking. For students, this approach promotes analytical reasoning, reflective judgment, and higher cognitive engagement. For instructors, implementing a classroom cycle that transitions from individual reflection to collaborative discussion provides a structured means to foster non-linear cognitive development. Through consistent use of this method, students gain practice in essential skills and internalize key cognitive attributes required for critical thinking.

Future studies should examine the long-term effects of reading log interventions on the development of critical thinking across different proficiency levels and academic disciplines. Therefore, effective English as a Foreign Language (EFL) reading instruction requires a fundamental change in the teacher's role. Instead of focusing only on teaching comprehension strategies, teachers should design inquiry-based learning environments. Embedding reading within meaningful, project-driven tasks increases student engagement. Moreover, teachers should investigate the long-term effects of reading log-based assessment on student autonomy and examine how project-based reading frameworks impact reading motivation and effectiveness across varied EFL contexts.

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