4493-Article Text-27573-1-2-20260327.docx

by mh hasbi

Submission date: 22-Mar-2026 11:39AM (UTC+0800)
Submission ID: 2875475456
File name: 4493-Article_Text-27573-1-2-20260327.docx (153.18K)
Word count: 4495
Character count: 27877

ETDC Indonesian Journal of Research and Educational Review
Volume 5, No. 2, 2026, pp 1294 - 1305
e–ISSN 2809-3682
p–ISSN 2809-7505
https://doi.org/10.51574/ijrer.v5i2.4493

Effects of Wall and Individual Underhand Passing Practice on Volleyball Accuracy for Middle School Students

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Article Info

Article history:

Received December 27, 2025
Accepted February 24, 2026
Published March 22, 2026

Keywords:

Middle School;
True Experiment;
Underhand Passing;
Volleyball;
Wall-passing.

ABSTRACT

Underhand passing is a crucial foundation in volleyball, yet many students still struggle to achieve consistent accuracy. This study aims to analyze the effectiveness of wall-passing training compared to individual passing training in improving underhand passing accuracy at middle school 1 Pamboang. This research utilized a quasi-experimental design with a Two-Group Pretest–Posttest approach involving 20 students as the target population. Data was collected through passing accuracy tests before and after the treatment, which were then systematically tabulated and analyzed using descriptive and inferential statistical techniques. The results demonstrated that both training models made a significant positive contribution to improving students' abilities. The wall-passing training group recorded a substantial increase in average scores, rising from 10.50 during the pre-test to 18.90 in the post-test. Meanwhile, the individual passing training group also experienced an improvement, with mean scores increasing from 10.40 to 16.60. Although both methods were proven effective, descriptive data indicated that the wall-passing group achieved a higher final performance level than the individual passing group. These findings suggest that wall media is highly effective for building basic technical consistency and accuracy before students progress to more complex situational drills.

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1. INTRODUCTION

Volleyball is a team sport that requires mastery of various basic techniques for optimal team performance (Akhir et al., 2025; Purnomo et al., 2022). Basic volleyball techniques, such as serving, passing, setting, and smashing, provide an essential foundation for determining the quality of reception, ball control, and overall team play (Juhanis & Nurulita, 2024; Saputra et al., 2022; Widiatma et al., 2022). One crucial basic technique is the underhand/forearm pass, particularly for receiving serves, receiving rebounds from opponent's smashes, controlling the first ball, and initiating team attacks (Karisman & Supriadi, 2022; Risma et al., 2020). Due to the importance of

underhand passing, training in this basic technique must be carried out regularly and structured to ensure consistent development of player skills (Iqbal et al., 2025; Sitorus et al., 2025). Structured training allows players to familiarize themselves with movements, improve posture and ball contact, and enhance accuracy and control (Chuang et al., 2022; Salim et al., 2024). However, in school practice, especially at the Middle School level, it is not uncommon to find that students' mastery of underhand passing is still far from ideal. Based on a survey of Middle School students, many students' underhand learning outcomes did not meet the expected skill standards (Batez et al., 2021; Mayori et al., 2024). This shows that although the underhand pass is a basic technique, mastery is not automatically achieved without proper and intensive practice.

In the context of Middle School students, many problems frequently arise regarding underhand passing skills (Akhir et al., 2025; Setiawan et al., 2025). Some of these include errors in platform position (arm platform), body position, eye-arm coordination, ball control, and return accuracy. Research by Permadhi et al. (2025) revealed that in analyzing the basic underhand passing skills of elementary school extracurricular participants, although some students demonstrated good results, some players experienced difficulties, particularly with ball contact, which could potentially impact pass quality.

This research is relevant because it aims to provide recommendations for effective and easily implemented training methods in the school environment by both physical education teachers and extracurricular coaches. If the tested training method proves effective, it can be adopted as part of the learning programme or routine training at Middle School 1 Pamboang. Thus, this research can make a tangible practical contribution to improving the quality of learning and student athletic achievement.

The results of this study are expected to provide a fundamental foundation for designing an effective and adaptive training model for Middle School students. By considering age, training frequency, and school environment, this model will not only be theoretical but also provide practical solutions that can be consistently implemented in formal educational institutions. This is crucial to ensure that sports program development aligns with the unique characteristics and actual needs of students on the field.

Building upon the situational analysis, it was found that mastering the underhand passing technique remains a significant challenge for many students, despite its vital role in ball control and game transitions. The main obstacles generally lie in positional coordination and movement consistency. Although methods such as wall bounces and independent training (drills) are known to have significant potential, the majority of previous studies tend to focus exclusively on a single method without comprehensive comparisons (Esposito et al., 2024; Hasibuan & Akhmad, 2022; Meysurah et al., 2026; Zhang et al., 2025), especially within the context of the Middle School population.

Therefore, this study aims to fill this gap in the literature by comparing various training methods in a regular school environment. The urgency of this research lies in its contribution to the academic sports literature and in providing practical recommendations for physical education teachers and coaches. Thus, this effort is

expected to improve the quality of learning and mastery of basic volleyball techniques in a more measurable manner and have a broad impact in the school environment.

2. METHOD

This study employed a Two-Group Pretest–Posttest Control Group design, an experimental design involving an experimental group with a specific intervention and a control group with conventional treatment to quantitatively evaluate the effectiveness of the intervention. Through a dual measurement scheme, namely a pretest (O_1) to determine the baseline and a posttest (O_2) to measure the final outcome, this model allows researchers to control initial variability and accurately compare changes (delta) between the two groups. The use of this design is highly relevant in the context of education and sports because it can increase external validity by approximating natural environmental conditions, while providing a more objective estimate of the intervention's impact compared to a single-group design.

This research was conducted at Middle School 1 Pamboang, West Sulawesi, involving all eighth-grade students as the target population relevant to the underhand passing training program criteria. Subject selection was based on the developmental characteristics of Middle School students, allowing all elements in the population to have equal potential for inclusion in the study, in accordance with the sampling technique applied. The primary focus of this research was to analyze the relationship between the independent variable (X), consisting of two underhand passing training models, and the dependent variable (Y), namely the students' underhand passing accuracy level, to ensure an empirical and measurable analysis direction.

Data collection techniques used movement observation and underhand passing skill tests to generate comprehensive quantitative and qualitative data regarding the participants' abilities. This approach aligns with the quasi-experimental principle proposed by Creswell and Creswell (2018), which states that research instruments must be relevant to the variables being studied to ensure data validity and reliability. By combining technical observation and accuracy testing, this study was able to capture students' skill development in depth, both in terms of movement mechanics and the results of technique mastery in the field.

This research instrument was supported by using standardized equipment to ensure measurement consistency and objectivity. This included standard volleyball as per regulations, a wall as a rebound medium, and a stopwatch to synchronize trial durations based on the AAHPER skills test protocol. Furthermore, a target area with specific dimensions was specifically created on the wall or court to facilitate more precise and measurable accurate assessments. The use of these standardized instruments is crucial in generating valid and reliable data in accordance with the principles of experimental research.

The data collection technique in this study integrated two main methods: observation of movement mechanics and direct underhand passing skills testing. This approach was chosen to meet the characteristics of quasi-experimental research, which requires a balance between quantitative data on achievement outcomes and qualitative information

regarding the quality of participants' movement techniques. By combining these two methods, researchers were able to capture a comprehensive picture of students' skill development, from technical aspects to final ball control outcomes.

The data analysis stage was conducted using an inferential statistical approach to test the comparative effectiveness of the wall passing training model and individual drills on underhand passing accuracy. The analysis process began with basic assumption tests, including normality and homogeneity tests, to ensure the data was suitable for further processing. After the conditions are met, hypothesis testing continues using a paired t-test to see the internal improvement of each group and an independent t-test to determine significant differences between the two training models.

3. RESULTS AND DISCUSSION

Results

Empirical data obtained from the field include the results of the initial test (pre-test) and final test (post-test) regarding the effect of wall-to-wall passing and individual passing exercises on the underhand pass accuracy of students at SMP Negeri 1 Pamboang. All data were then systematically tabulated to facilitate further testing using inferential statistical techniques and descriptive statistical analysis. This descriptive analysis was conducted to provide a comprehensive overview of the data, which includes the calculation of the average value (mean), standard deviation, variance, maximum and minimum values, range, and the preparation of a frequency distribution table.

Results of Descriptive Statistical Analysis

A descriptive analysis of the wall-to-wall passing and individual passing training data in measuring the underhand pass accuracy of students at SMP Negeri 1 Pamboang has been systematically summarized in Table 1, while full calculation details are available in the research appendix. The data summary presents a comprehensive statistical overview of student achievement in both training models, which serves as an objective basis for evaluating the effectiveness of the implemented training program.

Table 1. Descriptive Analysis of the Wall-To-Wall Passing and Individual Passing

Descriptive	Wall passing practice		Individual passing practice	
	Pretest	Posttest	Pretest	Posttest
N	10	10	10	10
Mean	10.5000	18.9000	10.4000	16.6000
Std. Deviation	1.58114	1.91195	1.07497	1.42984
Variance	2.500	3.656	1.156	2.044
Range	5.00	6.00	3.00	4.00
Minimum	8.00	16.00	9.00	15.00
Maximum	13.00	22.00	12.00	19.00
Sum	105.00	189.00	104.00	166.00

Summary of descriptive analysis in Table 1, the results of the initial test (pre-test) of wall-to-wall passing practice on the underhand passing accuracy of students of SMP Negeri 1 Pamboang showed a total score of 105.00 from 10 samples tested. The data produced an average value (mean) of 10.50 with a standard deviation of 1.58114, and a score range of 5.00 moving from a minimum score of 8.00 to a maximum score of 13.00. These statistics provide an objective initial picture of students' basic abilities before being given further training interventions.

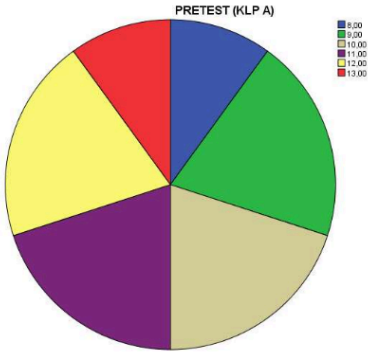

Figure 1. Pretest data for group A (Passing to the wall exercise)

The final test data (post-test) on the wall passing exercise on the underhand passing accuracy of students of Middle School 1 Pamboang, obtained a total score of 189.00 from 10 samples tested. The analysis results showed that the average value (mean) increased significantly to 18.90 with a standard deviation of 1.91195. The recorded range value was 6.00, with a minimum score of 16.00 and a maximum score of 22.00, which indicates a substantial improvement in performance compared to the initial test results.

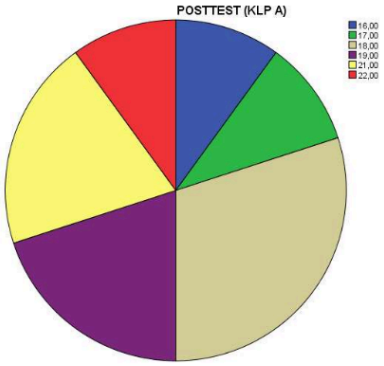

Figure 2. Posttest results data for group A (Passing to the wall exercise)

The results of the descriptive analysis of the initial test (pre-test) of the individual passing training group showed a total score of 104.00 from 10 samples of students of Middle School 1 Pamboang. The data produced an average value (mean) of 10.40 with a standard deviation of 1.07497, which reflects a relatively homogeneous level of data distribution. In addition, a range value of 3.00 was recorded, with a minimum score of 9.00 and a maximum score of 12.00, which provides an initial overview of students' basic competencies in underhand passing accuracy before being given independent training treatment.

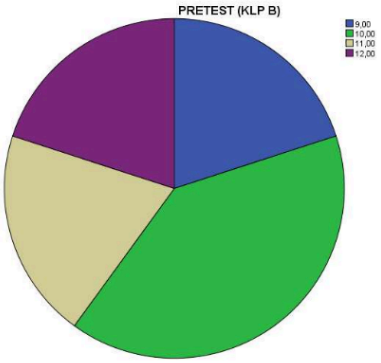

Figure 3. Pretest results data for group B (Individual passing practice)

The results of the final test (post-test) in the individual passing training group on the underhand passing accuracy of students of Middle School 1 Pamboang, recorded a total score of 166.00 from 10 samples tested. Data analysis showed an average value (mean) of 16.60 with a standard deviation of 1.42984, which reflects a fairly good level of performance consistency among students. In addition, a range value of 4.00 was obtained, with a minimum score of 15.00 and a maximum score of 19.00, which indicates a measurable increase in competence compared to the initial test results in the group.

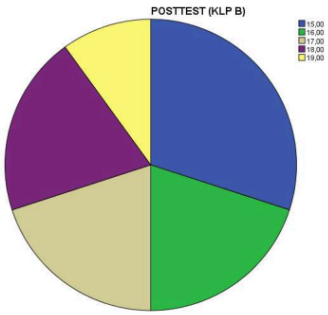

Figure 4. Posttest results data for group B (Individual passing practice)

The results of the descriptive data analysis above provide a comprehensive overview of the distribution of pre-test and post-test scores in both training groups, for both wall passing and individual passing. Although the data indicate a trend toward improved performance among students at Middle School 1 Pamboang, these descriptive results cannot yet be used to confirm the research hypothesis regarding the significant influence of the independent variable on underhand pass accuracy. Therefore, further statistical analysis is necessary to validate whether the changes are truly the result of the training intervention.

As a first step in hypothesis testing, researchers need to conduct a data normality test to determine the appropriateness of the statistical method used, whether a parametric or non-parametric approach will be used. This test is crucial to ensure that the data distribution meets the basic assumptions of the study, ensuring that the resulting generalizations have a high level of accuracy and reliability. Once the characteristics of the data distribution are identified, the analysis process will proceed to the significance test to empirically answer the research hypothesis.

Discussion

The results of this study indicate that basic technique training, both through the wall-passing method and individual drills, significantly contributes to improving volleyball players' underhand passing accuracy. This finding aligns with the principles of motor learning theory, which states that structured repetition, immediate feedback, and focused practice are key to the effective development of both fine and gross motor skills (Anderson & Steel, 2022; Orangi et al., 2025). In this context, fundamental elements such as foot position, arm platform, center of gravity, and hand-eye coordination are dominant factors determining the accuracy of ball bounces.

Drills specifically designed to allow players to repeat movements consistently without time pressure or interference from opponents have been shown to be effective in building muscle memory and technical stability (Ade et al., 2016). Through high repetition frequency in a controlled environment, athletes can internalize correct movement mechanics until they become automatic (Caldeira et al., 2024; Lola et al., 2024). Thus, this training model not only improves immediate technical ability but also strengthens the foundation of players' performance in more complex game situations in the future.

The findings of this study align with various previous studies confirming the effectiveness of structured training in improving sports skills. For example, research by Obinaru (2024) showed that drills significantly improved underhand passing ability in a volleyball team, with an average increase of 18.61%. Consistent with these results, the use of a wall as a learning aid was also shown to provide substantial increases in students' technical ability scores, confirming that static rebound aids are highly effective in building movement consistency.

In a more specific experimental context, the use of striped wall targets (wall media) has been shown to be effective in improving both underhand and overhand passing skills in young athletes, as demonstrated in a study by Putra et al. (2025). Recent research by

Pratama et al. (2025) on Islamic middle school students also strengthens the evidence that wall-based training significantly improves underhand passing accuracy. Furthermore, Hernandez-Martinez et al. (2023) found that varying drill training in adolescent athletes aged 16–19 years had a significant positive impact on their technical performance on the field.

Overall, observations of various training programmes in schools indicate that drills, including individual practice, significantly improve accuracy and ball control compared to pre-training levels (Gjinovci et al., 2017; Raiola et al., 2025). The consistency of these findings across the literature confirms that a repetitive, target-focused approach is a highly reliable method for implementation in physical education curricula (Syahputri et al., 2025). This provides a strong foundation for coaches and teachers to integrate wall-passing and individual drills into basic volleyball training.

The group that underwent individual underhand passing drills showed significant improvements in accuracy, a finding consistent with research, which confirmed that regular independent practice effectively improves the basic technique of extracurricular students (Bradley & Conway, 2016; Chan, 2016). The main advantage of this method lies in its flexibility and in-depth focus on detailed technical aspects, such as footwork, platform position, and precise arm control. This is supported by a study by Janiva et al. (2025), which demonstrated that both individual and pair training effectively improved the quality of underhand passing, particularly in upper-secondary students.

Beyond technical aspects, independent practice plays a crucial role in building students' personal consistency (Astuti et al., 2023), as reflected in the consistent increase in scores between pre-test and post-test results. This undivided focus on situational distractions or team pressure allows students to internalize movement mechanics more deeply and independently. Therefore, individual drills not only serve as a method for strengthening technique but also serve as a highly relevant alternative solution when school training facilities or team resources are limited.

This research makes a significant contribution to the development of sports science and physical education practice. Theoretically, it enriches the literature on volleyball training methodology, particularly in its comparative effectiveness study of the wall-passing method and individual drills in a middle school student population. These findings reinforce motor learning theory, which emphasizes the importance of structured repetition and the use of assistive devices in building muscle memory and fundamental technique stability. Furthermore, this study provides new empirical data on the effectiveness of independent training in a regular school setting, which can serve as a reference for future researchers in developing more adaptive training models.

Practically, this study provides concrete guidance for physical education teachers and coaches in selecting the most efficient training methods based on available facilities. The use of the wall-passing method and individual drills proved to be effective solutions for improving underhand passing accuracy, even under conditions of limited team or field resources. These results enable schools to implement independent, measurable, and consistent training programmes to improve the overall quality of students' athletic performance.

4. CONCLUSION

This study shows that both training models, wall-to-wall passing and individual passing, positively contribute to improving the abilities of students at Middle School 1 Pamboang. This is evidenced by a significant increase in the average score (mean) in both experimental groups. The wall-passing training group recorded an increase in the average score from 10.50 in the pre-test to 18.90 in the post-test. Meanwhile, the individual passing training group also experienced an increase from an average of 10.40 to 16.60. Although both methods are effective, descriptive data show that the wall-passing group achieved a higher final score (18.90) than the individual passing group (16.60). However, these descriptive results are an initial step that still requires further inferential statistical tests, including normality tests and significance tests, to validate whether these changes empirically answer the research hypothesis regarding the effectiveness of the given intervention.

As a recommendation, teachers are advised to implement the wall-passing training method as one of the main training menus in volleyball learning. This method has proven effective for beginners because it provides high repetition intensity and consistent feedback from the ball's bounce. Considering that this data has only reached the descriptive analysis stage, it is recommended that further researchers conduct hypothesis tests (t-tests) and normality tests to see the statistical significance of differences in inferential terms, as well as adding other research variables such as learning motivation or eye-hand coordination.

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