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## Preliminary Study of an IPAS Learning Package Integrating Problem Based Learning, Deep Learning, and the Traditional Engklek Game for Elementary School Students

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### ABSTRACT

IPAS (Integrated Natural and Social Sciences) learning in elementary schools plays an important role in developing students' critical thinking skills. This preliminary study aimed to identify learning needs and formulate a conceptual design of an IPAS learning package integrating Problem-Based Learning (PBL), deep learning, and the traditional Engklek game. This study employed a qualitative descriptive approach involving 62 sixth-grade students and two teachers at SDN Karangsambung II. Data were collected through observations, interviews, and document analysis and analyzed using data reduction, data display, and conclusion drawing techniques. The findings revealed that IPAS learning remained predominantly teacher-centered, the implementation of PBL was not yet optimal, deep learning components had not been fully integrated into instructional materials and assessment practices, and traditional games had not been systematically utilized in learning activities. Based on the needs analysis and literature review, this study produced a conceptual design of a PBL-based IPAS learning package supported by the traditional Engklek game. The findings provide a foundation for further product development and validation to support more meaningful and contextual IPAS learning

## 1. Introduction

The transformation of 21st-century education requires students to develop higher-order thinking skills in order to adapt to rapid technological advancements, globalization, and the increasing complexity of social issues (Arifin & Mu'id, 2024). This transformation also necessitates the mastery of the four essential 21st-century competencies critical thinking, creativity, collaboration, and communication (4C) as fundamental capacities for navigating technological developments and addressing complex real-world challenges (Purba et al., 2023 ; Thornhill-Miller et al., 2023). Although these competencies should be cultivated

from the elementary school level, instructional practices remain predominantly teacher-centered, limiting opportunities for students to develop critical thinking, problem-solving, and collaborative skills effectively.

In the Merdeka Curriculum, Integrated Natural and Social Sciences (IPAS) is designed to foster scientific thinking skills through activities such as observing, questioning, investigating, analyzing, and drawing conclusions (Thornhill-Miller et al., 2023). Conceptually, the characteristics of IPAS provide substantial potential for developing students' critical thinking skills (Barus & Sahrul, 2024). Nevertheless, numerous studies have reported that IPAS instruction in elementary schools continues to be dominated by conventional teaching approaches, resulting in limited student engagement in investigative processes and independent knowledge construction (Farhan et al., 2025). Consequently, the potential of IPAS as a vehicle for promoting critical thinking skills has not yet been fully realized.

One instructional model that has been proven effective in enhancing critical thinking skills is Problem Based Learning (PBL) (Hmelo-Silver, 2004). Numerous studies and meta analyses have demonstrated that PBL improves students' problem-solving abilities, reasoning skills, and learning engagement by placing learners in authentic problem situations that require investigation, inquiry, and collaboration (Seibert et al., 2021 ; Liu & Liu, 2022). Furthermore, the characteristics of PBL are closely aligned with the principles of deep learning, which emphasize conceptual understanding, reflective thinking, and the ability to connect knowledge with real world contexts (Aisyah & Gumala, 2025). Despite its potential, studies that specifically integrate PBL with a deep learning approach within the context of IPAS instruction at the elementary school level remain relatively limited.

The use of game based learning media has gained increasing attention due to its potential to enhance students' motivation, engagement, and overall learning experiences (Prialitya & Hanafiah, 2025). Traditional games, including Engklek, offer considerable potential as contextual learning media, as they not only promote physical and social interaction but also foster critical thinking, decision-making, collaboration, and problem solving skills (Lutfiah et al., 2025 ; Sutyaningsih et al., 2025). In addition to preserving local cultural values, traditional games can create more enjoyable and meaningful learning environments (Mude, 2024). Nevertheless, the integration of traditional games as an integral component of problem-based and deep learning approaches in IPAS instruction remains underexplored in the existing literature.

Based on the literature review, several research gaps can be identified. First, most studies on PBL in IPAS instruction have primarily focused on improving learning outcomes, while the development of instructional designs that explicitly integrate deep learning principles remains limited (Aisyah & Gumala, 2025). Second, research on traditional games has generally emphasized their effects on motivation, character development, or academic achievement, with relatively few studies examining their role in fostering critical thinking skills within a PBL framework (Prialitya & Hanafiah, 2025). Third, only a limited number of studies have simultaneously integrated PBL, deep learning, and traditional games within the

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context of IPAS instruction at the elementary school level (Amelia & Arwin, 2020; Dese et al., 2025).

Therefore, this preliminary study aims to design an IPAS learning package based on Problem-Based Learning (PBL) integrated with deep learning principles and supported by the traditional Engklek game. The development of this learning package is expected to provide an innovative alternative for promoting contextual and meaningful IPAS instruction, fostering students' critical thinking skills, and simultaneously supporting the preservation of local cultural heritage at the elementary school level.

## 2. Methodology

This study employed a qualitative descriptive research design aimed at identifying the learning needs of IPAS instruction in elementary schools. The study was conducted at SDN Karangsambung II and involved 62 sixth-grade students distributed across two classes, namely Class VI A (32 students) and Class VI B (30 students), as well as two teachers. The participants were selected using purposive sampling, based on the need to obtain relevant information regarding the implementation of IPAS learning in the classroom (Sugiyono, 2021). Data were collected through classroom observations, interviews, and document analysis. The data were analyzed using qualitative descriptive analysis, following the stages of data reduction, data display, and conclusion drawing. Subsequently, data analysis was conducted through data triangulation, as illustrated in the following figure 1.

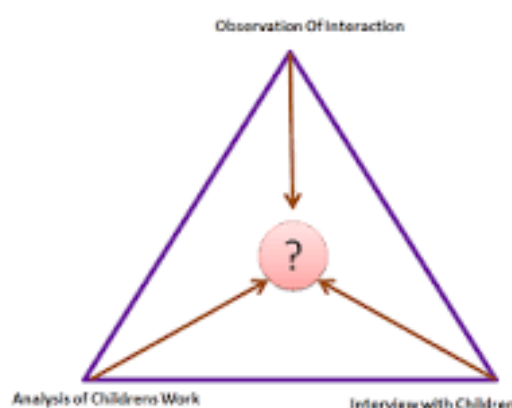


Figure 1. Technique Triangulation (Sugiyono, 2021)

Document analysis was conducted on teaching modules, learning materials, student worksheets, and assessment instruments to identify the extent to which deep learning components and critical thinking skills had been integrated into the learning process. Furthermore, the observation guidelines focused on five aspects: (1) the implementation of learning activities, (2) student participation, (3) the application of Problem Based Learning (PBL) stages, (4) the use of instructional media, and (5) assessment practices. The interview guidelines were used to explore teachers' and students' perceptions regarding the implementation of IPAS learning,

challenges in developing critical thinking skills, and the potential use of traditional games in the learning process. To ensure the credibility of the findings, data validity was established through source triangulation and technique triangulation. Information obtained from observations, interviews, and document analysis was compared and cross-checked to ensure consistency. In addition, member checking was conducted by confirming the interview results with the participating teachers.

### **3. Results and Discussion**

Based on the results of classroom observations and interviews with both teachers and students, it was found that IPAS instruction in Grade VI at SDN Karangsambung II has not yet optimally fostered students' critical thinking skills. Learning activities tend to focus on content delivery and exercise based tasks, while the implementation of the Problem Based Learning (PBL) model has not been carried out consistently. This finding is consistent with previous studies indicating that IPAS instruction in elementary schools is still predominantly characterized by teacher centered approaches, which provide limited opportunities for students to develop higher order thinking skills (Atikah et al., 2025 ; Andhika & Endang Indarini, 2025).

One teacher stated,

"Learning activities are still dominated by explanation and question-answer sessions because students often need direct guidance before working independently."

Another teacher explained,

"Problem Based activities have been introduced occasionally, but they have not yet been implemented consistently in every IPAS lesson."

Students also reported that learning activities mostly involved completing exercises after teacher explanations. One student stated,

"Usually we listen to the teacher's explanation first and then answer questions from the textbook."

These findings indicate that opportunities for investigation, discussion, and problem solving remain limited. Furthermore, instructional components such as lesson plans and assessment practices have not yet fully encouraged students to engage in problem-solving activities and deep learning processes. On the other hand, the findings revealed considerable potential for utilizing traditional games as contextual learning media; however, their integration into IPAS instruction has not been implemented systematically. These findings indicate the need to develop a comprehensive learning package that integrates Problem Based Learning (PBL), deep learning principles, and traditional games to strengthen students' critical thinking skills (Prawati et al., 2021 ; Rosanti et al., 2025 ; Permana et al., 2025).

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The findings of the preliminary study indicate that IPAS instruction in elementary schools is still predominantly characterized by conventional, teacher-centered approaches, resulting in suboptimal student engagement in higher order thinking processes. The learning process tends to emphasize information delivery and exercise based activities, thereby limiting opportunities for students to engage in investigation, discussion, and problem solving. This condition is consistent with previous findings suggesting that IPAS instruction at the elementary school level has yet to effectively promote active student participation and the development of critical thinking skills (Junaedi et al., 2025). These findings were supported by the results of interviews conducted with teachers, as illustrated in the figure 2 below.



Figure 2. Teacher Interview Activities at SDN Karangsambung II

Based on these findings, a research gap remains regarding the integration of Problem-Based Learning (PBL), deep learning principles, and the use of traditional games within a unified instructional package for IPAS learning in elementary schools. Most previous studies have examined the implementation of PBL, the development of learning media, or the use of traditional games separately, without integrating these components into a comprehensive and cohesive learning package.

The development of a learning package that not only emphasizes an instructional model but also integrates contextual learning experiences through traditional games has the potential to support more meaningful and student-centered learning. This perspective is consistent with the findings of Wulandari & Fauzi, (2021), who reported that the integration of PBL with traditional games can enhance students' critical thinking skills in IPAS learning. However, previous studies have generally been limited to combining several instructional approaches without developing a comprehensive and integrated learning package.

The development of the Engklek game as a PBL-based learning medium for IPAS requires a clear conceptual foundation to ensure that the resulting product aligns with the intended learning objectives. Therefore, it is necessary to establish key indicators that serve as guidelines throughout the design and development process. These indicators function to ensure that the Engklek game is not merely a recreational activity but also effectively integrates pedagogical elements, student

engagement, and meaningful conceptual learning. The development of the traditional Engklek game for IPAS learning is based on five key aspects: pedagogical alignment, student engagement, integration of learning concepts, development of 21st-century skills, and the incorporation of local wisdom. A summary of the results of the needs analysis obtained through the preliminary study is presented in Table 1 below.

Table 1. Summary of Needs Analysis Results

| Data Source             | Main Findings                        | Implications                       |
|-------------------------|--------------------------------------|------------------------------------|
| Observation             | Learning remains teacher-centered    | Need for student-centered learning |
| Interview               | PBL not consistently implemented     | Need for structured PBL package    |
| Document Analysis       | Modules do not support deep learning | Need for integrated module         |
| Observation & Interview | Traditional games rarely used        | Need for contextual learning media |

Source: Authors, 2026.

The five development indicators were derived from the synthesis of needs analysis findings and literature review results. The findings highlighted the need for learning activities that promote active participation, critical thinking, contextual learning experiences, and alignment with curriculum objectives. These needs were then integrated with theoretical perspectives on PBL, deep learning, and game based learning to formulate the core indicators for product development.

The first aspect is pedagogical alignment, which refers to the consistency between the game design, learning objectives, and the stages of the Problem-Based Learning (PBL) model. The developed game is intended not merely as a form of entertainment but as a learning medium designed to facilitate each phase of the instructional process, including problem orientation, investigation, and reflection. Previous studies have demonstrated that PBL is an effective approach for enhancing students' critical thinking skills, problem-solving abilities, and active engagement in the learning process (Purwanto & Efendi, 2025).

The second aspect is student engagement, the Engklek game was selected because it provides an active learning experience through physical activities, social interaction, and problem solving challenges. Student engagement is a crucial factor in the learning process, as it influences motivation, participation, and learning outcomes. Game based learning has been shown to enhance student participation and engagement more effectively than traditional teacher-centered instructional approaches (He, 2017).

The third aspect is the integration of IPAS learning concepts, In the proposed design, each stage of the Engklek game is linked to problems or tasks related to IPAS content. Consequently, gameplay activities remain closely aligned with the intended academic objectives. The integration of game based activities with learning content enables students to gain more meaningful learning experiences, as

concepts are acquired through contextual activities that are relevant to their everyday lives (Laila et al., 2021).

The fourth aspect is the development of 21st-century skills, particularly critical thinking and collaboration. These competencies are essential skills that should be nurtured from the elementary school level. Through group discussions, problem analysis, and decision making activities embedded within the gameplay, students are provided with opportunities to develop higher-order thinking skills as well as the ability to work effectively in teams. Previous research has shown that the consistent implementation of Problem Based Learning (PBL) contributes significantly to the enhancement of students' critical thinking skills (Purwanto & Efendi, 2025).

The fifth aspect is contextual learning and local wisdom, The use of the traditional Engklek game represents an effort to integrate local culture into the learning process. In addition to enhancing the relevance of learning by connecting it with students' lived experiences, this approach also contributes to the preservation of local cultural heritage (Irmayani et al., 2025). Previous studies have shown that traditional games embody social, cultural, collaborative, and character-building values that can support both educational processes and students' character development (Astuti & Apriliani, 2025). The core indicators used as the basis for developing the Engklek game are presented in Table 2.

Table 2. Core Indicators for the Development of the Engklek Game

| Main Aspect                          | Indicator                                         | Description                                                                                                                              |
|--------------------------------------|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Pedagogical Alignment                | Alignment with PBL-based IPAS learning objectives | The Engklek game is designed in accordance with the intended learning outcomes and the stages of the Problem Based Learning (PBL) model. |
| Student Engagement                   | Active and participatory learning activities      | Students are actively involved in gameplay, discussions, and problem solving activities.                                                 |
| Integration of Learning Concepts     | Reinforcement of IPAS concepts through gameplay   | IPAS content is embedded in challenges and problem solving tasks at each stage of the Engklek game.                                      |
| Development of 21st-Century Skills   | Critical thinking and collaboration               | The game encourages teamwork, communication, and problem solving skills.                                                                 |
| Contextual Learning and Local Wisdom | Utilization of the traditional Engklek game       | The learning medium is based on local cultural heritage and is closely connected to students' everyday experiences.                      |

Source: Authors, 2026.

Based on these five aspects, the developed Engklek game is intended not only to function as a learning medium but also as a means of integrating the Problem-Based Learning (PBL) approach, fostering 21st-century skills, and preserving local wisdom within IPAS instruction at the elementary school level. Therefore, these five aspects serve as the primary conceptual foundation for the design and development of the proposed product. After identifying the core indicators to be incorporated into the traditional game, the researchers also developed a general conceptual framework of the product, which will subsequently be integrated with



the learning module (Susilowati et al., 2026 ; Nurkhafifah et al., 2026). The conceptual design of the product is presented in the following figure 3.

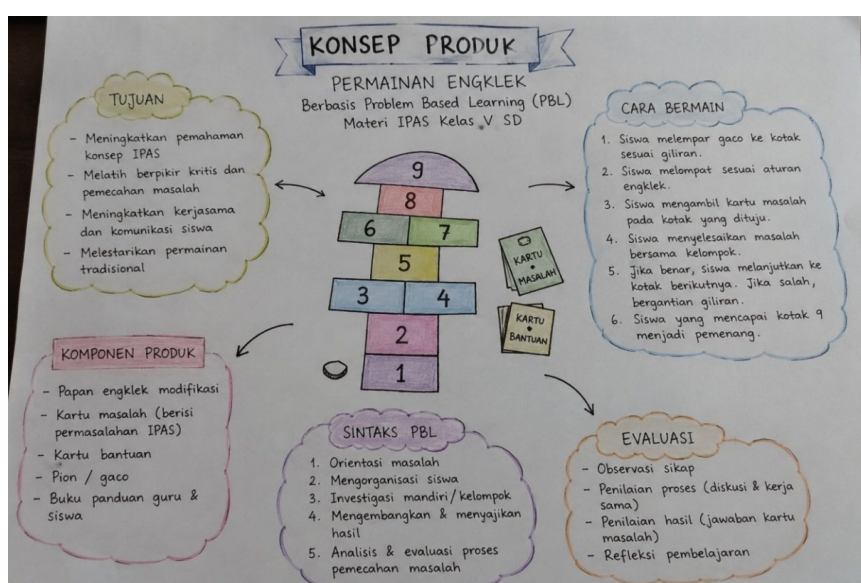


Figure 3. Conceptual Design of the Traditional Engklek Game Integrated into the PBL-Based IPAS Learning Package

Figure 2 illustrates the conceptual design of a PBL-based IPAS learning package supported by the traditional Engklek game, which integrates a learning module and game based media into a unified instructional framework (Suwarni et al., 2025). The Engklek game is utilized as a medium to facilitate problem-solving activities, thereby encouraging students to actively engage in the learning process (Hamidah & Wulandari, 2026). The integration of gameplay with the learning module enables the creation of more contextual, meaningful, and student centered learning experiences while simultaneously supporting the development of critical thinking and problem-solving skills (Darmawati & Mustadi, 2023; Adela et al., 2023 ; Wahyuni et al., 2025).

Therefore, the proposed product is not limited to the development of the Engklek game as a learning medium; rather, it constitutes a comprehensive IPAS learning package integrated with a PBL-based learning module. This design serves as the foundation for achieving the research objective, namely, to develop a conceptual design of an IPAS learning package based on PBL and supported by the traditional Engklek game, with the aim of promoting deep learning in elementary school education.

#### 4. Conclusion

This preliminary study found that IPAS learning in elementary schools has not yet optimally supported the development of students' critical thinking skills due to the limited implementation of Problem Based Learning, insufficient integration of deep learning principles, and the underutilization of contextual learning media. Based on



the needs analysis and literature review, a conceptual design of a PBL-based IPAS learning package supported by the traditional Engklek game was developed. The design is expected to promote more active, contextual, and meaningful learning experiences while fostering critical thinking skills and preserving local cultural values. However, this study was conducted in only one elementary school with a limited number of participants; therefore, the findings cannot yet be generalized to broader educational contexts. Future research should focus on expert validation, limited field testing, and effectiveness testing to evaluate the impact of the developed learning package on students' critical thinking skills and learning outcomes.

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