



Implementation of the Problem-Based Learning Model to Improve Students' Critical Thinking Skills Regarding HIV/AIDS at SMK Tunas Bangsa Malang

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ABSTRACT

This classroom action research was conducted to address the suboptimal critical thinking skills observed among students. The study aims to examine the effectiveness of implementing the Problem-Based Learning (PBL) model in enhancing students' critical thinking abilities in Physical Education, Sport, and Health classes—specifically on the topic of HIV/AIDS transmission and prevention. The research involved 19 eleventh-grade students at SMK Tunas Bangsa Malang. The intervention utilized the PBL model supported by the ZEP Quiz gamification platform to promote active participation and improve content retention. Data were collected through observation, critical thinking assessments, and documentation. The results indicate that (1) the PBL model significantly improved students' critical thinking through contextual, group-based problem solving; (2) the ZEP Quiz platform effectively increased student engagement, motivation, and memory retention; and (3) students' average critical thinking score improved from 67.25 in the first cycle to 82 in the second cycle, with the percentage of students meeting the minimum passing criteria rising from 52.6% to 89.5%. These findings suggest that the integration of PBL and gamified learning tools such as ZEP Quiz is effective in enhancing critical thinking within the context of health education in physical education programs.

Keywords: Critical Thinking, Problem-Based Learning, HIV/AIDS Prevention, Physical Education

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INTRODUCTION

Education is fundamentally a process of teaching and learning involving interaction between teachers and students. In this process, the method of content delivery plays a crucial role as part of the learning system. A teacher's role encompasses educating, guiding, and facilitating the development of students (Sopian, 2016). To fulfill this role effectively, teachers must design appropriate learning strategies that align with students' characteristics and needs. Improving the quality of education requires innovative pedagogical models that promote active learning and adapt to the demands of the 21st century. One significant factor contributing to the low quality of human resources in Indonesia is unequal access to quality education. This disparity necessitates dynamic and inclusive teaching

strategies that empower both teachers and students. According to Putra Aryana (2020), quality education is defined by learning processes that are inquiry-driven, student-centered, and produce outcomes aligned with educational goals (Halean, S., Kandowangko, N., & Goni, 2021).

Law No. 20 of 2003 concerning the National Education System emphasizes the development of high-quality human resources as a prerequisite for national competitiveness in the global era (Sujatmoko, 2016). The rise of globalization—often referred to as the digital era or the Fourth Industrial Revolution—has introduced numerous challenges and opportunities in education. While globalization fosters access to information and technology, it also brings disparities in access to education, the erosion of cultural identity, and pressures for standardization that may conflict with local contexts (Nawatmi et al., 2016).

One of the advances in globalization has resulted in a significant shift, bringing various opportunities and challenges, especially in the world of education. Currently, sources of scientific references are not only focused on printed books; science and technology are developing very rapidly. This has an influence on our world of education, both in terms of infrastructure and content in the form of methods, models, strategies, and approaches. Quality will be evident in students if educators can create a learning atmosphere in accordance with strategies and approaches that lead to a revolutionary world (Rahmawati, 2019).

In response, education must equip learners with the ability to analyze, synthesize, and evaluate information critically. Technological advancements, particularly in digital learning tools, have transformed educational paradigms, making critical thinking an essential competency (Umam, 2018). Critical thinking enables students to structure ideas, analyze problems, and make informed decisions. It promotes intellectual autonomy, deeper understanding, and responsible judgment (Syutaridho, 2016). In such a situation, the ability to filter out which information is relevant and which is not, amidst a multitude of facts, becomes a significant asset. Therefore, students' ability to think critically is also influenced by the teacher's accuracy in choosing a learning model (Susanti et al., 2019).

The success of fostering critical thinking depends largely on the selection of suitable pedagogical models. One model recognized for enhancing high-order

thinking skills is the Problem-Based Learning (PBL) model. In research (Evandel et al., 2024), according to Kokom (2013: 59), Problem-Based Learning (PBL) encourages students to engage in real-world problem-solving, while Kamdi (2007: 77) emphasizes its structured, inquiry-based approach rooted in the scientific method. PBL empowers students to actively construct knowledge and develop skills necessary for addressing complex societal issues, including those related to health education.

A pressing issue relevant to both health and education is the transmission and prevention of HIV/AIDS, which remains a serious concern in Indonesia, particularly among adolescents. The lack of comprehensive reproductive health education and the persistence of stigma exacerbate the problem (Darmawan et al., 2024). The existence of a stigma or a less strong social understanding of people with HIV/AIDS is a factor that worsens the condition (Ismail et al., 2023). Therefore, an understanding of the transmission of HIV/AIDS needs to be published to the world of education. Schools, particularly through physical and health education curricula, play a pivotal role in equipping students with accurate knowledge, preventive behaviors, and empathy.

To optimize the implementation of PBL, this study integrates gamification through the ZEP Quiz—a digital platform that combines interactive quizzes with elements of competition and engagement. As noted by Setyaningrum et al. (2023). Gamification increases student motivation and participation. The ZEP Quiz creates a dynamic learning environment that reinforces memory retention and fosters continuous assessment (Lailawati et al., 2025).

Based on the description above, it can be concluded that the low critical thinking skills of students indicate the need for a focused, systematic, and innovative learning approach, in line with the demands of the 21st century. In the digital era and the Industrial Revolution 4.0, critical thinking has become an essential competency—not only to filter massive information flows, but also to solve complex problems, make ethical decisions based on data, and actively participate in global society (Rafzan et al., 2020). This condition is also reflected in the students of class XI SMK Tunas Bangsa Malang, who showed suboptimal critical thinking skills, especially in understanding the material on transmission and

prevention of HIV/AIDS. This situation requires a learning approach that fosters active involvement, analytical thinking, and problem-solving in real-world contexts. Therefore, the application of the Problem-Based Learning (PBL) model, combined with gamification through the ZEP Quiz platform, is seen as a relevant and potentially effective strategy to overcome these problems. This study was conducted to empirically analyze the effect of applying the PBL method, assisted by ZEP Quiz, on improving students' critical thinking skills in the context of PJOK learning at SMK Tunas Bangsa Malang.

METHODS

This study adopts a quantitative classroom action research (CAR) approach designed to enhance students' critical thinking skills through the implementation of the Problem-Based Learning (PBL) model, supported by the gamification-based ZEP Quiz platform. CAR was chosen to allow iterative reflection and adjustment of instructional strategies, thereby optimizing the learning experience (Evandel et al., 2024). This research was conducted in two cycles, and each cycle consisted of two meetings.

The research was conducted at SMK Tunas Bangsa in Malang City, involving 19 students from Class XI during the even semester of the 2024/2025 academic year (May–June 2025). The study focused on improving critical thinking related to HIV/AIDS transmission and prevention as part of physical and health education instruction.

The study followed the Kemmis and McTaggart action research model, which includes four key phases: planning, implementation, observation, and reflection. Two cycles of intervention were conducted, with each cycle comprising two instructional meetings. 1) Planning, designing lesson plans and student worksheets based on PBL principles, formulating real-life cases, and developing quizzes via ZEP Quiz, 2) Implementation, teachers introduced real-world problems related to HIV/AIDS, organized small group discussions, and facilitated learning, 3) Observation, student engagement and performance were monitored through observation checklists and participation levels, and 4) Reflection, outcomes from each cycle were evaluated to identify areas for instructional improvement. The instruments used in this study include: Student activity observation sheets, case-

based critical thinking test questions, interactive quizzes through ZEP Quiz as a formative evaluation tool.

RESULTS AND DISCUSSION

This research was conducted through two cycles of systematically designed classroom actions that aimed to improve students' critical thinking skills in understanding material about HIV/AIDS transmission and prevention. In this research, there are four crucial stages in each cycle, namely planning, implementation, observation, and reflection. In the planning stage, the researcher prepares materials that are in accordance with class needs and the required classroom equipment and prepares appropriate strategies to encourage and develop students' critical thinking skills. Interest and trend factors are one of the triggers for the emergence of critical thinking (Rahardhian, 2022). The next stage is implementation, where researchers carry out or implement according to the plan that has been prepared. Furthermore, in the observation stage, researchers observe students during learning to see student involvement in critical thinking. While in the reflection stage, researchers analyze the results obtained from the cycle in order to evaluate student success and are made to develop further strategies to improve students' critical thinking in the next cycle.

The following are the results of the first and second cycles conducted by researchers to determine the abilities of SMK Tunas Bangsa students in improving their critical thinking skills.

Cycle I

Planning, consisting of 1) Developed a lesson plan integrating PBL principles with the topic "Dangers of HIV/AIDS Transmission", 2) Designed contextual learning scenarios with steps: problem orientation, data collection, analysis, and solution development, and 3) Prepared Student Worksheets (LKPD), discussion prompts, and ZEP quiz-based evaluations.

Implementation, consisting of 1) Teachers presented real-life cases of HIV/AIDS, 2) Students formed discussion groups to identify causes, methods of transmission, and preventive strategies, and 3) Groups presented their findings; a ZEP quiz was administered at the end as an assessment tool.

Observation, consisting of 1) Most students were passive: only a few dominated group discussion, 2) Many students struggled to relate theoretical knowledge to real-life contexts, and 3) Observation revealed limited distribution of critical thinking skills and low levels of engagement.

Reflection, consisting of 1) Limited discussion effectiveness due to lack of familiarity with PBL, 2) Students required clearer instructions and support to develop structured reasoning, and 3) The ZEP Quiz showed potential for increasing motivation, but its impact would improve if introduced earlier in the lesson. Only 52.6% of students met the Minimum Mastery Criteria (KKM) in Cycle I. These findings prompted adjustments to instructional strategies in the next cycle.

Cycle II

Planning, consisting of 1) Revised lesson plans and worksheets based on Cycle I reflections, 2) Introduced clearer task instructions and designed deeper critical thinking challenges, and 3) Implemented pretest and posttest quiz activities using ZEP Quiz.

Implementation, consisting of 1) Lessons began with a ZEP pretest quiz to activate prior knowledge, 2) Students tackled a complex case: "How to prevent the spread of HIV in a school environment?", and 3) Group discussions were guided and followed by presentations.

Observation, consisting of 1) Improved student engagement and equitable participation across groups, 2) Students demonstrated better reasoning and solution-oriented thinking, and 3) Participation in the ZEP Quiz was enthusiastic, indicating high motivation.

Reflection, consisting of 1) Active collaboration was achieved, 2) Students exhibited deeper understanding of content and demonstrated improved ability to apply knowledge to real-world scenarios, and 3) Cycle II recorded an average critical thinking score of 82, with 89.5% of students meeting the KKM.

In the second cycle, improvements in the learning process were made based on the reflection and evaluation results from the first cycle. The findings demonstrated a notable enhancement in students' critical thinking skills, with the average score increasing to 82. Additionally, the number of students who met the Minimum Mastery Criteria (KKM) rose to 17 out of 19 students (89.5%). These

results indicate that the implementation of the Problem-Based Learning (PBL) model in the second cycle was effective in improving both the quality of the learning process and the learning outcomes—particularly in fostering students' critical thinking abilities on the topic of HIV/AIDS transmission and prevention.

Table 1. Critical Thinking Ability Test Results for Grade XI Students of SMK Tunas Bangsa Malang

No	Aspects of Critical Thinking Abilities	Cycle I	Cycle II
1	Analyze information	68	82
2	Assessing arguments and opinions	65	80
3	Draw a conclusion	66	83
4	Provide proper reasons/logic	70	83
Overall Average		67.25	82

The table presents the comparative results from the first and second cycles, highlighting the improvement in critical thinking skills among Grade XI students at SMK Tunas Bangsa, particularly in understanding the importance of HIV/AIDS transmission and prevention. Key findings from the data include, 1) A significant improvement was observed across all dimensions of critical thinking, 2) The most substantial gains occurred in the aspects of drawing conclusions and providing logical reasoning, and 3) These results suggest that the implementation of the Problem-Based Learning (PBL) model, supported by ZEP Quiz, effectively encouraged students to engage in more reflective, logical, and analytical thinking when addressing real-world issues.

Table 2. Result of Cycle I and Cycle II

Cycle	Number of Students	Students Completed (≥ 75)	Students Not Yet Completed (< 75)	Percentage of Completion
Cycle I	19	10	9	52,6%
Cycle II	19	17	2	89,5%

In Cycle I, 52.6% of students met the Minimum Mastery Criteria (KKM), while 47.4% did not achieve the required level of competency. In Cycle II, the percentage of students achieving mastery increased significantly to 89.5%. These findings demonstrate the effectiveness of the Problem-Based Learning (PBL) model, particularly when integrated with ZEP Quiz gamification, in enhancing students' critical thinking skills.

The study's results support the principles of constructivist learning theory, which emphasizes the active role of learners in constructing knowledge through real-world experiences and problem solving. Gamification elements, such as those incorporated in the ZEP Quiz platform, play a pivotal role in increasing students' motivation and engagement. The platform encourages rapid thinking, facilitates self-evaluation through immediate feedback, and fosters a dynamic and positively competitive classroom environment. Furthermore, active participation in group discussions contributed to the development of higher-order thinking skills, including analysis, evaluation, and inference. The measurable improvements from Cycle I to Cycle II indicate substantial growth not only in the cognitive domain but also in students' affective engagement with the learning process.

CONCLUSIONS

This study concludes that the implementation of the Problem-Based Learning (PBL) model, supported by gamification through the ZEP Quiz platform, significantly enhances the critical thinking skills of Grade XI students at SMK Tunas Bangsa Malang—particularly in learning content related to the transmission and prevention of HIV/AIDS. The PBL model, which emphasizes real-world problem solving, collaborative learning, and active inquiry, offers meaningful opportunities for students to engage in higher-order thinking. By situating the learning content within a context that is relevant to adolescents' lives, the approach increases students' interest, motivation, and awareness of critical public health issues.

The ZEP Quiz platform was strategically utilized at two key points in the learning process: as a pre-quiz to activate students' prior knowledge and as a post-quiz for formative evaluation. This dual application not only boosted students' enthusiasm for learning but also reinforced their memory and conceptual understanding through engaging, repeated interaction. As a result, students became more actively involved in discussions, demonstrated the ability to construct logical arguments, and showed greater confidence in drawing conclusions and proposing solutions to real-world problems.

The improvement is evident in the increase in students' average critical thinking scores—from 67.25 in Cycle I to 82.00 in Cycle II—out of a total of 19

Grade XI students at SMK Tunas Bangsa Malang. Furthermore, the proportion of students who met the Minimum Mastery Criteria (KKM) rose from 52.6% to 89.5%. Based on these findings, it can be concluded that the integration of the Problem-Based Learning (PBL) model with ZEP Quiz gamification is effective in Physical and Health Education (PJOK), particularly for topics that demand critical thinking and social awareness.

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