Exploring Problem-Based Learning within Physical Education in Indonesia: A Content Analysis

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Abstract

The Problem-Based Learning (PBL) model plays a crucial role in developing critical thinking and problem-solving skills, which are essential for 21st-century education. This study aims to analyze the content of field research focusing on the application of the PBL model in physical education (PE) in Indonesia. Although numerous articles have been published on PBL, few have conducted content analyses on this topic. Therefore, this study explores the implementation of PBL in Indonesian physical education using a content analysis approach. The research employed a content analysis design, with the primary data source consisting of articles from SINTA (a nationally accredited journal databases in Indonesia) -indexed PE journals. A total of 13 articles published between 2006 and 2023 met the criteria for analysis. The findings highlight significant opportunities for further PBL research in Indonesian PE, particularly using qualitative methods. Notably, there is a lack of studies involving grade 9 or 12 students. Most existing research focuses on learning outcomes, uses a variety of intervention types, and frequently relies on questionnaires and test sheets. Additionally, some quasi-experimental studies were found to use inappropriate data analysis techniques. This review provides critical baseline evidence to guide future research and pedagogical innovation in PE by identifying current gaps and methodological limitations in how PBL is applied and studied in Indonesia.

Keywords: Content Analysis, Physical Education, Problem-Based Learning

INTRODUCTION

Physical Education (PE) in the 21st century plays a vital role in fostering a culture of health and fitness among students. Achieving this goal requires the active participation of all stakeholders, with teachers serving as a key driving force. To support student development, teachers need to adopt innovative and effective instructional strategies. They are increasingly encouraged to facilitate learning that promotes critical thinking and problem-solving skills (Ryan, 2021). One recommended approach is the implementation of the Problem-Based Learning (PBL) model in PE, which allows students to enhance their skills, increase motivation to learn, and engage in social collaboration with peers (Luo, 2019).

While PBL has been widely adopted in other subject areas, its use in PE remains limited (Hushman & Napper-Owen, 2011). Nonetheless, PBL presents a promising opportunity to foster student collaboration

within PE through direct instruction methods (Kotsonis, 2022). Moreover, implementing PBL in PE can facilitate cross-curricular integration, such as strengthening mathematical understanding through problem-solving activities embedded in physical education practice (Rodríguez-Martín & Buscà, 2022).

The development of students' skills in PE can be effectively enhanced through the implementation of PBL (Prabandaru et al., 2020), particularly when integrated with Project-Based Learning (PjBL) (Hariyadi et al., 2023). PjBL is a student-centered instructional model that promotes holistic learning by connecting academic content with real-life contexts (Hariyadi et al., 2023; Koh, 2023), and it has been used to promote sports through problem-solving projects involving physical activities (Treadwell, 2018). Since both PBL and PjBL emphasize problem solving and critical thinking, combining them in PE may further enhance students' learning outcomes. Teachers are increasingly expected to create student-centered learning environments that foster critical thinking and higher-order thinking skills (HOTS), while also keeping pace with rapid technological advancements (Sotos-Martínez et al., 2023).

The application of PBL aligns well with the core competencies required in 21st-century PE, including critical thinking (logical reasoning and evaluation), collaboration (working toward shared goals), communication (effectively conveying and receiving information), and creativity (generating novel and useful solutions) (Widiawati et al., 2018). Beyond improving PE learning outcomes, PBL also helps students develop collaborative skills that are essential for success in the modern workforce (Rahmadi et al., 2023).

Despite the recognized value of student-centered learning, research on the use of PBL in PE within the Indonesian context remains limited. Most existing studies in Indonesian PE settings have focused on other pedagogical models, such as cooperative learning, direct instruction, or traditional methods. Moreover, no research to date has systematically mapped or analyzed PBL-related studies in PE using structured methodologies such as content analysis, systematic reviews, or scoping reviews. This significant gap underscores the urgent need for a comprehensive understanding of how PBL is represented, or overlooked, in national academic discourse, which serves as the primary focus of this paper.

This study collected all available research data from PE journals in Indonesia published between 2006 and 2023. Using a content analysis approach, it aimed to address the following research questions: (1) What are the trends in the number of PBL studies over time? (2) What types of research designs are used to examine PBL in Indonesia? (3) What topics are most commonly explored in PBL research? (4) What kinds of treatments are applied when implementing PBL? (5) What instruments are used to support PBL implementation? (6) What data analysis techniques are employed in PBL research? and (7) How do the studies progress or build upon one another in investigating PBL?

The goal of this study is to provide a comprehensive overview of PBL research within the context of Indonesian PE. While similar studies have been conducted such as those exploring the integration of critical thinking in biology education (Fauzi & Pradipta, 2018; Susetyarini & Fauzi, 2020) this research differs in both scope and focus. Unlike previous work, which was confined to a seven-year publication window and centered on biology, the present study encompasses all relevant PE articles available since the inception of each journal.

Although both the previous and current studies utilized Science and Technology Index (SINTA), a nationally accredited journal databases in Indonesia, this study specifically applies PE-related parameters in its analysis. Rather than arguing for the general benefits of PBL, it aims to critically examine how PBL has been portrayed and implemented in PE within nationally recognized publications. By doing so, this study contributes a more focused and structured understanding of current research trends, methodological approaches, and potential gaps in the field, ultimately laying the groundwork for future PBL research in Indonesian PE.

METHODS

Design

This study employed a content analysis design to examine research on PBL published in Indonesian PE journals indexed by SINTA. Content analysis is a method used to interpret and categorize textual information through a process of coding and thematic classification (Krippendorff, 2018). This approach allowed for an in-depth exploration of publication trends, methodological characteristics, and thematic focuses of PBL-related research. Given the exploratory nature of the study and the absence of established analytical models specific to PBL in PE, an inductive approach was used, enabling categories to emerge from the data rather than being imposed beforehand. This design was chosen to generate a nuanced understanding of the current research landscape and to identify gaps and opportunities for future studies.

Data Sources and Search Strategy

As of December 2023, 24 PE journals were listed in the SINTA database. To identify relevant studies, we manually accessed each journal's online archive and searched for articles using the keyword "PBL" in titles, abstracts, and keywords. Articles that mentioned PBL but lacked substantive content related to its implementation, discussion, or evaluation were excluded. In total, 13 articles met the inclusion criteria, namely, a meaningful engagement with PBL in the context of PE.

Table 1. Guidelines for Content Analysis Aspects

Types of research (2a)	Types of quantitative research (2b)	Data collection instruments	Data analysis methods
A.1. Classroom Action Research (CAR) CAR	B.1. Observation Studies (OS)	C.1. Questionnaire Sheet	D.1. Mean
A.2. Research and Development (R&D) R&D	B.2. Correlational Research (CR)	C.2. Observation Sheet	D.2. Percentage
A.3. Qualitative	B.3. Survey Research (SR)	C.3. Test Sheet	D.3. N-gain
A.4. Quantitative	B.4. Pre-Experimental Designs (PED)	C.4. Interview Sheet	D.4. T-test
	B.5. True Experimental Designs (TED)	C.5. Unidentified	D.5. ANOVA
	B.6. Quasi-Experimental Designs (QED)		D.6. ANCOVA
	B.7. Ex Post Facto Designs (EPFD)		D.7. Correlation
			D.8. Unidentified
			D.9. Others

Selection Criteria

To guide the analysis, a self-developed content analysis instrument was used. While informed by prior studies (e.g., Fauzi & Pradipta, 2018; Susetyarini & Fauzi, 2020), the instrument was adapted to suit the specific focus on PBL in PE and was not directly drawn from a validated template. The instrument was structured to capture seven core aspects: Type of research, Data collection instruments, Data analysis methods, Number of publications per year, Research subjects, PE topics addressed, and Type of treatment or intervention.

Analysis

Only the first three aspects (type of research, data collection instruments, and data analysis methods) are presented in Table 1, as these are commonly addressed in the literature and allow for meaningful comparisons. The remaining four aspects are discussed in the results section but were excluded from the table

due to the absence of standardized frameworks and the risk of overgeneralizing categories such as PE topics or treatment types.

Unlike earlier studies that pre-defined analytical categories before data collection, this study adopted a flexible, inductive approach, allowing categories to emerge from the data itself. This strategy was considered more suitable for the exploratory nature of the study and the limited availability of prior analytical models specific to PBL research in PE. By allowing the data to shape the analysis, this study aims to offer a grounded and contextually relevant overview of how PBL is represented in nationally recognized PE journals in Indonesia.

RESULTS AND DISCUSSION
Results

We initially retrieved 70 articles by entering the keyword "PBL" into the search feature of each journal. However, after a more in-depth examination based on the content analysis guidelines, only 13 articles met the criteria for inclusion. Articles that only provided theoretical explanations without presenting empirical field research on PBL were excluded. The final selection of articles included in the analysis is presented in Table 2.

A total of 13 articles met the inclusion criteria and were analyzed in this study, each focusing on the implementation of Problem-Based Learning (PBL) within Physical Education (PE) in Indonesia. These studies employed a range of research designs, with quantitative methods being the most common (n = 8), followed by classroom action research (CAR) (n = 4), and research and development (R&D) (n = 1). The data collection instruments used varied, with most studies using questionnaires and test sheets (n = 6), while others relied solely on questionnaires (n = 3), test sheets (n = 3), or observation sheets (n = 1). In terms of instructional strategies, the majority implemented PBL alone (n = 8), while the remaining studies combined PBL with other models such as Teaching Personal and Social Responsibility (TPSR), Movement Problem-Based Learning, Project-Based Learning (PjBL), or IQ-based interventions.

The participants in these studies represented a diverse range of educational levels. The majority involved junior high school students (n = 6), followed by senior high school students (n = 3), elementary school students (n = 1), vocational high school students (n = 1), university-level PE students (n = 1), and teachers (n = 1). One study focused on students with special needs, demonstrating the inclusive potential of PBL in PE. Regarding research topics, most studies explored the impact of PBL on student learning outcomes, particularly in the psychomotor domain (n = 7), followed by the affective (n = 5) and cognitive (n = 1) domains (See Table 3). Some studies addressed more than one domain simultaneously, while two focused explicitly on developing problem-solving skills as a core competency aligned with 21st-century learning goals. The findings suggest that although there is growing interest in PBL within PE in Indonesia, research remains concentrated on traditional learning outcome metrics. There is a clear opportunity for future studies to explore broader educational competencies such as creativity, collaboration, and critical thinking.

Discussion

The findings from this content analysis reveal that the use of Problem-Based Learning (PBL) in Physical Education (PE) research in Indonesia remains limited and underexplored. From 2006 to 2023, only 13 studies met the criteria for substantive engagement with PBL in PE, with no articles published between 2007 and 2016. This gap may indicate two key issues: (1) the limited implementation of PBL in PE classrooms, and/or (2) the lack of scholarly documentation of such efforts by practitioners. A separate investigation is warranted to examine these barriers more closely.

Table 2. Characteristic of included studies

Article	Author	Year	Journals	Methods	Instruments	Treatments
A1	Prayoga, M. F.	2021	Edu Sportivo: Indonesian Journal of Physical Education	Quantitative	Test Sheet	PBL only
A2	Birriy, A. F., et al.	2020	JOSSAE: Journal of Sport Science and Education	R&D	Questionnaire	PBL only
A3	Setiawan, E.	2017	Jurnal Pendidikan Jasmani dan Olahraga	Quantitative	Questionnaire	PBL only
A4	Rahayu, N. et al.	2018	Jurnal Pendidikan Jasmani dan Olahraga	Quantitative	Test Sheet	Teaching Personal Social Responsibility (TPSR) & PBL
A5	Rahmadi et al.	2023	Edu Sportivo: Indonesian Journal of Physical Education	CAR	Questionnaire & Test Sheet	PBL only
A6	N. Fauzi & Lubay,	2017	TEGAR: Journal of Teaching Physical Education in Elementary School	CAR	Observation Sheet	PBL & Movement Problem-Based Learning
A7	Hidayat, U.Y.	2006	Jurnal Pendidikan Jasmani Indonesia	Quantitative	Questionnaire	PBL & Movement Problem-Based Learning
A8	Safitri, R. et al	2023	Gelanggang Olahraga: Jurnal Pendidikan Jasmani dan Olahraga	Quantitative	Questionnaire & Test Sheet	PBL and PjBL
A9	Hakim et al.	2023	Kinestetik: Jurnal Ilmiah Pendidikan Jasmani	Quantitative	Test Sheet	PBL & Intelligence Quotien (IQ)
A10	Aji	2023	PHEDHERAL	CAR	Questionnaire & Test Sheet	PBL only
A11	Hulu et al.	2020	Jumper : Jurnal Mahasiswa Pendidikan Olahraga	Quantitative	Questionnaire & Test Sheet	PBL only
A12	Arisetiyana, F. F. et al.	2020	Jp.jok (Jurnal Pendidikan Jasmani, Olahraga dan Kesehatan)	Quantitative	Questionnaire & Test Sheet	PBL only
A13	Yane, S.	2017	Jurnal Pendidikan Olah Raga	CAR	Questionnaire & Test Sheet	PBL only

The need for transformation from teacher-centered to student-centered learning in line with 21st-century competencies underscores the relevance of PBL (Lonergan, Cumming, & O'Neill, 2022). Prior studies support its effectiveness in enhancing critical thinking (Sharma et al., 2023), learning motivation (Arisetiyana et al., 2020), and creativity (Setiawan, 2017). However, the low number of PBL studies in Indonesian PE

indicates that traditional models still dominate. Sustained implementation and further research are essential to strengthen PBL's role in advancing PE learning.

Table 3. Distribution of PBL Research Subjects in PE

Article	Subject	Topics
A1	Student of Senior High School Grade 2	The effect of PBL on learning outcome components (psychomotor)
A2	University student of PE	The effect of PBL on learning outcome components psychomotor and affective.
A3	Student of Vocational High School Grade 2	The effect of PBL on learning outcome components (affective).
A4	Students and 4 teachers of Senior High School	The effect of PBL on learning outcome components (affective).
A5	Students of Junior High School with Special Need	The effect of PBL on learning outcome components (affective)
A6	Elementary students Grade 4	The effect of PBL on learning outcome components (psychomotor)
A7	Teacher of Junior High School	PBL to promote problem-solving
A8	Students of Junior High School Grade 1	The effect of PBL on problem solving.
A9	Students of Junior High School	The effect of PBL on learning outcome components (cognitive)
A10	Students of Junior High School Grade 2	The effect of PBL on learning outcome components (psychomotor)
A11	Students of Junior High School Grade 2	The effect of PBL on learning outcome components (psychomotor)
A12	Students of Junior High School Grade 2	The effect of PBL on learning outcome components are psychomotor and affective
A13	Students of senior High School	The effect of PBL on learning outcome components (psychomotor)

Methodological Trends and Gaps

Our findings show a heavy reliance on quantitative methods (n = 8) and classroom action research (CAR; n = 4), with only one R&D study (Birriy et al., 2020) and no qualitative or mixed-method approaches identified. This suggests a strong preference for experimental and quasi-experimental designs, possibly reflecting either researcher training trends or journal publication preferences. As noted by Haegele and Hodge (2015), robust quantitative research requires methodological rigor, while qualitative approaches offer the depth needed to explore nuanced phenomena such as students' learning processes or strategic thinking (Mabley, Ventura-Medina, & Anderson, 2020).

Notably, there is an absence of qualitative studies examining how PBL is experienced and implemented in Indonesian PE. Studies using interviews, observations, or narrative inquiry could reveal how students engage with PBL or how teachers adapt it in real classrooms. Furthermore, integrating mixed-methods designs (e.g., Buitrago-Flórez et al., 2021) would enhance the richness and contextual relevance of PBL research in PE settings.

Instrumentation and Analytical Concerns

Instruments used were mostly questionnaires and test sheets a trend that mirrors the dominance of quantitative methods in the reviewed studies (e.g., Aji, 2023; Arisetiyana et al., 2020; Hulu et al., 2020; Setiawan, 2017). No studies employed interview protocols or qualitative observation frameworks, confirming the absence of interpretive or exploratory inquiry. This restricts our understanding of how PBL facilitates deeper learning beyond measurable outcomes.

Furthermore, issues were observed in the data analysis methods. Most studies used T-tests, either for post-test comparisons or N-gain analysis (e.g., Prayoga, 2021; Safitri et al., 2023). Surprisingly, despite the frequent use of quasi-experimental designs (QEDs) (n = 4), none of the studies employed ANCOVA a more appropriate method for controlling baseline differences when randomization is not feasible (Maciejewski, 2020). This reflects a broader concern raised in Indonesian educational research regarding misalignment between research design and statistical analysis (Fauzi & Pradipta, 2018; Susetyarini & Fauzi, 2020).

Participants and Sampling Bias

Participants were predominantly junior high school students (n = 6), with minimal representation of elementary and senior high school grade 3 students. The absence of studies involving grade 3 students in both junior and senior high schools may be due to institutional constraints during national exams (Susetyarini & Fauzi, 2020). However, the near absence of elementary-level research is striking and signals a gap in understanding how PBL might be adapted for younger learners.

Topics and Treatments

The dominant research topic was the impact of PBL on learning outcomes, specifically in the psychomotor (e.g., Aji, 2023; Fauzi & Lubay, 2017; Hulu et al., 2020; Prayoga, 2021; Yane, 2017), affective (e.g., Birriy et al., 2020; Rahayu et al., 2018; Setiawan, 2017), and cognitive domains (e.g., Hakim et al., 2023; Arisetiyana et al., 2020). A few studies explored PBL's role in developing problem-solving skills, aligning with 21st-century learning priorities (e.g., Hidayat, 2006; Rahmadi et al., 2023). Treatments varied, with some studies combining PBL with other pedagogical models such as Teaching Personal and Social Responsibility (TPSR) (Rahayu et al., 2018), Project-Based Learning (PjBL) (Safitri et al., 2023), or IQ-based interventions (Hakim et al., 2023). While this diversity is promising, the limited theoretical grounding and lack of consistent evaluation frameworks make it difficult to assess their relative effectiveness.

Implications and Limitations

These findings suggest that although Indonesian PE researchers have begun to explore PBL, the field is still emerging. There is a pressing need to diversify research methods, improve statistical rigor, and expand research coverage across student populations and learning outcomes. This study is not without limitations. The scope was confined to journals indexed by SINTA, which may have excluded relevant studies published in international or non-indexed platforms. Additionally, the lack of standardized categories for PE subtopics and treatments limited the depth of comparative analysis. Future research should consider using mixed methods approaches and broaden the search to include more varied publication sources. Developing a standardized coding scheme could also enhance consistency and comparability across future studies.

CONCLUSIONS

This study reviewed 13 field research articles on PBL in PE published in SINTA-indexed journals in Indonesia between 2006 and 2023. The findings show that PBL research in PE is still limited, predominantly

quantitative, and mostly employs quasi-experimental designs. While participants span all education levels, there is a notable absence of grade 3 junior/senior high school students, likely due to national exam constraints. Research mainly focuses on PBL's effects on learning outcomes (particularly psychomotor, affective, and cognitive domains) using questionnaires and test sheets as primary instruments. However, many studies lack rigorous methodological reporting and appropriate data analysis, especially the absence of ANCOVA in quasi-experimental studies. It is recommended that PE teachers adopt PBL to support 21st-century learning, and researchers expand PBL exploration using qualitative approaches, improve instrument validation, and apply suitable statistical techniques.

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