



The Effect of Training in Improving the Ability of Side-Style Shot Put Technique

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Abstract

This study examined the impact of a structured side-style (glide) shot-put training program on the technical skills of eighth-grade students at SMP Maniamas Ngabang. Employing a one-group pretest-posttest experimental design, the research involved 30 participants whose performances were assessed using a validated rubric and shot distance test. The results showed an increase in mean scores from 61.67 (SD = 4.81) to 70.20 (SD = 4.48), representing an improvement of about 13.83%. Statistical analysis confirmed data normality and homogeneity, while the paired sample t-test revealed a significant difference between pretest and posttest ($t = -40.065$; $p < 0.05$). These findings demonstrate that a well-structured and repetitive training model effectively enhances students' coordination, strength, and mastery of technique. Furthermore, this research contributes to physical education pedagogy by offering an evidence-based framework for designing innovative and feedback-oriented training programs that improve technical proficiency and motor learning in school-based sports activities.

Keywords: motor coordination, physical education, shot put, side-style technique, training program.



Introduction

Shot put is one of the oldest athletics disciplines in the world, having been contested at the first modern Olympic Games in 1896 in Athens, Greece. Shot put performance is determined not only by muscle strength but also by the ability to transfer power from the lower extremities to the upper extremities through the kinetic chain during the acceleration phase of the throw. Therefore, learning proper technique through systematic and continuous training is crucial for optimal performance (Mappanyukki & Anwar, 2025). Furthermore, numerous biomechanical factors have been identified as the most influential variables in successful shot put performance: release velocity, angle, and coordination time (Huang, 2014).

This understanding of biomechanics is important not only for elite athletes but also informs material in physical education. Physical education: Shot put is introduced in physical education for the development of motor skills, strength, and coordination. However, many students encounter challenges in learning the sidestroke (gliding) shot put technique, where they struggle with balance, timing, and control during the push phase (Landolsi et al., 2018). These challenges can be caused by insufficient practice time, the absence of formal technical feedback, and an inadequate understanding of movement mechanics (Putra et al., 2022). A similar issue was highlighted by (Bosse et al., 2015), who noted that student performance declines when training is not repetitive, incremental, and corrective. These biomechanical and instructional aspects are closely related, meaning that the (motor) learning process in schools must also incorporate the principles of coordination and feedback-oriented learning.

Several training schemes have been proposed to address these limitations. (Munandar et al., 2022) determined that a target-throw game model was effective in improving student technique and motivation in learning the side-stroke shot put. Similarly, (Ismail & Nuryastuti, 2023) implemented a power-position training program that significantly improved student performance ($t = 21.464$; $p < 0.05$), suggesting that a combination of technical development and instruction can result in more consistent and powerful throws. On the other hand, biomechanical differences in rotational and gliding forces indicate that gliding forces are more stable due to less variable kinematic patterns (Mastalerz & Sadowski, 2022). Despite this, the effects of structured gliding force training programs on junior high school students in Indonesia are still limited. Most previous studies have focused on athletes or general physical

education, and little attention has been paid to the pedagogical use of biomechanical training models for physical education in schools.

(Zaras et al., 2021), efficient performance of shot-put strongly depends on the coupling between manipulation of hand action force and the Kinematics of body motion. Likewise (Mastalerz & Sadowski, 2022) stressed that biomechanical variables like release angle and velocity have great potential to contribute on throwing distance. These results are consistent with the assumption that repetition of movement and correction of technique are bases for formal training programs even in unskilled population (Mappanyukki & Anwar, 2025). There have been studies, which contributed useful perspectives but they are often descriptive instead of integrative and hence emphasised for need to develop a model that bridges biomechanical understanding with pedagogical application. Integration of structured training elements involving repetition, loading progressions and performance feedback may optimize technical skill development and student engagement.

Side-style Shot Put throw (Gaya Menyamping) is often taught to Indonesian students in secondary school, meanwhile, this style is easier to learn and more appropriate in terms of the physical development of students as opposed to can be done by the course (Putratana & Hariyanto, 2022). However, from initial observations held at the SMP Maniamas Ngabang, especially to students which sit in class VIII, most of them still show not good moves others poor arm push while their feet are not right when they undergo the pushing phase. These results suggest that the learning methods currently being used in schools may not be sufficiently successful in technical skill development.

It follows that this research is conducted with the purpose of, investigating the influence of a structured side-style shot put training program through technical skill development in eighth graders students at SMP Maniamas Ngabang. We speculate that feedback-based and systematic training regimen would greatly enhance the students' coordination, technical ability, and the pushing strength. The proposed results will help to design evidence-based training programme for PE teachers and sports coaches, offering a simple yet innovative approach to improve students' throwing performance and, ultimately, sport success.

Methods

Research Design

The present study adopted a quantitative experimental design throughout employing one-

group pretest–posttest. This project intended to verify how much a training model influences performance gains by students in the side-style shot put. This design was chosen because it is appropriate for measuring change that occurs after an intervention without a control group, as is frequently used in educational and sports performance research (Özlem Orhan et al., 2021). While this single-group pretest–posttest design has been instrumental in assessing within-subject change, it inherently lacks a comparison group. Lack of a control group is recognized as a methodological limitation that can affect internal validity. Nonetheless, a second control class was not possible, due to the organization of the school and the scheduled physical education lessons for all classes in one particular morning. All students in grade 8 were exposed to the same curriculum with the same class teachers, so there was no comparable non-treatment group. Even with this drawback, the design is still well-suited to a preliminary investigation of the immediate effects of structured training in an actual classroom condition and has been common in educational intervention research.

Participants

The respondents in this study were 30 eighth-grade students from Maniamas Junior High School, Ngabang, West Kalimantan, selected using a purposive sampling technique. Participants had to meet the inclusion criteria (being in good health, actively attending physical education classes at school during the data collection period, and having previously attended a general shot put lesson). This was the rationale for using this approach. The sample consisted of 18 male and 12 female students, with a mean age of 13.6 years (SD = 0.48). All students had attended physical training lessons twice a week, in accordance with the national curriculum standards used by their school.

This sampling method was deemed appropriate for generalizing to the population of eighth-grade students at the school, as all subjects had similar prior physical education experiences and schedules.

Prior to data collection, the researcher obtained ethical clearance from the school, and the physical education teacher also coordinated with the study to avoid any potential harm or ethical violations. We also adhered to a policy of voluntary participation, confidentiality, and informed consent from both the school and the participants.

Instrument

Data were obtained through the use of a performance-based testing device (i.e., test instrument) that measured students' technical execution in the side-style shot put. The instrument

was self-constructed based on the learning standards of the Physical Education program and it was adapted from (Abdullah, 2020) evaluation framework. It evaluated 5 main factors of performance: 1) start position, 2) gliding technique, 3) push movement, 4) coordination and strength, 5) accurately and distance throw.

Factors were each scored from very poor (1) to (5) very good. Another transparency increasing indicator example under the coordination & power construct was "the capacity to time in synchrony lower limb upper-limb movements while performing a pushing phase that generates ideal force.

Validity and reliability were established by expert review and pilot testing. The values of the validity coefficients (r) ranged from 0.71–0.86 (considered good item discrimination), and the reliability coefficient (Cronbach's α) was 0.89 (showing high internal consistency).

Other supporting instruments were stopwatch, measuring tape, and observation checklist for recording the students' technical execution in pretest and posttest.

Procedure

The study procedure was initiated by the students' being tested in a pretest of their side-style shot put technique capability. Participants then followed a controlled training intervention involving regularly structured teaching units focused on strength development, coordination and technically correct execution. The training was carried out four times a week during sixteen sessions, with approximately 60 min of duration per session. The training protocol consisted of three phases warm-up, core training, and cool-down for safety and optimization.

Throughout the intervention, the instructor gave learners oral and visual feedback after every imitation attempt to address technical errors while reinforcing correct movement patterns. We used demonstrations and direct observation to confirm that the students had understood the biomechanics of each phase of the glide technique. This mechanism also had the potential to facilitate learning via feedback, with the words being corrected and taught right immediately.

All activities were conducted under qualified physical education instructors and the researcher's supervision for safety throughout the program. Precautions against injury were: sufficient warm-up time, correct shot put equipment and student fatigue or discomfort. Upon finishing the training phase, participants participated in another test (posttest) employing the same instrument to estimate changes in performance due to intervention.

Table 1*Descriptive Statistics*

	N	Min	Max	Mean	Std. Deviation
Pretest	30	54.00	72.00	61.6667	4.80900
Posttest	30	63.00	80.00	70.2000	4.48292
Valid N (listwise)	30				

Table 2*Tests of Normality*

	Shapiro-Wilk		
	Statistic	df	Sig.
Pretest	.972	30	.588
Posttest	.968	30	.475

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Data Analysis

All numerical data gathered from pretest and post test were evaluated utilizing the Statistical Package for the Social Sciences (SPSS). The methodology of the data analysis was divided into three major stages: (1) descriptive statistics: scoring mean value, standard deviation, and score interval; 2) testing assumptions with the aid of the following tests: Shapiro-Wilk test for normal distribution, and Levene's statistic for homogeneity; and (3) inferential analysis - the use of a paired t-test to determine if there was a significant difference between students' pre and post test scores, to establish whether the structured training improved the students' technical performance;

The type I error rate was .05. Cohen's d for effect size was reported in addition to p values to quantify the size of intervention effect. Statistical analysis provided evidence of a very large effect ($t(29) = -40.07$, $p < .001$, $d = 7.32$) indicating the training program had a large and practical effect upon students' technical ability.

This analytic method is consistent with previous studies that have investigated the impact of regulated training on sport performance (Maqbool et al., 2024).

Results

Results and Main Findings This section presents the main findings of the study on the effect of training on improving lateral shot put skills in eighth-grade students at Maniamas Junior High School, Ngabang. As an analysis method, I used quantitative data collected through pretests and posttests after the shot put training program. After the data were collected, they were processed using the Statistical Package for Social Sciences to obtain descriptive data and inferential test results.

The data analysis indicated the superiority of physical performance in with after training following the given program. From the results of descriptive test, respondents' average score obtained in pretest amounted to 61.67 then increased to be 70.20 for posttest where difference between them is equal to 8.53 point or a

Table 3*Test of Homogeneity of Variances*

		Levene Statistic	df1	df2	Sig.
pretest & posttest	Based on Mean	.094	1	58	.761
	Based on Median	.093	1	58	.762
	Based on Median and with adjusted df	.093	1	57.347	.762
	Based on trimmed mean	.094	1	58	.761

Table 4*Paired Samples Statistics*

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	61.6667	30	4.80900	.87800
	Posttest	70.2000	30	4.48292	.81847

Table 5
Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 Pretest & Posttest	30	.971	.000

Table 6
Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest - Posttest	-8.53333	1.16658	.21299	-8.96894	-8.09772	40.065	29	.000

raise of about 13.83% from beginning condition (Table 1).

The p value for normality test ($p = 0.588$ for pretest, $p = 0.475$ posttest) and homogeneity test ($p = 0.761$) indicated the data were in normal distribution form and equal variance condition, respectively, as parametric tests (Table 2 and 3).

The correlation test results indicated that there was a strong correlation between the pretest and posttest scores ($r = 0.971$; $p = 0.000$), leading to consistent improvement in ability after administration of treatment. Paired Sample t-test revealed the value of $t = -40.065$, at significant $0.000 (<0.05)$; indicating that there is a significant difference in pre and post test results, as depicted (Table 4, 5 & 6).

Therefore, the applied training program has a positive and statistically significant impact on the development of abilities in the sideways shot put technique, while planned and repeated training was found to be effective in improving coordination, pushing force and movement regulation for examinees.

Discussion

The findings show that a lateral shot put technique program had a significant effect on students' performance. Average scores of participants improved from 61.67 to 70.20 which is around a 13.83% improvement. This means that technical skills develop accurately through the organization and structured training. The results are consistent with a prior athletic training theoretical model in which explosive power of muscles and coordination patterns of movements contribute significantly to performance in shot put. A study examining weight training among throwers has found that increased upper and lower body strength are significantly associated with putting distance (Caughey & Thomas, 2022).

In addition, a previous study that investigated kinematic chain-based interventions in throwing

sports revealed that training sessions with an emphasis on intersegmental movement (e.g., leg-hip-arm) can lead to significant improvements in putting and shoulder strength. This provides evidence that technique instruction enhances other technique related components of sound production and helps the whole body movements to be coordinated. (Kanakapura Chananke Gowda et al., 2024). Other related studies from the literature, like in lateral shot put with softballs, achieved real increment required for the technique by interfering progressively during several cycles and increased student success rates themselves (from 52% to 96%). (Surin et al., 2014) This supports that a varied and continuous training is an effective method in developing individual motor competences in shot put.

In all, the results of this investigation demonstrate that systematically organized technique training is able to enhance students' side shot put techniques according to the theoretical basis and research outcomes from the above discussion. Strength training that integrates the musculature, chains and repeats technique seem appropriate to obtain meaningful positive changes in performance.

Conclusions

The training program of the side-style shot put technique was shown to have significant effect on improving technical ability of 8th- grade students in SMP Maniamas Ngabang main after analysis and discussion, it was concluded that training which already designed give a positive trend for both of group. The rise in the mean score from 61.67 at pretest to 70.20 on posttest, which amounts to around 13.83%, shows that effectively and even substantially practice systematically and orderly had influence of improvement basic technical skills, coordination of movement and pushing strength at students too. The paired-sample t-test

results ($p < .001$) also indicated that the treatment made a difference in students' performance.

It can be concluded that application of a planned, repetitive and student center training style has been an effective method of enhancing the shot put technique skills in junior high school students. These results are also in line with the original purpose of the study to examine structured training efficacy, and could have important implications for PE curriculum design and teaching practice, furthering systematic, feedback-oriented pedagogy aimed at skills mastery and motor coordination.

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