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Optimising orthodox style learning in physical education through a variational training model

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ABSTRACT

Background: The research problem is to improve our understanding of how different training approaches can improve bullet-shot results. **Research Objectives**: This study aims to investigate the impact of different training models on the learning outcomes of orthodox-style shot put. **Methods:** The research method employed was an experiment with a one-group pre-test and post-test design to enhance student learning outcomes using a varied training model. The subjects consisted of 32 students from a high school in Palembang. The study was conducted over 30 days, with four weekly meetings. During each meeting, 2-3 training models were presented, resulting in a total of 10 variation training models, namely Passing Techniques in Football Baseball, Techniques that Hold the Repulsion, Hanging the Ball, Resisting Pull, Clap Hand, Reject Target, Throwing Darts, Shoot in Target, and Load Rejection One Shoot. Data analysis used SPSS version 23 to calculate the significant value of the pretest and posttest results. **Finding/Results**: The study found that using varied training models resulted in significantly better learning outcomes in orthodox-style bullet throwing. **Conclusion**: The study concluded that varied training models have a considerable positive influence on learning outcomes in the orthodox style of instruction. This suggests that the findings contribute to a deeper understanding of effective training methods in sports education and have practical implications for athletic training programs. We could conduct longitudinal studies to investigate the long-term impact of diverse training on skill retention and entry into competitive athletics.

Keywords: Variation training model; physical education; orthodox throwing; learning outcomes

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INTRODUCTION

Variation training is an important aspect of developing students' athletic skills, particularly in learning the orthodox style of shot put (Hatase & Takanashi, 2022; Sakamoto et al., 2018). Training variations encompass a range of techniques, methods, and strategies aimed at developing the strength, endurance, and technical skills required for the shot put. To learn the orthodox style of shot put, one must possess good technical skills and optimal physical strength (Ismail, 2023; Ni'am et al., 2023).

Diverse training models can assist students in developing the technical skills required for shot put, such as throwing technique, body position, and coordination of movements (Landolsi et al., 2018; Mulyadi & Putra, 2020). Additionally, a range of exercises can enhance the muscle strength necessary for the shot put, including the arm, shoulder, and leg muscles (Auriemma & De Luigi, 2018; Gksu & Kural, 2019).

The learning process in this field still lacks a valid, practical, and effective training model, which prevents optimal learning outcomes. As a result, the orthodox style of teaching makes learners fail to reach the expected optimal level. The absence of a valid training model means that students do not learn the correct techniques and principles in bullet throwing. Furthermore, the absence of a practical training model may impede the implementation of training in the field due to difficulties in accessing or utilising facilities (Makaruk et al., 2023; Sharma et al., 2022).

The inadequacy of effective training models results in students not experiencing significant improvements in the technical skills and physical strength required for the shot put (Armanda et al., 2021; Hidayatulloh et al., 2018). Physical education is crucial in aiding students to develop the necessary physical skills for the shot put (Almadhkhori et al., 2021; Caughey & Thomas, 2022). Additionally, they can develop lower body strength and learn proper throwing technique.

Through physical education, students can improve their health and physical fitness, which can help them execute the shot-put technique correctly. It is important to avoid adding new content to the text (Hidayanto et al., 2018; Al-Aqra & Al-Mallahi, 2022). Physical education can also contribute to the development of mental aspects such as focus, concentration, and mental resilience, which can positively impact learning outcomes, including shot put (Kamal, 2016; Kontou et al., 2018).

Physical education can improve students' motivation, which can positively impact their enthusiasm for learning and lead to better academic results (Aliriad et al., 2023; Carsiwan, 2016). A learning environment that is conducive to learning, including appropriate facilities and support from teachers and classmates, can also have a positive impact on students' shot-put learning outcomes (Mustapha et al., 2019).

Throwing bullets is like throwing a basketball from a distance: People who are not familiar with athletics may find it easier to understand by analogy which sport they encounter more often. Improve shot-put learning outcomes, in line with the development of physical education. According to several studies, variation training has the potential to significantly improve learning outcomes (Caughey & Thomas, 2022; Pavlović, 2017).

The level of motivation has a significant impact on the ability to throw accurately. This impact is greater for high motivation than for low motivation. Intense push-up and depth jump training can improve the ability to throw with greater force. Studies have shown that dumbbell variation training can improve orthodox style shot put ability. Jumping and running exercises can also support the learning outcomes of the bullet points. Improving both leg muscle strength and arm muscle explosiveness can lead to better results in throwing projectiles (Aliriad, 2023; Aliriad et al., 2024).

Shot put is defined as a branch of athletics that focuses on the ability to throw a ball as far as possible (Anousaki et al., 2018; Horváth et al., 2023). This sport is included in the learning of physical education, where the throwing technique has a great influence on the results of the throw (Saračević et al., 2018; Thaqi et al., 2021). A high level of motivation can contribute to the ability to throw accurately (Emda, 2018). Incline push-up depth jump exercises can improve the ability to throw with greater strength (Amrin & Jumareng, 2023).

Dumbbell variation training can improve orthodox style shot put ability (Datuela et al., 2020; Yachsie, 2019). Jumping and running exercises can support learning outcomes (Pavlović, 2017; Refiater et al., 2022). However, no previous studies have attempted a variation exercise model to improve student learning outcomes with orthodox style exercise techniques. It is hoped that this initiative will provide direction for further research in shot put learning as well as useful data for designing a variational learning model in the sport of shot put.

The limitations of the training model highlight some specific gaps in knowledge that need to be addressed. One of them is the lack of a comprehensive and integrated training model to develop the technical skills and physical strength necessary in the shot put, especially in the context of the orthodox style. Existing models may be inadequate in addressing the specific challenges students face in learning the technique, such as a lack of focus on key elements such as posture, throwing technique, and movement coordination (Nied & Franklin, 2002; Satria, Septiano, et al., 2023).

In addition, the lack of emphasis on varied training approaches and appropriate modifications is also an obstacle, thus hindering student learning potential. The potential contribution of this study is the development of more effective, integrated, and diverse training models that are able to overcome existing limitations. By deepening the technical skills and physical strength required in the orthodox-style shot put, the study can provide more detailed and practical guidance for physical education coaches and teachers in designing training programmes that suit students' needs (Biino et al., 2023; Wu & Jensen, 2022).

It is hoped that this research will enrich the scientific literature in the field of sports and make a significant contribution to the development of more effective and efficient sports training practices. This research focuses on the development of techniques and strategies to improve the performance of shot-put athletes. Optimum results can be achieved through the use of strength, technical, and plyometric exercises, as well as attention to important elements such as posture, throwing technique, and movement coordination (Blake et al., 2021; Khalafi et al., 2023).

A training approach that includes variations and modifications to increase explosive power and throwing accuracy is emphasised. In addition, the latest research in exercise biomechanics and physiology has been analysed with the aim of improving the understanding of the body's response to exercise in order to optimise the performance of shot putters (Juniarsyah et al., 2021; Manresa-Rocamora et al., 2021).

This study aims to determine the most effective training method for improving learning outcomes in shot put. Learning the orthodox style shot put requires good technical skills and optimal physical strength (Dolan et al., 2017; Ishak et al., 2021). A training model that is diverse and encompasses a variety of techniques, methods, and strategies aims to develop the strength, endurance, and technical skills required for the shot put (Herrywansyah & Andibowo, 2023; Aziz et al., 2021; Kencana et al., 2015).

This research is important because it can improve student learning outcomes in orthodox shooting by developing valid, practical, and effective training models and determining the most effective training methods to achieve optimal learning outcomes. Contribute to the sports science literature, optimise technical skills and physical strength, and potentially improve athletic performance and student interest in the sport.

METHOD

This study uses an experimental research design with a group of pretest and posttests (Darwin et al., 2021). The population of this study was 32 high school students in Palembang. The samples were selected using the purposive random sampling method

with the help of computer software to perform the actual random assignment.

The research instrument consisted of 10 variations of training models conducted for 30 days, with four meetings held once a week. Each session includes 23 training models. Measurements include accuracy and throwing distance in learning shot put. Accuracy is measured by how close the ball falls to the centre of a defined circular area of approximately 2.134 metres in diameter, while distance is measured by how far the ball is thrown from the starting point of the throw. The bullet must fall within the target sector with a radius of 34.92 degrees from the throwing area to avoid disqualification.

The study was conducted over three months, from March to May 2022, on sports fields during PE lessons. The actual random assignment method uses computer software to select students from the population. The consistent application of research methods throughout the study period helps to reduce the likelihood of changes due to maturation or history. Identifying and measuring variables that may be a source of bias or confounding is also important for more accurate analysis.

The data obtained from the variation exercise model test are analysed using SPSS 23 statistical software. The statistical analysis used was an independent t-test to compare the improvement in learning outcomes with the variation exercise model. In addition, descriptive statistical calculations will be used to summarise the measurement results before and after the exercise programme. The results of the data analysis will be used to evaluate the effectiveness of each type of exercise in improving shot put learning outcomes.

Table 1. Variety Training Model

No	Variation of Training Models	Description
1	Passing Techniques in baseball	This exercise involves two people using a baseball to practice the repulsion technique. The players stand approximately 5 metres apart, facing each other. The first person throws the ball using the repulsion technique (similar to a shot put). The exercise should be repeated for one minute until the student can perform the movement correctly. The rejection technique should be repeated until the students fully understand the technique.
2	Techniques that hold the repulsion	The technique involves each student using a bottle filled with sand. The following steps should be followed: Adjust your body position sideways to reject the throw. Hold the bottle in the middle and make a repulsion movement without releasing the sand. Repeat the movements until you understand the basic repulsion technique.
3	Hanging the Ball	This technique involves using the hanging ball media individually. The body position should be straight, standing approximately ½ metre away from the media. Students should make repulsion movements until their hands can touch the hanging ball. This movement should be repeated until the student understands the basic techniques, alternating between repetitions.
4	Resisting Pull	This technique is performed individually using rubber band media that is shaped to resemble skipping and used to repel. The movements are repeated until students can understand the basic techniques and are carried out alternately.
5	Clap Hand	This technique is performed in pairs, facing each other. Firstly, students perform clapping movements using one hand using the repulsion technique. Secondly, the technique is carried out individually using rubber band media formed to resemble skipping and used to perform repulsion. They repeat the movement until they understand the basic techniques. The movement is repeated until the students can perform the basic techniques alternately.
6	Reject Target	This technique is performed individually using Hula Hoops and bamboo

No	Variation of Training Models	Description
		slats. Students hold the bamboo slats with the Hula Hoop positioned 2.5 meters away. They then make a repulsion movement by throwing the bamboo slats toward the target, which is the point of the Hula Hoop circle. The movement is repeated until the target is met and the technique is understood.
7	Throwing Darts	This technique is performed individually using hula hoops and bamboo slats. Students hold the bamboo slats with the hula hoop positioned 2.5 metres away. They then make a repulsion movement by throwing the bamboo slats towards the target, which is the point of the Hula Hoop circle. The movement is repeated until the target is met and the technique is understood.
8	Shoot In Target	The technique is performed individually by students using ping pong balls and cups. The objective is to throw the ping-pong ball into the cup located 1 metre away. The movement is repeated until the target is met and the technique is understood.
9	Load Rejection	The technique is performed individually by the students using a 1 kg barbell as the medium. They hold the barbell and perform the repulsion technique without removing it. The movements are repeated until the students understand the repulsion technique.
10	One Shoot	The students perform the movements individually using a basketball and basketball hoop. They set a distance of approximately 1 metre from the basketball hoop and then held the ball with one hand and made a repulsion. The movement should be repeated until the student understands the repulsion technique and can use the ball to enter the basketball ring.

RESULTS AND DISCUSSION

Based on the results of the pre-test and post-test, the average pre-test score was 4.3215 and the average post-test score was 7.125. The median pretest score was 4, and the median posttest score was 7. These results indicate a significant increase in posttest scores compared to pretest scores, suggesting that the method or intervention used had a positive impact on student learning outcomes. Table 1 presents the pretest and posttest results.

The pre-test and post-test results from 32 students showed a significant increase in post-test scores compared to pre-test scores. The average score on the pretest was 4.3215 with a median of 4, while the average score on the posttest was 7.125 with a median of 7. This suggests that the method or intervention used has a positive impact on student learning outcomes. The pretest minimum score was 2, and the posttest minimum score was 6, with both tests having a maximum score of 10. Therefore, it can be concluded that the intervention successfully improved student learning outcomes during the measured period.

Table 2. Description of Pretest and Posttest Variation Results

Variable	N	Largest Data	Smallest Data	Range	Mean	Standard Deviation
Pretest Variation Exercise	32	9	2	7	4	1.94630
Posttest Variation Exercise	32	10	6	4	7	1.20462

Table 2 demonstrates that there was less variation in posttest scores (range: 4) than in pretest scores (range: 7), indicating a consistent improvement in student learning outcomes after the intervention or treatment provided. Furthermore, the mean posttest score (7) was higher than the mean pretest score (4), indicating a significant improvement in student learning outcomes. The standard deviation of the posttest score

(1.20462) is lower than that of the pretest score (1.94630), indicating greater homogeneity in the posttest scores. This suggests that the intervention or treatment has successfully and consistently improved students' learning outcomes.

Table 3. Pre-Test Frequency Distribution

No	Class Interval	f_i	x_i	$f_i x_i$	x_i^2	$f_i x_i$	Xi-x	$(Xi-X)^2$	$f (Xi-X)^2$
1	1-3	11	2.0	22.0	4.0	44.0	-2.34	5.4756	60.2316
2	4-6	17	5.0	85.0	25.0	425.0	0.66	0.4356	7.4052
3	7-9	4	8.0	32.5	56.0	224.0	3.66	13.3956	53.5824
Total		32	15.0	139.0	86.0	693.0	1.98	19.3068	121.2192

Based on the table above, which shows the frequency distribution of pretest results, exercise variation can be observed. The frequency (Fi) is 32, the number of middle values (Xi) is 15.0, and the total (FiXi) is 139.0. The frequency (Fi) is 32, the number of middle values (Xi) is 15.0, and the total (FiXi) is 139.0. The number (Xi2) is 86.0, and (FiXi)2 is 693.0.

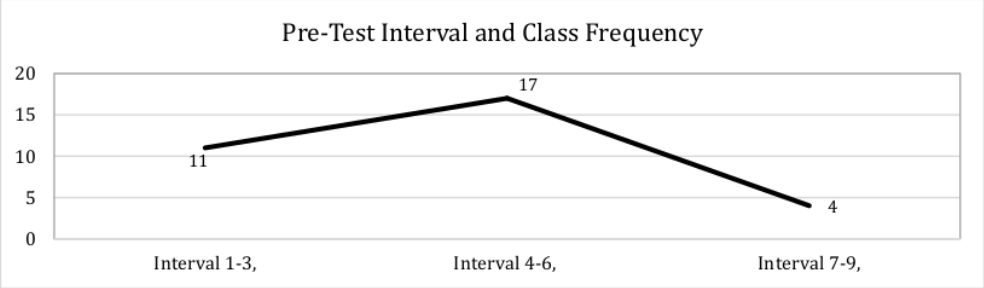

Figure 1. Frequency of Pre-Test Interval Classes

Table 4. Posttest Frequency Distribution

No	Interval keys	f_i	x_i	$f_i x_i$	x_i^2	$f_i x_i$	Xi-x	$(Xi-X)^2$	$f (Xi-X)^2$
1	5-6	7	5.0	38.5	30.25	211.75	-2.1878	4.7851	33.4960
2	7-8	23	7.5	172.0	49.25	1132.75	0.3125	0.0976	2.2448
3	9-10	2	9.5	19.0	90.0	180.50	2.3125	5.3476	10.6952
Total		32	22.0	230.0	160.75	1525.00	0.4375	10.2303	46.436

Based on the histogram picture above, the distribution of the results of the variation exercise shows that the data obtained from the pre-test has a mean value of 5.5 (5–6) with a total of 7 people, a mean value of 7.5 (7-8) with a total of 23 people, and a mean value of 9.5 (9–10) with a total of 2 people.

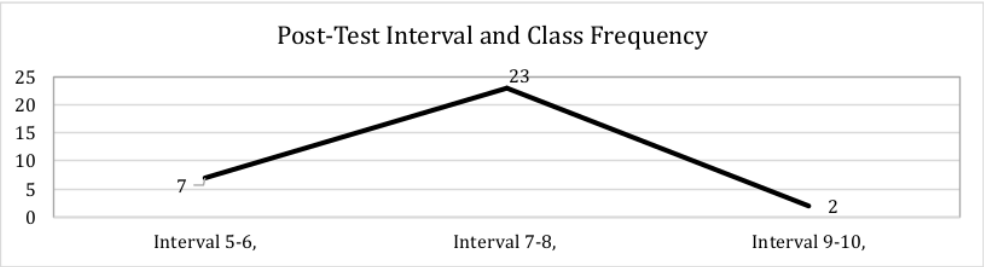

Figure 2. Frequency of Post-Test Interval Classes

Table 5. T-test Experiment

Statistical Test	Value	Interpretation
t-count	20.580	Significant
t-table (α=0.05)	1.693	

The calculation results indicate that the t-count was 20.580, which was then compared to the t-table of 1.693 (α = 0.05). The comparison shows that $t_{count} \geq t_{table}$ 20.580 ≥ 1.693 (significant). Therefore, it can be concluded that the experimental method has an effect on the results of learning the orthodox style of bullet throwing in student XII. The results showed that the experiment had an effect on the results of learning the orthodox style of bullet throwing when the variation training model was used.

The results showed that the experimental method in the form of a variation training model has a significant positive impact on the learning outcomes of students in Class XI Palembang in the framework of learning in an orthodox style. The significant increase in the average posttest score compared to the pretest score, as well as the statistical analysis, indicates a significant difference between the pretest and posttest results. Furthermore, the decrease in the standard deviation of posttest scores compared to pretest scores suggests an improvement in the consistency of student learning outcomes following the intervention. Additionally, the lower standard deviation for posttest scores indicates greater homogeneity in student learning outcomes after the intervention. The frequency distribution results also offer supplementary information on the distribution of scores for the pretest exercise variations. In comparison to studies that utilise alternative variables, such as distinct learning techniques or interventions, this study can offer a more comprehensive comprehension of the efficacy of varied training methods in learning the orthodox style of shot put. By contrasting these findings with other studies that may have employed different methods or interventions, researchers can gain further insight into the pros and cons of each approach in the context of sports learning.

These findings support previous studies that suggest varied training methods can improve physical education learning outcomes (Endrawan et al., 2023; Lubis et al., 2021). Various previous studies have shown that variation in practice can positively influence student learning outcomes, especially in terms of increasing the consistency and effectiveness of learning (Daharis & Rahmadani, 2018; Ramadan, 2017). Research on the orthodox shot-put variation model provides evidence that variation training methods can effectively improve student learning outcomes. This is a significant contribution to the academic literature on sports learning, particularly in the development of methods and strategies that can have a positive impact on student learning outcomes (Haiah & Putra, 2023; Kanca et al., 2021). The new understanding that emerges from these findings is a greater understanding of the importance of variation training methods in learning sports (Pranopik, 2017; Satria et al., 2023), particularly in the context of orthodox style shot put. Previous research has highlighted the level of motivation, jumping exercises, push-ups, and dumbbell variation exercises can improve orthodox-style shot put skills. In the academic literature, this research can enrich the understanding of different learning approaches that can be key to improving student learning outcomes in specific sports (Musiandi & Taroreh, 2020; Pahliwandari, 2020). This research provides a strong foundation for teachers and coaches to consider and apply variation in learning practice. Developing more detailed learning strategies and tailoring them to students' needs can improve learning outcomes (Nelly, 2021; Secha et al., 2023; Semarayasa, 2017). Teachers and trainers can design programmes that are more effective and responsive to students' individual needs (Abduh et al., 2020; Najib et al., 2022).

One of the potential limitations of this study is the difficulty in generalising the results to a wider population. This study mainly focused on students in the context of orthodox shot-put learning, so further research is needed to find out if these results can be widely applied to different sports or other learning contexts. Potential biases that need to be considered should be addressed by increasing the size of the sample to make it more representative. Future research could explore different types of variation and how they can be optimised for better learning outcomes and extend the generalisation of these findings to a wider population.

Subsequent research can investigate and experiment in the context of sports learning. Taking these findings into account, future research can further explore the types of variations that can be applied and how they can be optimised for better learning outcomes. Thus, this study not only makes a current practical contribution but also provides a basis for further research that can further improve our understanding of sport learning. Overall, this study brings a new understanding of the role of variation training methods in improving student learning outcomes in sport learning, particularly in the context of orthodox shot put. This is not only about the general principles of variation in practice but also how the concept can be specifically and effectively applied to the development of specific sport skills. These findings provide practical contributions to the development of sports learning methods and strong empirical support for the effectiveness of variation training methods in the context of orthodox style shot put learning. Variational training methods can be considered an effective strategy for improving student learning outcomes.

CONCLUSION

The training method for the orthodox style shot put variation can improve student learning outcomes and provide a model for variation training in learning the orthodox style shot put. These findings are consistent with previous studies that highlighted the potential of varied training models to improve learning outcomes in sports. This research suggests integrating variational training methods into learning to increase effectiveness. It also recommends continuing research to better understand the effectiveness of these methods in a wider context. Additionally, it proposes developing a sports curriculum that includes variational training methods as an integral part to make it more results-oriented. This research creates a novelty in the study of orthodox shot-putting by investigating the effectiveness of variational training methods. The novelty lies in the variation of exercises in the context of school learning. The contribution of this study was the discovery that the integration of variational training methods can improve student learning outcomes in shot put sports. Methodologically, this study provides insight into the implementation of variation training methods in the school environment, while practically, it provides valuable guidance for teaching and sport curriculum development. Recommendations for future research could include further investigation of long-term effects, the inclusion of more diverse samples, and improved control of external variables. Thus, this study not only fills the knowledge gap in shot put but also makes a significant contribution to practitioners, researchers, and curriculum developers.

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CONFLICT OF INTEREST

The authors declare that they have no competition.

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