Jurnal Pemberdayaan Masyarakat
Volume 5 Issue 1 Year 2026 | Pages 127–137
ykgm.org

E-ISSN 2962-8091
DOI: https://doi.org/10.46843/jpm.v5i1.708

Enhancing ESP Students' Critical Thinking and Communication skills through AI-Supported Case-Based Learning

Isnaini Eddy Saputro[1], Desi Surlitasari Dewi[2], Tiara Nove Ria[3], Mohammed Abbas Mahdi[4]
[1]Department of English Education, Universitas Muhammadiyah Sorong, Indonesia
[2]Department of English Education, Universitas Riau Kepulauan, Indonesia
[3]Department of Management, STIE Semarang, Indonesia
[4]Linguistics Department, University of Kerbala, Iraq

ABSTRACT

This study examined the effectiveness of Case-Based Learning (CBL) integrated with artificial intelligence (AI) tools in enhancing critical thinking and communication skills among English for Specific Purposes (ESP) students in higher education. The study was motivated by the growing need for ESP students to develop advanced reasoning and practical communication skills to meet academic and professional demands. Using a quasi-experimental pre-test–post-test control-group design, 237 ESP students participated, with 119 assigned to the experimental group and 118 to the control group. Over six weeks, the experimental group engaged in AI-supported CBL, while the control group received conventional CBL without AI tools. Data were collected using a critical thinking test adapted from the Watson–Glaser framework and a communication skills rubric and analyzed using Welch's t-tests. The results showed statistically significant improvements in critical thinking ($t = 25.567$, $p < .001$) and communication skills ($t = 24.981$, $p < .001$) in the experimental group compared to the control group. The findings confirm that AI-supported CBL has a substantial impact on students' higher-order thinking and communicative performance. This study contributes to ESP pedagogy by providing empirical evidence that integrating AI tools into CBL serves as an effective instructional model.

ARTICLE INFORMATION

Keywords:
artificial intelligence; case-based learning; critical thinking; communication skills; english for specific purpose

Correspondent Author:
Isnaini Eddy Saputro

Email:
isnaini1291@gmail.com

© Yayasan Keluarga Guru Mandiri. This is an open-access article under the CC Attribution 4.0 International License.
Article info: Submitted: 2025-12-05 | Revised: 2025-12-29 | Accepted: 2026-01-11 | Published: 2026-02-19
Recommended citation: Saputro, I. E., Dewi, D. S., Ria, T. N., & Mahdi, M. A. (2026). Enhancing ESP Students' Critical Thinking and Communication skills through AI-Supported Case-Based Learning. *Jurnal Pemberdayaan Masyarakat, 5*(1), 127-137.

INTRODUCTION

In recent years, higher education has witnessed a paradigm shift as artificial intelligence (AI) and digital technologies have increasingly integrated into language learning. These innovations have reshaped not only how English for Specific Purposes (ESP) instruction is delivered but also the competencies expected of 21st-century students (Dewi et al., 2023; Kohnke et al., 2021). Beyond linguistic proficiency, ESP students are now required to demonstrate strong communication skills and critical thinking, two interrelated skills essential for academic success and professional performance in globalized and technology-mediated workplaces (Canale & Swain, 1980; Richards, 2008). Universities, therefore, face the challenge of preparing ESP students with both advanced reasoning abilities and practical communicative skills that meet the demands of their specific disciplinary contexts.

A promising approach to address these needs is Case-based Learning (CBL), a student-centered instructional model that emphasizes meaning-focused communication through authentic tasks. CBL

has long been recognized for its potential to foster fluency, accuracy, and interactional competence while encouraging students to engage in problem-solving and reflection (Sapeni & Said, 2020; Akbulut & Hill, 2020). The integration of AI into CBL offers an even greater potential to enhance learning outcomes. AI-powered tools provide scaffolding, feedback, and personalization that traditional classroom interactions often cannot sustain due to time and resource limitations (Kundu & Bej, 2025). For example, ChatGPT can serve as a conversational partner or brainstorming assistant, Grammarly can provide real-time corrections and suggestions for writing, and AI-powered collaborative platforms can facilitate group problem-solving tasks. These tools allow students to rehearse, refine, and reflect upon their communication in iterative cycles, thereby deepening both their language competence and cognitive engagement (Kohnke et al., 2021). In the Indonesian context, where students frequently struggle with confidence and fluency in authentic communication, AI-assisted TBLT offers a valuable means of reducing anxiety, increasing autonomy, and motivating sustained participation.

Communication skills, which encompasses grammatical, sociolinguistic, discourse, and strategic dimensions (Canale & Swain, 1980), remains central to ESP instruction. Students who develop strong communication skills are better able to articulate domain-specific knowledge, negotiate meaning, and adapt language use to diverse contexts (Joe et al., 2015). However, research indicates that many Indonesian ESP students continue to struggle with communication beyond textbook-driven activities, often relying on rote learning rather than demonstrating authentic, purposeful use of English in professional scenarios (Bagni, 2023). CBL, supported by AI technologies, can help bridge this gap by immersing students in simulated workplace tasks, enabling them to practice English for meaningful outcomes while receiving continuous digital scaffolding.

Similarly, critical thinking is increasingly regarded as a cornerstone of higher education, involving interpretation, analysis, evaluation, and logical reasoning in decision-making (Zhang, 2023). However, traditional lecture-based ESP instruction often fails to cultivate these higher-order skills, focusing instead on memorization and language form (Nababan et al., 2023). By engaging students in inquiry-based, problem-solving tasks, CBL naturally fosters critical thinking (Hopper, 2018). The integration of AI adds further value, as tools such as AI-driven feedback systems and content generators can support reflective learning, offer diverse perspectives, and guide students through iterative reasoning processes (George, 2023; Kundu & Bej, 2025).

With the integration of AI tools, CBL can be further enhanced by providing immediate feedback, facilitating collaboration, and scaffolding students' engagement with complex communicative tasks (Kundu & Bej, 2025). AI-powered platforms such as ChatGPT, Grammarly, and digital collaborative tools can support ESP students in planning, rehearsing, and refining their language use, thus enriching both the process and outcomes of communicative learning. Moreover, AI-assisted environments promote collaborative learning by enabling students to co-construct ideas, negotiate meaning, and revise outputs collectively in real time. This process not only improves language accuracy and fluency but also encourages deeper cognitive engagement with case-based tasks. As a result, integrating AI into CBL enriches both the learning process and communicative outcomes by aligning language practice with authentic, problem-centered professional contexts.

Case-Based Learning (CBL) has also been proposed as a powerful pedagogical approach to address the limitations of traditional ESP instruction and foster deeper communicative and cognitive engagement. Rooted in constructivist theory, CBL situates learning in meaningful, discipline-relevant contexts that require students to analyze real-world scenarios, evaluate alternatives, and collaborate to generate solutions (Kolodner, 1993; Merrett, 2023). By shifting the focus from form-focused instruction to communication through meaningful tasks, CBL engages students in authentic interaction where language functions as a tool for achieving goals, negotiating meaning, and

collaborating with peers (Hopper, 2018; Hsu, 2016; Kulak & Newton, 2014). This process aligns naturally with the development of communication skills, as conceptualized by Canale and Swain (1980) and later elaborated by Celce-Murcia (2007), encompassing grammatical, sociolinguistic, discourse, and strategic competencies. These elements are activated when students interpret case details, articulate perspectives, and negotiate meaning in group settings (Morales & Limpot, 2023).

Moreover, when CBL tasks incorporate elements of analysis, reasoning, or decision-making, they directly stimulate critical thinking. Students must weigh evidence, justify conclusions, and make purposeful judgments—skills essential to higher-order reasoning (Crogman & Crogman, 2018). Prior research has demonstrated that CBL fosters both language development and cognitive growth (Gu & Guo, 2017; Hidayati, 2021; Kaur et al., 2020). Hassan et al. (2023) and Akbulut & Hill (2020) found that task-based, case-oriented activities promote authentic language use and enhance student interaction. Kulak and Newton (2014) reported that CBL increases motivation and participation even in large-group classrooms, while Kaur et al. (2020) highlighted its positive impact on higher-order thinking and sustained engagement. Similarly, studies conducted in Indonesian contexts confirm that CBL supports not only communicative development but also critical reflection and problem-solving (Dharmayanti, 2021; Hidayati, 2021; Samsudin, 2022).

Despite growing scholarly attention to CBL and AI in language education, empirical studies that quantitatively examine the dual impact of AI-supported CBL on communication skills and critical thinking remain scarce, particularly in ESP higher education contexts. Most prior research has focused on either communicative development or cognitive outcomes, often using qualitative methods such as classroom observations or student reflections. Moreover, studies situated in Indonesian universities remain limited, despite the pressing need for evidence-based practices to strengthen ESP learning. Addressing this gap, the present study investigates the extent to which AI-supported Case-Based Learning (CBL) enhances both communication skills and critical thinking among ESP students. Specifically, this study examines how the implementation of AI-supported CBL influences students' communication skills and critical thinking skills in ESP instructional contexts.

METHOD

This study employed a quantitative pre-test and post-test control group design (Creswell, 2014) to examine the impact of Case-Based Learning (CBL) integrated with Artificial Intelligence (AI) support on students' communication skills and critical thinking skills. This design enabled comparisons between an experimental group receiving the AI-assisted CBL intervention and a control group taught through conventional instruction, thereby providing a rigorous assessment of the intervention's effectiveness. The participants were 237 students enrolled in an English for Specific Purposes (ESP) course at a private university in Indonesia. They were randomly assigned to two groups: 119 students to the experimental group and 118 to the control group. All students participated voluntarily and were informed of the research's objectives. Ethical clearance for the study was obtained from the university's ethics committee, and informed consent was collected from each participant prior to data collection.

Data were collected through pre-test and post-test assessments of both critical thinking and communication skills. The critical thinking test was adapted from the Watson-Glaser Critical Thinking Appraisal, covering indicators of assumption recognition, drawing conclusions, and information interpretation. The communication skills test was designed based on Canale and Swain's framework and assessed grammatical, sociolinguistic, discourse, and strategic competencies. The scoring rubric was adapted from Joe et al. (2022) to ensure systematic evaluation of students' performance. All instruments underwent a pilot test with a separate group of 32 ESP students to ensure clarity, usability, and appropriateness for the target population. Minor adjustments were made to item

wording and task instructions based on pilot feedback. The reliability of the instruments was confirmed using Cronbach's alpha, yielding coefficients of α = .87 for the communication skills rubric and α = .83 for the critical thinking test, indicating strong internal reliability. Content and construct validity of the communication skills test were confirmed through expert judgment by two applied linguistics specialists, who awarded the instrument a validity score of 0.89, suggesting strong alignment with theoretical constructs.

The intervention was carried out over eight sessions within the ESP course. In the experimental group, students participated in CBL activities supported by AI tools, while the control group received conventional instruction without AI integration. In the first session, students in both groups completed the pre-tests for critical thinking and communication skills. In the experimental group, the lecturer introduced the principles of CBL and the role of AI in supporting learning. During sessions two to seven, students in the experimental group worked collaboratively on discipline-specific case studies that required analysis, decision-making, and communication. They were tasked with identifying problems, evaluating alternatives, and presenting solutions, using AI tools such as ChatGPT for generating ideas, Grammarly for refining language, and Padlet for collaborative discussions. The lecturer facilitated group work by modeling ethical AI use, monitoring progress, and guiding reflective activities. In contrast, the control group studied the same content through conventional ESP instruction that emphasized reading comprehension, vocabulary exercises, and structured writing tasks, but without case-based tasks or AI integration. In the final session, both groups completed post-tests for communication skills and critical thinking. Students in the experimental group also presented their case solutions, demonstrating how they applied language and reasoning skills during the process.

The data collected in this study were analyzed quantitatively using descriptive and inferential statistical techniques. Before conducting the main analysis, all data were first screened for completeness and accuracy. Descriptive statistics, including means, standard deviations, and percentage distributions, were used to summarize students' self-efficacy and critical thinking scores across the pre-test and post-test phases. This provided an initial overview of students' performance and the general trends in their learning outcomes following the implementation of PjBL with AI-integration. To examine the impact of the intervention more rigorously, paired-samples t-tests were used to compare students' self-efficacy and critical thinking skills before and after the implementation of the AI-integrated PjBL model. This statistical procedure was chosen because it is suitable for determining whether there are significant differences between two related sets of data collected from the same participants. The significance level (α) was set at 0.05 to determine statistical significance. Prior to conducting the t-tests, the normality assumption was tested using the Shapiro-Wilk test. The findings validated the use of parametric tests, as the data met the assumption of normality. To evaluate the extent of change between the pre-test and post-test scores, effect sizes (Cohen's d) were computed. All statistical analyses were conducted using IBM SPSS Statistics version 26. The findings were then interpreted to assess the extent of improvement in students' self-efficacy and critical thinking skills resulting from the integration of AI tools within the PjBL framework.

RESULTS AND DISCUSSION

The descriptive analysis reveals an improvement in students' critical thinking skills in both the experimental and control groups, with the experimental group showing a substantially higher mean score. This suggests that students who experienced Case-Based Learning (CBL) supported by AI demonstrated greater development in critical thinking compared to those taught through traditional methods. The comparison of mean scores is illustrated in Figure 1.

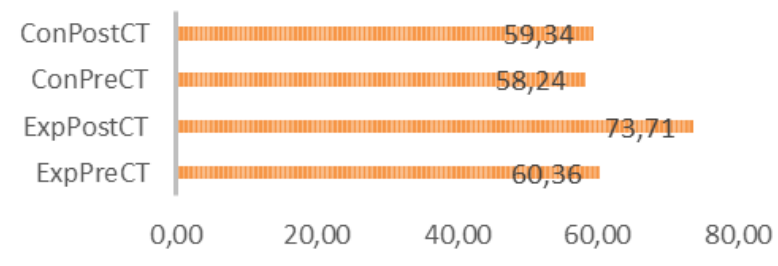

Figure 1. Mean of Critical Thinking Pre-And Post-Test Scores

With the mean score rising from 60.36 in the pre-test to 73.81 in the post-test (N = 119), the results showed a discernible improvement in critical thinking among students in the experimental group who were taught using Case-Based Learning (CBL) supplemented by AI. The control group, which received instruction via conventional methods, on the other hand, only slightly improved their scores, going from a pre-test mean of 58.24 to a post-test mean of 59.34 (N = 118). This discrepancy suggests that, despite both groups being exposed to the same ESP content, the incorporation of AI-supported CBL provided richer opportunities for analysis, inference, and reasoning, leading to greater development of critical thinking skills than traditional education. To assess the students' critical thinking abilities after Case-Based Learning was implemented. A normality test was conducted to ensure the data met the assumptions required for parametric testing, and to assess students' critical thinking abilities after Case-Based Learning (CBL) supported by Artificial Intelligence (AI) was implemented, compared with a conventional teaching approach. The Shapiro-Wilk test result (Sig = 0.0634) indicates that the data were normal. Table 1 shows the results of additional analyses using paired-samples t-tests.

Table 1. Paired Sample T-Test of Critical Thinking

Pair	Mean Difference	t-value	df	Sig. (2-tailed)
Pre- & Post-test of Experimental group	-13.34	-182.75	118	.000 (significant)
Pre- & Post-test of Control Group	-1.10	-39.43	117	.000 (significant)

Note: df=degree of freedom, Sig. = Significance value, t= score of difference

The results showed that students in the experimental group who received instruction utilizing the AI-supported Case-Based Learning (CBL) method significantly improved their critical thinking abilities. A significant performance improvement was indicated by the mean difference of -13.34 between the pre-test and post-test scores. This improvement was statistically significant, as indicated by a paired-samples t-test ($t(118) = -182.75$, $p < .001$). Although it was much lower, the control group, which was instructed using conventional teaching techniques, likewise demonstrated a statistically significant gain. This group's mean difference was -1.10, with a t-value of -39.43 and $p < .001$.

These findings imply that the AI-supported CBL strategy was significantly more effective at promoting higher-order reasoning, even though both strategies helped students build critical thinking skills. The controlled application of real-world scenarios, which forced students to recognize issues, assess supporting data, and defend their choices, was responsible for the experimental group's notable improvement. By providing quick feedback, eliciting diverse viewpoints, and supporting students' analytical reasoning, the incorporation of AI tools likely improved this process. When taken together, these elements explain why students in the experimental group outperformed those taught using traditional approaches.

An independent-samples t-test was performed after a paired-samples t-test for both groups. The Levene test was used to assess homogeneity prior to the test. With a F value of 38.214 and a significance level (p-value) of 0.000, the findings of Levene's Test for Equality of Variances

demonstrate a statistically significant result. Because the p-value is below the traditional alpha threshold of 0.05, this suggests that the assumption of equal variances between groups is broken. Therefore, rather than using the conventional independent samples t-test, which assumes equal variances, a Welch's t-test was performed using the findings from the row that does not assume equal variances. Table 2 displays the findings.

Table 2. Welch's Test of Critical Thinking

T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI Lower	95% CI Upper
21.690	186.414	.000	7.93042	.36563	7.20913	8.65172

The critical thinking post-test scores of students in the experimental group (who received AI-supported CBL training) and the control group (who received traditional education) are compared using Welch's t-test in Table 2. The test produced a p-value of.000 and a t-value of 21.69 with 186.41 degrees of freedom, suggesting that the difference between the two groups is statistically significant at the 0.001 level. The difference in critical thinking scores between the experimental and control groups is not only statistically significant but also practically and educationally relevant, according to an additional analysis of Cohen's d (1.99), which indicates a large effect size. Students' growth in critical thinking seems to have benefited significantly from the usage of AI-supported case-based learning.

The integration of AI likely offered more interactive, problem-solving-oriented, and personalized learning experiences, which could have fostered deeper cognitive engagement and reflective thinking. In contrast, the traditional method may have offered fewer opportunities for such cognitive stimulation, leading to the significantly lower improvement in critical thinking observed in the control group. Greater interactive, problem-solving-focused, and individualized learning experiences were likely enabled by the incorporation of AI, which may have encouraged deeper cognitive engagement and introspective thought. On the other hand, it is possible that the conventional approach offered fewer opportunities for this kind of cognitive stimulation, which is why the control group's critical thinking improved far less. The descriptive analysis reveals an improvement in students' communication skills in both the experimental and control groups, with the experimental group showing a substantially higher mean score. This suggests that students who experienced Case-Based Learning (CBL) supported by AI demonstrated greater development in communication skills compared to those taught through traditional methods. The comparison of mean scores is illustrated in Figure 2.

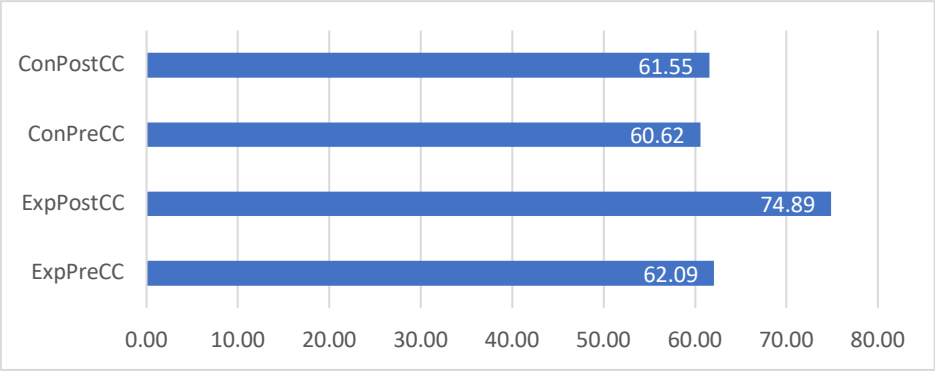

Figure 2. Mean of Communication skills Pre-and Post-Test Scores

According to the findings, students in the experimental group who received instruction through Case-Based Learning (CBL) with AI help showed a discernible increase in communicative ability. In the post-test, the mean score rose from 62.09 to 74.89 (N = 119). The control group, on the other hand, received instruction via conventional methods, and their scores increased by less than one point, from a pre-test mean of 60.62 to a post-test mean of 61.55 (N = 118). It demonstrates how the AI-supported CBL technique significantly improves students' communication skills. The experimental group's 12.80-point increase indicates a major pedagogical impact, as students received immediate scaffolding through AI tools like Grammarly and ChatGPT, which likely improved their language production and interaction skills, in addition to engaging with real-world cases. The control group, on the other hand, made very little development, indicating that conventional approaches were inadequate for fostering communication skills in the ESP setting. To ensure the data met the requirements for parametric testing, a normality test was conducted before performing a paired-samples t-test. The Shapiro-Wilk test result (Sig = 0.0512) indicates that the data were normal. Table 3 presents the results of paired-samples t-tests for the experimental and control groups.

Table 3. Paired Sample T-Test of Communication Skills

Pair	Mean Difference	t-value	df	Sig. (2-tailed)
Pre- & Post-test of Experimental group	-12.80	-242.35	118	.000
Pre- & Post-test of Control Group	-0.93	-40.11	117	.000

Paired sample t-tests revealed that the experimental group's improvement was statistically significant (t(118) = -242.35, p <.001), whereas the control group likewise demonstrated a statistically significant but negligible gain (t(117) = -40.11, p <.001). These results imply that, when compared to the conventional teaching method, the AI-supported CBL approach significantly improved students' communication skills. These results imply that, compared with the conventional teaching strategy, the AI-supported Case-Based Learning (CBL) approach was significantly more effective in improving students' communicative ability.

The strong statistical evidence highlights that authentic, case-driven tasks supported by AI tools provided meaningful opportunities for students to practice language use, negotiate meaning, and develop fluency, while conventional approaches offered limited progress. After conducting a paired-samples t-test for both groups, an independent-samples t-test was conducted. Prior to the test, a homogeneity test was conducted using the Levene test. The results of Levene's Test for Equality of Variances show a statistically significant outcome, with an F value of 27.827 and a significance level (p-value) of 0.000. This indicates that the assumption of equal variances between groups is violated, as the p-value is less than the conventional alpha level of 0.05. Therefore, a Welch's t-test, using the results from the row that does not assume equal variances, was conducted instead of the standard independent samples t-test that assumes equal variances. The results are presented in Table 4.

Table 4. Welch's Test of Experimental and Control Groups' Communication skills

t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% CI Lower	95% CI Upper
25.567	196.413	0.000	7.256	0.284	6.696	7.816

Welch's t-test showed a statistically significant difference between the two groups (t(196.413) = 25.567, p < .001). The difference in communication skills scores between the experimental and control groups is statistically significant, as indicated by an additional analysis of Cohen's d (3.65), which shows a large effect size. These results imply that the respondents' communicative skills were

significantly and consistently affected by case-based learning with AI support. This outcome is consistent with theoretical viewpoints that highlight how contextually situated, problem-based learning promotes pragmatic awareness and deeper language processing. Students were challenged to interact with peers, interpret meaning, and construct coherent discourse through involvement with real-world instances, all of which activated various aspects of communication skills. This process was further enhanced by the incorporation of AI technologies, which served as both linguistic models and cognitive scaffolds, providing students with instant feedback, expanded vocabulary options, and improved discourse structure in real time. When taken together, these factors explain why students in the experimental group outperformed those taught using traditional approaches in terms of gains.

The implementation of Case-Based Learning (CBL) supported by Artificial Intelligence (AI) and digital tools in this study has clearly demonstrated its effectiveness in enhancing both critical thinking skills and communication skills among ESP students majoring in Business. This outcome can be explained through several interconnected pedagogical and technological mechanisms. First, CBL situates learning in authentic, discipline-specific contexts that require students to engage in problem-solving, analysis, and meaning negotiation (Sapeni & Said, 2020). Such contexts naturally stimulate higher-order thinking while simultaneously creating opportunities for real-world language use. For business students in particular, discussing and resolving cases mirrors the communicative demands they will encounter in professional environments, thereby making learning more meaningful and transferable. This alignment with real-world communication supports the development of grammatical, discourse, sociolinguistic, and strategic competencies, as described in Canale and Swain's framework (1980). Second, the integration of AI tools significantly amplified the benefits of CBL by providing cognitive scaffolding and linguistic support (Kessler, 2018). For example, tools such as ChatGPT and Grammarly offered immediate feedback on both content and form, enabling students to refine their arguments and improve accuracy in real time. In this way, AI allowed students to focus more deeply on problem analysis and decision-making rather than struggling with surface-level language issues (Mahdi & Dewi, 2025). Unlike previous ESP studies that examined either CBL or AI-assisted learning in isolation, this study makes a novel contribution by systematically integrating AI tools into the CBL process, demonstrating how AI functions as an active pedagogical mediator rather than a supplementary aid.

Third, the findings highlight that traditional methods, while producing marginal gains, fall short of fostering the communicative and critical capacities needed in ESP contexts (Bortnyk, 2021; Hassan et al., 2023). The minimal improvements in the control group underscore the limitations of conventional instruction, which often emphasizes rote learning and decontextualized language practice. By contrast, the AI-supported CBL model encouraged student autonomy, collaboration, and reflection—three pillars of active learning that are repeatedly linked to improved educational outcomes in applied linguistics and higher education research.

Unlike the traditional approach, which primarily involved textbook exercises and teacher-led explanations, CBL placed students in realistic, business-related scenarios that required them to analyze, reason, make decisions, and communicate persuasively in English (Merrett, 2023). Throughout the intervention, students were consistently engaged in case discussions, business simulations, and collaborative problem-solving tasks that directly reflected the communicative demands of the professional business world. In every case activity, students had to define problems, evaluate multiple viewpoints, interpret business data, and formulate decisions or solutions. These processes activated the core components of critical thinking: inference, interpretation, analysis, evaluation, and explanation, as measured by the Watson-Glaser Critical Thinking Appraisal used in this study. The significant improvement in students' critical thinking scores in the experimental group (Sig. 0.000) validates the impact of the CBL model in promoting structured reasoning and reflective

judgment in ESP contexts. This empirical evidence contributes novel quantitative support to the growing body of ESP research by confirming that AI-enhanced CBL leads to statistically significant gains in critical thinking, an outcome that has been underexplored in prior ESP studies.

Additionally, the integration of AI tools functioned as both linguistic support and cognitive scaffolding (Hong & Lim, 2021). Students used ChatGPT to simulate dialogues, rehearse presentations, and generate draft arguments for business proposals, and used Grammarly and Rewordify to refine grammar and vocabulary in their scripts. This AI-supported environment allowed students to revise their ideas iteratively, engage with multiple forms of feedback, and improve their communicative performance both in spoken tasks (Wei, 2023; Yang et al., 2024). These AI-supported activities also enhanced their self-confidence in the ESP class and reduced anxiety. Furthermore, through collaborative platforms like Google Docs and Padlet, students could negotiate meaning, build arguments collaboratively, and practice persuasive communication. These features directly strengthened their communication skills, specifically their discourse, strategic, and sociolinguistic abilities, which are all essential for effective business communication (Mutohhari et al., 2021; Thornhill-Miller et al., 2023). Unlike the control group, where students often acted as passive recipients of information, the students in the experimental group demonstrated autonomy, self-confidence, and engagement. They took ownership of their learning and participated actively in the co-construction of knowledge. This shift from passive to active learning was a direct outcome of the instructional design, in which CBL and AI were employed not just as content-delivery tools but also as interactive mediators of critical and communicative skills.

The results imply that ESP instruction for business students must incorporate authentic, case-based tasks supported by AI to mirror the demands of real-world business practice more closely. Rather than isolating language instruction from content and context, this approach embeds English use within professional reasoning to make language learning both purposeful and transferable. From a scientific perspective, this study contributes to ESP and applied linguistics research by advancing a pedagogical model that empirically links AI-supported CBL with measurable improvements in both critical thinking and communication skills. This study also contributes to the emerging intersection of AI, critical thinking, and ESP in EFL education. It validates the use of AI not as a replacement for instruction but as an enabler of higher-order thinking and communication. It also demonstrates how digital tools can be systematically embedded into CBL to generate measurable gains in student outcomes and advances our understanding of technology-enhanced language pedagogy in ESP settings. By providing empirical evidence from an EFL business context, the findings extend current theoretical discussions on technology-enhanced learning and offer a replicable framework for future ESP research and instructional design.

CONCLUSION

This study demonstrates that Case-Based Learning (CBL) supported by Artificial Intelligence (AI) significantly enhances business students' critical thinking skills and communication skills in English for Specific Purposes (ESP) contexts. The findings show that students engaged in AI-assisted CBL were better able to analyze authentic business problems, construct well-reasoned arguments, and communicate solutions effectively in professional scenarios. The strategic use of AI tools such as ChatGPT, Grammarly, and Rewordify, along with collaborative digital platforms, provided pedagogical scaffolding that supported language accuracy, idea development, and interactive communication. The application of these results suggests that integrating AI-supported CBL into Business ESP curricula can lead to more effective, practice-oriented instruction that better prepares students for the communicative and cognitive demands of real-world business environments. By moving beyond

traditional, grammar-focused instruction toward task-driven and technology-enhanced learning, ESP programs can foster higher-order thinking and professional communication skills. Future research may examine the long-term impact of AI-supported CBL on workplace readiness, as well as its influence on other dimensions of communication skills, including intercultural communication and negotiation skills, while also considering students' digital literacy and attitudes toward AI.

DECLARATION OF GENERATIVE AI

The authors declare that no generative AI or AI-assisted technologies were used in the writing process of this manuscript.

CONFLICTING INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

FUNDING INFORMATION STATEMENT

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

REFERENCES

Akbulut, M. S., & Hill, J. R. (2020). Case-Based Pedagogy for Teacher Education: An Instructional Model. *Contemporary Educational Technology, 12*(2).

Bagni, M. (2023). ICT Tools in ESP Syllabus Design. *Iperstoria, 21*, 105–127.

Bortnyk, S. (2021). Key Issues of English for Special Purposes (ESP) Competence in Adult Education and Career Development. *Analele Universității „Dunărea de Jos" din Galați, Fascicula XX, Sociologie, 16*(1), 175-183.

Canale, M., & Swain, M. (1980). Theoretical Bases of Communicative Approaches to Second Language Teaching and Testing. *Applied Linguistics, 1*(1), 1–47.

Celce-Murcia, M. (2007). Rethinking the Role of Communicative Competence in Language Teaching. In *Intercultural Language Use and Language Learning* (pp. 41–57).

Crogman, H., & Crogman, M. T. (2018). Modified Generated Question Learning, and Its Classroom Implementation and Assessment. *Cogent Education, 5*(1).

Dewi, D. S., Waloyo, E., & Ria, T. N. (2023, November). The Impact of Technology-Based Learning on Students' Affective, Behavioral, and Cognitive Engagement in EFL Higher Education. In *Proceedings of UNNES-TEFLIN National Conference* (Vol. 5, pp. 167-179).

Dharmayanti, P. A. P. (2021). Case Based Learning In Language Teaching. *JOSELT (Journal on Studies in English Language Teaching), 2*(2), 13–19.

George, A. S. (2023). Preparing Students for an AI-Driven World: Rethinking Curriculum and Pedagogy in the Age of Artificial Intelligence. *Partners Universal Innovative Research Publication, 1*(2), 112-136.

Gu, P., & Guo, J. (2017). Digital Case-Based Learning System in School. *PLOS ONE, 12*(11), 1–15.

Hassan, A., Alawawda, M., Alzahrani, F., & Naz, N. (2023). Developing an ESP-Based Language Learning Environment to Help Students Improve Critical Thinking Skills in Written Output. *Information Sciences Letters, 12*(4), 1131–1140.

Hidayati, L. (2021). Case-Based Method and Its Implementation in English for Medical Purposes. *Journal of Language, Literature, and English Teaching (JULIET), 2*(2), 1–7.

Hong, S., & Lim, C. (2021). Development of Language Educators' Scaffolding Strategies Using an Artificial Intelligence Speaker. *Journal of Educational Technology, 37*(2), 309–341.

Hopper, M. (2018). Alphabet Soup of Active Learning: Comparison of PBL, CBL, and TBL. *HAPS Educator, 22*(2), 144–149.

Hsu, W. (2016). Harvard Business School (HBS) Case Method to Teaching English for Business Communication. *Education and Linguistics Research, 2*(2), 95.

Joe, J., Kitchen, C., Chen, L., & Feng, G. (2015). A Prototype Public Speaking Skills Assessment: An Evaluation of Human-Scoring Quality. *ETS Research Report Series, 2015*(2), 1-21.

Kaur, G., Rehncy, J., Kahal, K. S., Singh, J., Sharma, V., Matreja, P. S., & Grewal, H. (2020). Case-Based Learning as an Effective Tool in Teaching Pharmacology to Undergraduate Medical Students in a Large Group Setting. *Journal of Medical Education and Curricular Development, 7*, 238212052092064.

Kessler, G. (2018). Technology and the Future of Language Teaching. *Foreign Language Annals, 51*(1), 205–218.

Kohnke, L., Jarvis, A., & Ting, A. (2021). Digital Multimodal Composing as Authentic Assessment in Discipline-Specific English Courses: Insights From ESP Learners. *Tesol Journal, 12*(3), e600.

Kolodner, J. L. (1993). *Case-Based Learning*. Kluwer Academic Publishers.

Kulak, V., & Newton, G. (2014). A Guide to Using Case-Based Learning in Biochemistry Education. *Biochemistry and Molecular Biology Education, 42*(6), 457-473.

Kundu, A., & Bej, T. (2025). Transforming EFL Teaching With AI: A Systematic Review of Empirical Studies. *International Journal of Artificial Intelligence in Education*, 1-34.

Mahdi, M. A., & Dewi, D. S. (2025). Students' Experiences, Engagement, and Attitudes in the English Education Revolution: The Role of Interactive Technology. *International Journal of Educational Qualitative Quantitative Research, 4*(1), 1-14.

Merrett, C. G. (2023). Analysis of Flipped Classroom Techniques and Case Study Based Learning in an Introduction to Engineering Materials Course. *Advances in Engineering Education, 11*(1), 2–29.

Morales, R. O., & Limpot, M. (2023). A Structural Relationship Model of Communication Skills. *Asian Journal of Education and Social Studies, 47*(1), 26–42.

Mutohhari, F., Sutiman, S., Nurtanto, M., Kholifah, N., & Samsudin, A. (2021). Difficulties in Implementing 21st Century Skills Competence in Vocational Education Learning. *International Journal of Evaluation and Research in Education, 10*(4), 1229–1236.

Nababan, D., Marpaung, A. K., & Koresy, A. (2023). Strategi Pembelajaran Project Based Learning (PjBL). *Jurnal Pendidikan Sosial Dan Humaniora, 2*(2), 706–719.

Richards, J. C. (2008). *Teaching Listening and Speaking* (Vol. 35). Cambridge University Press.

Samsudin, A. (2022). The Implementation of Case Method in English Department of Politeknik Negeri Jember. *Journal of English in Academic and Professional Communication, 8*(1), 21–27.

Sapeni, M. A. A. R., & Said, S. (2020). The Effectiveness of Case-Based Learning in Increasing Critical Thinking of Nursing Students: A Literature Review. *Enfermeria Clinica, 30*, 182–185.

Thornhill-Miller, B., Camarda, A., Mercier, M., Burkhardt, J. M., Morisseau, T., Bourgeois-Bougrine, S., ... & Lubart, T. (2023). Creativity, Critical Thinking, Communication, and Collaboration: Assessment, Certification, and Promotion of 21st Century Skills for the Future of Work and Education. *Journal of Intelligence, 11*(3), 54.

Wei, L. (2023). Artificial Intelligence in Language Instruction: Impact on English Learning Achievement, L2 Motivation, and Self-Regulated Learning. *Frontiers in Psychology, 14*.

Yang, F., Li, K., & Li, R. (2024). AI in Language Education: Enhancing Students' Speaking Awareness Through AI-Supported Training. *International Journal of Information and Education Technology, 14*(6), 828–833.

Zhang, Z. (2023). Collaborative Learning in Social Constructivism: Promoting English Learning in a Secondary Classroom in China. *Journal of Education and Educational Research, 3*(3), 1–5.