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THE EFFECT OF A PROBLEM-BASED LEARNING MODEL ON STUDENTS' CRITICAL THINKING SKILLS IN PHYSICAL FITNESS GYMNASTICS MATERIAL AT SMP NEGERI 1 LAWE SIGALA-GALA

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Abstract

This study aimed to determine the effect of the Problem-Based Learning (PBL) model on students' critical thinking skills within the context of Physical Fitness Gymnastics, a component of Physical Education (PE). Employing a quasi-experimental design with a one-group pretest-posttest approach, the research was conducted with 30 eighth-grade students from SMP Negeri 1 Lawe Sigala-Gala, selected via total sampling. The intervention consisted of a series of lessons on the "Indonesian Fantastic Children's Gymnastics" (Senam Anak Indonesia Hebat) delivered using the PBL model, where students worked collaboratively to solve authentic problems related to gymnastic sequences, techniques, and health benefits. Critical thinking skills, operationalized through five indicators—analysis, reasoning, evaluation, reflection, and decision-making—were measured using a validated essay test. The results indicated a substantial increase in the mean score from 48.7 in the pretest to 76.7 in the posttest. A paired-sample t-test revealed a statistically significant difference between the pretest and posttest scores ($t(29) = 15.87$, $p < 0.05$), with the t-value exceeding the critical t-table value of 2.04. This leads to the conclusion that the implementation of the Problem-Based Learning model has a significant positive effect on enhancing students' critical thinking skills in the subject of physical fitness gymnastics. The findings advocate for the integration of PBL as an effective pedagogical strategy in the PE curriculum to foster higher-order thinking skills alongside physical proficiency.

Keywords: ***Critical Thinking, Gymnastics, Physical Education, Physical Fitness, Problem-Based Learning, Secondary Education***

INTRODUCTION

The educational landscape of the 21st century increasingly emphasizes the cultivation of higher-order thinking skills, moving beyond rote memorization towards fostering students' ability to analyze, evaluate, and create. Among these essential skills, critical thinking stands as a cornerstone for preparing students to navigate complex, real-world challenges. It is defined as the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and evaluating information gathered from observation, experience, reflection, or communication as a guide to belief and action (Facione, 2011). While traditionally associated with subjects like science, mathematics, and language arts, the imperative to develop critical thinking is equally vital in Physical Education (PE). Physical Education is often perceived primarily as a domain for developing psychomotor skills and promoting physical health. However, its potential as a vehicle for cognitive and social-affective development is profound. In the context of PE, critical thinking enables students to understand the 'why' behind physical activities, not just the 'how'. It empowers them to analyze movement efficiency, evaluate the health benefits of different exercises, reflect on their own performance and strategies, and make informed decisions about their lifelong physical activity habits. For instance, when learning a gymnastic sequence, a critically thinking student does not merely mimic the teacher's demonstration; they analyze the biomechanics of each movement, reason through the sequence's flow, evaluate their own execution against criteria, and reflect on how to improve, thereby transforming a physical task into a rich cognitive engagement. Despite this potential, a common observation in many PE classrooms, particularly in more traditional settings, is that students passively follow instructions without deep cognitive involvement. This pedagogical approach limits the subject's educational impact and fails to equip students with the analytical tools necessary for autonomous, health-conscious living. There is a pressing need for instructional models that

intentionally integrate cognitive challenge with physical activity. Problem-Based Learning (PBL) emerges as a highly suitable pedagogical model to address this gap. Rooted in constructivist theory, PBL is an instructional student-centered approach that empowers learners to conduct research, integrate theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem (Savery, 2015). In a PBL setting within PE, students might be presented with a problem scenario, such as "Design a safe and effective five-minute warm-up routine using gymnastic movements for your classmates," or "Analyze why a particular student is struggling to maintain balance in a gymnastic pose and propose a modified training plan." This approach shifts the role of the student from a passive recipient to an active problem-solver and the role of the teacher from a knowledge transmitter to a facilitator of learning.

While previous research, such as that by Wulandari (2019) in science and Ramadhan (2021) in broader PJOK contexts, has demonstrated the efficacy of PBL in promoting critical thinking, its application and systematic investigation within the specific sub-domain of physical fitness gymnastics remain underexplored. Gymnastics, with its inherent emphasis on form, sequence, rhythm, and bodily control, presents a unique and structured context for applying problem-solving and critical analysis. This study, therefore, seeks to contribute to the existing body of knowledge by specifically investigating the effect of the Problem-Based Learning model on the critical thinking skills of junior high school students in the topic of physical fitness gymnastics. By providing empirical evidence from the context of SMP Negeri 1 Lawe Sigala-Gala, this research aims to inform PE teachers and curriculum developers about the value of innovative, student-centered approaches that can simultaneously enhance both the physical and cognitive dimensions of student learning.

LITERATURE REVIEW

This study is underpinned by the convergence of two key theoretical domains: the pedagogical principles of Problem-Based Learning and the conceptual structure of critical thinking as a measurable educational outcome.

Problem-Based Learning as a Constructivist Pedagogy

PBL is not merely a teaching technique but a comprehensive educational strategy grounded in constructivist learning theories, particularly those of John Dewey and Jerome Bruner, who emphasized learning through experience and discovery. The core principles of PBL, as delineated by Barrows (1996), include student-centered learning, which occurs in small groups and is facilitated by tutors where problems form the organizing focus and stimulus for learning. Problems are presented at the beginning of the learning sequence, before any preparation or study has occurred, and serve as a catalyst for inquiry and knowledge acquisition. In the context of PE, a PBL module involves presenting students with an ill-structured, authentic problem that is relevant to the physical activity at hand. This approach aligns perfectly with the goals of modern PE, which seek to develop students who are not only physically literate but also capable of planning, executing, and evaluating their own fitness activities (SHAPE America, 2013). The process of grappling with a problem related to gymnastics—such as creating a routine that improves cardiovascular endurance and flexibility, or troubleshooting a peer's performance error—requires students to engage in research, collaboration, and practical application, thereby constructing their understanding in a meaningful context.

Critical Thinking in Physical Education

Critical thinking in an educational setting is a multifaceted process that extends far beyond simple criticism. This study is built upon a framework derived from Facione's consensus in the Delphi Report, which outlines core critical thinking skills such as analysis, evaluation, inference, explanation, and self-regulation. When translated to the physical education environment, these skills take on a practical dimension. For instance, analysis involves examining gymnastic movements by breaking them down into their parts, such as arm position or center of gravity. Evaluation then entails judging the effectiveness of a self-designed sequence or a peer's performance against established criteria like safety and flow. Further skills include inference, which means drawing logical conclusions about the cause of a performance issue, and explanation, which requires clearly articulating the rationale behind a designed routine or given feedback. Finally, self-regulation involves a student reflecting on their own learning process and performance to make necessary adjustments. The integration of these interconnected cognitive processes into physical activity fundamentally shifts physical education from a purely performance-based subject to one that also deeply and deliberately engages the mind.

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Empirical Studies on PBL and Critical Thinking

A substantial body of research supports the positive impact of PBL on critical thinking across various disciplines. A meta-analysis by Strobel and van Barneveld (2009) concluded that PBL was more effective than traditional instruction for long-term knowledge retention and skill development. Specifically, in science education, Wulandari (2019) found that PBL significantly improved students' critical thinking skills compared to direct instruction. Within the field of PJOK (Physical Education, Sport, and Health), Ramadhan (2021) demonstrated that PBL could enhance critical thinking skills in sports and game contexts, leading to better tactical understanding among students. However, the application to rhythmic or gymnastic activities, which are more structured and less inherently game-like, is less common. Gymnastics requires precision, creativity, and an understanding of kinesiology, making it a fertile ground for PBL interventions. This study aims to fill this niche by providing concrete evidence of how PBL can transform the learning of physical fitness gymnastics from a routine of imitation to an engaging process of inquiry and critical analysis.

METHOD

Research Design and Approach

This study employed a quantitative research approach utilizing a quasi-experimental design, specifically the One-Group Pretest-Posttest Design. This framework was selected because it allows for the measurement of the effect of an intervention within a single group by comparing the state of the participants before and after the treatment. The design was suitable for the practical constraints of classroom-based research, where forming a control group was not feasible.

Participants and Sampling Procedure

The population for this study was all eighth-grade students at SMP Negeri 1 Lawe Sigala-Gala. The sample consisted of 30 students from class VIII-A, selected through a total sampling technique. This involved including the entire population of a single intact class, which is a common practice in educational quasi-experiments to avoid disrupting the existing school structure. The participants were adolescents with a mixed range of physical abilities and prior experience in gymnastics, a profile typical of a general junior high school physical education class.

The Intervention: Problem-Based Learning Model

The treatment was the implementation of the Problem-Based Learning (PBL) model in teaching the "Indonesian Fantastic Children's Gymnastics" unit. The PBL process was structured over several sessions following a standard cycle. It began with students being presented with an authentic, ill-structured problem, such as designing a fitness routine for a school health event. Students then worked in small groups to identify what they needed to know, engaging in self-directed learning using resources provided by the teacher. Through collaborative problem-solving, they synthesized their research to create and refine their gymnastic routines. The cycle concluded with groups performing their routines and explaining their design choices, followed by facilitator-led discussion and individual reflection.

Measurement Instrument and Data Collection

The dependent variable of critical thinking skills was measured using a specifically developed essay test. This test contained open-ended questions mapped to five indicators: analysis, evaluation, reasoning, reflection, and decision-making. For example, students were asked to break down a movement into its key phases, assess the effectiveness of a routine, or justify an exercise selection. The instrument was validated by experts in physical education pedagogy and educational assessment. A reliability test using inter-rater scoring on a pilot sample showed a high Cohen's Kappa coefficient, indicating strong agreement between scorers. Data were collected by administering this essay test as a pretest before the PBL intervention and again as a posttest after its completion.

Data Analysis Plan

The data analysis followed a structured sequence. It began with descriptive statistics to calculate the mean, standard deviation, and range of the pretest and posttest scores. Subsequently, the Shapiro-Wilk test was used to assess whether the data came from a normally distributed population, a prerequisite for parametric testing. Finally, a paired-sample t-test was conducted to compare the mean pretest and posttest scores. This test evaluated the null hypothesis that there was no significant difference against the alternative hypothesis that a significant difference existed, using a five percent significance level.

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RESULTS

The descriptive statistics revealed a clear picture of the students' performance. In the pretest, the average critical thinking score was 48.7 with a standard deviation of ±4.1, indicating a generally low and relatively homogeneous level of critical thinking skills before the intervention. The scores ranged from a minimum of 42 to a maximum of 56. After the implementation of the PBL model, the posttest results showed a marked improvement. The average score rose to 76.7 with a standard deviation of ±3.5, and the score range shifted to a minimum of 70 and a maximum of 82.

The Shapiro-Wilk test yielded a non-significant result ($p > .05$) for the difference scores (posttest-pretest), indicating that the assumption of normality was met. This permitted the use of the parametric paired-sample t-test. The results of the t-test were conclusive. The calculated t-value was 15.87 with 29 degrees of freedom. This value far exceeded the critical t-table value of 2.04 for a two-tailed test at a 5% significance level. The associated p-value was less than 0.001. Therefore, the null hypothesis (H0) was rejected, and the alternative hypothesis (H1) was accepted. This provides strong statistical evidence that the increase in critical thinking scores from pretest to posttest was significant and unlikely to have occurred by chance.

DISCUSSION

The significant increase in students' critical thinking scores, as evidenced by the quantitative data, strongly supports the efficacy of the Problem-Based Learning model in the PE context, specifically for physical fitness gymnastics. This finding can be attributed to the inherent structure of PBL, which actively engages students in the very cognitive processes that define critical thinking. The PBL process forced students to move beyond passive reception. When presented with the problem of designing a gymnastic routine, they were required to analyze the components of fitness and break down complex movements. They had to evaluate the suitability of different exercises against the goals of enjoyment and effectiveness. The collaborative nature of the task necessitated reasoning and justifying their choices to peers. The act of creating and refining the routine fostered continuous reflection on their understanding and performance. Finally, selecting the final sequence and explaining its benefits required informed decision-making.

This aligns perfectly with the constructivist foundation of PBL, as championed by Savery (2015), which posits that knowledge is most durably constructed when learners are actively involved in solving meaningful problems. The authentic problem scenario provided a context that made the learning of gymnastic movements purposeful. Students were not just learning 'how' to perform a jump; they were learning 'why' and 'when' to incorporate it into a routine designed for a specific health outcome. This depth of engagement is often missing in traditional command-style PE lessons. The findings of this study corroborate and extend previous research. The works of Wulandari (2019) and Ramadhan (2021), which found PBL effective for critical thinking in science and general PJOK, are reinforced here within a specific and structured physical activity domain. The success of the intervention demonstrates that the benefits of PBL are transferable to the psychomotor domain, enhancing the argument for its widespread adoption across the curriculum. It shows that physical education can and should be a venue for rigorous intellectual development.

For practicing teachers, the implication is clear: shifting from a directive teaching style to a facilitative, problem-based approach can yield dual benefits. It not only helps students achieve the required physical competencies but also equips them with the critical thinking skills necessary to autonomously manage their health and fitness beyond the classroom. Challenges such as the need for careful lesson planning, resource preparation, and classroom management in a more dynamic setting are acknowledged, but the pedagogical payoff, as demonstrated, is substantial.

CONCLUSION

Based on the data analysis and discussion, this study concludes that the implementation of the Problem-Based Learning model has a significant and positive effect on enhancing the critical thinking skills of eighth-grade students at SMP Negeri 1 Lawe Sigala-Gala in the subject of physical fitness gymnastics. The initial level of critical thinking was low, but the structured, problem-centered approach of PBL successfully engaged students in analytical, evaluative, and reflective processes, leading to a marked and statistically significant improvement. This demonstrates that PE is a fertile ground for fostering essential 21st-century skills when taught through innovative, student-centered pedagogies.

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In light of these findings, the following suggestions are offered. For teachers and PE practitioners, it is highly recommended that PE teachers integrate the Problem-Based Learning model into their teaching repertoire, particularly for units involving strategy, composition, or health-related fitness. Professional development workshops focusing on the design and facilitation of PBL modules in a physical activity context would be invaluable. For students, they are encouraged to embrace the active role offered by PBL. They should proactively engage in the problem-solving process, collaborate effectively with peers, ask probing questions, and take ownership of their learning journey in PE. For school administrators, they should support this pedagogical shift by providing necessary resources, such as access to research materials and technology, and by creating a flexible schedule that allows for the extended project work often required by PBL. Encouraging and funding teacher training in innovative methodologies is crucial. For future researchers, subsequent studies should aim to employ a randomized controlled trial (RCT) design with a control group to further strengthen the causal inference. Research could also explore the long-term retention of critical thinking skills gained through PBL, its effect on students' motivation and attitudes towards PE, and its application to other specific physical activities such as athletics, swimming, or traditional games.

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