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Literature Review on The Integration of Engklek Games in Physics Learning

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Abstract

The traditional game of Engklek is a hopping game played on one foot across a flat surface. Integrating local wisdom through innovative learning approaches can increase student motivation while preserving traditional culture. This study explores how the Engklek game can be implemented as an instructional medium in physics education. Using a Systematic Literature Review (SLR) with the PRISMA method, this research analyzes 10 relevant article studies published between 2021 to 2025 retrieved from the Google Scholar database and limited to those indexed in Scopus or SINTA. The analysis shows that the Engklek game explores physics concepts such as parabolic motion, Newton's laws, energy work, momentum and impulse, torque, and rigid body equilibrium. The game proves to be an effective and enjoyable medium for physics learning. The implications of using Engklek support the development of ethophysics by connecting scientific concepts with local wisdom.

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INTRODUCTION

Indonesia is a country with cultural diversity, one of which is the wisdom that exists and becomes the identity or characteristic of a certain region (Sari et al., 2022). The wisdom of a certain region that is recognized as cultural wealth has moral values, knowledge, and contextual sources of knowledge called local wisdom (Rahmatih et al., 2020; Satino et al., 2024; Anzelina 2023; Tohri et al., 2022). Local wisdom is generally passed down from generation to generation through gradual interaction between humans and the community environment (Nugraha & Deta, 2023). One form of local wisdom that continues to be preserved is traditional games, which represent cultural heritage within the community.

There are various traditional games that have the potential to be used as a medium for contextual and meaningful learning (Pratiwi et al., 2025; Syofiyanti et al., 2025; Amreta et al., 2025; Darmawan et al., 2025). One of them is the game of Engklek, which originated in West Java and outside Java and is beginning to be abandoned by teenagers (Sari et al., 2021). Engklek is a game of hopping on one foot on a flat surface such as the ground or squares (Widyastuti et al., 2020). The movement pattern and rules of the game indicate that Engklek has the potential to be integrated into learning practices, particularly as culturally grounded educational media (Ningrum et al., 2024; Maulidia et al., 2025; Maulina et al., 2025).

In science education, particularly physics, many concepts are considered abstract and difficult for students to visualize and understand (Rizaldi et al., 2020). Physics belongs to the field of natural science, exploring various phenomena through reasoning, empirical observation, and experimentation (Rumiati et al., 2021; Kamalia & Wasis, 2021; Elizanatalie & Deta, 2023). Therefore, the use of appropriate learning media is essential to

support students in connecting theoretical concepts with real-life experiences (Mikamahuly et al., 2023; Febrianti, 2019; Siregar et al., 2022). In this context, traditional games can serve as a bridge that connects physics concepts with students' real-life experiences (Aryani et al., 2025).

Prior investigations reveal that the use of traditional games contributes positively to students' enthusiasm and understanding of physics concepts. For example, a study by Rumiati et al., (2021) explains that incorporating traditional games like Egrang helps students grasp physics concepts more effectively. Additionally, embedding traditional game-based practices into educational settings contributes to the improvement of learners' outcomes and motivation (Pratama & Putri, 2024). Engklek, as one of the traditional games, has been used in several studies to train children's motor skills and cooperation (Maharani et al., 2025), as well as to strengthen numeracy aspects (Amreta et al., 2025).

However, research linking the Engklek game with physics learning is still rare. Engklek game has the potential to be used as a medium and integrated into physics learning. Therefore, the purpose of this study is to examine the application of Engklek in physics learning through linking scientific concepts with local wisdom.

METHODS

This study used the Systematic Literature Review (SLR) method to collect, analyze, and interpret prior research related to the topics (Ummaroh et al., 2023). The SLR method used followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards by selecting articles from Google Scholar over the past five years. The three stages of PRISMA are (1) Identification, (2) Screening, and (3) Inclusion. These guidelines aim to provide comprehensive guidance used in conducting comprehensive systematic and meta-analysis studies. The following is the PRISMA 2020 flowchart as shown in Figure 1.

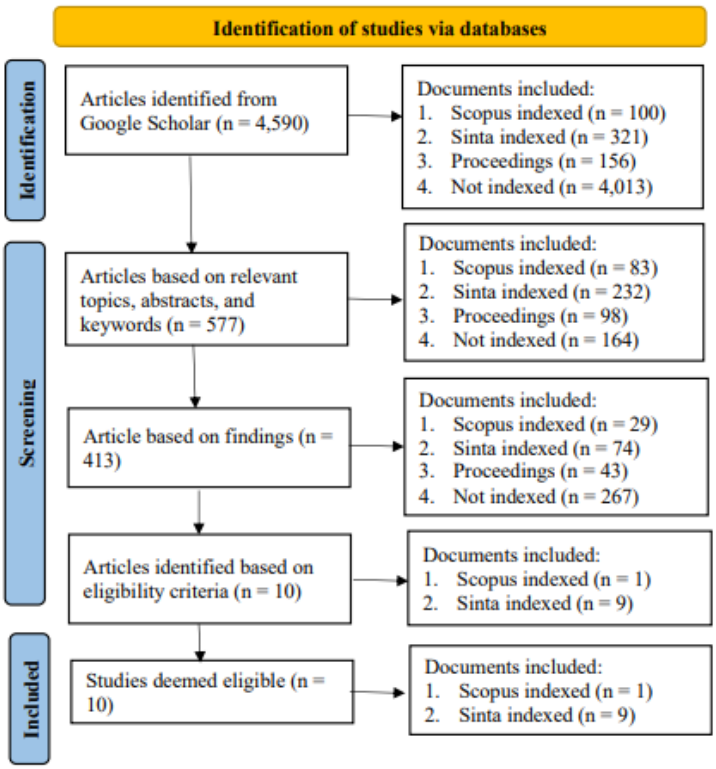

Figure 1 PRISMA flow diagram

Figure 1 shows the systematic selection of articles worthy of review retrieved from the Google Scholar database and limited to journals indexed in Scopus or SINTA. During the identification stage, 4,590 documents were found in various databases, with 421 articles indexed by Scopus or SINTA. Next, the screening stage involved reviewing the titles, abstracts, keywords, and indexing of each document. The keywords used are Engklek, learning media, and physics. At this stage, irrelevant articles were eliminated so that they could be reviewed again to determine their suitability. These suitable articles became the studies included in the review.

Data collection for the reviewed articles was carried out using inclusion and exclusion criteria aimed at selecting, sorting, and loading all databases unrelated to the topic (Fahrezi et al., 2022). Table 1 shows the results.

Table 1 Inclusion and exclusion criteria

Category	**Criteria**	
	Inclusion	**Exclusion**
Population	Students	Non-students
Access	Accessible	Not accessible
Variable	Table contents	Table contents
Indexed	Sinta or Scopus	Not indexed
Publication year	2021-2025	Before 2021
Language	Indonesian and English	Other languages
Findings	The use of engklek in physics education	Irrelevant opinions in physics learning

Table 1 shows the inclusion and exclusion categories or criteria for document collection. These criteria include the research subject, variables studied, publication time frame, and relevance of the research results used as a reference. Publication articles adhering to the inclusion criteria are considered suitable for analysis. This table facilitates the determination of the clarity and consistency of the research study.

The data analysis used in this study is content analysis, which aims to identify the main topics, keywords, and findings related to the game of Engklek as a medium for learning physics from data selected based on inclusion and exclusion criteria. The content analysis presents a table showing the year range, research title, and research results.

RESULTS AND DISCUSSION

The results show that traditional games such as Engklek can be used as effective and contextual media for physics learning. From an ethnophysics perspective, cultural activities embedded in traditional games contain implicit representations of physical phenomena that can be explored in educational contexts. The movement patterns, balance, and hopping mechanics involved in Engklek reflect several physics concepts related to motion and force. Therefore, integrating traditional games into physics learning not only contextualizes abstract concepts but also connects scientific knowledge with student cultural experiences.

The following table presents data related to articles that were reviewed as eligible based on the inclusion and exclusion criteria in Table 2.

Table 2 contains 10 articles examining the use of Engklek game in physics learning. Several studies indicate that the physics activities involved in the game implicitly represent fundamental physics concepts. For example, when players hop on one foot while maintaining body stability, they experience the principle of rigid body equilibrium and the role of the center of mass in maintaining balance (Febrianty et al., 2023). In addition, the

jumping motion and the act of throwing the marker during the game illustrate projectile motion and translational motion governed by Newton's law (Rizki et al., 2022). These findings indicate that simple cultural activities in Engklek can reflect physics principles through direct physics experiences.

Table 2 Related article data on Engklek in physics learning

Researcher (publication year)	Result
Febrianty et al., (2023)	Engklek has a physical concept that can be studied, namely, in the material on the equilibrium of rigid body
Rizki et al., (2022)	The main physics concepts in Engklek game are parabolic motion, the transfer of energy through work, the interaction of forces in momentum and impulse, and the balance conditions in rigid body systems
Hariyono et al., (2022)	Traditional games such as Engklek and Ontang-anting can make learning physics more interesting, enjoyable, and relevant to everyday life
Sari et al., (2023)	The physics concepts involved in the Engklek game include parabolic motion, Newton's laws, and the equilibrium of rigid bodies.
Ady et al. (2024)	The integration of Engklek game into the PBL model has been proven to enhance students' critical thinking, creativity, and collaborative skills in physics learning
Ramadhani & Andriani., (2025)	The game of Engklek in motion and force helps students understand physics concepts in a way that's concrete and contextual
Sari et al., (2025)	Engklek involves physics concepts such as the motion of parabolas, the relationship between work and energy, interactions momentum and impulse, and the mechanical equilibrium of rigid body
Nasution (2025)	Engklek is relevant for teaching basic physics concepts such as gravitational force and equilibrium of rigid body
Asra et al., (2021)	The integration ethnoscience of traditional games such as Engklek is relevant to the concepts and principles of physics
Riyanto et al., (2025)	Engklek involves physics namely the ideas of motion in a parabola, the fundamental laws formulated by Newton, torque, and equilibrium of rigid body

Further studies the pedagogical potential of Engklek when integrated into physics learning strategies. For instance, the combination of Engklek with learning is more engaging and relevant to student experiences (Hariyono et al., 2022). In addition, Engklek has been utilized as contextual teaching material to explain concepts such as Newton's law and rigid body equilibrium in a more meaningful way (Sari et al., 2023). The integration of the game within a problem-based learning model has also been shown to develop student critical thinking, collaboration, and creativity in physics learning (Ady et al., 2024). These results suggest that culturally familiar activities can support both conceptual understanding and higher-order thinking skills.

Other studies emphasize the role of Engklek in helping students understand general physics concepts through contextual learning materials. The use of LKPD has been shown to support student understanding of motion and force through concrete learning activities (Ramadhani & Andriani, 2025). Similarly, ethnoscience-based learning approaches reveal that the movements involved in the game illustrate concepts such as force, momentum, energy, and gravitational interaction (Sari et al., 2025; Nasution, 2025). The integration of traditional games into ethnoscience learning also demonstrates that cultural practices can serve as entry points for introducing physics concepts (Asra et al., 2021). In the context, Engklek represents a form of ethnophysics cultural activity that implicitly contains physical phenomena such as parabolic motion, torque, and rigid body equilibrium (Riyanto et al., 2025).

The limitations of this study lie in the scope of the study, which is limited to a specific context, both in terms of the number of respondents and the variety of games. Most studies focus on the conceptual aspects of physics, so they have not explored the integration of the game of Engklek into the curriculum in depth. In addition, the research is qualitative in nature with descriptive observations, so the generalization of findings to the population is still limited. Nevertheless, the results of the study have important implications for the world of education. The integration of the game of Engklek is an alternative innovation in physics learning with contextual learning experiences that are relevant to local wisdom.

CONCLUSION

The application of Engklek games in physics learning has been shown to connect scientific concepts with local wisdom in a contextual manner, particularly in explaining parabolic motion, Newton's laws, work and energy, momentum and impulse, torque, and rigid body equilibrium, so that students not only understand basic principles but also their relevance in everyday life. This finding has implications for strengthening ethnophysics, namely culture-based physics learning through direct experience. This research is constrained by the limited number of studies discussing the incorporation of the Engklek game into physics education. Moreover, the long-term implementation across various educational stages has not yet been widely examined. Therefore, further research is recommended to explore the application of Engklek at various levels of education, measure its long-term impact, and develop digital media within the game.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

Conceptualization, AWS and UAD; methodology, AWS and UAD; formal analysis, AWS and WF; writing—preparation of the original draft, AWS, WF, and UAD.

AI DISCLOSURE STATEMENT

The author used ChatGPT and DeepL during the preparation of this work for translation, grammar improvement, and to assist in understanding and interpreting reviewer comments. After using the tool/service, the author thoroughly reviewed and edited the content as needed and takes full responsibility for the content of the publication. The authors declare that this research was prepared, researched, written, and edited without the aid of artificial intelligence (AI) techniques.

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