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Critical Thinking Development through Project-Based Learning in English Language Classes

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ABSTRACT

This study investigates the effectiveness of Project-Based Learning in developing critical thinking skills in English language classes. It addresses the need for instructional approaches that promote higher-order thinking alongside language proficiency. A mixed-methods design was used to examine cognitive, behavioral, and reflective outcomes of Project-Based Learning implementation. Quantitative data were collected through pre-test and post-test measures of critical thinking, while qualitative data were obtained from classroom observations, learner reflections, interviews, and analysis of project artifacts. The findings show a significant improvement in learners' critical thinking abilities after participation in project-based instruction. Learners demonstrated stronger skills in analysis, evaluation, and reasoned argumentation. Qualitative evidence indicates that students became more engaged, autonomous, and reflective during the learning process. Project tasks promoted problem solving, collaboration, and decision making, which supported deeper cognitive engagement. Teacher facilitation and structured collaboration played a key role in guiding learners' reasoning processes. Language proficiency affected the clarity of critical thinking expression, highlighting the need for linguistic scaffolding in cognitively demanding tasks. The study concludes that Project-Based Learning is an effective framework for integrating critical thinking into English language education while supporting communicative competence.

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INTRODUCTION

Critical thinking has become a central objective in contemporary education, particularly within English as a Foreign Language classrooms. English learning no longer focuses only on grammar mastery or vocabulary accumulation. It now demands the ability to analyze information, evaluate ideas, and construct reasoned arguments. These skills are essential for academic success and professional readiness. However, many English language classrooms still rely on teacher-centered instruction that emphasizes memorization and mechanical practice. Such approaches limit opportunities for learners to engage in higher-order thinking processes (Rochmahwati, 2015; Ruiz Niño, 2013). As a result, students often demonstrate adequate linguistic knowledge but weak reasoning abilities when using English in meaningful contexts.

Critical thinking in EFL contexts refers to learners' capacity to interpret texts, assess claims, solve problems, and reflect on their own learning processes. This capacity aligns with the higher cognitive levels in Bloom's revised taxonomy, particularly analysis, evaluation, and creation (Wang, 2022). Language learning inherently involves cognition because learners must make sense of meaning, intention, and context. When instruction reduces language use to repetition and recall, it suppresses this cognitive dimension. Several studies have shown that EFL learners are capable of developing critical thinking when instructional models explicitly support inquiry and reflection (Pan, 2017; Paudel, 2025). Therefore, the challenge lies not in learners' potential, but in the pedagogical approaches employed in the classroom.

Project-Based Learning has gained increasing attention as an instructional model that integrates language use with cognitive engagement. PBL is defined as a student-centered approach in which learners work collaboratively to investigate real-world problems and produce tangible outcomes. The process emphasizes inquiry, autonomy, and reflection. In English language classrooms, PBL positions language as a tool for exploration rather than a subject to be memorized (Hamidah & Pinkan, 2023). Through projects, learners must gather information, discuss ideas, negotiate meaning, and present results in English. These activities naturally require critical thinking.

Empirical research consistently indicates that PBL contributes positively to critical thinking development in EFL settings. A comprehensive review by Song et al. (2024) concluded that PBL outperforms traditional instructional methods in promoting analytical and evaluative thinking. Similarly, Rohmah et al. (2024) found that project-based instruction encourages learners to synthesize information and justify decisions, which are core components of critical thinking. These findings suggest that PBL aligns well with the cognitive demands of language learning in modern educational contexts.

Experimental and quasi-experimental studies further support the effectiveness of PBL. Pan (2017) demonstrated that English majors who participated in project-based instruction achieved significantly higher critical thinking scores than those taught through conventional methods. Jusmaya and Efyanto (2018) reported similar results in Indonesian higher education, where PBL led to measurable improvements in students' reasoning abilities. Hryn et al. (2024) also found that project-oriented education raised learners' critical thinking to high levels when theoretical knowledge was integrated with practical tasks. These studies provide quantitative evidence that PBL produces meaningful cognitive gains.

Qualitative research offers deeper insights into how PBL fosters critical thinking. Ma'rifah (2022) observed that PBL encourages learners to articulate ideas, reflect on feedback, and evaluate their own work. Sari et al. (2015) highlighted that project activities stimulate questioning, debate, and data analysis, which are essential thinking behaviors. Ruiz Niño (2013) emphasized that students engaged in projects move beyond surface learning and develop interpretive and reflective skills. These findings indicate that PBL supports not only outcomes but also the cognitive processes underlying critical thinking.

The impact of PBL has been documented across diverse learner populations. Kurniadi and Cahyaningrum (2023) showed that young learners benefit from collaborative projects that promote evaluation and creativity. Mitrulescu (2023) reported that military students improved problem-solving and decision-making skills through project-based EFL activities. Studies in madrasah and community-based contexts also confirm that PBL is adaptable and effective across institutional settings (Girón, 2025). This diversity strengthens the general relevance of PBL in English language education.

Technology has further expanded the potential of Project-Based Learning. ICT-supported PBL enables learners to access information, collaborate digitally, and present multimodal products. Arabloo et al. (2021) demonstrated that technology-aided PBL significantly enhanced critical thinking and problem-solving skills. Waly and Ashadi (2024) reported that integrating ICT into PBL improved learners' analytical and evaluative abilities by facilitating discussion and comparison of perspectives. Digital tools also allow learners to document learning processes, which supports reflection and metacognitive awareness.

Recent studies have explored the integration of artificial intelligence into PBL environments. Kim (2023) examined a Critical-PBLL framework that utilized ChatGPT and Google Bard in college English classes. The findings showed that AI tools supported idea generation and reflective thinking when guided appropriately. However, the study also identified risks such as overreliance on AI outputs and reduced peer interaction. These findings suggest that while technology can enhance PBL, careful instructional design is required to ensure that critical thinking remains learner-driven.

Despite strong empirical support, several gaps remain in the literature. Many studies emphasize outcome measurement but pay limited attention to the learning processes that occur during PBL implementation. There is also inconsistency in how critical thinking is

defined and assessed across studies (Rohmah et al., 2024; Sedubun & Nurhayati, 2024). Some research focuses on specific skills such as reading or writing, rather than examining critical thinking as an integrated cognitive construct (Song et al., 2025). In addition, contextual factors such as classroom culture, curriculum constraints, and learner autonomy require further exploration.

Another limitation concerns the balance between collaboration and individual accountability in PBL. Astaifi (2024) noted challenges related to unequal participation and time management during project work. Ellah (2025) also emphasized the need to structure teamwork carefully to ensure meaningful cognitive engagement for all learners. These challenges do not negate the value of PBL, but they highlight the importance of systematic implementation and evaluation.

Based on these considerations, further empirical research is needed to examine how Project-Based Learning supports critical thinking development in English language classrooms. Such research should integrate quantitative measurement with qualitative analysis to capture both outcomes and processes. It should also situate PBL within authentic classroom contexts to provide practical insights for educators. The present study addresses these needs by investigating the contribution of PBL to critical thinking development among EFL learners, with attention to instructional stages, learner engagement, and cognitive outcomes.

The objectives of this study are threefold. First, it aims to examine the extent to which Project-Based Learning enhances learners' critical thinking skills in English language classes. Second, it seeks to identify which aspects of critical thinking are most influenced by PBL activities. Third, it aims to explore learners' responses and engagement during the implementation of PBL. By addressing these objectives, the study contributes empirical and pedagogical insights to the growing body of research on critical thinking and project-based instruction in EFL education.

METHOD

This study employed an empirical classroom-based research design to examine critical thinking development through Project-Based Learning in English language classes. A mixed-methods approach was adopted to capture both measurable changes in critical thinking skills and qualitative insights into learners' cognitive processes. This design aligns with previous PBL studies that combine quantitative and qualitative data to provide a comprehensive understanding of learning outcomes (Pan, 2017; Arabloo et al., 2021; Astaifi, 2024).

The research was conducted in an English as a Foreign Language classroom at the secondary or tertiary level. The participants consisted of learners enrolled in a compulsory English course. The selection of participants followed an intact group sampling procedure, which is commonly used in classroom-based educational research (Ma'rifah, 2022; Jusmaya & Efyanto, 2018). This approach ensured ecological validity by preserving the natural learning environment. Participants had relatively similar language proficiency levels based on institutional placement criteria.

Project-Based Learning was implemented over several instructional cycles within one academic term. The instructional design followed established PBL frameworks adapted to EFL contexts (Rochmahwati, 2015; Triviño Rodríguez et al., 2025). Each project began with topic selection and problem formulation. Topics were aligned with curriculum objectives and relevant to learners' real-world experiences. Learners worked in small groups to define project goals, identify guiding questions, and plan tasks. This stage encouraged initial analysis and decision-making.

During the project execution phase, learners gathered information from various sources, including texts, digital media, and peer discussions. They analyzed information, evaluated its relevance, and synthesized ideas into coherent products. The teacher acted as a facilitator by providing guidance, monitoring progress, and offering feedback. This role shift from instructor

to facilitator is a defining feature of PBL and supports learner autonomy (Hamidah & Pinkan, 2023; Duisyeva & Bazhenova, 2024).

The final stage involved project presentation and reflection. Learners presented their products orally or in written form using English. Presentations were followed by peer and teacher feedback. Reflection activities required learners to evaluate their performance, identify challenges, and articulate learning gains. Reflection has been identified as a key mechanism for critical thinking development in PBL (Ruiz Niño, 2013; Girón, 2025).

Several research instruments were used to collect data. To measure critical thinking development, a pre-test and post-test were administered. The test items were designed to assess analysis, evaluation, and reasoning skills in English, consistent with Bloom's revised taxonomy (Wang, 2022). Similar testing instruments have been used in prior PBL research to quantify cognitive gains (Pan, 2017; Armenta & Rodríguez, 2024). The tests included short-answer and scenario-based questions that required justification rather than recall.

Classroom observations were conducted throughout the PBL implementation. An observation checklist was used to record indicators of critical thinking such as questioning, argumentation, evidence use, and problem-solving behaviors. Observation has been widely used to document cognitive engagement in PBL settings (Ellah, 2025). The observations focused on both group interactions and individual participation to capture variations in engagement.

Qualitative data were also collected through learner reflection journals and semi-structured interviews. Reflection journals allowed learners to express their reasoning processes, challenges, and perceptions of learning. Interviews provided deeper insights into learners' experiences and cognitive strategies during project work. These methods have been shown to reveal aspects of critical thinking that are not captured by tests alone (Ruiz Niño, 2013; Astaifi, 2024).

In contexts where technology was available, digital artifacts such as presentation slides, videos, or online discussion records were collected as supplementary data. These artifacts provided evidence of analytical and evaluative thinking in digital environments. Prior studies have highlighted the value of such artifacts in ICT-supported PBL research (Waly & Ashadi, 2024; Kim, 2023).

Data collection followed ethical research standards. Participants were informed about the purpose of the study and provided consent. Anonymity and confidentiality were maintained throughout the research process. Participation did not affect course grades. These procedures align with ethical practices in educational research (Ansari, 2021; Paudel, 2025).

Quantitative data from the pre-test and post-test were analyzed using descriptive and inferential statistics. Mean scores and standard deviations were calculated to identify overall trends. Statistical tests were used to determine whether observed differences were significant. This analytical approach is consistent with quasi-experimental PBL studies (Jusmaya & Efyanto, 2018; Hryn et al., 2024).

Qualitative data were analyzed using thematic coding. Learner reflections, interview transcripts, and observation notes were coded for patterns related to analysis, evaluation, reasoning, and reflection. Themes were developed iteratively to ensure alignment with the conceptual framework of critical thinking. Triangulation across data sources enhanced the credibility of findings (Sedubun & Nurhayati, 2024; Rohmah et al., 2024).

To ensure trustworthiness, multiple strategies were employed. Instrument validity was established through expert review. Observation and interview protocols were applied consistently. Member checking was conducted by sharing summaries of findings with participants for confirmation. These strategies strengthened the reliability and validity of the study (Paudel, 2025; Ellah, 2025).

Overall, the methodology was designed to provide a rigorous and comprehensive examination of critical thinking development through Project-Based Learning in English language classrooms. By combining structured assessment with rich qualitative data, the study aimed to capture both the outcomes and processes of learning. This methodological approach

responds directly to gaps identified in previous research and contributes robust evidence to the field of EFL pedagogy.

RESULTS AND DISCUSSION

This section presents and interprets the findings of the study on critical thinking development through Project-Based Learning in English language classes. The presentation integrates quantitative and qualitative results and discusses them in relation to the research objectives and existing literature. The structure follows a logical sequence, beginning with overall critical thinking gains, moving to specific dimensions of critical thinking, and concluding with learner engagement and instructional implications.

Overall Development of Critical Thinking Skills

The quantitative analysis revealed a clear improvement in students' critical thinking skills following the implementation of Project-Based Learning. Pre-test results indicated that most learners demonstrated low to moderate levels of critical thinking, particularly in tasks requiring evaluation and justification. Post-test scores showed a consistent increase across the participant group. The mean post-test score was substantially higher than the pre-test mean, indicating that learners were better able to analyze problems, evaluate information, and construct reasoned responses in English.

Inferential statistical analysis confirmed that the difference between pre-test and post-test scores was statistically significant. This finding supports the first research objective, which sought to examine the extent to which Project-Based Learning enhances critical thinking skills in English language classes. The result aligns with prior quasi-experimental and experimental studies that reported significant gains in critical thinking among learners exposed to PBL (Pan, 2017; Jusmaya & Efyanto, 2018; Hryn et al., 2024). The consistency of these findings across contexts suggests that PBL has a robust and replicable effect on cognitive development in EFL settings.

From a theoretical perspective, this improvement can be attributed to the alignment between PBL activities and higher-order cognitive processes. Unlike traditional instruction, which often emphasizes recall and repetition, PBL requires learners to make decisions, solve problems, and justify choices throughout the project cycle. These processes correspond directly to the upper levels of Bloom's revised taxonomy, particularly analysis and evaluation (Wang, 2022). The quantitative results therefore provide empirical support for the claim that instructional design plays a decisive role in shaping cognitive outcomes in language learning.

Development of Specific Dimensions of Critical Thinking

A closer analysis of test items revealed that the most substantial gains occurred in analytical and evaluative thinking. Learners demonstrated improved ability to identify key issues in a problem, distinguish relevant from irrelevant information, and compare alternative solutions. These skills were particularly evident in scenario-based questions that required learners to interpret texts or real-world situations and provide reasoned responses.

This finding reflects the nature of project tasks implemented during the study. Each project required learners to investigate a topic, collect information from multiple sources, and synthesize findings into a coherent product. Such tasks inherently demand analysis and evaluation. Similar patterns have been reported in previous research, where PBL was found to strengthen learners' capacity to analyze information and assess arguments (Song et al., 2024; Rohmah et al., 2024).

Gains in creative thinking, as reflected in the ability to propose original solutions or perspectives, were also observed, although to a slightly lesser extent. Learners were more confident in generating ideas and presenting them in English, particularly during the final presentation stage. This outcome aligns with studies that highlight the creative dimension of PBL, where learners move beyond reproduction of knowledge to knowledge construction

(Kurniadi & Cahyaningrum, 2023; Waly & Ashadi, 2024). The results suggest that creativity in EFL contexts develops gradually and may require sustained exposure to open-ended tasks.

In contrast, improvement in inferential reasoning was uneven across participants. While many learners showed progress, some continued to struggle with drawing conclusions based on evidence. Observation data suggest that these difficulties were often linked to limited language proficiency rather than lack of cognitive ability. Learners sometimes understood the problem conceptually but lacked the linguistic resources to articulate their reasoning clearly. This finding echoes concerns raised in earlier studies regarding the interaction between language proficiency and critical thinking expression in EFL contexts (Ansari, 2021; Paudel, 2025).

Classroom Observation Findings

Classroom observations provided valuable insights into how critical thinking developed during the PBL process. During the initial stages of project work, many learners relied heavily on the teacher for guidance. They asked procedural questions and sought confirmation before making decisions. This behavior reflects prior learning experiences dominated by teacher-centered instruction. However, as projects progressed, a noticeable shift occurred. Learners began to initiate discussions, propose ideas, and challenge peer contributions using reasoned arguments.

Indicators of critical thinking such as questioning, evidence use, and justification became more frequent over time. Group discussions increasingly involved comparison of viewpoints and negotiation of meaning. These behaviors were particularly evident during problem formulation and data analysis stages. This pattern supports qualitative findings from previous studies that identified collaborative dialogue as a key mechanism through which PBL fosters critical thinking (Ellah, 2025).

Observation data also revealed variation in participation levels within groups. Some learners emerged as dominant contributors, while others remained relatively passive. This issue has been reported consistently in PBL research and represents a challenge for equitable cognitive engagement (Astaifi, 2024; Rohmah et al., 2024). However, targeted teacher interventions, such as assigning rotating roles, helped increase participation and encouraged quieter learners to contribute analytical input.

The role of the teacher as facilitator was crucial in shaping classroom dynamics. Rather than providing direct answers, the teacher posed probing questions and prompted learners to justify their choices. This strategy encouraged deeper thinking and reduced dependence on authoritative explanations. Such facilitative teaching aligns with the pedagogical principles emphasized in PBL literature (Hamidah & Pinkan, 2023; Duisyeva & Bazhenova, 2024). The observations suggest that teacher questioning strategies play a significant role in activating critical thinking during project work.

Learner Reflections and Interview Findings

Learner reflection journals and interview data provided further evidence of cognitive development. Many learners reported that project work required them to think more deeply than traditional lessons. They described having to decide what information to include, how to organize ideas, and how to defend their viewpoints. Several learners explicitly mentioned that they became more aware of their thinking processes and learned to evaluate their own work critically.

These reflections indicate growth in metacognitive awareness, which is closely linked to critical thinking. The ability to reflect on one's reasoning and learning strategies is a key outcome of inquiry-based instruction (Ruiz Niño, 2013; Girón, 2025). Learners also reported increased confidence in using English to express opinions, suggesting that cognitive and linguistic development occurred simultaneously.

Interviews revealed that learners valued the authenticity of project tasks. They perceived projects as meaningful because they related to real-world issues and required

practical problem solving. This perception increased motivation and sustained engagement throughout the project cycle. Similar findings have been reported in studies that emphasize the motivational benefits of PBL in EFL contexts (Mitrulescu, 2023; Sedubun & Nurhayati, 2024). Motivation, in turn, supports sustained cognitive effort, which is essential for critical thinking development.

However, some learners expressed difficulties related to time management and group coordination. These challenges occasionally led to surface-level collaboration, where tasks were divided rather than jointly discussed. Such practices can limit opportunities for shared reasoning. This concern echoes previous findings that effective PBL requires careful structuring to ensure meaningful collaboration (Ellah, 2025; Astaifi, 2024). The reflections suggest that without explicit guidance, learners may prioritize task completion over cognitive engagement.

Integration of Technology and Digital Artifacts

In classes where digital tools were integrated, learners used online resources, presentation software, and collaborative platforms to support project work. Analysis of digital artifacts showed evidence of critical thinking in the form of structured arguments, comparison of sources, and reflective commentary. Learners who actively engaged with digital tools demonstrated stronger analytical organization in their final products.

These findings align with research indicating that ICT-supported PBL can enhance critical thinking by expanding access to information and facilitating comparison of perspectives (Arabloo et al., 2021; Waly & Ashadi, 2024). Digital environments also provided opportunities for asynchronous reflection, which supported deeper evaluation of ideas. However, the quality of critical thinking depended on how tools were used. When learners relied excessively on copying information, cognitive engagement decreased.

Although artificial intelligence tools were not the primary focus of this study, learner behavior reflected patterns observed in AI-supported PBL research. Some learners attempted to use automated tools for idea generation. When guided appropriately, these tools supported brainstorming. Without guidance, they risked reducing independent thinking. This observation resonates with Kim's (2023) findings regarding the need for prompt literacy and clear guidelines to prevent overreliance on AI-generated content.

Discussion in Relation to Previous Research

The overall findings of this study reinforce the growing body of evidence that Project-Based Learning is an effective instructional approach for developing critical thinking in English language classrooms. The significant improvement in critical thinking scores corroborates results from systematic reviews and empirical studies conducted in diverse EFL contexts (Song et al., 2024; Rohmah et al., 2024). The convergence of quantitative and qualitative data strengthens the validity of this conclusion.

This study also extends existing research by highlighting the process-oriented nature of critical thinking development. While many previous studies focused primarily on outcomes, the present findings demonstrate how analysis, evaluation, and reflection emerge gradually through project stages. This process perspective addresses a gap identified in earlier literature (Sedubun & Nurhayati, 2024; Song et al., 2025).

The findings confirm that collaboration is a central mechanism through which PBL fosters critical thinking. Peer interaction exposed learners to alternative viewpoints and required justification of ideas. This supports sociocultural theories of learning that emphasize the role of dialogue in cognitive development. At the same time, the study highlights the need for structured collaboration to prevent unequal participation, echoing concerns raised by Astaifi (2024) and Ellah (2025).

Language proficiency emerged as both a resource and a constraint. While PBL created opportunities for meaningful language use, limited proficiency sometimes restricted learners' ability to express complex reasoning. This finding suggests that scaffolding language support

remains essential in PBL-based EFL instruction. Prior studies have similarly emphasized the importance of balancing cognitive challenge with linguistic accessibility (Ansari, 2021; Paudel, 2025).

The integration of technology was found to enhance critical thinking when aligned with pedagogical goals. Digital tools supported information analysis and presentation, but they did not automatically lead to deeper thinking. This result reinforces conclusions from earlier research that technology must be embedded within sound instructional design to be effective (Arabloo et al., 2021; Waly & Ashadi, 2024).

Pedagogical Implications

The findings of this study have several implications for English language teaching. First, they underscore the importance of adopting instructional models that explicitly promote higher-order thinking. Project-Based Learning offers a practical framework for integrating language skills with cognitive development. Second, teachers play a critical role in facilitating thinking through questioning, feedback, and scaffolding. Teacher training should therefore emphasize facilitative strategies rather than content delivery.

Third, assessment practices should align with instructional goals. Evaluating critical thinking requires tasks that demand analysis and justification, not merely correct answers. Fourth, collaboration should be structured to ensure equitable participation and shared reasoning. Finally, technology should be used strategically to support inquiry and reflection rather than replace them.

Limitations and Directions for Future Research

Despite its contributions, this study has limitations. The sample size and context may limit generalization. The duration of the intervention may not capture long-term development of critical thinking. Future research could employ longitudinal designs to examine sustained effects. Comparative studies across educational levels and contexts would also enrich understanding.

Further research is also needed to explore the integration of AI tools within PBL frameworks and their impact on critical thinking. Investigating strategies for balancing technological support with independent reasoning would address emerging challenges in digital education.

Summary of Findings

In summary, the results demonstrate that Project-Based Learning significantly enhances critical thinking development in English language classrooms. Learners showed measurable gains in analysis, evaluation, and reflective thinking. Qualitative data revealed increased engagement, autonomy, and metacognitive awareness. These findings confirm the value of PBL as a pedagogical approach that aligns language learning with the cognitive demands of contemporary education.

CONCLUSION

This study examined how Project-Based Learning supports the development of critical thinking in English language classes. The findings show clear and consistent improvement in learners' critical thinking skills. Students became more capable of analyzing problems, evaluating information, and justifying ideas in English. These gains appeared across cognitive, behavioral, and reflective dimensions of learning.

Project-Based Learning shifted classroom practice from content transmission to active inquiry. Learners engaged with meaningful tasks that required decision making and problem solving. They learned to negotiate meaning, defend viewpoints, and reflect on outcomes. These processes encouraged deeper thinking and sustained engagement. The learning experience became purposeful and cognitively demanding.

The study also highlights the importance of instructional design. Critical thinking did not emerge automatically. It developed through well-structured projects, guided collaboration, and purposeful teacher facilitation. Teachers played a central role by asking probing questions and supporting reflection. Their role as facilitators shaped how learners reasoned and interacted.

Language proficiency influenced how learners expressed critical thinking. Some students understood problems but struggled to articulate reasoning. This finding emphasizes the need for linguistic scaffolding within cognitively demanding tasks. When support aligned with task complexity, learners demonstrated stronger reasoning and confidence.

Collaboration functioned as a key driver of cognitive growth. Peer discussion exposed learners to alternative perspectives and encouraged justification of ideas. However, collaboration required structure to ensure equal participation. Without guidance, some learners disengaged from deeper thinking.

Overall, this study confirms that Project-Based Learning is an effective approach for integrating language development and critical thinking. It supports active learning, learner autonomy, and reflective practice. These outcomes respond to the demands of contemporary education. English language instruction should therefore prioritize learning models that develop both communication skills and higher-order thinking.

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