The Effect of Sniper Game on Throwing Accuracy in Elementary School Physical Education

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Abstract	This study aimed to examine the effect of the sniper game on throwing accuracy in Physical Education, Sports, and Health (PJOK) learning among fifth-grade elementary school students. The sniper game is a target-based, play-oriented activity designed to enhance manipulative motor skills, particularly throwing accuracy. A quasi-experimental design with a pretest–posttest control group model was employed. The participants were 30 fifth-grade students of SDN 3 Sukamenak, divided into an experimental group (n = 15) and a control group (n = 15). The experimental group received PJOK instruction using the Sniper game, while the control group received conventional instruction. Data were collected through a throwing accuracy test and analyzed using descriptive statistics and paired sample t-tests at a significance level of 0.05.The results showed improvements in both groups; however, the experimental group demonstrated a greater increase in mean scores (Δ = 1.267) compared to the control group (Δ = 0.667). Statistical analysis indicated a significant effect of the sniper game on throwing accuracy (p < 0.05). These findings demonstrate that the sniper game can be effectively implemented as a game-based instructional strategy to improve throwing accuracy in elementary school PJOK learning. The scope of this study was limited to throwing accuracy; future research may explore its broader impact on other manipulative motor skills and across different educational contexts.
Keywords	Elementary School, Physical Education, Sniper Game, Throwing Accuracy.

INTRODUCTION

Physical education serves as a medium to foster the development of motor skills, physical abilities, and knowledge (Novri, 2020). In the context of elementary education, Physical Education, Sports, and Health (PJOK) plays an important role in developing gross motor skills such as running, jumping, and throwing, as well as fine motor skills such as writing and drawing (Pandiangan *et al.*, 2024). In addition, PJOK is also directed toward shaping students' character through values of fair play, cooperation, and a healthy lifestyle (Setiawan, 2025). According to Al Fathan *et al*. (2022), PJOK plays a significant role in schools, fostering students who are physically and mentally healthy, possess strong personality traits, discipline, and high sportsmanship, ultimately forming quality individuals. Thus, physical education not only functions as a means of physical and character development but also serves as an essential medium for cultivating fundamental movement skills.

Elementary school students are in an active developmental phase, characterized by enjoyment of movement and learning through direct experience (Ismail Gani et al., 2022). Therefore, PJOK instruction needs to be designed contextually and game-based to foster healthy habits, positive character, and meaningful movement skills. This aligns with the findings of Siregar et al. (2024), who emphasized that PJOK in elementary schools supports children's physical, mental, and social growth. One important aspect is manipulative skills, particularly throwing, which involve using the hands or other body parts to control an object through varied, interconnected movement patterns. These skills can be developed through game activities with variations in distance, ball size, and the use of obstacles (Lesmawan et al., 2025; Cahyono, 2024). Research conducted by Habibie & Fitrianto (2023) demonstrated that throwing skills not only enhance manipulative movement competence but also strengthen cognitive and affective aspects. Among the various skills developed, manipulative skills, such as throwing, play a strategic role because they require complex coordination among the hands, eyes, and body, and serve as a foundation for mastering diverse games and sports.

In throwing skills, accuracy is an important indicator of movement quality. According to Setyawan (2022), accuracy is defined as the ability to control movements in a specified direction or intensity, while Sa'diyah & Susanto (2020) emphasize that accuracy refers to the alignment between intention or goal and the outcome achieved toward a particular target. Both perspectives highlight that accuracy is closely related to focus, control, and movement regulation. Van Den Tillaar (2020) further explains that throwing accuracy is not only measured by successfully hitting the target, but

also by the degree of deviation from the target's center and the consistency of throwing patterns across repeated trials. Internal factors influencing accuracy include movement coordination, mastery of technique, strength, speed, and the ability to anticipate movements. External factors include the target size, throwing distance, and environmental conditions (Saputra et al., 2022).

According to Abyudaya et al. (2025), throwing is emphasized as a fundamental, basic movement, thereby requiring appropriate instructional methods. Farhat et al. (2024) demonstrated that spatial accuracy in throwing tasks is significantly related to broader ball skills. These findings highlight the need for structured learning strategies to improve throwing accuracy in elementary school settings.

Previous studies have shown that game-based learning approaches are effective in improving children's motor skills. Yusmawati et al. (2020) demonstrated that the use of audiovisual media significantly enhanced elementary students' mastery of basic throwing skills, with the passing rate increasing from 33.3% in the initial test to 100% after the intervention. This finding emphasizes that structured and engaging instructional strategies can effectively improve manipulative motor skills, a conclusion further supported by research on game-based approaches. Cahyono (2022) reported that implementing the "shoot the fish" game significantly improved elementary students' basic throwing skills. Similarly, Naufaldi (2025) found that structured play activities significantly increased motor skill scores among children aged 9–10 years, rising from 22.25 to 39.80 (p < 0.05). These studies affirm the effectiveness of structured games in enhancing motor skills; however, no research has systematically examined target-based instructional games specifically designed to improve measurable throwing accuracy, thereby highlighting the need for further investigation in this area.

Initial observations at SDN 3 Sukamenak revealed that the throwing accuracy of fifth-grade students had not yet reached an optimal level. The learning practices were still heavily reliant on demonstration and repetitive drills, with limited variations aimed at developing accuracy. This was reflected in the PJOK assessment results, where 24 students (80%) scored 71–80, while only 6 students (20%) scored above 80. These conditions indicate the need for more varied and structured instructional strategies to enhance students' throwing accuracy.

Although growing evidence supports game-based approaches, empirical studies specifically focusing on target-based instructional games to improve throwing accuracy in Indonesian elementary schools remain limited. This gap underscores the need for systematic research to

evaluate the effectiveness of target-based games in improving measurable throwing accuracy.

The Sniper game is a target-based learning activity designed to emphasize precision, repetition, and control of throwing movements. According to Kemdikbud (2023), the Sniper game is categorized as a manipulative game that focuses on practicing throwing accuracy at specific targets. In this activity, students throw tennis balls toward cones arranged within the playing area. The primary objective of the Sniper game is to train students to throw accurately to knock down cone targets. By implementing such games, PJOK learning becomes more contextual, varied, and meaningful, as students actively learn while playing.

From a theoretical perspective, motor learning is understood as a series of processes related to practice and experience that result in relatively permanent changes in skill behavior (Schmidt in Winarno, 1995). In line with recent developments in motor learning research, task-specific and goal-oriented practice has been shown to significantly improve spatial accuracy, force regulation, and movement coordination through progressive neuromuscular adaptation (Leech et al., 2022). In the context of throwing skills, accuracy develops through structured and repetitive practice that enables learners to systematically adjust strength, direction, and body position toward the designated target.

Therefore, this study aims to analyze the effect of the Sniper game on the throwing accuracy of fifth-grade students at SDN 3 Sukamenak. The novelty of this research lies in the application of a systematically designed target-based game to improve throwing accuracy. This approach offers new insights by emphasizing precision in manipulative skills, an area that has not yet been extensively explored in the context of elementary school physical education.

METHOD

This study employed a quantitative, quasi-experimental design. The research design was a pretest–posttest control-group design, which aimed to examine the effect of the Sniper game on students' throwing accuracy in Physical Education, Sports, and Health (PJOK) learning. In this design, the study involved two groups, namely an experimental group and a control group. Both groups were administered a pretest to measure students' initial throwing accuracy. Subsequently, the experimental group received PJOK instruction via the Sniper game, while the control group received conventional PJOK instruction. After the treatment period, both groups were given a posttest to assess changes in students' throwing accuracy.

The research subjects consisted of all fifth-grade students at SDN 3 Sukamenak in the 2025/2026 academic year, totaling 30 students. The sampling technique used was total sampling, as the entire population was included. Students were then divided into two groups using simple random sampling, with 15 assigned to the experimental group and 15 to the control group. Random assignment was conducted to ensure the equivalence of initial characteristics and minimize bias.

This study employed three data collection instruments: a throwing accuracy test (test tok-tok ball), an observation sheet, and an interview guide. The use of multiple instruments was intended to obtain comprehensive data and ensure consistency with the study's objectives.

The main instrument of this study was the Tok-Tok Ball Test, the Indonesian Student Fitness Test (TKSI) from Kemdikbudristek. This test was used to measure students' throwing accuracy skills before (pretest) and after the treatment (posttest). This test aims to measure the accuracy of elementary school students' throws as part of manipulative movement skills in physical education learning.

The test was conducted by having students throw 10 tennis balls from below, using one hand, toward a basket with a diameter of 30 cm and a height of 30 cm, from a distance of 3 meters. The test area is prepared with a flat surface, the throwing line is marked using chalk or tape, and the basket is placed at the standard distance. Students stand behind the throwing line and throw the ball when the whistle blows. Each student performs 10 throwing attempts.

The indicators of throwing accuracy were used as the basis for assessing students' ability to perform accurate throwing movements. Referring to Dyah et al. (2019), the throwing accuracy indicators in this study consisted of two main aspects:

a. Throwing the ball toward a designated target measures the student's ability to aim it accurately.

b. Throwing the ball into the basket measures the student's ability to make an accurate throw that results in the ball entering a specific target.

Table 1. Indicators of Throwing Accuracy

No	Aspect/Dimension	Operational Indicator	Observed Behavioral Description	Assessed Technical Components	Measurement Method
1.	Throwing toward the intended target	Ability to direct the ball toward the target	The ball hits the designated target area	Throwing direction, body position, and movement coordination	Number of successful throws hitting the target

| 2. | Throwing the ball into the basket | Ability to produce high-precision throws | The ball successfully enters the target basket | Force control, release angle, and technique consistency | Number of successful throws entering the basket |

Source : Dyah et al., 2019

The indicators of throwing accuracy in this study consist of two main dimensions. First, throwing toward the intended target, which refers to students' ability to direct the ball accurately so that it hits the target. This aspect assesses the direction of the throw, body position, and movement coordination, with measurement based on the number of successful throws hitting the target. Second, throwing the ball into the basket, which refers to students' ability to produce highly precise throws that result in the ball entering the basket. This aspect evaluates control of force, release angle, and consistency of technique, with measurement based on the number of successful throws entering the basket.

Based on these indicators, a scoring rubric was developed. Scores were obtained from the number of successful throws across several trials. The standards were then converted into ability categories, differentiated by gender, in accordance with developmental characteristics (Kemdikbudristek, 2023).

Table 2. Rubric for Throwing Accuracy

Male Score Range	Female Score Range	Conversion Score	Category
≥ 8	≥ 7	5	Very Good
6 – 7	5 – 6	4	Good
3 – 5	3 – 4	3	Fair
1 – 2	1 – 2	2	Poor
0	0	1	Very Poor

Source: Kemdikbudristek, 2023

The rubric for assessing throwing accuracy was based on the number of successful throws each student made. Male students with eight or more successful throws and female students with seven or more were categorized as Very Good. Six to seven successful throws for males and five to six for females were categorized as Good. Students who achieved three to five successful throws (males) or three to four (females) were categorized as Fair. One to two successful throws were categorized as Poor, while no successful throws were categorized as Very Poor. This rubric provides a standardized description of students' ability levels, thereby facilitating the analysis of pretest and posttest results.

Prior to implementation, the instrument was tested for validity and reliability. The validity and reliability of the instrument refer to the results of tests conducted by the TKSI developers at Kemdikbudristek. The reported validity coefficient is 0.376, and the reliability coefficient is 0.524,

indicating that the instrument has an acceptable level of measurement consistency for educational assessment. The use of this nationally standardized instrument aims to improve the consistency and credibility of research measurements.

Observation was conducted during the learning process to monitor students' participation and the implementation of the Sniper game in PJOK lessons. The observation was non-participant in nature, as the researcher observed classroom activities without directly intervening in the instructional process. The purpose of the observation was to ensure that the treatment was implemented according to the planned instructional procedures and to document students' engagement during the activity. The observational findings were used as supporting data to complement the quantitative results of the throwing accuracy test.

Semi-structured interviews were conducted with the PJOK teacher and the homeroom teacher to obtain additional information regarding the implementation of the learning process and students' characteristics during the study. The interviews were conducted after the treatment period. The interview with the PJOK teacher aimed to explore information concerning the effectiveness of the Sniper game implementation, students' responses during the activity, and any challenges encountered in the learning process. Meanwhile, the interview with the class teacher was intended to obtain a general overview of students' characteristics, participation levels, and the development of their learning behavior during the study. The interview data were used as supporting information to strengthen the interpretation of the quantitative findings from the throwing accuracy test.

The research procedure was conducted through several systematic stages. First, a pretest was administered to both the experimental and control groups to measure students' initial throwing accuracy. The pretest was conducted using the Tok-Tok Ball Test under identical testing conditions for both groups to ensure measurement consistency. Second, the treatment phase lasted 6 instructional sessions per group, excluding the pretest and posttest. The experimental group received PJOK instruction using the Sniper game, whereas the control group received conventional PJOK instruction. Each session was conducted according to the prepared lesson plans to ensure consistency of treatment in the experimental group and uniformity of instructional delivery in the control group. After all treatment sessions, a posttest was administered to both groups using the same instrument as the pretest to assess students' final throwing accuracy. The pretest-posttest design was used to determine the effect of the Sniper game on students' throwing accuracy.
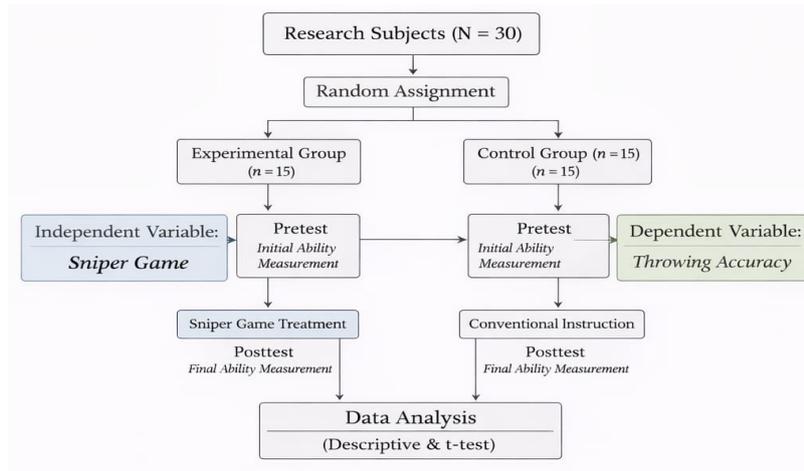
Figure 2. Quasi-Experimental Research Framework

The pretest and posttest data were analyzed using both descriptive and inferential statistics. Descriptive statistics (mean, standard deviation, minimum, and maximum scores) were used to summarize students' throwing accuracy scores in both the experimental and control groups.

Prior to hypothesis testing, assumption tests were conducted. Normality was examined using the Shapiro–Wilk test because the sample size was fewer than 50 participants. Homogeneity of variance between the experimental and control groups was assessed using Levene's test. The data were considered to meet the assumptions for parametric analysis when the significance values exceeded 0.05 ($p > 0.05$).

After the assumptions were met, a paired-samples t-test was performed for each group to examine changes in students' throwing accuracy following the implementation of the Sniper game. This test was used because the data were paired, as the measurements were taken from the same students before and after the intervention. The level of significance was set at $\alpha = 0.05$. A p-value less than 0.05 ($p < 0.05$) indicated a statistically significant difference between pretest and posttest scores.

FINDINGS AND DISCUSSION

Findings

The purpose of descriptive statistics in this study is to provide a concise overview of the data before conducting inferential analysis. They present the minimum, maximum, mean, and standard deviation, allowing readers to observe general trends in the pretest and posttest results for both the experimental and control groups. In this way, descriptive statistics serve as the foundation for identifying initial patterns and preparing for hypothesis testing.

Table 3. Descriptive Statistics

Data Set	N	Minimum	Maximum	Mean	Std. Deviation
Pretest_Eksperimen	15	1	4	2.33	.976
Posttest_Eksperimen	15	2	5	3.60	.986
Pretest_Kontrol	15	1	4	2.13	.915
Posttest_Kontrol	15	1	4	2.80	.862
Valid N (listwise)	15				

Source: SPSS 27

Table 3 shows the descriptive statistics of the pretest and posttest results. In the experimental group, the mean score increased from 2.33 in the pretest to 3.60 in the posttest, indicating a clear improvement after the Sniper game intervention. In the control group, the mean score rose more modestly, from 2.13 to 2.80. These results suggest that, while both groups made progress, the improvement was greater in the experimental group, indicating the effectiveness of the Sniper game in enhancing throwing accuracy.

Prerequisite Tests

Before conducting the *Paired Samples t-test*, assumption tests were performed to ensure the data met the requirements for parametric analysis.

1. Tests of Normality (Shapiro–Wilk)

The purpose of the Shapiro–Wilk normality test is to determine whether the data follow a normal distribution, a prerequisite for parametric statistical analyses such as the t-test. This test is particularly recommended when the sample size is less than 50.

Table 4. Tests of Normality (Shapiro-Wilk)

Tests of Normality			
Data Set	Shapiro-Wilk		
	Statistic	df	Sig.
Pretest Kontrol	.881	15	.050
Posttest Kontrol	.882	15	.050
Pretest Eksperimen	.891	15	.070
Posttest Eksperimen	.896	15	.082

The Shapiro–Wilk normality test results show the following significance values: Pretest Control = 0.050, Posttest Control = 0.050, Pretest Experimental = 0.070, and Posttest Experimental = 0.082. Since all values are greater than 0.05, the data are considered normally distributed and thus meet the assumption required for parametric statistical analyses such as the t-test.

2. Test of Homogeneity of Variance (Levene's Test)

The purpose of the homogeneity test is to determine whether the variances of the data across the groups being compared are equal. Homogeneity of variance is one of the key assumptions for using

parametric statistical analyses. If the test results show that the variances are homogeneous, the analysis can be conducted more validly because the assumption of equal variances is met.

Table 5. Test of Homogeneity of Variance (Levene's Test)

Test of Homogeneity of Variance					
Data Set		Levene Statistic	df1	df2	Sig.
Pretest Kontrol dan Eksperimen	Based on Mean	.211	1	28	.650
	Based on Median	.076	1	28	.785
	Based on Median and with adjusted df	.076	1	27.532	.785
	Based on the trimmed mean	.247	1	28	.623
Posttest Kontrol dan Eksperimen	Based on Mean	.759	1	28	.391
	Based on Median	.700	1	28	.410
	Based on Median and with adjusted df	.700	1	27.876	.410
	Based on the trimmed mean	.830	1	28	.370

Source: SPSS 27

For the pretest, the significance values based on mean (0.650), median (0.785), median with adjusted df (0.785), and trimmed mean (0.623) are all greater than 0.05. This indicates that the variances between the control and experimental groups at the initial stage are homogeneous. For the posttest, the significance values based on mean (0.391), median (0.410), median with adjusted df (0.410), and trimmed mean (0.370) are also greater than 0.05. Thus, the variances between the two groups after treatment remain homogeneous. Overall, these results confirm that the data meet the assumption of equal variances, allowing parametric analyses such as the t-test to be applied validly.

3. **Paired Samples T-Test**

The purpose of the Paired Samples t-test is to determine whether there is a significant difference between two means from paired data, usually in a pretest–posttest design. This test checks if the treatment or intervention produces a meaningful change within the same group.

Table 6. Paired Samples T-Test

Paired Samples Test								
Paired Differences								
Data Set	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Pair 1 Pretest Kontrol Posttest Kontrol	-.667	.724	.187	-1.067	-.266	-3.568	14	.003
Pair 2 Pretest EksperimenPostt	-1.267	.458	.118	-1.520	-1.013	-10.717	14	<.001

est Eksperimen

For the control group, the mean difference between pretest and posttest scores was -0.667, with a t-value of -3.568 and a significance level of 0.003. This indicates a statistically significant difference, indicating that the control group experienced a measurable change between the two tests. For the experimental group, the mean difference was larger at -1.267, with a t-value of -10.717 and a significance level of <0.001. This shows a highly significant difference, suggesting that the experimental group improved more than the control group. Overall, both groups demonstrated significant changes, but the effect was more pronounced in the experimental group.

Contextual Interpretation

The findings demonstrate that the Sniper game intervention had a stronger impact on throwing accuracy than conventional PJOK instruction. The improvement in the experimental group was not only greater in magnitude but also more consistent, as reflected in the lower standard deviation. This suggests that structured, target-based activities such as the Sniper game provide more effective learning experiences for elementary school students. The results align with motor learning theory, which emphasizes task-specific and goal-directed practice, and support the principles of *Deep Learning* in PJOK by making learning more meaningful and engaging.

Discussion

The findings of this study indicate that the Sniper game intervention significantly improved students' throwing accuracy compared to conventional physical education instruction. The improvement observed in the experimental group was not only greater in magnitude but also more consistent, suggesting that structured, target-oriented activities can create a more effective learning environment for elementary school students.

Practically, the Sniper game emphasizes visual focus, hand–eye coordination, and movement consistency. Repeated aiming and throwing at specific targets provides immediate feedback on throwing accuracy, encouraging students to self-correct their technique and enhancing motivation and engagement in the learning process. Theoretically, these findings support the motor learning framework, which emphasizes the importance of specific, goal-oriented practice in skill acquisition (Schmidt & Lee, 2019). Target-based games such as Sniper provide both intrinsic feedback (direct observation of the throw's outcome) and extrinsic feedback (guidance from teachers or peers), enabling movement correction in accordance with the principles of closed-loop motor control. This explains the consistent improvement observed in the experimental group.

These results are consistent with previous studies. Cahyono (2022) demonstrated the effectiveness of game-based learning in improving manipulative motor skills. Naufaldi (2025) confirmed that structured target games enhance throwing accuracy among elementary school students. Farhat et al. (2024) emphasized the importance of precision-based activities in developing motor coordination, while Sari et al. (2024) highlighted innovative physical education curriculum strategies to increase student engagement. Yusmawati et al. (2020) showed that audiovisual media can improve basic throwing skills. In addition, Basa et al. (2020) reported that game-based creative activities, such as finger painting, stimulate motor development in early childhood. This reinforces the evidence that structured, goal-oriented activities can serve as effective strategies for improving manipulative motor skills in elementary school students. Despite these promising results, this study has limitations. First, the research was conducted in a single school, with a relatively small sample size, limiting the generalizability of the findings. Second, the focus was limited to throwing accuracy, without examining other manipulative motor skills such as catching or dribbling.

Future research should expand the scope by testing the Sniper game in different school contexts with larger samples. Additionally, subsequent studies could explore its impact on other manipulative skills and investigate affective aspects such as motivation, engagement, and sportsmanship. Such extensions would provide a more comprehensive understanding of the pedagogical value of target-based games in physical education. In conclusion, the Sniper game provides both pedagogical and theoretical contributions. Pedagogically, it offers an innovative instructional model that physical education teachers can apply to enhance manipulative motor skills. Theoretically, this study strengthens the motor learning framework by confirming that target-oriented activities consistently lead to skill improvement.

CONCLUSION

This study confirmed that the Sniper game, as a structured and target-oriented activity, plays a significant role in improving manipulative motor skills among elementary school students, particularly throwing accuracy. The main contribution of this research is to provide an evidence-based, innovative, and adaptable instructional model that enriches Physical Education, Sports, and Health (PJOK) practices while reinforcing the theoretical framework of motor learning. Thus, the study provides both theoretical and practical foundations for developing more meaningful and contextually grounded teaching strategies in physical education.

In practical terms, the findings imply that PJOK teachers can integrate the Sniper game as an alternative instructional approach to enhance students' throwing accuracy and overall motor competence. Nevertheless, the study is limited by its relatively small sample size and short intervention period, which restricts the generalizability of the results. Future research is recommended to investigate the long-term effects of the Sniper game on other manipulative skills, such as catching or dribbling, and to examine its applicability across different age groups and educational contexts. Such efforts will further validate the effectiveness of game-based interventions in advancing the quality of physical education in elementary schools.

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