

Analysis of Problem-Based Learning Model and Nias Local Wisdom to Enhance Critical and Creative Thinking Skills of Prospective Elementary School Teachers

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Abstract

This conceptual study analyzes the integration of the Problem-Based Learning (PBL) model and Nias local wisdom as a pedagogical approach to enhance critical and creative thinking skills among prospective elementary school teachers. Critical and creative thinking are essential competencies for 21st-century educators, enabling them to address complex educational challenges and foster active learning environments. Despite its recognized importance, teacher education in Indonesia, particularly in elementary teacher education programs (PGSD), often remains dominated by teacher-centered methods that limit students' analytical and innovative capacities. Drawing from theoretical frameworks and prior research on PBL, constructivist learning, and culturally responsive pedagogy, this study explores how integrating Nias cultural values such as *maena* (collective dance), and *hombo batu* (stone-jumping tradition) into problem-based learning can provide contextualized, meaningful learning experiences. Findings from previous studies (e.g., Sumarni & Kadarwati, 2020; Muliarsa et al., 2024; Rahmi et al., 2023) suggest that contextual learning grounded in local culture fosters students' engagement, reflective thinking, and creativity. This analysis underscores the potential of the Problem-Based Learning (PBL) model and Nias local wisdom as a framework for transformative teacher education that aligns global competencies with indigenous knowledge.

Keywords: Problem-Based Learning, Nias Local Wisdom, Critical Thinking, Creative Thinking

1. Introduction

Education serves as the cornerstone of national development, directly influencing the quality of human resources and a nation's capacity to address global challenges (Mulyasa, 2016). In the 21st century, education systems are expected to cultivate individuals who can think critically, act creatively, and adapt to rapidly changing contexts (Griffin & Care, 2012). According to the Indonesian National Education Standards Agency (BSNP, 2010), the competencies required for 21st-century learners include critical thinking and problem-solving, communication and collaboration, creativity and innovation, information and media literacy, and contextual learning skills. These competencies are not only essential for

students but also for teachers, who serve as key facilitators in developing these abilities among their learners (Sajidan et al., 2022; Saputri et al., 2020).

Critical and creative thinking skills play a pivotal role in preparing future educators to guide their students through problem-solving and decision-making processes. As noted by Paul and Elder (2013), critical thinking involves not merely absorbing information but also analyzing and evaluating ideas based on evidence and reasoning. Creative thinking, on the other hand, engages imagination and innovation to produce novel solutions and ideas (Redhana, 2019). Within the context of teacher education, fostering these skills among pre-service teachers is essential, as they will become future agents of change capable of cultivating higher-order thinking among elementary school pupils (Azizan et al., 2022; Bachri et al., 2023).

However, empirical evidence indicates that many pre-service elementary teachers in Indonesia still struggle to demonstrate critical and creative thinking competencies (Darwati & Purana, 2021; Lestari & Wardani, 2022). Teaching methods often remain transmissive, focusing on rote learning rather than inquiry and reflection. This teacher-centered paradigm restricts opportunities for student teachers to question, analyze, and synthesize information in meaningful ways (Rahardhian, 2022). Consequently, teacher education programs must adopt pedagogical models that encourage problem-solving, inquiry, collaboration, and reflection.

Problem-Based Learning (PBL) has been widely recognized as an effective strategy for promoting these competencies (Benedicto & Andrade, 2022; Savitri et al., 2021). Rooted in constructivist theory, PBL positions learners as active participants who construct knowledge through engaging with authentic, ill-structured problems. It enables learners to integrate theory with practice, enhancing their analytical and metacognitive abilities (Okta Pia et al., 2021). Furthermore, incorporating cultural contexts within PBL often referred to as culturally responsive PBL can enhance its effectiveness by connecting academic content with learners' lived experiences (Soraya et al., 2019; Pamungkas et al., 2017).

In Indonesia's multicultural landscape, integrating local wisdom into learning provides a culturally grounded framework that enriches students' understanding while preserving indigenous knowledge systems (Rahmi et al., 2023). Local wisdom encompasses community values, traditions, and ecological knowledge that shape ethical behavior, social responsibility, and environmental awareness. In Nias, for example, local wisdom manifests through cultural practices such as *hombo batu* (symbolizing courage and perseverance), *maena* (collaboration and unity), and *famadaya harimao* (strategic thinking). Embedding these values into educational practice not only enhances contextual relevance but also promotes socio-cultural sustainability.

The integration of Nias local wisdom into PBL thus offers a promising pedagogical innovation Problem-Based Learning with Nias Local Wisdom that aligns global educational competencies with local cultural identities. Through the Problem-Based Learning (PBL) model and Nias local wisdom, pre-service teachers can develop critical and creative thinking skills while internalizing the values of collaboration, problem-solving, and adaptability rooted in their cultural context. This conceptual paper seeks to analyze the theoretical foundations, pedagogical implications, and potential outcomes of implementing the Problem-Based Learning (PBL) model and Nias local wisdom in pre-service teacher education. It aims to contribute to the discourse on culturally responsive pedagogy and provide a framework for developing 21st-century competencies among prospective elementary school teachers.

2. Methodology

2.1. Research Design

This study employs a conceptual-analytical research design aimed at examining and synthesizing theoretical perspectives on Problem-Based Learning (PBL) and the integration of Nias local wisdom within teacher education. Conceptual research, as noted by Jaakkola (2020), involves building or clarifying theory by analyzing existing frameworks, identifying conceptual gaps, and generating new propositions. Accordingly, this paper does not collect empirical data through experiments or fieldwork but systematically analyzes scholarly literature to construct a theoretical framework for integrating local culture into the PBL model for pre-service elementary teachers.

The conceptual framework guiding this analysis is based on constructivist learning theory, critical and creative thinking theory, and culturally responsive pedagogy. These paradigms provide the foundation for exploring how PBL, when contextualized with Nias cultural values, can promote meaningful, reflective, and creative learning experiences.

2.2. Sources of Data

The data for this conceptual analysis are derived from: (1) Peer-reviewed journals indexed in Scopus, DOAJ, and Sinta, focusing on studies published between 2016 and 2024 related to PBL, critical and creative thinking, and local wisdom in education. (2) Books and theoretical frameworks on educational psychology, constructivism, and indigenous knowledge systems. (3) Contextual documentation on Nias cultural practices and values obtained from ethnographic studies, cultural archives, and government reports related to education and local heritage.

The inclusion criteria for literature were as follows: Research addressing Problem-Based Learning as a pedagogical model; Studies discussing critical and creative thinking skills in teacher education or science education contexts;

Publications on integration of local wisdom or culturally responsive learning; and Sources that provide relevant theoretical or practical insights applicable to Nias cultural contexts.

2.3 Analytical Framework

This conceptual analysis follows an integrative approach, consisting of four analytical stages adapted from Torracco (2005): Conceptual mapping, identifying key theoretical constructs and their interrelations (PBL, critical/creative thinking, and local wisdom). Synthesis of empirical findings, analyzing existing research to understand how these concepts have been applied in educational practice. Contextual integration, examining how Nias local wisdom values can be mapped onto PBL components. Model construction, proposing the Problem-Based Learning (PBL) model and Nias local wisdom framework that aligns global pedagogical standards with local cultural knowledge.

The analytical process is guided by three primary research questions: (1) What are the theoretical underpinnings of Problem-Based Learning that support the development of critical and creative thinking skills? (2) How can local wisdom, particularly from Nias culture, be meaningfully integrated into the PBL framework? (3) What are the potential pedagogical implications of implementing the Problem-Based Learning (PBL) model and Nias local wisdom in pre-service elementary teacher education?

2.4 Theoretical Basis

The theoretical structure of this study draws upon several educational paradigms:

- 1) Constructivist Learning Theory (Vygotsky, 1978; Piaget, 1972):
- 2) Constructivism posits that learners construct their understanding through interaction with their environment. Within PBL, learners engage in active inquiry, collaboration, and reflection, aligning with the social constructivist emphasis on knowledge co-construction (Hmelo-Silver, 2004).
- 3) Critical and Creative Thinking Frameworks (Paul & Elder, 2013; Redhana, 2019):
- 4) These frameworks emphasize analytical reasoning, synthesis, and originality. They serve as the cognitive goals of PBL, which promotes both critical evaluation of problems and creative generation of solutions.
- 5) Culturally Responsive Pedagogy (Gay, 2018; Ladson-Billings, 1995):
- 6) This perspective highlights the importance of integrating students' cultural backgrounds into teaching practices. It aligns with the integration of Nias local wisdom in PBL, ensuring that learning becomes contextually meaningful and identity-affirming.

2.5 Validity and Reliability of Conceptual Findings

To ensure conceptual rigor, this analysis employs a triangulation of sources and peer-reviewed validation of arguments. Sources were selected based on academic credibility and relevance, and cross-checked across multiple domains (education, culture, and pedagogy). The consistency of theoretical interpretations was verified by aligning major constructs (PBL, critical/creative thinking, and cultural integration) with existing literature reviews and empirical studies (e.g., Muliarsa et al., 2024; Rahmi et al., 2023; Soraya et al., 2019).

2.6 Ethical Considerations

Although no human participants were directly involved, this study follows ethical standards in academic writing and citation integrity, adhering to the American Psychological Association (APA, 7th edition) guidelines. Cultural sensitivity was also maintained by referencing Nias traditions respectfully and using authentic sources to represent local values.

3. Discussion and Conclusion

3.1 Conceptual Results: Synthesizing PBL and Local Wisdom

The synthesis of literature indicates that Problem-Based Learning (PBL) provides a robust pedagogical foundation for cultivating higher-order thinking skills such as critical and creative thinking. Rooted in constructivism, PBL encourages learners to actively construct knowledge through inquiry, reflection, and collaboration (Hmelo-Silver, 2004). When combined with local wisdom, particularly from the Nias cultural context, PBL gains deeper relevance and authenticity. This integration supports both cognitive and affective learning outcomes, aligning with culturally responsive pedagogy (Gay, 2018; Ladson-Billings, 1995).

Research by Benedicto and Andrade (2022) found that pre-service teachers who participated in PBL-based courses exhibited significant improvement in reasoning, analysis, and reflective judgment. Similarly, Sumarni and Kadarwati (2020) demonstrated that ethno-STEM project-based learning, which embeds local cultural practices into inquiry activities, enhances both critical and creative thinking. These findings suggest that connecting local contexts with PBL

not only improves cognitive engagement but also fosters a sense of cultural identity and pride essential qualities for future educators.

Within this theoretical synthesis, the conceptual outcome of this study is the Problem-Based Learning with Nias Local Wisdom Framework, which integrates PBL phases with cultural values and practices from Nias. The model aligns with the five key stages of PBL orientation, problem identification, investigation, solution development, and reflection each infused with elements of Nias local wisdom.

3.2 Mapping Nias Local Wisdom into PBL Phases

Problem Orientation (Cultural Awareness Stage)

The first phase of PBL involves presenting learners with an authentic, contextually relevant problem. Integrating Nias local wisdom at this stage allows educators to frame problems within familiar cultural and environmental settings. For instance, local ecological challenges such as soil erosion in hilly agricultural areas can be explored using traditional Nias farming techniques. The values of fahömi (care for nature) and togizidö (community cooperation) become starting points for problem identification.

According to Pamungkas et al. (2017), contextualizing learning through local wisdom enhances engagement because learners perceive the problem as meaningful and directly connected to their community. This step encourages students to employ observation, questioning, and problem formulation core indicators of critical thinking (Paul & Elder, 2013).

Problem Analysis and Exploration (Collaborative Inquiry Stage)

In this phase, learners investigate causes, gather information, and explore potential solutions. Nias traditions such as gotong royong (collective work) and maena (cooperative performance) provide cultural metaphors for teamwork and collaboration. Embedding these values strengthens the cooperative inquiry process that defines PBL (Muliarsa et al., 2024).

Through discussions grounded in communal decision-making practices, learners develop analytical reasoning, evaluate alternative perspectives, and integrate evidence processes strongly associated with critical thinking (Affandy et al., 2019). Moreover, these collective explorations mirror the social constructivist principle that knowledge is co-created through dialogue and shared experience (Vygotsky, 1978).

Solution Development (Creative Synthesis Stage)

PBL emphasizes hypothesis generation and creative problem-solving. Incorporating Nias cultural expressions such as tari moyo (bird dance) symbolizing agility and adaptability stimulates creative ideation. This stage nurtures divergent thinking, allowing learners to generate multiple alternative solutions while valuing local ecological knowledge.

Redhana (2019) emphasizes that creativity flourishes when learners are encouraged to connect scientific understanding with imaginative reasoning. Therefore, problem-solving tasks that require blending scientific reasoning and cultural insight (e.g., designing eco-friendly farming based on Nias traditional irrigation) stimulate both scientific creativity and cultural appreciation.

Testing and Evaluation (Reflective Validation Stage)

Learners then evaluate proposed solutions against real-world feasibility and cultural sustainability. Reflection is guided by local ethical frameworks, such as fame'cha (mutual respect) and bela zio (responsibility). This phase fosters critical reflection, aligning with what Mezirow (1997) calls transformative learning a process where individuals reassess assumptions and perspectives through experience.

Halimah et al. (2023) found that when reflection is culturally grounded, learners exhibit deeper metacognitive awareness and moral reasoning. In the Problem-Based Learning (PBL) model and Nias local wisdom, evaluating solutions through cultural lenses ensures that students' creative outcomes remain respectful and applicable to local realities.

e. Reflection and Knowledge Reconstruction

The final phase in Problem-Based Learning (PBL) model and nias local wisdom emphasizes reflective synthesis. Learners articulate what they have learned cognitively, emotionally, and culturally. This aligns with Gay's (2018) view that culturally responsive learning promotes holistic competence integrating intellectual growth with cultural identity. Reflection journals, storytelling, or community presentations rooted in Nias oral traditions can serve as effective tools to consolidate learning.

3.3 Theoretical Implications: Linking Problem-Based Learning (PBL) model and Nias Local Wisdom with 21st-Century Skills

The integration of local wisdom into PBL directly supports the 4C framework (Critical thinking, Creativity, Communication, and Collaboration) of 21st-century learning (Griffin & Care, 2012).

- 1) Critical Thinking: Through problem identification and cultural analysis, learners engage in evaluating real-world issues. Studies show that localized PBL significantly enhances analytical reasoning (Husen et al., 2017; Soraya et al., 2019).
- 2) Creativity: Exposure to traditional cultural practices broadens learners' perspectives, inspiring innovative solutions grounded in local knowledge (Muliarsa et al., 2024).
- 3) Collaboration: Collective cultural practices such as gotong royong naturally align with PBL's group-based problem-solving dynamics.
- 4) Communication: Using local language and narratives fosters inclusive participation and improves students' ability to articulate ideas clearly across cultural contexts.

This alignment demonstrates that integrating cultural values not only reinforces cognitive development but also fosters social and emotional competencies essential for future teachers.

3.4 Pedagogical Implications for Teacher Education

Embedding local wisdom within the PBL framework offers transformative potential for teacher education curricula, particularly in programs like PGSD (Primary School Teacher Education) in Indonesia. First, it allows teacher candidates to experience culturally contextualized pedagogy, preparing them to design similar culturally responsive lessons for their future students. Second, it reinforces reflective professionalism, as teachers become aware of how local culture shapes learning dynamics (Gay, 2018).

Moreover, this model supports the goals of the Merdeka Belajar (Freedom to Learn) initiative in Indonesia, which emphasizes autonomy, contextualization, and cultural appreciation in education. The Problem-Based Learning (PBL) model and Nias local wisdom aligns perfectly with these national priorities by promoting independent inquiry while maintaining local cultural integrity.

3.5 Discussion: Toward a Contextualized Model of Critical and Creative Thinking

The literature synthesis suggests that Problem-Based Learning (PBL) model and Nias local wisdom serves as a bridge between global pedagogical paradigms and indigenous epistemologies. While PBL represents a global best practice for higher-order thinking, local wisdom anchors learning within lived cultural realities, thereby addressing what Hall (2012) terms the "cultural gap in education."

In the context of Nias, local wisdom such as fahōmi, maena, and hombo batu encapsulate moral, cognitive, and social dimensions that can be leveraged pedagogically. These practices embody resilience, creativity, and collective responsibility the very competencies sought in 21st-century education. Integrating them into PBL not only enriches learning experiences but also contributes to decolonizing education by validating local knowledge systems (Smith, 2012).

The Problem-Based Learning (PBL) model and Nias local wisdom thus embodies a glocal pedagogy global in method, local in substance. It empowers future teachers to be both critical thinkers capable of addressing global challenges and cultural custodians preserving their heritage through education.

4. Conclusion

This conceptual study analyzed the integration of the Problem-Based Learning (PBL) model and Nias local wisdom as an innovative framework for enhancing critical and creative thinking among prospective elementary school teachers. The synthesis of literature reveals that PBL, grounded in constructivist theory, effectively fosters higher-order thinking through inquiry, collaboration, and reflection. When contextualized with local wisdom, PBL becomes more meaningful, culturally resonant, and socially transformative.

Integrating Nias local wisdom into PBL encourages learners to engage with problems rooted in real-life cultural contexts, promoting contextual understanding and reflective reasoning. Cultural values such as gotong royong (collective work), maena (collaboration), and hombo batu (courage and perseverance) provide fertile ground for developing teamwork, creativity, and moral responsibility core competencies of 21st-century learning.

The proposed Problem-Based Learning (PBL) model and Nias local wisdom bridges the gap between global educational paradigms and indigenous cultural knowledge. For teacher education programs, particularly in Indonesia, this model offers a pathway toward culturally responsive pedagogy that not only cultivates cognitive excellence but also strengthens cultural identity and sustainability. In line with national education reforms such as Merdeka Belajar, the Problem-Based Learning (PBL) model and Nias local wisdom framework empowers future teachers to think critically, act creatively, and teach contextually.

Future research is recommended to empirically validate the model through design-based studies or mixed-method approaches, assessing its effectiveness in improving pre-service teachers' learning outcomes and classroom applications. The integration of local wisdom into PBL should continue to evolve as a glocal strategy embracing global educational competencies while preserving and revitalizing indigenous heritage.

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