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Cultivating Critical Thinking in History Education through Problem-Based Learning: A Case Study from Post-Colonial Indonesia

Destiana Safitri [1]✉, Arif Purnomo [2], Ganda Febri Kurniawan [3], Dimas Anggoro [4]

[1] Kebumen Senior High School 2, Indonesia
[2] Faculty of Social and Political Sciences, Universitas Negeri Semarang, Indonesia
[3] Doctoral School of Education, Eötvös Loránd University, Hungary
[4] History Education Program, Universitas Negeri Semarang, Indonesia

ABSTRACT

This study critically examines the cultivation of critical thinking skills through Problem-Based Learning in history education at SMA Negeri 2 Kebumen, Indonesia. Drawing on qualitative case study methodology, the research investigates how PBL implementation shapes students' critical thinking development across twelve indicators derived from Ennis's critical thinking framework. The findings reveal that while students demonstrated competency in eight indicators including focusing questions, analysing arguments, and interacting with others, four indicators remained underdeveloped: deduction and induction, defining terms, and identifying assumptions. This study argues that PBL's effectiveness in history education depends significantly on teacher facilitation quality, student readiness, and the extent to which critical thinking is explicitly taught rather than assumed to develop incidentally. The research contributes to international conversations about active learning pedagogies in post-colonial history education contexts, highlighting both the potential and limitations of PBL for developing historical thinking competencies.

KEYWORDS
Critical Thinking; Problem-Based Learning; History Education; Post-Colonial Pedagogy; Indonesia

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ABSTRAK

Studi ini mengkaji secara kritis penumbuhan keterampilan berpikir kritis melalui Problem-Based Learning (PBL) dalam pendidikan sejarah di SMA Negeri 2 Kebumen, Indonesia. Dengan metodologi studi kasus kualitatif, penelitian menyelidiki implementasi PBL terhadap dua belas indikator berpikir kritis dari kerangka Ennis. Temuan menunjukkan siswa kompeten pada delapan indikator, seperti memfokuskan pertanyaan dan menganalisis argumen, namun empat indikator lain masih kurang berkembang, yakni deduksi dan induksi, pendefinisian istilah, serta identifikasi asumsi. Studi berargumen bahwa efektivitas PBL bergantung pada kualitas fasilitasi guru, kesiapan siswa, dan pengajaran eksplisit berpikir kritis. Penelitian ini berkontribusi pada wacana pedagogi aktif dalam konteks sejarah pascakolonial, menyoroti potensi dan keterbatasan PBL.

KATA KUNCI
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CONTACT Destiana Safitri ✉ destiana.teacher@gmail.com, Kebumen Senior High School 2, 54317 Kebumen, Indonesia
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Introduction

The twenty-first century demands educational approaches that move beyond knowledge transmission toward the cultivation of higher-order thinking skills essential for navigating complex, information-rich environments (Meirbekov et al., 2022; Santos-Meneses & Drugova, 2023). Among these competencies, critical thinking occupies a position of particular significance, recognised globally as fundamental to academic success, professional effectiveness, and democratic citizenship (Saldıray & Doğanay, 2024; Simonovic et al., 2023). Critical thinking enables individuals to analyse information, evaluate evidence, construct arguments, and make reasoned judgments, capacities increasingly vital in an era of misinformation and rapid technological change.

In the context of history education, critical thinking assumes distinctive significance. Historical understanding requires more than factual recall; it demands the capacity to interrogate sources, evaluate competing interpretations, construct evidence-based arguments, and recognise the constructed nature of historical narratives (Seixas et al., 2013; Wineburg, 2001). These competencies distinguish historical thinking from generic critical thinking, involving specific disciplinary practices including sourcing, corroboration, contextualisation, and perspective-taking (Sendur et al., 2021; Wineburg, 2001). History education, therefore, occupies a strategic position for developing students' critical thinking capacities while simultaneously cultivating historical consciousness and national identity (Rüsen, 2005; Thorp & Persson, 2020).

Indonesia, as a post-colonial nation with a complex history of nation-building and contested historical narratives, presents a particularly significant context for examining critical thinking development in history education (Pratama, 2022). The nation's history curriculum has been repeatedly reshaped to serve shifting political agendas, from the anti-colonial nationalism of the independence movement to the authoritarian nationalism of the New Order regime (Pratama, 2022; Vickers, 2023). Contemporary reforms, including the Merdeka Curriculum, emphasise student-centred learning and the development of critical thinking as central educational objectives (Rohmah et al., 2024).

Despite these policy commitments, research consistently identifies challenges in cultivating critical thinking in Indonesian history classrooms. Studies document the persistence of teacher-centred pedagogies, limited student engagement, and assessment systems that privilege factual recall over higher-order thinking (Fernandes et al., 2024; López-Fernández et al., 2023). These challenges reflect broader tensions in post-colonial education systems, where the imperative to transmit national values coexists with aspirations toward critical citizenship (Obiagu, 2024; Smets, 2024). The cultivation of critical thinking through history education, therefore, involves navigating tensions between knowledge transmission and critical inquiry, between national identity formation and the development of autonomous, questioning citizens.

Problem-Based Learning has emerged as a promising pedagogical approach for developing critical thinking across educational contexts. PBL is a student-centred methodology that engages learners with authentic, ill-structured problems, requiring them to identify what they know, what they need to know, and how to acquire and apply knowledge to reach solutions (Lonergan et al., 2022; Santos-Meneses et al., 2023). Grounded in constructivist learning theory, PBL positions students as active constructors of knowledge rather than passive recipients of information (Sukkamart et al., 2025; Wang, 2021). Research has demonstrated PBL's effectiveness in developing critical thinking skills,

problem-solving abilities, and self-directed learning competencies (Nicholus et al., 2024; Sharma et al., 2023).

However, the effectiveness of PBL depends significantly on implementation quality, including problem design, teacher facilitation, and student readiness (Lonergan et al., 2022; Wang, 2021). In the Indonesian context, large class sizes, limited instructional time, and teachers' limited experience with student-centred pedagogies present particular challenges for PBL implementation (Fitriati et al., 2024; Moslemi Nezhad Arani et al., 2023). Understanding how PBL functions in specific institutional and cultural contexts is essential for evaluating its potential and limitations for developing critical thinking in history education.

The significance of this inquiry extends beyond the Indonesian context. As educational systems worldwide seek pedagogies that develop higher-order thinking skills, understanding how PBL functions in diverse cultural and institutional contexts becomes increasingly important (Anggraeni et al., 2023; Moslemi Nezhad Arani et al., 2023). By examining the implementation of PBL in Indonesian history education, this study contributes to broader international conversations about active learning pedagogies, the cultivation of critical thinking, and the distinctive challenges of history education in post-colonial contexts.

Research Questions

1. How does PBL implementation in history education shape students' critical thinking development across Ennis's twelve indicators?
2. What factors facilitate or constrain the development of critical thinking through PBL in this context?

Literature Review

Critical Thinking: Conceptual Foundations and Educational Frameworks

Critical thinking has been defined and operationalised in diverse ways across philosophical and psychological traditions. Ennis (1996) offers a foundational definition, characterising critical thinking as reasonable, reflective thinking that is focused on deciding what to believe or do. This definition emphasises the purposeful, reflective character of critical thinking and its orientation toward judgment and action. The definition encompasses both the cognitive processes involved in reasoning and the dispositional qualities that enable individuals to engage in reflective thought. Ennis's formulation has been influential in educational contexts because it provides a clear, actionable conception of critical thinking that can guide curriculum design and assessment.

Facione (1990), building on a Delphi consensus of experts, provides a complementary conceptualisation that identifies critical thinking as purposeful, self-regulatory judgment that results in interpretation, analysis, evaluation, inference, and explanation of evidential, conceptual, methodological, criteriological, or contextual considerations. This definition, developed through systematic consultation with critical thinking scholars and practitioners, emphasises the multidimensional character of critical thinking and the integration of multiple cognitive operations. The Delphi consensus approach lends particular

credibility to Facione's framework, as it represents a broad scholarly agreement about the essential components of critical thinking.

These definitions share several common elements that are significant for educational practice. Critical thinking involves cognitive skills including analysis, evaluation, inference, and explanation; it is purposeful and reflective rather than automatic or impulsive; and it is oriented toward judgment and decision-making. Critical thinking also involves dispositions, including open-mindedness, intellectual curiosity, and the willingness to reconsider one's own views (Ennis, 1996; Facione, 1990). The development of critical thinking, therefore, requires attention to both cognitive skills and affective dispositions. This dual focus has important implications for pedagogy, suggesting that effective critical thinking instruction must address not only what students can do but also what they are willing to do.

Ennis (1996) identifies twelve key abilities of critical thinking that have been widely applied in educational research and practice. These abilities include focusing on a question, analysing arguments, asking and answering questions of clarification, judging the credibility of a source, observing and judging observation reports, deducing and judging deductions, inducing and judging inductions, making and judging value judgments, defining terms and judging definitions, identifying assumptions, deciding on an action, and interacting with others. These abilities are not discrete skills but interconnected competencies that develop through engagement with meaningful content and authentic problems. In the context of history education, these abilities align with disciplinary practices including sourcing, corroboration, contextualisation, and perspective-taking (Claravall et al., 2024; Marczyk et al., 2022; Wineburg, 2001). Historical thinking requires students to ask focused questions about the past, analyse historical arguments, judge the credibility of sources, make inferences from evidence, and engage with multiple perspectives.

Historical Thinking and Disciplinary Specificity

The cultivation of critical thinking in history education requires attention to the distinctive epistemological foundations of historical inquiry. Wineburg (2001) argues that historical thinking is unnatural, requiring students to overcome the natural tendency toward presentism and recognise the fundamental otherness of the past. This capacity for self-transcendence involves not only cognitive operations but also affective dimensions, including the willingness to have one's certainties challenged and to engage with perspectives fundamentally different from one's own. Wineburg's research demonstrates that historical thinking demands a particular orientation toward evidence and interpretation that distinguishes it from generic critical thinking. Students must learn to read sources not for their surface content but for their subtext, considering the author's perspective, purpose, and context.

Seixas et al. (2013) identify six historical thinking concepts central to history education: historical significance, evidence, continuity and change, cause and consequence, historical perspectives, and the ethical dimension. These concepts provide a framework for designing instruction that develops students' capacity to think historically, moving beyond factual recall toward interpretation, analysis, and judgment. The concept of historical significance, for example, requires students to make judgments about what matters in the past, a process that involves both cognitive analysis and value judgments. The concept of evidence requires students to interrogate sources critically, considering their reliability,

perspective, and limitations. These concepts are not merely content knowledge but forms of reasoning that must be developed through deliberate practice.

van Drie and van Boxtel (2008) propose a framework of historical reasoning encompassing six components: asking historical questions, contextualising, using sources, using substantive concepts, using meta-concepts, and constructing an argument. This framework emphasises that historical reasoning is a complex, multifaceted activity requiring students to coordinate multiple cognitive operations. Asking historical questions requires students to formulate inquiries that can be investigated through historical methods. Contextualising requires placing events and sources in their historical context. Using sources involves critical evaluation and interpretation of evidence. Constructing an argument requires synthesising evidence into a coherent interpretation. PBL, with its emphasis on authentic problems and student-directed inquiry, has potential to support the development of these historical reasoning competencies.

Rüsen (2005) theory of historical consciousness provides a complementary framework for understanding the development of historical thinking in relation to identity and values. Rüsen distinguishes among traditional, exemplary, critical, and genetic forms of historical consciousness. Traditional and exemplary forms treat the past as a source of fixed lessons or moral exemplars; critical forms interrogate dominant narratives; genetic forms recognise historical change as dynamic and contingent. The development of critical historical consciousness requires movement toward critical and genetic forms, enabling students to recognise the constructed nature of historical narratives and the multiplicity of perspectives. This framework is particularly relevant for post-colonial contexts, where students must navigate multiple historical narratives and develop their own orientations toward the past.

Problem-Based Learning: Theoretical Foundations and Implementation

Problem-Based Learning emerged in medical education in the 1960s and has since been adopted across disciplines and educational levels (Barrows, 1996; Chen, 2024; Savin-Baden & Fraser, 2024). PBL is grounded in constructivist learning theory, which positions learning as an active process of knowledge construction rather than passive reception (Aslan, 2021; Chandra et al., 2024). From a socio-constructivist perspective, learning occurs through social interaction and collaboration, with knowledge co-constructed through dialogue and shared problem-solving (Vygotskiĭ et al., 1978). This theoretical foundation distinguishes PBL from transmission-oriented pedagogies that position teachers as authorities and students as passive recipients of information.

The core principles of PBL include learning driven by authentic, ill-structured problems; students working in collaborative groups; the teacher serving as facilitator rather than instructor; students taking responsibility for their own learning; and learning integrated across disciplines (Barrows, 1996; Houghton, 2023; Lonergan et al., 2022). These principles reflect a fundamental shift in the roles of teachers and students. Teachers become facilitators who guide inquiry rather than authorities who transmit knowledge. Students become active participants who take responsibility for their learning rather than passive recipients of information. This shift has significant implications for classroom practice, requiring changes in both teacher behaviour and student expectations.

The PBL process typically follows a structured sequence: students encounter a problem and identify what they know and what they need to know; they generate hypotheses and identify learning issues; they engage in self-directed study to research the problem; they share findings and develop solutions; and they reflect on the learning process (Barrows, 1996). This sequence is designed to scaffold student inquiry while maintaining student autonomy. The first phase, encountering the problem, provides motivation and direction for learning. The second phase, identifying learning issues, helps students develop metacognitive awareness of their knowledge gaps. The third phase, self-directed study, develops self-regulated learning skills. The fourth phase, sharing findings, develops collaboration and communication skills. The final phase, reflection, develops metacognition and the capacity to learn from experience.

Research on PBL has demonstrated positive effects on critical thinking, problem-solving, and self-directed learning (López-Fernández et al., 2023; Marczyk et al., 2022). However, the effectiveness of PBL depends significantly on implementation quality. Martell (2022) identifies several factors influencing PBL success, including problem design, teacher facilitation, student readiness, and institutional support. Problems must be authentic, ill-structured, and appropriate for students' developmental level. Teachers must be skilled in facilitating inquiry without providing answers. Students must be ready for active, self-directed learning. Institutions must provide the resources and support needed for effective implementation. In the Indonesian context, research has documented both the potential and challenges of PBL implementation, with studies reporting improvements in critical thinking alongside challenges related to large class sizes, limited resources, and teachers' limited experience with student-centred pedagogies (Anggraeni et al., 2023; Rohmah et al., 2024).

Recent bibliometric analyses of PBL research reveal growing attention to critical thinking development, particularly in Asian contexts (Muchson et al., 2024). Studies have identified PBL as a transformational framework that integrates theory, practice, and learning context, thereby enhancing critical thinking skills multidimensionally (Anggraeni et al., 2023). However, research also identifies gaps in contextual representation, methodological design, and the integration of educational technology, suggesting the need for more diverse and rigorous studies of PBL implementation. These findings underscore the importance of examining PBL implementation in specific cultural and institutional contexts to understand its potential and limitations.

Research Method

Research Design and Approach

This study employed a qualitative descriptive approach to investigate the cultivation of critical thinking through PBL in history education at SMA Negeri 2 Kebumen. The qualitative approach was selected for its capacity to generate rich, contextualised understanding of educational practices as they unfold in natural settings (Creswell & Creswell, 2023). Unlike quantitative methods that privilege measurement and generalisation, qualitative inquiry enables researchers to explore the meanings that participants attach to their experiences, the tacit knowledge that shapes practice, and the complex interplay of factors that influence educational outcomes. This approach was particularly appropriate for examining how PBL was implemented and how critical thinking developed in the specific context of a single school and classroom.

The descriptive design was specifically chosen for its appropriateness in examining the status, characteristics, and dynamics of a particular phenomenon within its natural context (Stake, 1995). This design enables researchers to provide detailed accounts of how a phenomenon manifests in practice, the factors that shape it, and the relationships among these factors. In the context of this study, the descriptive design enabled systematic documentation of how PBL was implemented in history education, students' critical thinking development across Ennis's twelve indicators, and the factors facilitating or constraining this development. The design supported the collection and analysis of rich, contextual data that could illuminate the complexities of PBL implementation in a specific educational setting.

The selection of SMA Negeri 2 Kebumen as the research site was purposive. The school's implementation of the Merdeka Curriculum, with its emphasis on student-centred learning and critical thinking, provided a relevant policy context for the investigation. The school's history teacher had expressed interest in PBL as a pedagogical approach for developing critical thinking, making the site appropriate for examining PBL implementation. The selection of Grade XI IPS 3 students as the research participants was based on their having studied the relevant historical content and their teacher's willingness to implement PBL for the research period. This purposive selection enabled focused investigation of PBL implementation in a specific, information-rich case.

Data and Sources of Data

Data for this study were drawn from multiple sources to enable comprehensive understanding of PBL implementation and critical thinking development. Primary data sources included teacher informants, student informants, classroom activities, and documentary evidence. The history teacher at SMA Negeri 2 Kebumen was selected for his experience teaching history under the Merdeka Curriculum and his willingness to implement PBL for the research. The teacher's perspectives were essential for understanding how PBL was planned and implemented, the challenges encountered, and the strategies employed to address these challenges.

Students from Grade XI IPS 3, comprising thirty-six students, were selected as research participants. Student selection was based on their having studied the Proclamation of Independence material, which provided the content for PBL implementation. Student perspectives were critical for understanding how PBL was experienced, the development of critical thinking skills, and the challenges encountered. The inclusion of student voices was essential for capturing the lived experience of PBL and the ways in which students made sense of their learning.

Classroom activities constituted a third major data source. Direct observation of history lessons across three PBL sessions documented teacher-student interactions, instructional strategies, student engagement patterns, and the enactment of critical thinking development in practice. Observations focused on identifying how PBL was implemented, the nature of student participation, and evidence of critical thinking development. Documentary evidence, including lesson plans, teaching materials, and assessment documents, was collected and analysed to understand how PBL was planned and how critical thinking objectives were articulated in formal curriculum documents.

Data Collection

Data collection occurred over a structured period from January to February 2023, enabling concentrated engagement with participants and observation of three PBL sessions. The research employed three principal data collection techniques: semi-structured interviews, non-participant observation, and document analysis. Semi-structured interviews were conducted with key informants to explore their perspectives on PBL implementation and critical thinking development in depth. Interview protocols were developed to address the research questions while maintaining flexibility to pursue emergent themes. Teacher interviews explored conceptions of critical thinking, strategies for PBL implementation, perceived challenges, and observations of student development. Student interviews investigated perceptions of PBL, engagement with historical content, and awareness of critical thinking development. All interviews were audio-recorded with participants' consent and transcribed verbatim for analysis.

Non-participant observation of history lessons was conducted across three PBL sessions. Each session followed the PBL sequence: orientation to the problem, organising students for learning, guiding individual and group investigation, developing and presenting work, and analysing and evaluating the problem-solving process. The researcher observed teacher-student interactions, student engagement behaviours, group dynamics, and evidence of critical thinking development. Detailed field notes were maintained throughout the observation period, documenting both what was observed and the researcher's reflections on what was observed.

Document analysis involved systematic collection and review of relevant documents. Lesson plans, teaching materials, and assessment documents were analysed to understand how PBL was planned and how critical thinking objectives were articulated. Document analysis focused on the alignment between stated objectives and observed practice, as well as the extent to which critical thinking was systematically integrated into instructional design. The analysis of documents provided insight into the formal curriculum and how it supported or constrained PBL implementation and critical thinking development.

Trustworthiness of Data

To ensure the trustworthiness of findings, this study employed multiple strategies aligned with qualitative research standards. Triangulation was pursued across sources, comparing data from teachers, students, and documents; and across techniques, cross-verifying observation, interview, and documentary evidence. This triangulation enabled identification of convergent patterns while also revealing tensions and contradictions that enriched understanding. For example, observations of student engagement were compared with student accounts of their engagement, and both were compared with teacher observations. This process enabled identification of both consistencies and discrepancies across data sources.

Member checking was conducted by sharing preliminary findings with participants and soliciting feedback on interpretations. This process helped ensure that researcher interpretations accurately reflected participant perspectives and enabled participants to correct misunderstandings or add nuance. The researcher maintained detailed field notes documenting contextual factors and reflexive observations throughout the research

process. These notes included both descriptive accounts of what was observed and reflective commentary on the researcher's interpretations and assumptions.

Thick description of the setting, participants, and practices enables readers to assess the transferability of findings to other contexts. Detailed contextual information about the school, community, and educational policy environment supports informed judgment about applicability. The researcher documented the school's characteristics, the broader institutional and policy context, and the specific conditions shaping PBL implementation and critical thinking development at the site. This thick description provides readers with the information needed to assess the relevance of findings to their own contexts.

Data Analysis

Data analysis followed an iterative, thematic approach consistent with qualitative research conventions. The analysis process comprised several phases aligned with Miles, Huberman, and Saldana's (2020) interactive model. Data reduction involved systematic review and condensation of interview transcripts, observation notes, and documentary evidence. This process entailed identifying relevant passages, coding for thematic content, and organising data according to emerging categories. Initial codes were derived both from Ennis's critical thinking framework and from patterns emerging from the data. Codes were organised around the twelve critical thinking indicators, PBL implementation phases, and factors facilitating or constraining development. The coding process was iterative, with codes refined and reorganised as analysis proceeded.

Data display organised condensed data into thematic matrices and narrative summaries to facilitate pattern identification and cross-case comparison. Displays enabled systematic examination of relationships between concepts, identification of convergent and divergent patterns, and testing of emerging interpretations against the full range of evidence. Data were organised around themes including PBL implementation, critical thinking development across indicators, and implementation challenges. The display of data in thematic matrices enabled systematic comparison across indicators and identification of patterns in student development.

Conclusion drawing and verification were conducted iteratively through constant comparison of data across sources and techniques. Emerging interpretations were tested against discrepant cases and alternative explanations. The researcher engaged in ongoing reflection on how personal assumptions and perspectives might shape data collection and interpretation. Final conclusions were grounded in the full range of evidence and subjected to member checking to enhance credibility. This iterative process ensured that conclusions were well-supported and that alternative interpretations had been considered.

Results

PBL Implementation in History Education

The implementation of PBL in history education at SMA Negeri 2 Kebumen followed the standard PBL sequence across three sessions, each addressing a different historical topic. Session 1 focused on Indonesian resistance against the VOC and the Dutch government; Session 2 addressed resistance against the Portuguese and Spanish; and Session 3

examined resistance against the Dutch East Indies government. Each session followed the five-phase PBL structure, with the teacher facilitating student inquiry and group work.

In the orientation phase, the teacher communicated learning objectives, motivated students, and presented the problem. As the teacher explained, students were divided into groups, and each group was given a problem to solve, with the teacher only guiding and directing them. The teacher presented problems related to specific historical resistance movements, with each group assigned a different topic such as Sultan Nuku, Sultan Agung, or Sultan Ageng Tirtayasa in Session 1. This orientation phase was designed to establish the purpose and direction of learning, providing students with the context they needed to engage with their problems.

In the organisation phase, the teacher divided students into five groups and explained the tasks for each group. Students were organised to work collaboratively on their assigned problems. The teacher noted that during discussion, seating was arranged not too formally so students would feel comfortable. This attention to classroom environment reflected the teacher's effort to create conditions conducive to collaborative inquiry. The informal seating arrangement was intended to reduce anxiety and promote open communication among group members.

In the investigation phase, students gathered information from diverse sources, including textbooks, modules, library books, and internet resources. The teacher guided students in collecting relevant information and finding solutions to their problems. Observations revealed that while most groups engaged actively in information gathering, some students remained passive, relying on more engaged peers to do the work. This variation in participation was noted across all three sessions. Some students demonstrated initiative in seeking information and contributing to group discussions, while others required more encouragement and guidance.

In the presentation phase, groups presented their findings to the class. Each group presented their analysis of their assigned resistance movement, followed by question-and-answer sessions with other groups. The teacher reported that each group presented their discussion results, and students engaged in question and answer with other groups. Observations revealed increasing engagement across sessions, with students becoming more active in questioning and responding by the third session. This pattern suggested that students were becoming more comfortable with the PBL process and more confident in their ability to engage in historical inquiry.

In the evaluation phase, the teacher guided students in evaluating the problem-solving process and reflecting on learning. Students were given opportunities to draw conclusions and ask questions about unclear material. The teacher observed that students' critical thinking had grown well by the third session. This observation was supported by evidence of increasing student engagement and the quality of student presentations.

Critical Thinking Development across Ennis's Indicators

Analysis of observation and interview data revealed differential development across Ennis's twelve critical thinking indicators. Eight indicators were identified as well-developed, while four remained underdeveloped. Students demonstrated the ability to identify and focus on problems presented by the teacher. Observations showed that groups could articulate the central questions related to their assigned resistance movements and maintained focus on these questions throughout their investigation. This ability to focus

on questions was evident in the clarity and relevance of student presentations and discussions.

Students gathered relevant information from multiple sources, including textbooks, modules, library resources, and internet sources. They demonstrated the ability to identify relevant information and organise it in relation to their problems. This capacity for analysing arguments was evident in the quality of student presentations, which demonstrated understanding of multiple perspectives and the ability to synthesise information from diverse sources. Students actively asked questions when material was unclear and answered questions from peers during presentations. As one student noted, when they did not understand, they asked the teacher or friends who already understood. Engagement in questioning increased across sessions, with students becoming more comfortable asking and answering questions.

Students demonstrated the ability to evaluate source credibility by comparing information across sources. The teacher observed that students sought the truth of sources by comparing them. This capacity for judging source credibility was evident in students' use of multiple sources and their attention to the reliability of information. Through group discussions and problem analysis, students developed the capacity to observe problems systematically and make judgments based on their observations. Students also demonstrated the ability to consider decisions and determine appropriate actions for solving problems. The teacher noted that students were able to decide what action to take by considering solutions based on information and experience. Students showed capacity to make decisions about actions based on problem analysis and demonstrated motivation to learn and engage with historical content.

Students actively interacted with teachers and peers during learning. Group discussions involved exchanging opinions and presenting findings to the class. Observations revealed that students became more comfortable interacting across sessions, with even initially passive students becoming more engaged by the third session. This development reflected both growing comfort with the PBL process and the development of social and communication skills.

However, students struggled to develop and evaluate deductions from information gathered. As the teacher observed, students were still lacking in developing material. Students could gather information but had difficulty drawing logical conclusions from it. Students also had difficulty explaining the meaning of observations and making generalisations from specific cases. The teacher noted that students still needed continuous practice in this area. Students struggled to define historical terms precisely and evaluate definitions. The teacher observed that students were not yet maximal in defining terms in the material they studied. Students had difficulty identifying implicit assumptions in historical arguments. The teacher attributed this to students feeling embarrassed and nervous when conveying arguments.

Factors Affecting Critical Thinking Development

Several factors were identified as affecting students' critical thinking development through PBL. Student engagement emerged as the most significant factor. The teacher explained that the obstacle in cultivating critical thinking actually depends on the students themselves, with student interest in learning being the key. While most students

were engaged, some remained passive, affecting group dynamics and learning outcomes. This variation in engagement reflected differences in student motivation, prior knowledge, and learning preferences.

Time constraints presented a significant challenge. Students noted that history classes scheduled during late periods affected their focus and engagement. As one student explained, when history was at the end of the day, it became boring and their minds were already unfocused. This finding highlights how institutional scheduling can affect pedagogical effectiveness. The timing of history classes in the school timetable influenced student energy levels and attention, affecting their capacity to engage deeply with historical content.

Teacher facilitation quality influenced critical thinking development. The teacher's ability to guide inquiry, scaffold thinking, and maintain engagement affected student outcomes. While the teacher demonstrated competence in implementing PBL, students still required more explicit instruction in deduction, induction, definition, and assumption identification. The quality of teacher facilitation was evident in the teacher's attention to student engagement and his efforts to create a supportive learning environment.

Group dynamics affected participation and learning. Some students were more active in group work, while others remained passive. The teacher noted that not all students were active during the lesson and some did not fully understand the material. Group dynamics influenced both the quality of group work and individual learning outcomes. Students who were more active in group work demonstrated greater critical thinking development than those who remained passive. Resource availability affected the quality of student investigation. Students had access to textbooks, modules, library resources, and internet sources, enabling information gathering. However, the quality and relevance of resources varied, with some groups finding more relevant and reliable sources than others.

Discussion

The Potential and Limitations of PBL for Critical Thinking Development

The findings of this study reveal both the potential and limitations of PBL for developing critical thinking in history education (Anggraeni et al., 2023). Students demonstrated competency in eight of Ennis's twelve critical thinking indicators, suggesting that PBL can effectively develop many critical thinking abilities. The well-developed indicators, including focusing on questions, analysing arguments, asking and answering questions, judging source credibility, and interacting with others, align with the core activities of PBL. As students engaged in group investigation and presentation, they naturally practiced these skills. This finding is consistent with research demonstrating PBL's effectiveness for developing analytical and collaborative skills (Marczyk et al., 2022).

However, the underdeveloped indicators, including deduction, induction, definition, and assumption identification, reveal that PBL alone is insufficient for developing all critical thinking abilities. These higher-order thinking skills require explicit instruction and scaffolding that may not occur naturally through PBL (Yu & Zin, 2023). The systematic review by Yu and Zin (2023) found that PBL models need to be modified to guarantee positive outcomes for critical thinking development. The findings suggest that teachers must explicitly teach these skills rather than assuming they will develop incidentally

through PBL. Students need direct instruction in deductive and inductive reasoning, precise definition of terms, and identification of assumptions in arguments.

This finding has important implications for PBL implementation in history education. While PBL provides a valuable structure for engaging students with authentic historical problems, teachers must supplement PBL with explicit instruction in the specific thinking skills students need. This may include modelling deductive and inductive reasoning, teaching students how to define terms precisely, and guiding students to identify implicit assumptions in historical arguments. Such explicit instruction could be integrated into the PBL process through targeted mini-lessons, structured reflection activities, or individualised feedback.

Historical Thinking and Disciplinary Specificity

The findings also highlight the importance of attending to the disciplinary specificity of historical thinking. While Ennis's framework provides a useful set of general critical thinking indicators, history education requires additional competencies including sourcing, corroboration, contextualisation, and perspective-taking (Seixas et al., 2013; Wineburg, 2001). Students' difficulty with identifying assumptions may reflect their limited experience with the constructed nature of historical narratives and the need to recognise implicit assumptions in historical accounts. Historical narratives often contain unstated assumptions about causation, significance, and perspective that students may not recognise without explicit instruction.

The PBL implementation in this study focused on historical content without explicitly addressing the epistemological foundations of historical inquiry. Students investigated resistance movements but may not have developed the capacity to interrogate how these narratives were constructed, whose perspectives were included, and whose were marginalised. This limitation reflects broader patterns in Indonesian history education, where the emphasis on content transmission often overshadows attention to historical thinking (Pratama, 2022; Purwanta, 2018). Students learned about historical events but may not have developed the capacity to think historically about these events.

A more robust approach would integrate PBL with explicit instruction in historical thinking. For example, students could be guided to source primary documents, corroborate evidence across sources, contextualise historical events, and consider multiple perspectives. This integration of PBL with historical thinking frameworks would address both general critical thinking and discipline-specific competencies, preparing students for more sophisticated historical inquiry. Such an approach would also address the underdeveloped indicators by providing structured opportunities for deduction, induction, definition, and assumption identification.

The Post-Colonial Context of History Education

The findings of this study must be understood within Indonesia's post-colonial context, where history education has been repeatedly shaped by state interests and the imperative of nation-building (Eddyono, 2020; Pratama, 2022; Purwanta, 2018). The tension between cultivating critical historical consciousness and inculcating prescribed values remains unresolved in curriculum policy and classroom practice (Alvén, 2024; Pratama, 2022). The PBL implementation in this study, while promoting engagement and some

critical thinking skills, did not explicitly address how historical narratives are constructed or whose perspectives are marginalised.

As Liu (2020) argues, decolonising education in Indonesia still faces epistemic dependency on state-centred and Eurocentric narratives. Historical education must move toward epistemic justice and critical pedagogy to reframe national identity and historical consciousness (Santiago & Dozono, 2022). PBL, with its emphasis on authentic problems and student inquiry, has potential to support this movement, but only if implemented with explicit attention to the politics of knowledge and the construction of historical narratives. Students need opportunities to interrogate historical narratives, consider multiple perspectives, and recognise the constructed nature of historical accounts.

The findings suggest that PBL implementation in Indonesian history education could be strengthened by engaging students with contested historical interpretations, encouraging them to question dominant narratives, and supporting them to recognise the constructed nature of historical accounts. This approach would develop both critical thinking and critical historical consciousness, preparing students for active, informed citizenship in a diverse, post-colonial society. Such an approach would also address the underdeveloped indicators by providing opportunities for critical analysis of historical narratives.

Teacher Facilitation and Professional Development

The findings underscore the central importance of teacher facilitation for effective PBL implementation. The teacher in this study demonstrated competence in managing the PBL process, including organising groups, guiding investigation, and facilitating presentations. However, students' difficulty with higher-order thinking skills suggests that teachers need additional support in scaffolding thinking and teaching critical thinking explicitly. The teacher's facilitation was effective in supporting basic critical thinking skills but did not adequately address the more demanding higher-order skills.

Professional development for PBL implementation should address both the mechanics of PBL and the pedagogical strategies for developing critical thinking. Teachers need support in designing problems that promote higher-order thinking, facilitating group discussions that push students beyond surface-level analysis, and providing explicit instruction in reasoning skills. As Fullan (2025) argues, educational change requires attention to multiple dimensions, including the possible use of new teaching approaches and the possible alteration of beliefs. PBL implementation requires not only new classroom practices but also shifts in how teachers conceptualise their roles and the purposes of education.

The findings also highlight the need for professional development that addresses the distinctive challenges of implementing PBL in the Indonesian context. Large class sizes, limited instructional time, and students' prior experience with teacher-centred pedagogies all present challenges for PBL implementation. Professional development should address these contextual factors, providing teachers with strategies for managing large groups, adapting PBL to time constraints, and supporting students to transition from passive to active learning roles.

Implications for Policy and Practice

The findings of this study have several implications for policy and practice in history education. Curriculum and policy should support PBL implementation by providing flexibility in curriculum coverage and assessment. The Merdeka Curriculum's emphasis on student-

centred learning and critical thinking provides a supportive policy context, but teachers need concrete guidance and resources for implementing PBL effectively. This guidance should include examples of effective PBL implementation, criteria for assessing student critical thinking, and strategies for addressing common challenges.

Teacher professional development should address both PBL mechanics and critical thinking instruction. Teachers need support in designing authentic problems, facilitating group inquiry, scaffolding thinking, and teaching critical thinking explicitly. Professional development should be sustained, context-sensitive, and focused on practice, enabling teachers to experiment with new approaches and receive feedback and support. This professional development should also address the distinctive challenges of implementing PBL in large classes with limited instructional time.

Assessment should align with PBL and critical thinking goals. Current assessment practices that privilege factual recall may undermine PBL implementation and critical thinking development. Developing assessment approaches that capture students' critical thinking, historical reasoning, and ability to engage with multiple perspectives would support more serious attention to these objectives. Such assessment could include rubrics for evaluating critical thinking, portfolio assessment, and performance-based assessment.

PBL implementation should be complemented by explicit instruction in historical thinking. While PBL provides a valuable structure for engaging students with historical content, it should be supplemented with explicit teaching of sourcing, corroboration, contextualisation, and perspective-taking. This integration would develop both general critical thinking and discipline-specific historical competencies. Attention to post-colonial dynamics should inform PBL design. History education in Indonesia should move beyond content transmission toward critical engagement with historical narratives. PBL problems should engage students with contested historical interpretations, multiple perspectives, and the constructed nature of historical accounts.

Conclusion

This study has critically examined the cultivation of critical thinking through Problem-Based Learning in history education at SMA Negeri 2 Kebumen, revealing both the potential and limitations of PBL for developing students' critical thinking abilities. Students demonstrated competency in eight of Ennis's twelve critical thinking indicators, including focusing on questions, analysing arguments, and interacting with others. However, four indicators remained underdeveloped: deduction and induction, defining terms, and identifying assumptions.

The findings suggest that PBL's effectiveness in history education depends significantly on teacher facilitation quality, student readiness, and the extent to which critical thinking is explicitly taught rather than assumed to develop incidentally. While PBL provides a valuable structure for engaging students with authentic historical problems and developing many critical thinking abilities, it must be supplemented with explicit instruction in higher-order thinking skills. The study also highlights the importance of attending to the disciplinary specificity of historical thinking and the post-colonial context of Indonesian history education.

The implications of this study extend beyond the Indonesian context. As educational systems worldwide seek pedagogies that develop higher-order thinking skills,

understanding how PBL functions in diverse cultural and institutional contexts becomes increasingly important. This study suggests that PBL can effectively develop many critical thinking abilities, but its effectiveness depends on implementation quality, including teacher facilitation, problem design, and explicit instruction in thinking skills. The integration of PBL with historical thinking frameworks and attention to post-colonial dynamics would strengthen its contribution to history education in diverse contexts.

Ultimately, this study argues that the cultivation of critical thinking through history education requires more than pedagogical innovation; it requires fundamental shifts in how teachers conceptualise their roles, how students understand their learning, and how educational systems define success. Critical thinking is not a generic skill that develops automatically through any active learning approach; it requires deliberate cultivation through explicit instruction, thoughtful problem design, and sustained engagement with meaningful content. By attending to these factors, history education can fulfil its potential to develop not only knowledgeable students but also critical, reflective citizens capable of engaging with the complexities of the past and the challenges of the present.

The limitations of this study should be acknowledged. As a single-site case study, the findings are not statistically generalisable to other contexts, though they may offer insights applicable to similar Indonesian secondary schools. The relatively brief data collection period limited the depth of understanding that could be achieved; extended observation over a full academic year would enable richer understanding of how critical thinking develops through PBL over time. Future research should address these limitations through multi-site studies, longitudinal designs, and comparative analysis across diverse contexts.

References

Alvén, F. (2024). Controversial issues in history teaching. *Journal of Curriculum Studies*, *56*(5), 537–553. https://doi.org/10.1080/00220272.2024.2322502

Anggraeni, D. M., Prahani, B. K., Suprapto, N., Shofiyah, N., & Jatmiko, B. (2023). Systematic review of problem based learning research in fostering critical thinking skills. *Thinking Skills and Creativity*, *49*, 101334. https://doi.org/10.1016/j.tsc.2023.101334

Aslan, A. (2021). Problem- based learning in live online classes: Learning achievement, problem-solving skill, communication skill, and interaction. *Computers & Education*, *171*, 104237. https://doi.org/10.1016/j.compedu.2021.104237

Barrows, H. S. (1996). Problem-based learning in medicine and beyond: A brief overview. *New Directions for Teaching and Learning*, *1996*(68), 3–12. https://doi.org/10.1002/tl.37219966804

Chandra, A., Stewart, C. M., & Meyer, C. (2024). An eclectic problem-based learning model in an entrepreneurship capstone course. *The International Journal of Management Education*, *22*(3), 101034. https://doi.org/10.1016/j.ijme.2024.101034

Chen, Juanjuan. (2024). *Cognitive mapping for problem-based and inquiry learning : theory, research, and assessment*. Routledge.

Claravall, E. B., Isidro, E., & Irey, R. (2024). Historical Reasoning among Middle School Students with Learning Differences: Exploring the Use of Multiple Sources in Writing. *Reading & Writing Quarterly*, *40*(4), 352–376. https://doi.org/10.1080/10573569.2023.2232789

Creswell, J. W.., & Creswell, J. David. (2023). *Research design : qualitative, quantitative, and mixed methods approaches*. SAGE.

Eddyono, S. (2020). Competing Nationalisms in Post-New Order Indonesia. *Nationalism and Ethnic Politics*, *26*(4), 421–439. https://doi.org/10.1080/13537113.2020.1843775

Ennis, R. Hugh. (1996). *Critical thinking*. Prentice Hall.

Facione, P. A. (1990). *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction*.

Fernandes, R., Willison, J., & Boyle, C. (2024). Characteristics, prevalence and tensions of critical thinking in Indonesian high school English language classes resulting from policy-driven teaching. *Thinking Skills and Creativity*, *53*, 101605. https://doi.org/10.1016/j.tsc.2024.101605

Fitriati, F., Rosli, R., Iksan, Z., & Hidayat, A. (2024). Exploring challenges in preparing prospective teachers for teaching 4C skills in mathematics classroom: A school-university partnership perspectives. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2023.2286812

Fullan, Michael. (2025). *The new meaning of educational change*. Teachers College Press.

Houghton, J. (2023). Learning modules: problem-based learning, blended learning and flipping the classroom. *The Law Teacher*, *57*(3), 271–294. https://doi.org/10.1080/03069400.2023.2208017

Liu, J. C. H. (2020). Beyond borders: trans-local critical pedagogy for inter-Asian cultural studies. *Educational Philosophy and Theory*, *52*(11), 1162–1172. https://doi.org/10.1080/00131857.2020.1752188

Lonergan, R., Cumming, T. M., & O'Neill, S. C. (2022). Exploring the efficacy of problem-based learning in diverse secondary school classrooms: Characteristics and goals of problem-based learning. *International Journal of Educational Research*, *112*, 101945. https://doi.org/10.1016/j.ijer.2022.101945

López-Fernández, C., Tirado-Olivares, S., Mínguez-Pardo, R., & Cózar-Gutiérrez, R. (2023). Putting critical thinking at the center of history lessons in primary education through error- and historical thinking-based instruction. *Thinking Skills and Creativity*, *49*, 101316. https://doi.org/10.1016/j.tsc.2023.101316

Marczyk, A. A., Jay, L., & Reisman, A. (2022). Entering the Historiographic Problem Space: Scaffolding Student Analysis and Evaluation of Historical Interpretations in Secondary Source Material. *Cognition and Instruction*, *40*(4), 517–539. https://doi.org/10.1080/07370008.2022.2042301

Martell, C. C. (2022). A longitudinal study of beginning elementary teachers' beliefs and inquiry-based practices in the history classroom. *Teacher Development*, *26*(5), 627–643. https://doi.org/10.1080/13664530.2022.2126883

Meirbekov, A., Maslova, I., & Gallyamova, Z. (2022). Digital education tools for critical thinking development. *Thinking Skills and Creativity*, *44*, 101023. https://doi.org/10.1016/j.tsc.2022.101023

Miles, M. B.., Huberman, A. M.., & Saldaña, Johnny. (2020). *Qualitative data analysis : a methods sourcebook*. SAGE.

Moslemi Nezhad Arani, S., Zarei, A. A., & Sarani, A. (2023). Problem-based language learning: Why Aren't teachers using it? *Social Sciences & Humanities Open*, *8*(1), 100668. https://doi.org/10.1016/j.ssaho.2023.100668

Muchson, M., Cobern, W. W., & Saefi, M. (2024). The science education research trends (SERT) in Indonesian secondary schools: a systematic review and bibliometrics study. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2024.2308407

Nicholus, G., Nzabahimana, J., & Muwonge, C. M. (2024). Evaluating video-based PBL approach on performance and critical thinking ability among Ugandan form-2 secondary school students. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2024.2346040

Obiagu, A. N. (2024). Being a good citizen in a postcolonial context: Justice-oriented citizenship implications of Nigerian teachers' civic education ideologies. *Theory & Research in Social Education*, *52*(2), 273–311. https://doi.org/10.1080/00933104.2024.2305463

Pratama, S. (2022). Teachers' narratives about the possibility to teach controversial history of the 1965 affair in Indonesia. *British Journal of Sociology of Education*, *43*(6), 898–915. https://doi.org/10.1080/01425692.2022.2070127

Purwanta, H. (2018). The representation of colonial discourse in Indonesian secondary education history textbooks during and after the New Order (1975–2013). *History of Education*, *47*(3), 349–361. https://doi.org/10.1080/0046760X.2017.1384855

Rohmah, Z., Hamamah, H., Junining, E., Ilma, A., & Rochastuti, L. A. (2024). Schools' support in the implementation of the Emancipated Curriculum in secondary schools in Indonesia. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2023.2300182

Rüsen, J. (2005). *History : narration - interpretation - orientation*. Berghahn.

Saldıray, A., & Doğanay, A. (2024). An action research to develop critical thinking skills in the context of citizenship education in higher education. *Thinking Skills and Creativity*, *53*, 101584. https://doi.org/10.1016/j.tsc.2024.101584

Santiago, M., & Dozono, T. (2022). History is critical: Addressing the false dichotomy between historical inquiry and criticality. *Theory & Research in Social Education*, *50*(2), 173–195. https://doi.org/10.1080/00933104.2022.2048426

Santos-Meneses, L. F., & Drugova, E. A. (2023). Trends in critical thinking instruction in 21st-century research and practice: Upgrading instruction in digital environments. *Thinking Skills and Creativity*, *49*, 101383. https://doi.org/10.1016/j.tsc.2023.101383

Santos-Meneses, L. F., Pashchenko, T., & Mikhailova, A. (2023). Critical thinking in the context of adult learning through PBL and e-learning: A course framework. *Thinking Skills and Creativity*, *49*, 101358. https://doi.org/10.1016/j.tsc.2023.101358

Savin-Baden, Maggi., & Fraser, Heather. (2024). *Rethinking problem-based learning for the digital age : a practical guide for online settings*. Routledge.

Seixas, Peter., Morton, Tom., Colyer, Jill., & Fornazzari, Stefano. (2013). *The big six : historical thinking concepts*. Nelson Education.

Sendur, K. A., van Drie, J., & van Boxtel, C. (2021). Historical contextualization in students' writing. *Journal of the Learning Sciences*, *30*(4–5), 797–836. https://doi.org/10.1080/10508406.2021.1939029

Sharma, S., Saragih, I. D., Tarihoran, D. E. T. A. U., & Chou, F.-H. (2023). Outcomes of problem-based learning in nurse education: A systematic review and meta-analysis. *Nurse Education Today*, *120*, 105631. https://doi.org/10.1016/j.nedt.2022.105631

Simonovic, B., Vione, K., Stupple, E., & Doherty, A. (2023). It is not what you think it is how you think: A critical thinking intervention enhances argumentation, analytic thinking

and metacognitive sensitivity. *Thinking Skills and Creativity*, *49*, 101362. https://doi.org/10.1016/j.tsc.2023.101362

Smets, W. (2024). The purposes of historical canons in multicultural history education. *Journal of Curriculum Studies*, *56*(3), 297–308. https://doi.org/10.1080/00220272.2024.2328050

Stake, R. E.. (1995). *The art of case study research*. Sage Publications.

Sukkamart, A., Chachiyo, W., Chachiyo, M., Pimdee, P., Moto, S., & Tansiri, P. (2025). Enhancing computational thinking skills in Thai middle school students through problem-based blended learning approaches. *Cogent Education*, *12*(1). https://doi.org/10.1080/2331186X.2024.2445951

Thorp, R., & Persson, A. (2020). On historical thinking and the history educational challenge. *Educational Philosophy and Theory*, *52*(8), 891–901. https://doi.org/10.1080/00131857.2020.1712550

van Drie, J., & van Boxtel, C. (2008). Historical Reasoning: Towards a Framework for Analyzing Students' Reasoning about the Past. *Educational Psychology Review*, *20*(2), 87–110. https://doi.org/10.1007/s10648-007-9056-1

Vickers, A. (2023). Erasing and re-inscribing Chinese into Indonesian history. *Asian Ethnicity*, *24*(1), 78–92. https://doi.org/10.1080/14631369.2022.2069083

Vygotskiĭ, L. S.., Cole, Michael., Stein, Sally., & Sekula, Allan. (1978). *Mind in society : the development of higher psychological processes*. Harvard University Press.

Wang, C.-C. (2021). The process of implementing problem-based learning in a teacher education programme: an exploratory case study. *Cogent Education*, *8*(1). https://doi.org/10.1080/2331186X.2021.1996870

Wineburg, S. S.. (2001). *Historical thinking and other unnatural acts : charting the future of teaching the past*. Temple University Press.

Yu, L., & Zin, Z. M. (2023). The critical thinking-oriented adaptations of problem-based learning models: a systematic review. *Frontiers in Education*, *8*. https://doi.org/10.3389/feduc.2023.1139987