Teachers' Readiness and Students' Needs in Developing Local Wisdom-Based IPAS Teaching Materials with a Deep Learning Approach for Critical Thinking

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ABSTRACT
Teachers' Readiness and Students' Needs in Developing Local Wisdom-Based IPAS Teaching Materials with a Deep Learning Approach for Critical Thinking. Critical thinking is an essential 21st-century competency, yet many Indonesian elementary students still demonstrate low proficiency in this area. This study investigates the readiness of teachers and the needs of students regarding the development of IPAS (Science and Social Studies) teaching materials that integrate local wisdom with a deep learning approach to enhance critical thinking skills. Using a descriptive qualitative survey design, data were collected through interviews, focus group discussions, observations, and documentation involving 42 elementary school teachers and 77 students in Makassar. The findings reveal that most teachers possess a moderate level of pedagogical and technological readiness to adopt deep learning strategies, including concept-based instruction, reflective learning, and the integration of local culture into contextual learning. Students express a clear preference for interactive and meaningful learning activities that connect science concepts to real-life experiences and cultural identity. However, several challenges were identified, including time constraints, varied student abilities, and limited support systems. Additionally, existing teaching materials often lack contextual relevance and fail to stimulate higher-order thinking. This research provides empirical insights that can guide the development of innovative IPAS teaching materials tailored to the local context and aligned with the goals of the Merdeka Curriculum. The study recommends teacher training, inclusive material design, and strengthened stakeholder support to optimize implementation. Ultimately, the integration of local wisdom and deep learning offers a promising strategy to foster critical thinking and student engagement in elementary education.

Keywords: Deep Learning, Local Wisdom, Critical Thinking, Teaching Material, IPAS.

1. INTRODUCTION

Critical thinking is a key competency that students must possess to face the complexity of information and the dynamics of 21st-century life. However, various studies have shown that Indonesian students' critical thinking skills remain relatively low. [1] found that the average critical thinking achievement of junior high school students in Kediri Regency was only 42.08%, with interpretation skills at 23.47%, evaluation at 41.10%, and explanation at 33.33%, indicating a significant gap in higher-order thinking abilities. This finding is supported by [2], who reported an increase in students' critical thinking scores from 66.30 to 87.22 after using field-based instructional materials that incorporate local wisdom.

On the other hand, the learning approach at the elementary school level tends to remain teacher-centered and has yet to fully empower students' critical thinking potential. One promising solution is the development of IPAS (Integrated Natural and Social Sciences) teaching materials based on local wisdom, which can foster contextual and meaningful learning experiences that align with students' real-life situations. [3] found that science learning tools incorporating local wisdom yielded an N-gain score of 0.47 in critical thinking skills, categorized as moderate. This suggests that local content can enhance the connection between subject matter and students' environmental and cultural contexts, thereby deepening their analytical and reflective thinking processes. In other words, local wisdom provides a learning context that resonates with students' lives, enabling them to build deeper and more analytical understanding of the subject matter [3–5]. According to [6], integrating literacy and numeracy into mathematical reasoning has shown effectiveness in enhancing students' reasoning abilities, particularly when learning materials are developed with local context in mind. Similarly, [7]reported that mathematical modules

based on local wisdom and higher-order thinking questions could train students to become more critical and independent thinkers through valid, practical, and effective learning instruments.

Although numerous studies have focused on the development of learning tools based on local wisdom, the explicit application of the deep learning approach in designing elementary-level teaching materials is still limited. In fact, deep learning emphasizes not only content mastery but also encourages students to construct knowledge through deep internalization, reflection, conceptual integration, and evidence-based logical decision-making [8]. Instructional modules that integrate cultural elements and promote deep learning, such as those developed by [9] have proven effective in significantly enhancing students' evaluation, analysis, and metacognitive abilities.

However, the development of teaching materials that integrate local wisdom and deep learning must not be carried out arbitrarily. A grounded needs analysis is required to inform development, particularly regarding teachers' readiness to implement contextual and in-depth learning, as well as students' needs for relevant, engaging, and thought-provoking materials that stimulate critical thinking. Research by [10] reveals that both teachers and students are not yet familiar with instructional tools that support critical thinking within local and scientific contexts, despite a growing demand for such tools in the face of increasingly complex science and social studies education challenges.

The urgency of this study lies in providing strong empirical foundations concerning the readiness and needs of educational stakeholders as the basis for developing IPAS teaching materials that can meaningfully improve learning quality. A qualitative survey that explores perceptions, experiences, and challenges from the perspectives of teachers and students will contribute significantly to the development of contextual, pedagogically sound, and relevant teaching resources particularly in cultivating students' critical thinking through meaningful and deep learning strategies.

This study aims to obtain an in-depth understanding of teachers' readiness and students' needs related to the development of IPAS teaching materials based on local wisdom using a deep learning approach focused on enhancing critical thinking skills. Specifically, the study aims to: (1) analyze teachers' readiness to support the development of local wisdom-based IPAS teaching materials with a deep learning approach for improving students' critical thinking, both pedagogically and technologically; (2) identify students' needs for IPAS materials that can enhance critical thinking through a contextual, meaningful, and cognitively stimulating approach grounded in local wisdom and deep learning principles; and (3) uncover the challenges faced by teachers and students in implementing IPAS instructional materials that integrate local wisdom and deep learning at the elementary school level. The results of this study are expected to serve as a foundation for developing innovative instructional materials that are locally responsive, pedagogically relevant, and aligned with the transformative goals of the Merdeka Curriculum.

2. METHOD

This study employed a descriptive qualitative approach using a survey method, aiming to gain an in-depth understanding of teachers' readiness and students' needs in the development of IPAS (Integrated Natural and Social Sciences) teaching materials based on local wisdom, integrated with a deep learning approach to enhance critical thinking skills. The qualitative approach was chosen as it allows researchers to explore meanings, experiences, and perceptions contextually within the participants' natural settings [11].

The qualitative survey method was carried out through semi-structured interviews with teachers and students, focus group discussions (FGDs), classroom observations, and document analysis. The research subjects consisted of 41 IPAS teachers and 77 students from public and private elementary and junior high schools that had implemented the Merdeka Curriculum and were located in areas rich in local wisdom around Makassar and its surroundings. Purposive sampling was used with specific criteria, such as teachers who had taught IPAS for at least three years and students who had participated in IPAS learning within local contexts [12].

The research instruments were designed to explore teachers' readiness and students' needs, as well as the dimensions of students' critical thinking skills, by adopting the FRISCO framework [13,14], which includes six key indicators: Focus (the ability to concentrate on the main problem), Reason (the ability to develop logical arguments), Inference (the ability to draw conclusions based on evidence), Situation (understanding the context), Clarity (clarity in expressing ideas), and Overview (the ability to assess and reflect on the thinking process).

The FGD activities were used to explore the collective perceptions of teachers regarding IPAS learning, while interviews and open-ended questionnaires were designed to capture students' needs and preferences for meaningful and reflective IPAS learning ([15,16]). The research instruments included interview guides, FGD guidelines, observation sheets, and document analysis protocols. All instruments underwent content validation by education experts and field practitioners. The collected data were analyzed using thematic analysis as developed by [17], which consists of data familiarization, initial coding (open coding), identifying potential themes, reviewing and naming themes, and composing a reflective and systematic analytical narrative.

3. RESULTS AND DISCUSSION

3.1. Results

This section presents the research findings along with a comprehensive discussion. The results may be displayed using numbers, charts, tables, and other visual aids to facilitate reader comprehension. The discussion is organized into sub-sections as needed.

Research Findings

Teachers' Pedagogical Readiness in Integrating Deep Learning and Critical Thinking

Interviews with 42 elementary and junior high school teachers revealed that most teachers possess a relatively good understanding of deep learning and critical thinking concepts, albeit at varying levels. Teachers defined deep learning as learning that emphasizes conceptual understanding, interconnectivity between concepts, and reflective thinking. The principles most frequently cited were mindful learning, meaningful learning, and joyful learning. Critical thinking was understood as the ability to objectively analyze information and draw logical conclusions.

Methodologically, teachers had applied various learning approaches, including storytelling, group discussions, experiments, case studies, and real-world problem-solving. However, the optimal use of methods that stimulate students' critical thinking still requires further development. More experienced teachers tended to demonstrate greater readiness in applying deep learning approaches, although they continued to face challenges such as limited time and resources.

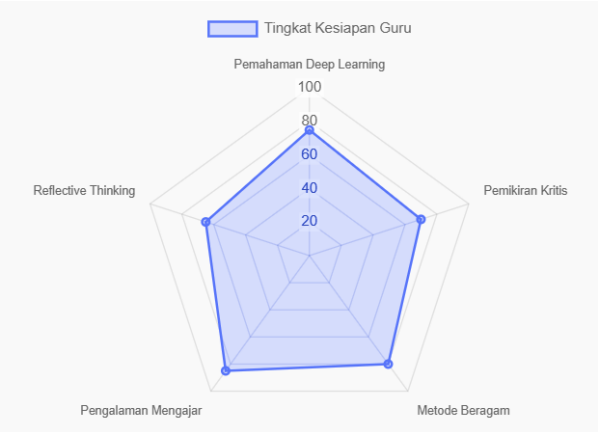

Figure 1. Teachers' Pedagogical Readiness

Technological Readiness of Teachers and Students

The findings show that most teachers reported comfort in using educational technologies. Tools such as Google Classroom, Quizizz, and projectors were commonly utilized to support the learning process. Teachers' familiarity with digital deep learning concepts indicates their readiness to adopt modern learning methods.

From the students' perspective, data revealed high levels of familiarity with technological devices such as computers and smartphones. Students actively used applications like Google and YouTube, suggesting their readiness for digital learning platforms. However, technology access disparities among students remain an issue requiring attention to ensure equal learning opportunities.

Integration of Local Wisdom in IPAS Learning

Most teachers demonstrated substantial efforts to incorporate local wisdom into IPAS instruction. Strategies included utilizing the surrounding environment, folklore, and traditional practices as learning contexts. Students expressed strong interest in learning that integrates local wisdom, viewing such content as highly engaging and relevant. Student interviews indicated that linking lesson materials to local culture enhanced their sense of relevance and strengthened cultural identity. Many students exhibited a solid understanding of their local traditions, which serves as a foundation for developing locally contextualized instruction.

Students' Learning Needs for Interactive Learning

Data showed that students strongly preferred interactive learning that involved experiments, hands-on activities, educational games, and discussions. Students felt more stimulated by learning that was not only theoretical but also practical and related to their everyday lives. The integration of scientific concepts with real-life applications, such as health and local ecosystems, helped students relate their learning to personal experiences.

Challenges in Implementing Deep Learning and Critical Thinking

The study identified several major challenges in implementing deep learning approaches: (1) Limited Time and Resources: A tight curriculum and limited classroom hours hinder the implementation of in-depth discussions and reflective activities required by deep learning. (2) Student Readiness Variation: Significant differences were observed in students' preparedness to engage in critical thinking-based learning. While focusing on problems was relatively easy to develop, evaluation and self-reflection skills posed greater challenges. (3) Material Complexity: Students reported difficulties understanding abstract concepts such as ecosystems and biological systems due to technical vocabulary and conceptual complexity. (4) Systemic Support: Support from school leaders and parents varied, with some stakeholders remaining skeptical about innovative teaching methods.

Evaluation of Existing IPAS Teaching Materials

Teachers' assessments of existing IPAS materials indicated that while the overall quality was acceptable, improvements were needed in several areas: (1) Relevance and Visualization: Teaching materials need better visual design and stronger connections to local contexts. (2) Integration of Local Wisdom: Current materials do not sufficiently incorporate local cultural content. (3) Difficulty Level: Teachers found it challenging to adjust the materials for students with varying levels of understanding.

Further details regarding the evaluation of existing IPAS teaching materials are presented in the following table

Table 1. Comparative Evaluation of Existing IPAS Teaching Materials

Evaluation Aspect	Current Condition	Development Needs
Relevance and Visualization	The current IPAS teaching materials are generally adequate in presenting fundamental content; however, the visualization is limited and lacks strong contextual linkage to students' real-life experiences. The use of images, diagrams, and interactive media remains insufficient, making it difficult for students to connect theory with practice.	Strengthening visual design and contextualization is needed. Each topic should be illustrated with engaging and interactive visuals that relate to local phenomena, surrounding environments, and regional culture to foster *meaningful learning*.
Integration of Local Wisdom	Elements of local wisdom have been introduced but are still supplementary and not yet a core	Local wisdom must be explicitly and systematically integrated

	part of the instructional content. Activities that connect local culture to scientific and social concepts remain minimal.	into every learning unit. For example, linking ecosystem topics with traditional farming systems or local environmental practices aligns with the principles of *contextual deep learning*.
Conceptual and Pedagogical Integration	The structure of the materials remains thematic and general, lacking depth in conceptual interconnection. Teachers often face challenges in linking IPAS topics across disciplines, such as connecting ecological concepts with social community studies.	Cross-disciplinary integration should be emphasized through a *deep learning* approach that promotes conceptual interconnectivity, reflective exploration, collaborative discussion, and critical reasoning development.
Level of Difficulty	The difficulty level across topics is inconsistent—some are too complex for elementary learners, while others are overly simplistic. This inconsistency creates challenges in differentiated instruction.	A tiered difficulty structure based on students' cognitive development levels is required. The content should be scaffolded adaptively to support both advanced and slower learners in achieving optimal growth.
Technological Accessibility	Most materials remain in conventional printed form, with limited digital access in some schools. The integration of digital learning tools such as Google Classroom, Quizizz, or YouTube within the instructional design is still minimal.	Development of interactive digital materials compatible with students' devices (smartphones/laptops) and accessible both online and offline is necessary. This supports 21st-century learning and aligns with *Merdeka Curriculum* principles.
Alignment with the Merdeka Curriculum	Some components already support the *Pancasila Student Profile*, yet the materials have not fully reflected reflective, collaborative, and independent learning values emphasized in the *Merdeka Curriculum*.	Teaching materials should highlight exploratory activities, self-reflection, and problem-based projects rooted in local issues to nurture critical thinking and *Pancasila* character development.

3.2. Discussion

Teachers' Pedagogical Readiness in the Context of Deep Learning

The findings suggest that teachers possess a foundational understanding of deep learning, aligning with [8], who define it as an approach that encourages students to construct knowledge through internalization, reflection, conceptual linking, and evidence-based reasoning. However, practical implementation remains a significant challenge.

[18] found that local wisdom-infused problem-based learning (PBL) significantly improved critical and creative thinking skills among junior high students, supporting this study's emphasis on the importance of local context. The varying levels of teacher readiness reflect the broader challenge of pedagogical transformation. [13] emphasized that developing critical thinking requires a systematic and sustained approach. The FRISCO

framework (Focus, Reason, Inference, Situation, Clarity, Overview) adopted in this study provides a structured foundation for nurturing students' critical thinking skills.

Local Wisdom as a Context for Meaningful Learning

This study found that integrating local wisdom into IPAS learning creates meaningful and contextual learning experiences. This aligns with [3], who found that local wisdom-based instructional tools produced a moderate N-gain (0.47) in students' critical thinking scores.

[19]found a significant correlation between critical thinking skills and mathematics achievement, suggesting that integrating critical thinking through local contexts can support overall academic success. These findings are consistent with [4], who stated that local wisdom offers a learning context closely tied to students' daily lives, helping them build deep and analytical understanding.

Technology as an Enabler for Deep Learning

The relatively high technological readiness of teachers and students presents an opportunity to advance deep learning-based instruction. The use of tools like projectors, Google Classroom, and Quizizz indicates that teachers are building a foundation for adopting more innovative approaches.

[20] found that while digital media has potential to empower 21st-century critical thinking in elementary science education, teachers have not fully optimized technology use based on student and content characteristics. Continuous technology training is therefore crucial. [21]also emphasized that digital media innovations such as digital comics are effective for enhancing critical thinking in science learning.

Implementation Challenges and Strategic Solutions

The identified challenges reflect the complexity of implementing deep learning at the elementary level. Limited time, diverse student abilities, and inconsistent support systems are key barriers.[22] found that PBL is effective in fostering elementary students' critical thinking but requires supportive conditions. [23] similarly emphasized that while PBL improves critical thinking in science, its effectiveness depends on teacher readiness and learning infrastructure.

Implications for IPAS Material Development

This study provides a strong empirical basis for developing responsive IPAS materials that meet teachers' and students' needs. Teachers envisioned ideal IPAS instruction to include local wisdom, effective use of technology, and problem-solving approaches linked to real-life issues. Students' preference for interactive and contextual learning supports the development of materials that incorporate games, experiments, and discussion. This aligns with the principles of joyful learning emphasized in deep learning. According to [24], joyful learning increases student engagement and motivation, while argue that combining joy and intellectual challenge creates optimal conditions for higher-order thinking development.

Contribution to Merdeka Curriculum Implementation

This study contributes significantly to the implementation of the Merdeka Curriculum, which emphasizes meaningful learning and character development. Integrating local wisdom into IPAS not only enhances critical thinking but also strengthens students' cultural identity.

The readiness of teachers and students to adopt innovative approaches and technology supports more effective implementation of the curriculum. [9]found that integrating educational technology under the Merdeka Curriculum improved student engagement and supported student-centered learning. [25] also highlighted teacher technological readiness as a key factor in successful curriculum implementation.

Nonetheless, the challenges identified require careful policy and program development. [26] pointed out key obstacles to Merdeka Curriculum implementation, including infrastructure limitations, teacher competence variability, and the need for ongoing training.

4. CLOSURE

Based on the descriptive qualitative research conducted with 42 teachers and students from Grades IV–VI at elementary schools implementing the Merdeka Curriculum in Makassar and surrounding areas, several key findings were identified that address the research questions concerning the readiness of teachers and the needs of students related to the development of local wisdom-based IPAS teaching materials with a deep learning approach to enhance critical thinking.

Teachers' Readiness in Supporting the Development of Local Wisdom-Based IPAS Teaching Materials with a Deep Learning Approach

Teachers demonstrated a relatively strong level of readiness to support the development of IPAS teaching materials grounded in local wisdom and integrated with a deep learning approach. Pedagogically, teachers showed a solid understanding of deep learning as instruction that emphasizes deep conceptual comprehension, interconnections among concepts, and reflective thinking, applying principles such as mindful learning, meaningful learning, and joyful learning. A variety of teaching strategies had been implemented, including storytelling, group discussions, experiments, case studies, and real-life problem-solving. Technologically, most teachers expressed confidence in using educational technologies such as Google Classroom, Quizizz, and projectors, indicating readiness to adopt modern learning methods aligned with deep learning. Teachers also made significant efforts to integrate local wisdom into IPAS learning by utilizing the local environment, folklore, and traditional practices as contextual learning tools. However, further development is still needed, particularly in optimizing methods that effectively stimulate students' critical thinking skills.

Students' Needs for IPAS Teaching Materials to Improve Critical Thinking Skills

Students clearly expressed the need for IPAS teaching materials that support the development of critical thinking skills through a local wisdom-based and deep learning-oriented approach. Their primary needs include interactive and application-oriented learning, with a strong preference for instruction that involves experiments, hands-on activities, educational games, and discussions. Students felt more motivated when learning was not only theoretical but also applicable and relevant to their daily lives. They also showed great interest in learning that connects the content with local culture, considering such topics highly engaging and relevant. Integrating science concepts with real-life applications—such as health and local ecosystems—helped students relate learning materials to their personal experiences, thereby enhancing their sense of relevance and appreciation for cultural identity. Students demonstrated a high level of familiarity with digital devices such as computers and smartphones, indicating their readiness to engage in digital learning platforms that support deep learning. In terms of critical thinking skills, students showed that the "focus" component (attending to the central issue) was relatively easier to develop, but more intensive guidance was needed for evaluation and reflection, which are key elements in the FRISCO framework.

Challenges in Implementing IPAS Teaching Materials that Integrate Local Wisdom and Deep Learning

The study identified several significant challenges faced by both teachers and students in implementing local wisdom-based IPAS teaching materials using a deep learning approach.

From the Teachers' Perspective: (1) Limited time and resources: Time constraints and a dense curriculum were major obstacles to implementing in-depth discussions and reflective activities required by the deep learning approach. (2) Variations in student abilities: There were considerable differences in students' readiness to engage in critical thinking-based learning. (3) Inconsistent systemic support: Support from school principals and parents varied, with some stakeholders remaining skeptical about innovative teaching methods.

From the Students' Perspective: (1) Content complexity: Students found it challenging to understand abstract concepts, such as ecosystems and biological systems, due to technical terminology and conceptual complexity. (2) Technology access gaps: Disparities in access to technology among students need to be addressed to ensure equitable learning opportunities. (3) Limited evaluation and reflection skills: Compared to their ability to focus on problems, students struggled more with critical evaluation and self-reflection.

Challenges in Existing IPAS Teaching Materials: (1) Relevance and visualization: Teaching materials require improvement in visual design and contextual relevance. (2) Integration of local wisdom: Current materials do not

adequately connect the content with students' local cultural contexts. (3) Adaptability to different difficulty levels: Teachers found it difficult to tailor materials to accommodate students with varied levels of understanding.

These findings are expected to serve as a strong foundation for the development of innovative IPAS teaching materials that are responsive to local contexts, pedagogically relevant, and capable of supporting the successful implementation of the Merdeka Curriculum in a more optimal and transformative manner—ultimately improving the quality of IPAS learning at the elementary level.

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