

ORIGINAL ARTICLE

Efficiency of Problem-Based Learning Models to Improve Passing Skills in Basketball Games

Arnaz Anggoro Saputro

PGRI Jombang University

Corresponding author: Arnaz Anggoro Saputro – amazsaputro@gmail.com

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Abstract:

Passing ability is a fundamental motor skill that plays a crucial role in basketball performance. However, preliminary observations indicated that the passing ability of students at the Leviathan Basketball Club was relatively low. This study aimed to evaluate the effectiveness of problem-based learning in improving students' basketball passing skills. A quasi-experimental method with a one-group pretest–posttest design was employed. The participants consisted of 21 students who received problem-based learning instruction focused on basketball passing skills over 12 sessions. The data collection instrument was a basketball passing skill test developed based on indicators of fundamental passing techniques and administered before (pretest) and after (posttest) the intervention. The collected data were analyzed using a Paired Sample T-Test with the assistance of SPSS software. The results revealed a statistically significant improvement in students' passing ability following the implementation of problem-based learning, with a significance value of 0.000 ($p < 0.05$). It can be concluded that problem-based learning is effective in enhancing basketball passing skills. This study contributes to the understanding of instructional models in physical education and sports, particularly in improving fundamental motor skills. Further research is recommended to explore the application of problem-based learning to other sports skills and broader participant groups.

Keywords: Problem-Based Learning; Passing; Basketball

1. Introduction

Problem-based learning (PBL) is a student-centered instructional strategy in which learners are confronted with authentic problems that require critical thinking, collaboration, and the application of knowledge in meaningful contexts (Haetami et al., 2023). This approach has been shown to enhance analytical skills, problem-solving abilities, and students' engagement through active and participatory learning processes (Wijnen et al., 2017). In physical education and sports contexts, PBL is increasingly recognized as a promising pedagogical model for developing not only cognitive outcomes but also fundamental motor skills (Kuncoro et al., 2023).

Basketball is one of the most popular sports among youth, including elementary school students in Jombang Regency, East Java. The Leviathan Basketball Club plays an important role in fostering basketball skills at an early age. However, preliminary observations conducted in this study revealed that students' passing ability remains at a low level, with an average passing accuracy of only 56%. This condition represents a critical issue, as passing is a fundamental technical skill that directly influences team performance, ball circulation, and tactical effectiveness in basketball (Yosika, 2023).

Previous studies have consistently reported that students' fundamental basketball skills, particularly passing, are often underdeveloped. Adiansyah et al. (2021) found that passing ability among school-aged players was still categorized as insufficient, indicating



weaknesses in both technical execution and decision-making. These findings highlight an urgent need for more effective and structured instructional approaches, as passing accuracy and timing are essential determinants of successful team play (Yosika, 2023).

One of the main factors contributing to poor passing performance is the continued reliance on traditional, coach-centered training methods (Suhardi, 2022). Such approaches often emphasize repetitive drills with limited contextual variation, providing minimal opportunities for students to actively engage in problem-solving or decision-making during realistic game situations. As a result, students tend to become passive learners and struggle to transfer technical skills, such as passing, into actual gameplay (Abdullah et al., 2024).

In response to this challenge, problem-based learning offers a pedagogical alternative that emphasizes real-game situations and active student involvement. Through PBL, students are encouraged to analyze game problems, collaborate with peers, and apply technical solutions such as selecting appropriate passing techniques—in dynamic contexts (Alita et al., 2019; Aji, 2023). This approach supports the development of motor skills within meaningful and engaging scenarios, which is particularly important for children in the early stages of skill acquisition (Utami & Giarti, 2020).

Despite the growing body of literature on problem-based learning, its application in sports training especially in improving fundamental motor skills such as basketball passing among elementary school athletes remains limited. Most existing studies focus on cognitive or academic outcomes, with relatively few examining motor skill development in extracurricular sports settings. Therefore, the novelty of this study lies in its investigation of the effectiveness of problem-based learning in enhancing basketball passing skills among elementary school players within a basketball club context, rather than in formal school physical education classes. This study also addresses the practical gap between pedagogical theory and coaching practice by providing empirical evidence on the use of PBL as an alternative training model in youth basketball. The findings are expected to contribute to the advancement of sports pedagogy literature and offer practical guidance for coaches seeking more participatory and student-centered training methods.

2. Materials and Methods

This study employed a quasi-experimental design with a single-group pretest-posttest methodology (Sugiyono, 2016). This design was chosen to evaluate the efficacy of a problem-based learning paradigm in improving students' basketball passing skills at the Leviathan Basketball Club, Jombang Regency, East Java Province.

This study used a single-group pretest-posttest design, in which one group of individuals was assessed on two occasions: before and after the intervention. An initial assessment (pretest) is conducted to evaluate student skills before implementing interventions that utilize problem-based learning. Next, the subject group underwent therapy for 12 sessions, in which instructions were delivered using problem-based learning methodology. This instruction aims to provide students with the ability to face authentic scenarios requiring passing skills within the framework of the game of basketball. After completing all learning sessions, the final assessment (posttest) was carried out using the same instrument as the pretest, namely the evaluation of basketball passing skills.

The sampling technique used in this study was total sampling. This technique was selected because the population size was relatively small and manageable. The population

consisted of all active elementary school students who were registered members of the Leviathan Basketball Club in Jombang Regency, totaling 21 participants.

By employing total sampling, all members of the population were included as research participants, ensuring that the sample fully represented the population under study. This approach minimized sampling bias and allowed for a comprehensive evaluation of the effectiveness of the problem-based learning intervention on basketball passing skills. Consequently, the sample size in this study was equal to the population size, consisting of 21 participants.

The instrument used in this study was a basketball passing skills assessment that had undergone validation and reliability testing. This assessment aims to evaluate students' skills in successfully passing a basketball, including speed, precision, and accuracy. This test was conducted both during the pretest and posttest to evaluate changes in passing skills after being given treatment. The research procedure consisted of; (a) pretest, which is an initial measurement of students' passing ability using a basketball passing test instrument; (b) treatment, where students were given passing learning with a problem-based learning model for 12 meetings. During this session, students are given a basketball game problem or situation that requires collaborative solving, with a focus on passing skills; and (c) posttest, after completing the program, a final assessment is conducted to evaluate students' passing skills using the same instrument used in the pretest.

Pretest and posttest data will be analyzed using the Paired Sample T-Test statistical method through the SPSS program. Paired T-test was used to compare the mean passing scores before and during therapy to determine whether there was a significant change. The significance value (p-value) of less than 0.05 in the test results indicates that the problem-based learning approach significantly improves students' passing ability. This analysis assesses the efficacy of the intervention in meeting the research objectives. This study began with descriptive statistical analysis, followed by normality and homogeneity tests, and concluded with a Paired Sample T-Test.

3. Results

Descriptive statistical analysis attempts to ascertain the lowest, maximum, and average values in the pre-test and post-test results, in particular. The results of the descriptive statistical test can be seen in Table 1.

Table 1. Results of Descriptive Statistical Tests

Group	Minimum	Maximum	Mean
Pretest	60	75	67
Posttest	70	89	88

Table 1 presents the results of descriptive statistical tests for participants' pretest and posttest scores. In the pretest group, the minimum score obtained was 60, with the maximum score reaching 75, and the average (mean) score of the participants was 67. After the intervention, the posttest group showed significant improvement, where the minimum score of the participants increased to 70, the maximum score reached 89, and the average score became 88.

Normality tests were conducted to ensure whether the pre-test and post-test data had a normal distribution. The normality test used is the Shapiro-Wilk method, because the sample size is below 50, the results of the normality test can be seen in detail in table 2.

Table 2. Normality Test Results

Group	Sig Value	Information
Pretest	0,325	Normal
Posttest	0,192	Normal

Table 2 shows the results of the normality test for both groups. In the pretest group, the significance value (sig) was 0.325, while in the posttest group, the sig value was 0.192. Both significance values exceed 0.05. As a result, it can be concluded that the pre-test and post-test data have a normal distribution, which confirms that the normality assumption is met for further statistical analysis.

The homogeneity test attempts to determine whether the variation between the pre-test and post-test is uniform. The homogeneity test uses Levene's statistical approach, and the results can be seen in detail in table 3.

Table 3. Results of Homogeneity Test

Group	Levene Statistic	Sig	Information
Pretest-Posttest	3,325	0,147	Homogen

Table 3 displays the results of the homogeneity test, which shows a Levene's Statistic value of 3.325 for the pre-test-post-test group, accompanied by a significance value (sig) of 0.147. Since this significance value exceeds 0.05, it can be said that the variance between the pre-test and post-test groups is homogeneous. This indicates that the homogeneity assumption is met, which is important for further statistical analysis. Next, the Paired Sample t-test was used to ensure significant differences between the pretest and posttest results, and the results are detailed in Table 4.

Table 4. Paired Sample T-Test Results

Group	Sig
<i>Pretest-Posttest</i>	0,000

Table 4 shows the results of the Paired Sample T-Test, showing a significance value (sig) of 0.000, which is less than 0.05, indicating a significant difference between the pre-test and post-test results. Consequently, it can be concluded that the problem-based learning methodology significantly improved students' basketball passing abilities.

4. Discussion

The findings of this study demonstrate that the implementation of problem-based learning (PBL) resulted in a significant improvement in students' basketball passing skills at the Leviathan Basketball Club. The observed improvement between pretest and posttest scores indicates that engaging students in authentic, problem-oriented learning environments effectively enhances their motor skill performance. These results align with prior research suggesting that PBL promotes deeper learning by encouraging learners to actively analyze, reflect on, and apply technical skills within realistic contexts (Wijnen et al., 2017; Aji, 2023).

From a theoretical perspective, the effectiveness of PBL in this study can be explained through constructivist learning theory, which emphasizes that knowledge is actively

constructed through experience and social interaction (Saputra et al., 2019). By confronting students with real-game passing scenarios, PBL facilitated meaningful learning experiences that allowed participants to understand not only the mechanics of passing techniques but also their tactical application. This experiential process supports previous findings indicating that contextualized practice enhances motor skill acquisition and retention (Permatasari et al., 2020).

Furthermore, the results are consistent with Kolb's experiential learning theory, which posits that learning occurs through a continuous cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984; Djati et al., 2023). Through repeated exposure to game-based problems, students were able to reflect on their performance, identify weaknesses in their passing decisions, and test improved strategies in subsequent sessions. This iterative learning process likely contributed to the significant gains observed in passing performance (Abdillah & Sudarso, 2022).

In addition to technical improvements, PBL also appears to support the development of non-technical competencies, such as communication, collaboration, and decision-making. Basketball is inherently a team-based sport, and effective passing depends heavily on players' ability to coordinate actions and anticipate teammates' movements (Nurjasman et al., 2023). The collaborative nature of PBL encouraged peer interaction and shared problem-solving, which may have enhanced both individual and team-level performance (Ihsan et al., 2022).

Despite its contributions, this study has several limitations that should be acknowledged. First, the use of a single-group pretest–posttest design without a control group limits the ability to attribute improvements solely to the PBL intervention, as external factors such as maturation or prior training experiences may have influenced the results. Second, the relatively small sample size ($n = 21$) and the specific context of a single basketball club restrict the generalizability of the findings to broader populations or different competitive levels. Third, this study focused exclusively on passing skills as a fundamental motor skill, without examining other technical or tactical aspects of basketball performance, such as shooting, dribbling, or defensive skills. Additionally, the duration of the intervention was limited to 12 instructional sessions, which may not fully capture the long-term effects of PBL on skill retention and performance transfer.

Future research should address these limitations by employing experimental or randomized controlled trial designs that include comparison groups to strengthen causal inferences. Studies involving larger and more diverse samples across different age groups, competitive levels, and training environments are also recommended to enhance the external validity of the findings. Moreover, future investigations could explore the application of PBL to other basketball skills or team sports to examine its broader impact on motor, tactical, and psychosocial skill development. Longitudinal studies are particularly needed to assess the long-term effectiveness and retention of skills acquired through PBL. Additionally, integrating qualitative approaches, such as interviews or observational analyses, may provide deeper insights into students' learning processes, motivation, and perceptions of problem-based learning in sports training contexts.

5. Conclusions

This study found that the use of a problem-based learning paradigm substantially improved students' basketball skills at the Leviathan Basketball Club. The findings of this study

indicate a substantial difference between the pre-test and post-test results, thus validating the effectiveness of the problem-based learning paradigm in improving students' motor skills.

6. References

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