Jurnal Ilmiah Mandala Education (JIME)
Vol 12 No.1 January 2026
p-ISSN : 2442-9511, e-2656-5862
DOI: *10.58258/jime.v12i1.10082/http://ejournal.mandalanursa.org/index.php/JIME*

The Effect of Target-Throwing Training on the Improvement of Javelin Throw Accuracy among Students at SDN Muncul 01 Setu, South Tangerang City

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Article Info

Article history:
Accepted: 06 January 2026
Publish: 13 January 2026

Keywords:
Kids Athletics
Target Throwing Training
Javelin Throw Accuracy
School

Abstract

This study aimed to analyze the effect of target-throwing training on improving javelin throw accuracy among elementary school students at SDN Muncul 01 Setu, South Tangerang City. The background of this study was the low level of students' throwing accuracy, which was influenced by limited variations in training methods and inadequate supporting facilities. A quasi-experimental method with a pretest–posttest control group design was employed, involving 40 students who were divided into an experimental group and a control group. The experimental group received target-throwing training for eight sessions, while the control group participated in conventional javelin throwing instruction. The research instrument was a javelin throw accuracy test administered before and after the intervention. Descriptive analysis showed a significant improvement in the experimental group, with the mean score increasing from 29.90 to 43.40. In contrast, the control group showed a smaller improvement, from 30.30 to 35.10. Statistical analysis using paired sample t-tests and independent sample t-tests indicated that target-throwing training had a significant effect on improving javelin throw accuracy ($p < 0.05$). These findings confirm that target-throwing training is an effective, safe, and relevant method for physical education instruction to enhance throwing accuracy among elementary school students.

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1. INTRODUCTION

Physical education is a subject that is not only oriented toward the mastery of motor skills but also aims to foster positive attitudes toward sports, develop physical health, and shape a balanced personality (Pasaribu, 2022). Within the scope of physical education, athletics holds an important position because it is considered a fundamental sport that trains basic human movements, namely running, jumping, and throwing (Nurulfa et al., 2022). Mastery of basic athletic skills from elementary school age serves as an essential foundation to support physical development as well as children's readiness to learn other sports disciplines.

One athletic event that needs to be introduced to students is the javelin throw. This activity not only trains arm muscle strength and body coordination but also develops concentration, accuracy, and movement control (Sobarna et al., 2019). However, in practical learning, javelin throwing is often considered difficult and risky for elementary school students. This difficulty arises because children are still in the stage of motor development, so their coordination, strength, and technical skills are not yet fully developed (Gilang, 2023). Therefore, simple, enjoyable, and safe learning methods are needed so that students can understand the basic principles of the javelin throw without fear. One

approach that can be applied is target-throwing training. This method emphasizes throwing practice toward a specific target with distances and sizes adjusted to children's abilities (Juli et al., 2024). Target-throwing training not only serves to develop throwing strength but also improves directional accuracy and movement control. Children are more motivated because the activities are packaged in the form of challenging yet enjoyable games (Yuliarsih et al., 2024). For example, students are asked to throw foam javelins or modified sticks into target circles, hit cones, or reach specific targets on the field.

Target-based learning has been proven effective in improving students' accuracy and motivation (Amallo et al., 2025). With clear targets, children are encouraged to focus more, adjust their body position, direct their gaze, and regulate the force of their throws. This activity indirectly helps them master the basic techniques of the javelin throw, such as foot positioning, arm swing, and coordination between lower and upper body movements (Karuniawati, 2025). In other words, target-throwing training can serve as an effective transitional medium before students fully practice the javelin throw with complete techniques on the field (Mappanyukki & Aksir, 2025). However, at SDN Muncul 01 Setu, South Tangerang City, the implementation of javelin throw instruction still faces several obstacles. Limited facilities, particularly the lack of standard javelins, are a major constraint, requiring teachers to modify equipment using safer and simpler tools. In addition, students tend to lose focus and become easily bored if learning methods are not varied. This situation results in learning objectives not being optimally achieved, especially in terms of throwing accuracy. In fact, accuracy is one of the fundamental skills that must be trained from an early age so that students become accustomed to throwing in the correct direction rather than relying solely on strength.

Based on initial observations, most students still make errors when throwing, such as unbalanced body positions, throws that deviate far from the target, and poor control of throwing force (Sobarna et al., 2019). This condition indicates the need for a more specific training method to improve accuracy. Target-throwing training is considered an appropriate solution because, in addition to being easy to implement, this method is also relevant to the characteristics of children who prefer game-based learning (Norito et al., 2022). Through this study, the authors aim to examine the extent to which target-throwing training influences the improvement of javelin throw accuracy among elementary school students at SDN Muncul 01 Setu, South Tangerang City. This research is expected to provide practical contributions for physical education teachers in selecting effective learning methods, particularly for javelin throwing skills. Furthermore, the findings are expected to serve as a reference for developing more varied training models, enabling students to learn enthusiastically while achieving optimal learning outcomes.

Through this study, it is hoped that the problem of low javelin throw accuracy among elementary school students can be addressed through appropriate training methods. In addition to improving motor skills, target-throwing training also has the potential to foster students' self-confidence, courage, and perseverance. This aligns with the objectives of physical education, which focus not only on physical aspects but also on character building and the development of positive values through sports activities.

2. MATERIALS AND METHODS

Research Design

This study employed a quasi-experimental approach using a pretest–posttest control group design. This design was chosen because field conditions did not allow for full randomization of participants, as students were already organized into intact classes (Juhrodin et al., 2023). Nevertheless, the design remains appropriate for examining the effect of target-throw training on improving javelin throwing accuracy by comparing learning outcomes between an experimental group that received a specific intervention and a control group that followed conventional physical education instruction (Sugiyono, 2018).

The population of this study consisted of all fourth- to sixth-grade students at SDN Muncul 01 Setu, South Tangerang City, who participated in physical education lessons. The sample was selected using cluster purposive sampling by choosing two classes with relatively similar characteristics in terms of student numbers and instructional schedules. One class was assigned as the experimental group, while the other served as the control group (Sugiyono, 2022).The experimental group included approximately 20 students from grades five and six, while the control group consisted of around 20 students selected by the physical education teacher from a class with comparable characteristics.

This study involved two primary variables: the independent variable and the dependent variable (Sudarwo et al., 2023). The independent variable was target-throw training, while the dependent variable was javelin throwing accuracy among elementary school students. Conceptually, target-throw training refers to throwing activities directed toward specific targets with the aim of improving motor coordination, concentration, and directional accuracy (Dianasari, 2023). Operationally, the training was implemented through a structured program conducted over eight instructional sessions, each lasting 45 minutes. The training activities included throwing at fixed targets, progressive variations in throwing distance, and simple target-based games using modified javelins that were safe and appropriate for elementary school students. Indicators of training effectiveness included students' ability to direct the javelin accurately toward the target, consistency of throwing performance, and achievement of target scores (Widiyatno & Fikri, 2025). By integrating a structured and child-centered training approach within regular physical education lessons, this study sought to provide empirical evidence regarding the effectiveness of target-throw training in enhancing javelin throwing accuracy among elementary school students.

Research Site and Duration

The study was conducted at SDN Muncul 01 Setu, South Tangerang City, Banten. The research took place over a two-month period, from October 20 to December 20, 2025. The intervention consisted of eight experimental sessions conducted during regular physical education classes.

Instruments and Data Collection

The primary research instrument was a javelin throwing accuracy test, selected to measure improvements in accuracy following the target-throw training intervention. The test utilized modified javelins suitable for elementary school students and a concentric circular target positioned at a predetermined distance. Each participant was given six throwing attempts, with each attempt scored according to the target zone hit. The final score represented the cumulative performance of all throws. In addition to the accuracy test, an observation checklist was used to assess students' basic throwing techniques, including grip, body position during approach, cross-step execution, release angle, and follow-through movement. Observations were recorded using a simple rating scale to facilitate objective assessment. A brief biodata form was also administered to collect basic participant information such as age, gender, and prior sports experience.

Data collection followed several stages aligned with the quasi-experimental design. First, both experimental and control groups completed a pretest to assess baseline javelin throwing accuracy. Second, the experimental group received target-throw training over eight sessions, while the control group participated in conventional javelin throwing instruction over the same period. Following the intervention, both groups completed a posttest using the same accuracy test instrument. Supporting documentation in the form of photographs and video recordings was used to enhance observation reliability.

Data Analysis

Data analysis aimed to determine the effect of target-throw training on improving javelin throwing accuracy. The analyzed data included pretest and posttest scores from both groups. Descriptive statistics were used to summarize data in terms of mean, standard deviation, minimum

and maximum values, and frequency distributions. Prior to hypothesis testing, prerequisite analyses were conducted, including normality testing using the Kolmogorov–Smirnov or Shapiro–Wilk tests and homogeneity testing using Levene's test. Hypothesis testing was performed using paired sample *t*-tests to examine within-group differences between pretest and posttest scores, and independent sample *t*-tests to compare posttest scores between groups. When data did not meet parametric assumptions, non-parametric alternatives such as the Wilcoxon Signed Rank Test and Mann–Whitney U Test were applied. All statistical analyses were conducted at a significance level of $\alpha = 0.05$.

3. RESULTS

This study aimed to examine the effect of target-throw training on improving javelin throwing accuracy among students at SDN Muncul 01 Setu, South Tangerang City. Research data were obtained through two measurement phases, namely pretest and posttest, administered to both the experimental and control groups. The pretest was conducted prior to the implementation of the training program to determine the students' initial javelin throwing accuracy, while the posttest was administered after the completion of the intervention to assess changes in performance.

The data were collected from two groups of participants. The experimental group consisted of 20 students who received target-throw training over six instructional sessions, whereas the control group consisted of 20 students who participated in conventional javelin throwing instruction. All participants completed the same javelin throwing accuracy test during both the pretest and posttest phases.

Descriptive Statistics

Descriptive statistical analysis was conducted to provide an overview of the distribution of javelin throwing accuracy scores for both groups. The analyzed data included total scores, mean values, standard deviations, minimum scores, and maximum scores obtained during the pretest and posttest measurements. This analysis was intended to describe the general tendency and variability of students' performance before and after the intervention.

The descriptive results showed that, prior to the intervention, both the experimental and control groups demonstrated relatively comparable levels of javelin throwing accuracy, as indicated by similar mean scores and score distributions in the pretest. Following the intervention, the experimental group exhibited an increase in mean posttest scores, indicating an improvement in javelin throwing accuracy after participating in the target-throw training program. In contrast, the control group showed a smaller change in mean scores between the pretest and posttest measurements.

Comparison of Pretest and Posttest Scores

Further analysis revealed differences in score improvements between the two groups. The experimental group demonstrated a noticeable increase in accuracy scores from pretest to posttest, suggesting that the target-throw training contributed to performance enhancement. Meanwhile, the control group, which followed conventional instruction, showed relatively limited improvement. Overall, the results indicate that students who participated in target-throw training achieved higher gains in javelin throwing accuracy compared to those who did not receive the specific training intervention. A detailed statistical summary of pretest and posttest scores for both groups is presented in Table 1.

Table 1. Experimental Variable Data Description

Data Variable	Mark	
	Pretest	**Posttest**
Min	20	31
Max	40	58
(Mean	29.90	43.40
Standart deviation	6.87	7.56
Varians	20	20

Based on the descriptive statistics of the experimental group, the lowest pretest score was 20 and increased to 31 in the posttest, while the highest score improved from 40 in the pretest to 58 in the posttest. The mean score of the experimental group increased from 29.90 in the pretest to 43.30 in the posttest, indicating an improvement of 13.50 points. The standard deviation was 6.87 for the pretest and 7.56 for the posttest, with a total sample size of 20 students. These results indicate a substantial improvement in javelin throwing accuracy after students participated in the target-throw training program. This descriptive finding serves as an initial indicator of the effectiveness of the intervention and provides a basis for further statistical analysis to examine significant differences between the experimental and control groups.

Table 2. Experimental Variable Data Control

Data Variable	Mark	
	Pretest	**Posttest**
Min	21	23
Max	40	46
Mean	30.30	35.10
Standart Deviation	6.77	6.57
Varians	20	20

Based on the descriptive statistics of the control group, the lowest pretest score was 21 and slightly increased to 23 in the posttest, while the highest score increased from 40 in the pretest to 46 in the posttest. The mean score of the control group rose from 30.30 in the pretest to 35.10 in the posttest, indicating an improvement of 4.80 points. The standard deviation was 6.77 for the pretest and 6.57 for the posttest, with a total sample size of 20 students. This result indicates that the control group experienced only a modest improvement in javelin throwing accuracy, which was considerably lower than the improvement observed in the experimental group.

The results of the *t*-test showed a significance value (2-tailed) of 0.001. This value is lower than the significance level of 0.05, indicating that the null hypothesis (H_0) was rejected. Therefore, there is a statistically significant difference between the mean scores of the two groups being compared. The mean difference between the two groups was −8.300, indicating that the first group obtained lower scores than the second group. In addition, the 95% confidence interval ranged from −12.835 to −3.765, which does not include zero, further confirming that the observed difference is statistically significant. Overall, these findings demonstrate that the different treatments or conditions applied to the two groups resulted in a meaningful and statistically significant difference in outcomes. In the context of an intervention or instructional method, these results indicate that the applied method produced a significantly different effect on the measured outcomes.

4. CONCLUSION

Based on the series of statistical analyses conducted, including the normality test, homogeneity test, Paired Sample *t*-test, and Independent Sample *t*-test, it can be concluded that the research data met all the requirements for parametric testing. The normality test results indicated that most of the data were normally distributed, while Levene's test confirmed that the variances of the two groups were homogeneous, allowing hypothesis testing to be appropriately performed using *t*-tests. The results of the Paired Sample *t*-test showed that both the experimental and control groups experienced improvements in javelin throwing accuracy after instruction. However, the increase in scores in the experimental group was considerably greater and more statistically significant than that in the control group, indicating that target-throw training had a stronger effect on improving accuracy. Furthermore, the Independent Sample *t*-test revealed a significant difference between the posttest scores of the experimental and control groups. The p-value, which was far below the 0.05 significance level, confirms that target-throw training had a significant effect on improving javelin throwing accuracy. Overall, the statistical findings consistently support the research hypothesis that target-throw training is effective and has a significant impact on enhancing javelin throwing accuracy among elementary school students.

5. ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to all parties who contributed to the successful completion of this study. Special appreciation is extended to the principal of SDN Muncul 01 Setu, South Tangerang City, for granting permission and providing full support during the research process. The authors also thank the physical education teachers for their cooperation, assistance, and valuable input throughout the implementation of the learning program. Gratitude is also addressed to all students who participated in this study for their enthusiasm, commitment, and active involvement during the training sessions. Their cooperation greatly contributed to the accuracy and reliability of the data collected.

Furthermore, the authors acknowledge the support and guidance provided by colleagues and academic peers who offered constructive feedback during the research design, data analysis, and manuscript preparation stages. This study would not have been possible without the collaboration and assistance of all individuals and institutions involved. Any remaining limitations or errors in this article are solely the responsibility of the authors.

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