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THE IMPACT OF SOCRATIC QUESTIONING ON ESP STUDENTS' READING COMPREHENSION, CRITICAL READING, AND ENGAGEMENT: A MIXED-METHODS INVESTIGATION

Sri Yuliani[1*], Amirul Mukminin[2], Eddy Haryanto[3]
[1]Universitas Muhammadiyah Palembang, Indonesia
[2,3]Universitas Jambi, Indonesia

Corresponding author's email: nyimasyuliani71@gmail.com

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Abstract: This study investigated the impact of Socratic Questioning (SQ) on ESP students' reading comprehension, critical reading skills, and engagement, while also exploring students' perceptions of its implementation in reading instruction. An explanatory sequential mixed-methods design was employed involving 30 ESP students enrolled in an English course at the Faculty of Economics and Business, Universitas Muhammadiyah Palembang. Quantitative data were collected using a 20-item reading test assessing reading comprehension and critical reading skills and a 10-item student engagement questionnaire. Qualitative data were obtained through classroom observations and semi-structured interviews with 10 selected participants. Quantitative data were analyzed using descriptive statistics and paired-samples *t*-tests, while qualitative data were analyzed thematically. The quantitative findings revealed significant improvements in students' reading comprehension, critical reading skills, and engagement following the implementation of SQ. The qualitative findings supported these results and revealed three prominent patterns: active meaning construction, evidence-based reasoning, and increased classroom participation. Students became more active and reflective readers by rereading texts, identifying relevant evidence, considering alternative interpretations, and articulating reasoned responses during classroom discussions. The integration of the quantitative and qualitative findings indicates that SQ promotes deeper comprehension and critical engagement by transforming reading into an interactive process of inquiry, dialogue, and evidence-based reasoning.The findings demonstrate the pedagogical potential of SQ for developing comprehension, critical reading, and active engagement in ESP reading instruction. ESP teachers are encouraged to integrate systematic Socratic questioning into reading activities while providing appropriate scaffolding to support students who may initially experience difficulty formulating and responding to higher-order questions. Effective time management is also necessary to balance dialogic discussion with other instructional objectives and ensure that SQ can be implemented sustainably in ESP classrooms.

Keywords: *Socratic questioning; ESP reading; critical reading; student engagement; mixed-methods.*

INTRODUCTION

Reading occupies a central position in English for Specific Purposes (ESP) because it enables learners to access disciplinary knowledge, specialized discourse, and professional practices. Unlike reading in General English, ESP reading requires learners to negotiate linguistic complexity alongside discipline-specific terminology, rhetorical conventions, conceptual relationships, and specialized ways of constructing knowledge. Consequently, successful ESP reading extends beyond decoding lexical and grammatical forms and requires learners to integrate textual information with

disciplinary knowledge, infer implicit meanings, evaluate claims, and determine the relevance and credibility of evidence. Recent empirical research confirms the complexity of these demands. Huang and Wible (2024), for example, demonstrated that disciplinary reading requires learners to negotiate the linguistic and conceptual characteristics of specialized texts, while Cui and Gardiner (2025) identified academic language-related challenges associated with English proficiency and learners' ability to succeed in content-based academic environments. In ESP contexts specifically, Bangkhadara et al. (2024) and Muhammadpour and Khalili Sabet (2024) demonstrated that reading performance is closely connected to learners' strategic engagement with specialized texts.

Recent research also suggests that ESP reading difficulties cannot be addressed adequately through instruction centered primarily on literal comprehension and information retrieval. Reading comprehension is an active cognitive process in which learners construct meaning by connecting textual propositions, activating background knowledge, generating inferences, monitoring comprehension, and evaluating interpretations. Bangkhadara et al. (2024) demonstrated that structured reading strategies contributed to university students' comprehension in an ESP course, whereas Erlangga et al. (2024) highlighted the importance of strategic engagement with online texts among ESP students. Similarly, Muhammadpour and Khalili Sabet (2024) found that an instructional intervention targeting reading strategies contributed to both comprehension and strategic reading behavior. More recent instructional innovations have extended ESP and EFL reading beyond conventional text-based practices through digital, collaborative, multimodal, and technology-supported approaches (Kim & Jeong, 2025; Wafiroh et al., 2025). Collectively, these developments indicate that contemporary ESP reading instruction needs to facilitate strategic meaning construction rather than simply test students' retrieval of textual information.

The challenge becomes more substantial when critical reading is considered. University students are expected not merely to understand texts but also to interrogate arguments, identify assumptions, evaluate evidence, recognize bias, compare perspectives, and construct reasoned judgments. Recent empirical evidence indicates that these abilities remain challenging for EFL learners. Le et al. (2024) identified difficulties among university students in applying critical reading strategies, while Nurhayati (2024) emphasized the importance of strategic awareness in critical reading comprehension. Kurniati (2024) similarly documented challenges associated with students' online critical reading skills, and Khathayut and Walker-Gleaves (2025) showed that learners' experiences of critical reading involve complex cognitive demands. Moreover, Mohammadi et al. (2023) demonstrated meaningful interrelationships among critical thinking, self-regulated learning, and reading comprehension. These findings indicate that comprehension and critical reading should not be treated as entirely separate processes; rather, deeper comprehension increasingly depends on learners' ability to monitor, interrogate, and evaluate textual meaning.

Such demands are particularly relevant in ESP because disciplinary texts embody specialized assumptions, rhetorical conventions, technical concepts, and professional perspectives. Students therefore need to evaluate not only what a text communicates but also how disciplinary knowledge and arguments are constructed. However, classroom reading instruction does not always provide sufficient opportunities for this form of intellectual engagement. Recent research on critical reading instruction has consequently emphasized pedagogical approaches that move students from passive reception toward active inquiry, collaborative interpretation, and evidence-based reasoning (Hidayanto et al., 2026; Jaya et al., 2025; Marzuki et al., 2026; Wafiroh et al., 2025). These instructional developments suggest that effective ESP reading pedagogy should simultaneously address comprehension, critical analysis, and students' active participation in meaning construction.

This issue was also evident in the instructional context motivating the present study. Preliminary classroom observations indicated that many ESP students could locate explicitly stated information, including facts, names, and textual details, but experienced considerable difficulty responding to inferential and evaluative questions. Their responses frequently reproduced portions of the text rather than demonstrating interpretation, evaluation, or synthesis. Students also encountered difficulties identifying authors' intentions, evaluating arguments, examining possible bias, and supporting interpretations with textual evidence. In addition, classroom interaction tended to be relatively passive, with

limited participation in extended discussions about the texts being read. These interconnected difficulties suggested a need for an instructional approach capable of supporting reading comprehension, critical reading, and active engagement simultaneously.

One pedagogical approach with considerable potential to address these interconnected challenges is Socratic Questioning (SQ). SQ organizes learning around purposeful and progressively challenging questions that encourage learners to clarify ideas, examine assumptions, identify evidence, consider alternative perspectives, and evaluate implications. Rather than providing interpretations directly, teachers use questions as cognitive scaffolds through which students articulate and refine their reasoning. In reading instruction, this process can reposition students from recipients of textual information to active readers who interrogate texts, defend interpretations, and reconsider their initial understanding.

The first major strand of recent research concerns SQ and reading comprehension. Mahmud and Tryana (2023) reported that Socratic questioning promoted reading comprehension by encouraging learners to interact more actively with textual meaning. Within the ESP field, Stojković and Zerkin (2023) further established the pedagogical relevance of the Socratic method by arguing that inquiry-oriented questioning can support disciplinary reasoning and learner participation. Recent evidence from Saputri et al. (2026) also indicates positive effects of Socratic questioning on EFL students' reading comprehension achievement. These findings converge with broader ESP reading studies demonstrating that active and structured reading processes can improve comprehension (Bangkhadara et al., 2024; Muhammadpour & Khalili Sabet, 2024). Collectively, this strand suggests that SQ may facilitate comprehension because students are required to explain, justify, and reconsider textual meaning rather than simply retrieve information.

A second strand concerns SQ and critical reading or critical thinking. Gunawan et al. (2024) demonstrated the potential of Socratic questioning for fostering university students' critical thinking, while Chang et al. (2024) found that an annotation-supported Socratic questioning approach strengthened critical thinking within language learning. Similarly, Shaheen and Mahmood (2024) reported an association between Socratic questioning and the development of critical thinking skills. More recent studies have extended these findings toward reading-related outcomes. Munir et al. (2025) demonstrated that questioning types can influence critical reading skills, while Febrianingrum and Munir (2025) associated Socratic Questioning 2.0 with deeper learning in English classrooms. Hayati et al. (2025) likewise reported improvements in critical thinking through Socratic questioning-based learning materials. Together, these findings indicate that systematic questioning can stimulate the evaluative and reflective processes central to critical reading.

A third strand concerns SQ and learner engagement. Socratic dialogue requires learners to respond, justify, reconsider, and interact with alternative perspectives, suggesting that its effects may extend beyond cognitive achievement to behavioral and cognitive engagement. Emerging evidence supports this proposition. Febrianingrum and Munir (2025) associated Socratic questioning with deeper participation in English learning, while Muliana et al. (2026) explicitly connected SQ with critical thinking and reading engagement in EFL classrooms. This relationship is important because contemporary research increasingly identifies engagement as a central component of successful reading development. Pratiwi et al. (2026) reported a relationship among digital reading activity, reading engagement, and reading comprehension, whereas Putra and Fiftinova (2026) highlighted the importance of attention in academic reading engagement. Similarly, technology- and collaboration-oriented studies have demonstrated that interactive learning environments can foster greater involvement in critical reading (Labibah et al., 2026; Nur et al., 2025; Wafiroh et al., 2025).

Despite these generally positive findings, the literature is not entirely conclusive. The effectiveness of questioning depends on the type, sequence, cognitive demand, and instructional support accompanying the questions. Haile (2024), for instance, emphasized the importance of teachers' questioning practices in facilitating reflective learning, while Munir et al. (2025) demonstrated that different questioning types can produce different consequences for critical reading. Thus, the mere presence of classroom questions does not necessarily produce deeper learning. Students who are unfamiliar with higher-order questioning may also require

sufficient scaffolding before they can formulate evidence-based responses, and extensive dialogic interaction may create time-management challenges in regular classroom instruction. This variability suggests that SQ should be investigated not only in terms of whether learning outcomes improve but also in terms of how students experience and respond to the questioning process.

The existing literature also reveals several methodological limitations. First, many studies have been conducted in general EFL, writing, critical-thinking, science, or broader educational contexts rather than discipline-specific ESP reading (Chang et al., 2024; Gunawan et al., 2024; Hayati et al., 2025; Shaheen & Mahmood, 2024). Second, existing research frequently examines comprehension, critical thinking or critical reading, and engagement as independent outcomes rather than as interconnected dimensions of reading development. Third, intervention studies commonly prioritize quantitative achievement measures, whereas qualitative studies emphasize experiences or perceptions without simultaneously establishing changes in learning outcomes. Consequently, current evidence remains fragmented across contexts, constructs, and methodological traditions.

Three related gaps therefore remain. Contextually, it remains insufficiently known whether the positive effects associated with Socratic questioning in general EFL and other educational contexts can be transferred to ESP reading, where learners must negotiate specialized vocabulary, disciplinary discourse, and domain-specific reasoning. Although Stojković and Zerkin (2023) established a pedagogical rationale for Socratic methods in ESP and recent ESP studies have investigated strategic reading interventions (Bangkhadara et al., 2024; Muhammadpour & Khalili Sabet, 2024), empirical evidence specifically examining SQ within ESP reading remains comparatively limited.

Integratively, it remains unclear whether SQ can simultaneously facilitate reading comprehension, critical reading skills, and learner engagement. Previous studies provide evidence for individual relationships—for example, SQ and comprehension (Mahmud & Tryana, 2023; Saputri et al., 2026), SQ and critical thinking (Chang et al., 2024; Gunawan et al., 2024), and SQ and engagement or deeper participation (Febrianingrum & Munir, 2025; Muliana et al., 2026)—but these outcomes have largely been investigated independently. This separation matters because comprehension, critical reading, and engagement are interrelated during authentic reading. Students need sufficient engagement to sustain critical interrogation, while critical evaluation may lead to more elaborate meaning construction and deeper comprehension.

Methodologically, it remains insufficiently understood how measurable changes associated with SQ correspond to students' experiences of the questioning process. Quantitative evidence can establish whether comprehension, critical reading, and engagement change following instruction, but it cannot fully explain how learners construct meaning through questioning, why they perceive particular questioning practices as beneficial or challenging, or what forms of scaffolding they require. Conversely, qualitative perceptions alone cannot establish whether measurable learning changes occur. A mixed-methods investigation is therefore necessary to integrate evidence concerning learning outcomes with evidence concerning the processes and experiences underlying those outcomes.

Novelty and Significance of the Study

The present study addresses these gaps by simultaneously investigating reading comprehension, critical reading skills, and learner engagement through Socratic Questioning within an ESP reading context. Its novelty lies in bringing these three theoretically interconnected outcomes into a single empirical framework rather than examining them independently. In this respect, the study extends previous research beyond general EFL reading and isolated cognitive or affective outcomes. It further integrates quantitative evidence of changes in reading comprehension, critical reading, and engagement with qualitative evidence of students' perceptions, thereby providing a multidimensional account of both the outcomes and experienced processes of SQ. To the best of the authors' knowledge, relatively few studies have simultaneously examined these three dimensions through an explanatory mixed-methods approach specifically within ESP reading instruction.

The study has theoretical significance because it contributes to the intersection of Socratic pedagogy, ESP reading instruction, critical reading, and learner engagement by conceptualizing SQ as a mechanism potentially connecting dialogic inquiry with comprehension,

evaluation, and participation. Rather than positioning comprehension, criticality, and engagement as independent outcomes, the study examines them as complementary dimensions of inquiry-oriented reading.

The study also has pedagogical significance for ESP instructors. Its findings may clarify how purposeful sequences of Socratic questions can be integrated into specialized reading activities to encourage students to clarify meanings, examine evidence, evaluate disciplinary claims, and justify interpretations. At the same time, examining students' experiences can identify implementation requirements, particularly the need for appropriate scaffolding, progressive questioning, and effective time management when students are unfamiliar with dialogic and higher-order reading activities.

Finally, the study has practical significance for curriculum designers and teacher educators seeking to incorporate inquiry-oriented pedagogy into ESP programs. Evidence concerning both learning outcomes and learner experiences may inform the design of reading tasks, teacher-questioning frameworks, professional development activities, and instructional materials that move ESP reading beyond literal comprehension toward active, critical, and evidence-based engagement with disciplinary texts.

Against this background, the present study investigates the impact of Socratic Questioning on ESP students' reading comprehension, critical reading skills, and engagement through an explanatory sequential mixed-methods design. Accordingly, the study addresses the following research questions: (1) Is there a significant difference in ESP students' reading comprehension before and after the implementation of Socratic Questioning? (2) Is there a significant difference in ESP students' critical reading skills before and after the implementation of Socratic Questioning? (3) Is there a significant difference in ESP students' engagement before and after the implementation of Socratic Questioning? (4) How do ESP students perceive the use of Socratic Questioning in supporting their reading comprehension, critical reading skills, and engagement?

Socratic Questioning (SQ) is a dialogic and inquiry-oriented instructional approach that promotes learning through systematic, purposeful, and progressively challenging questions. Rather than positioning students as passive recipients of information, SQ encourages them to clarify ideas, examine assumptions, evaluate evidence, consider alternative perspectives, and construct reasoned interpretations. Recent developments in English language education have further conceptualized SQ as an approach that supports deep learning by integrating reflective questioning, collaborative engagement, and critical thinking (Febrianingrum & Munir, 2025). Its relevance to reading instruction has also received increasing empirical support. Saputri et al. (2026) found that the implementation of Socratic Questioning contributed to significant improvements in EFL students' reading comprehension while encouraging critical engagement with argumentative texts, although learners still required guided practice when identifying implicit arguments, evaluating evidence, and constructing logical interpretations. Similarly, Muliana et al. (2026) demonstrated that Socratic Questioning can support reading comprehension, critical thinking, and reading engagement by encouraging learners to participate actively in inquiry-based reading activities. Within ESP instruction, these characteristics are particularly relevant because learners must engage with discipline-specific texts involving specialized terminology, rhetorical structures, evidence, and professional knowledge. Thus, SQ provides a potentially valuable pedagogical framework for transforming ESP reading from passive information retrieval into an interactive process of questioning, interpretation, evidence evaluation, and reasoned meaning construction.

Reading comprehension involves an active process of constructing meaning through the interaction of textual information, linguistic knowledge, prior knowledge, strategic processing, and readers' cognitive engagement. In ESP contexts, this process becomes particularly demanding because learners must simultaneously interpret specialized discourse, negotiate discipline-specific terminology and rhetorical structures, and connect textual information with relevant disciplinary knowledge. Recent empirical studies have demonstrated that strategic and interactive approaches to reading can strengthen ESP learners' comprehension and strategic engagement with specialized texts. Bangkhadara et al. (2024), for example, demonstrated that structured reading strategies enhanced university students' reading comprehension in an ESP course, while Erlangga et al. (2024) highlighted the contribution of collaborative and strategic engagement to ESP students' online text reading performance. Similarly, Muhammadpour and

Khalili Sabet (2024) found that an online hybrid reading intervention enhanced ESP students' reading comprehension and strategy use. More recent evidence specifically concerning Socratic Questioning further supports its relevance to reading instruction. Saputri et al. (2026) reported that Socratic Questioning improved EFL students' reading comprehension achievement, while Muliana et al. (2026) associated Socratic Questioning with critical thinking and reading engagement in EFL classrooms. Taken together, these findings suggest that SQ may strengthen reading comprehension by moving learners beyond literal information retrieval toward active inquiry, inference generation, interpretation, evidence evaluation, and reasoned meaning construction. Such processes are particularly valuable in ESP reading, where comprehension requires learners not only to understand what specialized texts communicate but also to examine how disciplinary meanings and arguments are constructed.

Critical reading extends beyond literal comprehension by requiring readers to analyze arguments, identify underlying assumptions, evaluate the relevance and credibility of evidence, recognize perspectives and potential bias, compare alternative interpretations, and formulate reasoned judgments. These competencies are particularly important in tertiary and ESP education, where students are expected to engage critically with increasingly complex academic and professional texts. Recent empirical evidence indicates that EFL learners continue to experience challenges in applying critical reading strategies effectively. Le et al. (2024) identified difficulties among university students in strategically analyzing and evaluating texts, while Nurhayati (2024) emphasized the importance of critical reading strategies in supporting deeper comprehension. More recent evidence from Azhipa et al. (2026) further indicates that critical reading requires learners to move beyond surface-level understanding toward more analytical and evaluative engagement with English texts. Socratic Questioning offers a potentially relevant pedagogical response because its systematic questions encourage learners to examine assumptions, interrogate evidence, consider alternative viewpoints, and justify interpretations. Gunawan et al. (2024) demonstrated the contribution of Socratic questioning to the development of critical thinking, while Munir et al. (2025) showed that different questioning types can influence students' critical reading skills. Taken together, these findings suggest that SQ may provide a pedagogical bridge between comprehension and critical reading by transforming reading from the passive reception of textual information into an inquiry-oriented process in which learners analyze claims, evaluate evidence, negotiate alternative perspectives, and construct and defend evidence-based interpretations.

Engagement represents another important dimension of effective reading instruction because meaningful comprehension requires students to invest cognitive effort and participate actively in learning. In reading classrooms, engagement can be reflected in sustained attention, participation in discussion, willingness to respond to questions, and active interaction with texts. Nur et al. (2025) found that interactive learning environments supported engagement in EFL critical reading. Recent EFL studies have likewise emphasized the relationship between reading engagement and reading-related outcomes (Pratiwi et al., 2026; Putra & Fiftinova, 2026). Furthermore, Muliana et al. (2026) specifically examined Socratic Questioning as an approach for enhancing critical thinking and reading engagement in EFL classrooms. Collectively, these findings indicate that SQ may contribute not only to students' cognitive processing but also to their active involvement in reading activities.

Reading comprehension, critical reading, and engagement should not be regarded as isolated learning outcomes. Comprehension provides the foundation for understanding textual meaning, critical reading extends this understanding toward analysis and evaluation, while engagement sustains students' cognitive and behavioral involvement throughout the reading process. Empirical evidence demonstrates meaningful relationships among critical reading, strategic learning, and reading comprehension (Le et al., 2024; Nurhayati, 2024), while recent studies have increasingly examined reading engagement alongside comprehension outcomes (Pratiwi et al., 2026; Putra & Fiftinova, 2026). Nevertheless, existing studies have generally investigated these dimensions separately. Research simultaneously examining reading comprehension, critical reading skills, and engagement through Socratic Questioning in an ESP context remains limited. Therefore, the present study integrates these three dimensions within a mixed-methods framework to provide a more comprehensive understanding of the pedagogical impact of Socratic Questioning on ESP students.

METHOD

This study employed an explanatory sequential mixed-methods design, integrating quantitative and qualitative approaches to examine the impact of Socratic Questioning (SQ) on ESP students' reading comprehension, critical reading skills, and engagement. In an explanatory sequential design, quantitative data are collected and analyzed first, followed by qualitative inquiry intended to explain, elaborate on, or contextualize the quantitative findings (James et al., 2024; Zhou et al., 2024). This design was selected because the study aimed not only to determine whether measurable changes occurred following the implementation of SQ but also to understand how students experienced the instructional process and how these experiences could explain the quantitative patterns.

The explanatory sequential design was considered more appropriate than convergent or exploratory mixed-methods designs because the qualitative phase was explicitly dependent on the results of the preceding quantitative phase. Integration occurred through connecting, whereby quantitative performance profiles informed the purposive selection of participants for follow-up interviews, and through the final interpretation, in which qualitative themes were used to explain and contextualize quantitative results (James et al., 2024; Zhou et al., 2024). Specifically, questionnaire and test results were first examined to identify students representing relatively high and moderate performance profiles. These profiles subsequently informed the selection of interview participants. Such explicit connections between phases strengthen integration and methodological transparency in explanatory sequential mixed-methods research (James et al., 2024).

The participants were 30 students enrolled in an English course at the Faculty of Economics and Business, Universitas Muhammadiyah Palembang. They were selected through purposive sampling because they were participating in an ESP-oriented English course relevant to the instructional objectives of the study. The participants were aged **18–21 years** and demonstrated **elementary-to-intermediate English proficiency**, based on their English course performance and initial reading assessment. Prior to the intervention, the participants had experience with conventional reading activities but had not previously received systematic instruction through Socratic Questioning.

The quantitative sample of 30 students represented the intact group accessible within the instructional setting. Although the sample enabled examination of within-group pretest–posttest changes, its relatively small size limits the broader statistical generalizability of the findings. Consequently, the results were interpreted within the specific instructional context investigated. The qualitative component was therefore particularly important for providing contextualized explanations of the quantitative patterns.

For the qualitative phase, 10 students were purposively selected from the quantitative sample based on their performance profiles. Five students represented relatively high scores and five represented moderate scores. Connecting quantitative profiles with qualitative participant selection is consistent with explanatory sequential mixed-methods integration, in which results from the first phase are used to purposively identify information-rich participants for subsequent qualitative investigation (James et al., 2024; Zhou et al., 2024). This selection was intended to capture variation in students' experiences of SQ rather than focusing exclusively on high-performing participants.

Table 1. *Profile of interview participants*

Participant	Age	English proficiency	Score profile	Previous SQ experience
S1–S5	18–21	Elementary–Intermediate	High	No systematic experience
S6–S10	18–21	Elementary–Intermediate	Moderate	No systematic experience

A 20-item test consisting of 10 reading comprehension and 10 critical reading items was administered before and after the intervention. The items assessed explicit comprehension, main ideas, inference, contextual meaning, argument identification, assumptions, evidence evaluation, perspectives, and reasoned conclusions. Three experts in ESP instruction, reading assessment, and ELT methodology evaluated the instrument for relevance, clarity, construct alignment, and appropriateness. Revisions were made based on their feedback, and the instrument demonstrated good internal consistency (KR-20 = .82).

Student engagement was measured using a

10-item, five-point Likert-scale questionnaire (1 = strongly disagree to 5 = strongly agree) covering attention, participation, persistence, and interaction with texts. Sample items included "I actively participate in discussions about the reading texts" and "I try to provide evidence from the text when explaining my answers." The questionnaire was validated by three experts and demonstrated good reliability (Cronbach's α = .86).

Classroom observations were conducted across four meetings using field notes and video recordings to document participation, responses to Socratic questions, use of textual evidence, and classroom interaction. Multiple qualitative sources were used to strengthen triangulation and credibility (Ahmed, 2024). Semi-structured interviews were subsequently conducted with 10 purposively selected students for approximately 20–30 minutes, primarily in Indonesian. The interviews explored students' experiences of SQ in relation to comprehension, critical reading, and engagement. Data adequacy was reached when the final interviews generated no substantively new themes.

Data collection followed the explanatory sequential design. Participants first completed the reading pretest and engagement questionnaire, followed by four meetings of SQ-based reading instruction and classroom observation. After the intervention, students completed the posttest and engagement questionnaire. Quantitative results were then used to select five relatively high-performing and five moderate-performing students for follow-up interviews, thereby explicitly connecting the quantitative and qualitative phases (James et al., 2024; Zhou et al., 2024).

Quantitative data were analyzed using IBM SPSS Statistics 26. Means and standard deviations were calculated, and the normality of difference scores was assessed using the Shapiro–Wilk test. Paired-samples *t*-tests were used to examine pretest–posttest differences at $p < .05$, while Cohen's *d* was calculated to determine effect sizes, with .20, .50, and .80 interpreted as small, medium, and large effects, respectively.

Qualitative data were analyzed thematically through familiarization, coding, categorization, theme development, and refinement. The first author conducted the primary coding, while a second researcher reviewed approximately 30% of the coded data; disagreements were resolved through discussion. Trustworthiness was strengthened through triangulation, member checking, peer debriefing, and an audit trail (Ahmed, 2024; Erdmann & Potthoff, 2023).

Quantitative and qualitative findings were integrated during participant selection and final interpretation. Qualitative themes were used to explain and contextualize quantitative patterns, enabling interpretation of both whether measurable changes occurred and how students experienced SQ (James et al., 2024; Zhou et al., 2024).

Ethical approval was obtained from the relevant institutional ethics committee before data collection. All participants provided informed consent and were informed that participation was voluntary and withdrawal would not affect their academic standing. Confidentiality and anonymity were maintained through participant codes and secure handling of research data.

RESULTS AND DISCUSSION

Quantitative findings

In quantitative data analyzed using descriptive statistics, including measures of central tendency (mean and standard deviation) to understand the overall distribution of scores. Additionaly, Additionally, inferential statistics, such as the T-test, were applied to compare the pretest and post-test results of ESP students' comprehension, students' critical skills, and students' engagement. This approach provided insights into whether the Socratic Questioning Method had a statistically significant impact on improving the reading skills of ESP students.

Table 1. *Paired samples statistics*

	Test	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-test	71.500	30	5.940	1.084
	Post-test	86.867	30	4.340	0.792

Source: Data processed using IBM SPSS Statistics 26

Table 1 presents the descriptive statistics of students' reading comprehension scores before and after the implementation of the instructional treatment. A total of 30 students participated in the study. The results indicate that the mean score on the pre-test was 71.500 (SD = 5.940**),** with a

standard error of the mean (SEM) of 1.084. Following the instructional treatment, the mean post-test score increased to 86.867 **(**SD = 4.340**),** with a standard error of the mean of 0.792. The increase in the mean score from 71.500 to 86.867 reflects an average improvement of 15.367 points in students' reading comprehension achievement. Furthermore, the lower standard deviation in the post-test compared to the pre-test (4.340 < 5.940**)** indicates that students' post-test scores were more consistent and less dispersed after the intervention.

Table 2. *Paired samples test*

Pair	Comparison	Mean Difference	Std. Deviation	Std. Error Mean	95% CI		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pre-test – Post-test	-15.367	6.205	1.133	-17.684	-13.050	-13.562	29	.000

Note. $p < .001$. The negative mean difference indicates that the post-test scores were higher than the pre-test scores.

The results of the Paired Samples t-test indicate that there was a statistically significant difference between students' reading comprehension scores before and after the implementation of the instructional treatment. As presented in the analysis, the mean score increased from 71.50 on the pre-test to 86.87 on the post-test, resulting in a mean improvement of 15.37 points**.**

The paired samples test yielded a t-value of -13.562 with 29 degrees of freedom (df = 29) and a two-tailed significance value of .000 (p < .001)**.** Since the significance value is lower than the alpha level of 0.05**,** the null hypothesis (H_0**)** is rejected, while the alternative hypothesis **(**H_1**)** is accepted. This finding demonstrates that the difference between the pre-test and post-test scores is statistically significant. Furthermore, the 95% confidence interval of the mean difference ranged from -17.68 to -13.05, indicating that the true mean difference is unlikely to be zero. This provides additional evidence that the instructional intervention had a positive effect on students' reading comprehension achievement.

Overall, the findings suggest that the implementation of the instructional method was effective in improving students' reading comprehension. The substantial increase in the post-test scores confirms that students demonstrated significantly better reading comprehension achievement after receiving the treatment compared with their initial achievement before the intervention.

Table 3. *Descriptive statistic pretest and post-test ESP students' critical reading skills*

	Test	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-test	67.833	30	6.724	1.227
	Post-test	84.633	30	5.112	0.933

Source: Data processed using IBM SPSS Statistics 26

The Paired Samples Statistics table presents the descriptive statistics of students' critical reading skills before and after the instructional intervention. A total of 30 students participated in both the pre-test and the post-test. The results show that the mean pre-test score was 67.833 (SD = 6.724, SEM = 1.227), indicating that students' critical reading skills were at a moderate level before the implementation of the instructional strategy. The relatively higher standard deviation suggests greater variability in students' initial performance. Following the instructional intervention, the mean post-test score increased substantially to 84.633 (SD = 5.112**,** SEM = 0.933). This represents an average improvement of 16.800 points, indicating that students demonstrated considerably better critical reading performance after receiving the treatment.

Table 4. *Pair sample t-test ESP critical reading skills*

Comparison	Pretest M (SD)	Posttest M (SD)	Mean Difference	SD Difference	SE	95% CI	t	df	p
Pretest–Posttest	67.83 (6.72)	84.63 (5.11)	−16.80	4.96	0.91	[−18.65, −14.95]	−18.542	29	< .001

The results demonstrated a substantial improvement in students' critical reading skills following the implementation of Socratic Questioning. The mean score increased from 67.83 (SD = 6.72) on the pretest to 84.63 (SD = 5.11) on the posttest, representing an average improvement of 16.80 points. The paired-samples t-test confirmed that this difference was statistically significant, $t(29) = -18.542$, $p < .001$, with a mean paired difference of −16.80 (SD = 4.96, SE = 0.91) and a 95% confidence interval ranging from −18.65 to −14.95. These findings indicate a statistically significant improvement in critical reading performance following SQ instruction.

These findings indicate that the instructional intervention had a statistically significant positive effect on students' critical reading skills. The large increase in the mean score, together with the highly significant t-value and narrow confidence interval, suggests that the intervention was highly effective in enhancing students' critical reading performance. Therefore, it can be concluded that the instructional method successfully improved students' critical reading skills after the treatment.

Table 5. *Descriptive statistics of ESP students' engagement*

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test Student Engagement	30	57	68	62.30	3.02
Post-test Student Engagement	30	78	89	83.43	3.02
Valid N (listwise)	30				

The Descriptive Statistics table summarizes the students' engagement scores before and after the implementation of the Socratic Questioning method. The analysis included data from 30 students, with no missing values, as indicated by the Valid N = 30. The results show that the mean pre-test score was 62.30 **(**SD = 3.02), with scores ranging from 57 to 68**.** These findings indicate that students' level of engagement was relatively moderate prior to the implementation of the instructional intervention. Following the implementation of the Socratic Questioning method, the mean post-test score increased substantially to 83.43 **(**SD = 3.02**),** with scores ranging from 68 to 89. This reflects an average improvement of 21.13 points, suggesting a considerable enhancement in students' engagement after the treatment.

Furthermore, the identical standard deviation (SD = 3.02) in both the pre-test and post-test indicates that the variability of students' engagement scores remained consistent across the two measurements. Although the spread of the scores did not change, the notable increase in the mean score demonstrates that the overall level of student engagement improved following the intervention. Overall, the descriptive statistics provide preliminary evidence that the implementation of the Socratic Questioning method had a positive impact on students' engagement. Students achieved considerably higher engagement scores after the intervention, indicating that the instructional method effectively promoted active participation and involvement in the learning process.

Qualitative findings

Observation classroom findings

This section aims to provide a comprehensive understanding of how the Socratic Questioning method functions in practice and to identify the factors that contribute to its success in the classroom. These classroom observation findings are particularly related to the research questions concerning the impact of Socratic Questioning on students' reading comprehension, critical reading skills, and engagement, as they provide observable evidence of students' participation, interaction, reasoning, and critical responses during the intervention.

Based on the data above, during the implementation of the Socratic Questioning method, students' engagement in class activities demonstrated a clear progression across the four meetings. In the first meeting, 12 out of 30 students actively participated in discussions, while only five questions were asked independently by students. By the fourth meeting, active participation increased to 28 students, and the number of questions initiated by students rose to 15, indicating that students gradually became more comfortable and confident in engaging with the material without prompting.

This finding directly addresses the research question concerning the impact of Socratic Questioning on student engagement, showing a progressive increase in active participation and independently initiated questions. Student interaction also improved over time. Initially, peer responses were limited, with most communication occurring between the lecturer and students. However, by the fourth meeting, student responses to peers' ideas became frequent and meaningful. Additionally, informal leadership among students emerged, with two students taking on guiding roles in the first meeting and seven students doing so by the final session. This development facilitated a more collaborative learning environment and encouraged quieter students to participate.

This observation further supports the research question on student engagement by demonstrating how SQ promoted increasingly active peer interaction, collaboration, and participation throughout the four meetings. Participation across students became more balanced over the sessions. While a few students dominated in the first meeting, the lecturer intervened strategically in subsequent meetings to ensure equitable opportunities for all students to contribute. The quality of student answers progressed from mostly brief responses in the first session to reasoned, evidence-based answers by the third and fourth meetings. Similarly, critical thinking skills improved, as students moved from few attempts at identifying assumptions or drawing conclusions to almost all students actively engaging in critical thinking by the fourth meeting. Students also increasingly related their answers to the ESP context, improving from 10 students in the first session to 28 students by the final meeting.

These findings are directly related to the research questions concerning critical reading skills and engagement, as the progression toward reasoned, evidence-based responses, identification of assumptions, and conclusion drawing demonstrates increasingly critical interaction with ESP texts.

Interview findings

The interview findings aims to provide a comprehensive overview of how the Socratic Questioning method has been applied in the context of English for Specific Purposes (ESP) reading classes. The description of interview finding related to the question:

"What do students perceive the implementation of Socratic Questioning method in ESP reading instruction?"

The interview findings directly address the research question concerning students' perceptions of the implementation of Socratic Questioning in ESP reading instruction, while also providing qualitative explanations for the research questions related to reading comprehension, critical reading skills, and engagement.

> "Socratic questioning in ESP reading classes is that it helps me think critically about the material. Rather than just reading to understand, I'm encouraged to ask myself why the author presents the information in a certain way. It became more active readers by rereading passages, identifying textual evidence, and discussing alternative interpretations before reaching conclusions. This method makes reading more meaningful because it challenges me to question and analyze the content deeply, which improves my comprehension and critical thinking skills." [S1]

This student points out that Socratic questioning promotes critical thinking by encouraging students to not only understand the content but also analyze and question the material. This deeper level of engagement helps improve both comprehension and critical thinking, making reading more meaningful and insightful.

This response directly relates to the research questions concerning reading comprehension and critical reading skills because the student perceived SQ as encouraging deeper comprehension, textual evidence identification, analysis, and critical interpretation.

> "Socratic questioning encourages me to engage with the text more actively. Instead of just passively reading, I ask myself questions that push me to think about the text's deeper meanings and connections to other ideas. This active engagement improves my ability to comprehend complex texts, which is especially useful in ESP reading, where the material is often more technical and specialized." [S2]

This response highlights how Socratic questioning fosters active engagement with the text. By encouraging students to ask questions and make connections, it helps them understand complex and specialized texts, which is particularly important in ESP reading, where the

material can be technical and challenging.

This finding addresses the research questions concerning reading comprehension and engagement, particularly through the student's reported active interaction with texts and deeper processing of specialized ESP content.

> "Socratic questioning helps me develop a deeper understanding of the material. It doesn't just focus on finding the right answer, but on exploring different perspectives and considering why things are presented in a certain way. This approach makes me more thoughtful and reflective, which is a huge advantage in ESP classes, where understanding the nuances of the content is crucial." [S3]

This student appreciates the reflective nature of Socratic questioning. By encouraging exploration and different perspectives, it helps students develop a more nuanced understanding of the material. This approach is especially beneficial in ESP, where the ability to understand subtle details and context is key to mastering the subject.

This response is linked to the research questions on reading comprehension and critical reading because it highlights deeper understanding, reflection, and consideration of multiple perspectives.

> "The Socratic questioning method encourages independent thinking, which is an advantage in ESP reading classes. Instead of relying on the teacher for answers, I am encouraged to find answers myself through deep analysis and questioning. This method fosters a sense of responsibility for my own learning, which makes me more confident in my reading abilities." [S4]

This student emphasizes the benefit of promoting independent thinking. Socratic questioning encourages students to take responsibility for their learning by engaging in self-directed analysis, which boosts confidence and fosters a sense of ownership over their understanding of the material.

This finding contributes particularly to the research questions concerning critical reading and engagement, as independent analysis and increased confidence reflect both cognitive and participatory involvement in ESP reading.

> "Socratic questioning helps improve both comprehension and critical thinking simultaneously. It pushes me to go beyond surface-level understanding and think about the text's purpose and implications. In ESP, where the content is often dense and specialized, this method helps me grasp not only the facts but also the deeper context and relevance." [S5]

This student acknowledges the dual benefit of improving both comprehension and critical thinking. Socratic questioning encourages students to understand the material more deeply by considering its broader context and implications, which is essential for tackling the often complex and specialized content in ESP reading.

This response directly addresses the research questions concerning reading comprehension and critical reading skills by demonstrating how students perceived SQ as supporting both deeper understanding and evaluation of textual purposes and implications.

> "Socratic questioning is that it makes the reading process more dynamic and interactive. Instead of just reading and answering questions, I engage in a dialogue with the text and with my classmates. This interactive element helps me understand the material better and encourages me to look at the text from different angles, which is especially helpful in ESP classes." [S6]

This response highlights the interactive nature of Socratic questioning, which encourages dialogue both with the text and peers. This dynamic approach makes reading more engaging and allows for a broader understanding of the material by exploring different viewpoints, a key advantage in ESP reading.

This finding is particularly connected to the research question on student engagement, while also supporting reading comprehension through active interaction with texts, peers, and alternative viewpoints.

> "Socratic questioning in ESP reading is that it promotes deeper reflection. I'm encouraged to think about the material in relation to real-life situations or other knowledge I have. This makes the learning process more relevant and helps me retain information better, as I can see how the material applies beyond the classroom." [S7]

This student highlights how Socratic questioning encourages real-world connections and deeper reflection. By relating the material to practical situations or prior knowledge, students

find the learning process more meaningful and memorable, which enhances retention and understanding in ESP reading.

This response relates primarily to the research question concerning reading comprehension because the student connected deeper reflection and prior knowledge with more meaningful understanding of ESP texts.

> "The Socratic questioning method helps improve my analytical skills. I am asked to break down the material, identify its key ideas, and consider their validity. This approach helps me become more analytical and methodical in my reading, which is important in ESP classes where the material often requires a more detailed and structured approach." [S8]

This student appreciates the method's focus on developing analytical skills. By breaking down the material and critically assessing its ideas, Socratic questioning helps students develop a more structured and detailed approach to reading, which is especially beneficial in the context of ESP, where analysis is often required.

This finding directly addresses the research question concerning critical reading skills, particularly students' abilities to analyze key ideas and evaluate their validity.

> "Socratic questioning makes the reading process more engaging and less passive. It encourages me to ask questions, reflect on the content, and engage in discussions. This active participation makes learning more enjoyable and meaningful, which helps me stay motivated and improve my reading skills in ESP." [S9]

This response emphasizes the increased engagement and motivation that Socratic questioning brings to the reading process. By promoting active participation and reflection, the method makes learning more enjoyable and relevant, which in turn helps students stay motivated and improve their skills in ESP reading.

This response directly addresses the research question concerning student engagement, particularly through active participation, questioning, discussion, reflection, and motivation.

> "Socratic questioning provides a platform for deeper exploration and encourages me to challenge the material. Rather than just absorbing information, I question its assumptions and consider its evidences and implications. This critical engagement not only enhances my understanding but also prepares me for more complex readings in ESP, where such skills are essential." [S10]

This student highlights how Socratic questioning encourages critical engagement with the material, fostering a deeper understanding. By challenging assumptions and considering broader implications, students develop skills that are essential for tackling more complex texts in ESP reading.

This finding directly addresses the research questions concerning critical reading and reading comprehension, as the student emphasized questioning assumptions, evaluating evidence and implications, and developing deeper understanding of complex ESP texts.

Regarding the first research question, the quantitative findings demonstrated a significant improvement in students' reading comprehension following the implementation of Socratic Questioning (SQ). The posttest results were substantially higher than the pretest results, indicating improvement in students' ability to identify main ideas, draw inferences, interpret vocabulary in context, recognize supporting details, and synthesize textual information. The qualitative findings further revealed that students became more deliberate readers, frequently rereading passages, searching for textual evidence, and considering alternative interpretations before drawing conclusions. Thus, the qualitative evidence helps explain the quantitative improvement by showing that students did not merely achieve higher scores but also reported changes in how they approached and processed texts. These findings suggest that SQ facilitates deeper comprehension by shifting reading from passive information retrieval toward active meaning construction. Through systematic and probing questions, students were encouraged to examine textual information more carefully and provide evidence for their interpretations. The findings confirm previous evidence that structured and interactive reading instruction can strengthen comprehension in ESP contexts (Bangkhadara et al., 2024; Erlangga et al., 2024; Muhammadpour & Khalili Sabet, 2024) and are consistent with Saputri et al. (2026), who specifically associated Socratic Questioning with improved EFL reading comprehension. However, the present study extends these findings by demonstrating that measurable comprehension gains were accompanied by students' reported

use of rereading, evidence searching, and alternative interpretation. Nevertheless, because the study involved a relatively small sample and no comparison group, the improvement should not be attributed exclusively to SQ. Increased familiarity with the reading materials, repeated exposure to assessment tasks, or the novelty of the instructional approach may also have contributed to the observed improvement.

Regarding the second research question, the findings indicated that SQ significantly enhanced students' critical reading skills. Following the intervention, students demonstrated greater ability to analyze arguments, identify assumptions, evaluate evidence, recognize potential bias, distinguish facts from opinions, and formulate evidence-based conclusions. The interview findings provided further insight into this improvement, revealing that students increasingly recognized the importance of supporting their interpretations with textual evidence rather than relying solely on personal opinions. This qualitative evidence elaborates on the significant quantitative improvement in critical reading by indicating how students developed more analytical and evidence-based approaches to textual interpretation. SQ therefore appeared to facilitate a transition from literal comprehension toward analytical and evaluative reading. The findings confirm recent research linking Socratic questioning with critical thinking (Gunawan et al., 2024) and questioning practices with critical reading development (Munir et al., 2025). The present study extends this evidence to the ESP reading context by showing that SQ can support the interrogation of discipline-related texts through attention to assumptions, evidence, and alternative interpretations. At the same time, the findings do not suggest that critical reading developed automatically. Classroom observations indicated that students initially produced relatively brief responses and required progressive support before providing more reasoned and evidence-based answers. This qualification is important because it suggests that the effectiveness of SQ may depend on scaffolding, students' familiarity with higher-order questioning, and sufficient opportunities for practice.

Regarding the third research question, the quantitative findings demonstrated a significant increase in students' engagement following the implementation of SQ. This improvement suggests that the approach influenced not only students' cognitive achievement but also their active involvement in the learning process. The qualitative and observational findings help explain this quantitative pattern: students reported greater willingness to participate, ask questions, discuss interpretations, and express their ideas, while classroom observations showed increasingly active peer interaction and participation across the meetings. Rather than receiving interpretations directly from the teacher, students were encouraged to articulate viewpoints, respond to questions, challenge ideas, provide evidence, and consider alternative interpretations. This finding is consistent with Muliana et al. (2026), who reported that SQ can facilitate critical thinking and reading engagement in EFL classrooms, while Pratiwi et al. (2026) identified an association between reading engagement and reading comprehension. The present findings extend this literature by suggesting that the dialogic characteristics of SQ may connect behavioral participation with cognitive engagement during ESP reading. However, an alternative explanation should also be considered. Because SQ represented a relatively unfamiliar instructional approach for the participants, part of the increase in engagement may reflect a novelty effect rather than the enduring influence of SQ itself. In addition, engagement questionnaire responses may have been affected by social desirability bias, as students may have been inclined to report favorable perceptions of an instructional approach used in their own course. The convergence with classroom observations strengthens the interpretation of increased engagement, but it does not completely eliminate these alternative explanations.

Regarding the fourth research question, the qualitative findings revealed predominantly positive student perceptions of SQ. Students reported that the questioning process encouraged them to reread texts more carefully, locate supporting evidence, evaluate competing interpretations, and communicate their ideas with greater confidence during classroom discussions. Their responses indicate that SQ facilitated active knowledge construction through guided inquiry rather than passive reception of information. Greater participation in questioning and discussion encouraged students to explain their interpretations, defend claims with textual evidence, and reconsider their initial understanding when confronted with alternative perspectives. This pattern corresponds with recent studies showing that Socratic questioning

facilitates reflective learning and higher-order thinking (Gunawan et al., 2024; Haile, 2024). However, the findings also reveal a more nuanced implementation process than the predominantly positive interview responses alone might suggest. Classroom observations showed initial hesitation, uneven participation, and the need for lecturer intervention to encourage quieter students. Thus, the findings partly qualify the assumption that dialogic questioning automatically produces active participation. SQ appears to require gradual adaptation, structured scaffolding, and deliberate classroom management.

These challenges have important pedagogical implications. ESP instructors may need to model Socratic question types, provide prompts or question stems, gradually increase the cognitive complexity of questions, and explicitly demonstrate how textual evidence can be used to justify responses. Sufficient discussion time is also necessary because formulating, defending, and reconsidering interpretations can require more classroom time than conventional question–answer activities. In larger or less proficient classes, instructors may consider small-group Socratic discussions before whole-class interaction to reduce participation anxiety and provide students with additional preparation time. Future research should therefore investigate how different levels of scaffolding, questioning complexity, group organization, and instructional time influence the effectiveness of SQ.

The integration of quantitative and qualitative findings provides a more comprehensive explanation of the results. For reading comprehension, the significant quantitative improvement was elaborated by students' descriptions of rereading texts, searching for textual evidence, and considering alternative interpretations. For critical reading, the significant increase in scores was complemented by qualitative evidence showing that students increasingly questioned assumptions, evaluated evidence, and constructed evidence-based interpretations. Similarly, the quantitative increase in engagement was explained by students' reports of greater participation and confidence and by classroom observations showing progressively stronger interaction and independently initiated questioning. Thus, the qualitative findings do not merely repeat the quantitative results; they help explain the processes through which the observed changes may have developed.

Taken together, the integrated findings suggest that comprehension, critical reading, and engagement may operate as mutually reinforcing dimensions within SQ-based ESP reading instruction. Increased participation creates opportunities for students to articulate and reconsider interpretations; systematic questioning encourages them to examine evidence and assumptions; and these processes may contribute to deeper textual comprehension. Nevertheless, these relationships should be interpreted as contextual patterns rather than causal relationships because the present design does not establish causal mechanisms among the three outcomes.

The findings should be interpreted within the context and limitations of the study. First, the sample consisted of only 30 ESP students from a single faculty at one institution, which limits the extent to which the findings can be generalized to other universities, disciplines, or proficiency levels. Second, the absence of a comparison group prevents the observed improvements from being attributed exclusively to SQ. Third, part of the engagement and perception data relied on students' self-reports and may therefore have been influenced by social desirability bias. Fourth, the relatively short intervention does not establish whether the observed improvements would persist over time. Possible alternative explanations, including repeated testing, increased familiarity with the instructional materials, instructor effects, and the novelty of SQ, should also be acknowledged.

Accordingly, the findings should be understood as context-specific evidence of the pedagogical potential of SQ rather than definitive evidence of its effectiveness across all ESP settings. Future studies should employ larger and more diverse samples, comparison or control groups, longer interventions, delayed posttests, and additional observational measures. Such research could determine whether the observed improvements are sustained and clarify how SQ operates across different ESP disciplines and instructional contexts.

CONCLUSION

This study demonstrates that Socratic Questioning can effectively support ESP students' reading comprehension, critical reading skills, and engagement by transforming reading instruction from passive information retrieval into an active process of inquiry, evidence-based reasoning, and collaborative meaning

construction. The quantitative findings showed significant improvements in all three outcomes, while the qualitative findings revealed generally positive student perceptions of SQ, particularly in encouraging deeper textual analysis, evidence-based interpretation, active participation, and confidence in classroom discussion. The integration of quantitative and qualitative findings indicates that students not only demonstrated improved learning outcomes but also became more actively involved in examining textual evidence, evaluating alternative interpretations, and articulating reasoned responses.

Pedagogically, these findings imply that ESP instructors can incorporate systematic Socratic questions into reading activities to promote deeper comprehension, critical engagement with discipline-specific texts, and more participatory classroom interaction. However, SQ should be introduced gradually and supported through appropriate scaffolding, question modeling, and sufficient discussion time, particularly for students who are unfamiliar with higher-order questioning. Effective time management and balanced participation are also important to ensure that the questioning process remains productive and inclusive. Theoretically, the findings contribute to ESP reading pedagogy by demonstrating how comprehension, critical reading, and engagement can operate as interconnected dimensions within a dialogic and inquiry-oriented learning environment.

Nevertheless, the study involved a relatively small sample from a single institution, employed a relatively short intervention, and relied partly on self-reported engagement and perception data. The absence of a comparison group also limits causal interpretation and broader generalizability. Future research should therefore involve larger and more diverse ESP populations, use experimental or quasi-experimental and longitudinal designs, include control or comparison groups, and examine the sustained impact of SQ on actual reading achievement. Cross-disciplinary comparisons are also needed to determine whether its effectiveness varies across ESP fields, proficiency levels, text genres, and instructional contexts.

Overall, this study contributes to ESP reading instruction by demonstrating the potential of Socratic Questioning as a structured pedagogical approach that connects comprehension, critical inquiry, and active learner engagement, while highlighting the scaffolding and instructional conditions necessary for its effective implementation.

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