



IJPESS

Indonesian Journal of Physical Education and Sport Science

p-ISSN 2775-765X | e-ISSN 2776-0200

Volume 6, No. 1, March 2026. Page. 130-140

<http://journal.unucirebon.ac.id/index.php/ijpess>

The Impact of Active Learning Strategy on Learning the Underhand Serve and Receiving Serve in Volleyball for Female Students

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Received: 05 February 2026, Approved: 11 March 2026, Published: 30 March 2026

Abstract

Study purpose. The study aimed to examine the impact of applying active learning strategies in teaching the underhand serve and serve-receiving skills in volleyball to female students.

Materials and methods. The study was both experimental and two equal groups (experimental and control) were used and pre-and post-test were conducted to measure performance. The instructional plan (remediation) was introduced in eight learning units taught in four weeks, with each week consisting of two 45-minute classes (Sunday and Tuesday). The data was analyzed using the Statistical Package of the Social Sciences (SPSS). The t-test was used to compare groups, Pearson correlation coefficient to present the reliability, and skewness coefficient to present homogeneity, calculation of means and standard deviations were also part of statistical analysts.

Results. The results showed statistically significant differences between the pre-test and post-test scores, favoring the post-test scores for both groups in the sending and receiving skills. Statistical data also demonstrated the superiority of the experimental group, which implemented the active learning strategy, over the control group in the post-tests. The calculated t-value for the technical performance in sending was 13.96 and for receiving, 5.23, values exceeding the critical values, thus confirming the effectiveness of the strategy. This superiority is attributed to the role of active learning in increasing student motivation and developing their sensory-motor awareness through participation and interaction.

Conclusions. Active learning is a powerful approach to the development of volleyball skills, involvement of students, and their motivation. In the study, the adoption of active learning approach in teaching volleyball and sports skills is suggested.

Keywords: Active learning, volleyball skills, underhand serve, serve-receiving

DOI: <https://doi.org/10.52188/ijpess.v6i1.1942>

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Introduction

One of the indicators of development in the process of learning various motor skills is the adoption and selection of appropriate learning strategies, methods, and teaching aids that enhance the effectiveness of educational units and keep pace with the demands of the

educational process today. The world has witnessed tremendous development in all areas of life, and the educational field has had a significant share of this development through the creation of effective educational methods and approaches. The language of the modern age has imposed upon us a vital requirement in the teaching and learning process, highlighting its importance, necessity, and value in predicting outcomes. It also guides teachers in using and selecting teaching methods, approaches, activities, and educational aids appropriate to the desired objective, including the active learning strategy (Mohamed & Abdel-bary, 2021; Salam & Obaid, 2025).

Active learning is considered "one of the modern and effective" methods and approaches "in the educational process". (Khader & Amin, 2024) The goal "of the active learning" strategy "is to help learners acquire a set of skills", knowledge, attitudes, principles, and values. Volleyball is a team sport characterized by its diverse offensive and defensive skills, mastery of which depends on following sound planning and coordinating all efforts to achieve success. (Abdul-Salam & Abdul-samea, 2023) This game is also characterized by basic principles, as the learner's success depends on the extent of their mastery in all different circumstances. Therefore, the serve is considered one of the basic offensive skills that requires an ideal performance position to execute it accurately, and mastering it helps to gain points to win the match (Aprianto & Putra, 2025). Likewise, receiving the volleyball, whether from below or above, is one of the defensive skills, and teaching and acquiring it contributes to the team's continuity, development, and growth, in terms of focusing on the ball, its height, speed, and power. Any mistake results in the team losing a point, so these skills must be taught through guidance in the teacher's work path and its course in the lesson plan (Aldulimey et al., 2025; Majid et al., 2025). Teaching is a complex process with interconnected and overlapping elements in a series of steps, each step influencing and being influenced by the one before it.

The research gap is that the researcher has noticed a strong weakness in the acquisition of basic volleyball skills namely the underhand serve and receiving serve among students in secondary schools. The problem that was identified in the study was that traditional teaching methods did not bring about the intended effect and they were not consistent with the current advancements in the learning strategies (Sitorus et al., 2025). The difference also indicated how individual diversities among students in terms of abilities, aptitudes, and learning pace would go unnoticed, hence creating the need to apply an active learning strategy to deal with the educational shortfall.

The problem of the research is a gap in education as the researcher can see in her fieldwork. It was found that the conventional instructional strategies employed in secondary schools have failed to bring the intended effects in acquisition of simple skills in volleyball. The study was facilitated by the fact that one of the female students was diagnosed with a general weakness in performing the underhand serve and receiving serves. The researcher explained this by the inability of the current curriculum to keep up with the current trends in the teaching techniques. In a wider approach to the problem, the study was concerned with the following dimensions: Individual Differences: The necessity to approach each student as a different case regarding abilities, aptitudes and personal pace of learning, which traditional approaches did not take into consideration. Sensory-Motor Perception: Improving the deficiencies in the association of auditory and visual perceptions with practice performance. The study will be useful in improving kinesthetic awareness by direct interaction. Motivation and Engagement: Decreasing the passivity of the traditional lessons through involving students in thinking processes, decision making as well as teamwork as a necessary constituent of the learning process.

Research Objective

To identify the effect of the active learning strategy on the learning of the underhand serve and receiving serve skills in volleyball for female students.

Research Hypothesis:

The active learning strategy has a positive effect on the learning of the underhand serve and receiving serve skills in volleyball for female students in both the pre-test and post-test, with the post-test results showing a positive effect and supporting the active learning strategy.

Research Scope:

1. Human Scope: Female students of Al-Hariri High School for Distinguished Students for the academic year 2023-2024.
2. Time Scope: From October 15, 2023, to March 6, 2024.
3. Spatial Scope: The courtyard and playing field of Al-Hariri High School for Distinguished Students.

Materials and methods

Study participants

The research population was defined as the female students of Al-Hariri High School for Distinguished Students for the academic year 2023-2024, totaling (48) students. The main research sample was selected purposively (fifth preparatory grade), totaling (24) students. They were divided into two groups of (12) students each, as the research requirements were met (Muzaqi et al., 2025). The researcher excluded a group of students who represented in [Table 1](#):

Table 1. Research Population and Sample Members

Variables	Stage	number	Percentage
Research community	Fifth	48	100%
Main experiment sample		24	50%
Excluded	Sample of the pilot study	10	20.83%
	Injured and absent	14	29.16%

Study organization

Indicate methods and the purpose of their use; research procedures and an algorithm for conducting a pedagogical experiment.

1. Research Methodology

"The researcher followed the experimental method with a pre-test/post-test design for two equivalent groups, as it was suitable for the nature of the problem to be solved (Abdul-hasan & Abdul-samea, 2023; Mardila & Victorian, 2024)."

2. Research Procedures

- 1) Research Tools and Aids:
- 2) Arabic Sources and References.
- 3) Data Entry Form.
- 4) Personal Interviews.
- 5) Questionnaire.
- 6) Manual Calculator.
- 7) Dell Computer.
- 8) Regulation Volleyball Court.
- 9) (12) Volleyballs.

- 10) Measuring Tape.
- 11) Medical Scale.
- 12) Whistle.
- 13) (5) cm Wide Colored Tapes.

Identifying Research Variables

First: Test Selection

Standardized tests were selected (the underhand serve and receiving serve in volleyball for female students). These are among the skills included in the first semester curriculum (for the fifth preparatory grade) in the teacher's guide. A special questionnaire containing the tests was prepared and presented to a group of experts and specialists. Based on the results, the standardized tests were selected (Febriani et al., 2025; Ningsih et al., 2025a). After data collection, a 100% consensus was reached on the selection of tests that had been applied in previous studies and research on samples matching the specifications of the current research sample (Ningsih et al., 2025b).

Pilot Test

To obtain objective results, the researcher conducted a pilot test to assess the researched skills on a sample of (10) female students from the fifth preparatory grade on Tuesday, October 17, 2023, at the Al-Hariri High School for Distinguished Students. 2-3-4 Scientific Foundations of the Tests (Alimandan & Prabowo, 2024):

First: Test Validity

To verify the validity of the tests, the researcher used the following:

A- Face Validity: "The tests were presented to a group" of (7) expert specialists. Standardized tests were selected, and after data collection, agreement was reached, as shown in Table 2.

Table 2. shows the number of experts who agreed and disagreed, and the percentage

Tests	Agreed	Disagreeers	Percentage %
The underhand serve in volleyball	7	0	100%
Receiving the underhand serve in volleyball	7	0	100%

Second: Test Reliability:

To determine the reliability of the tests, the researcher used the following (Lombardi et al., 2020):

A- Test-Retest Method:

The tests were administered to a pilot sample of (10) female students on Tuesday, October 17, 2023. The tests were then re-administered seven days later, on Tuesday, October 24, 2024. The researcher calculated the simple correlation coefficient (Pearson's correlation coefficient) between the test results, which showed a strong correlation, as shown in Table 3.

Table 3. Shows the means of test reliability

Tests	Mean	Std	Mode	Skewness	standard error	Nature of distribution
The underhand serve in volleyball	16.12	1.64	15	0.69	0.30	Closer to moderate
Receiving the underhand serve in	16.36	0.65	16	0.56	0.12	Closer to

volleyball

moderate

Table (3) shows that the calculated skewness coefficient values do not exceed (1), indicating that the standardized tests are characterized by fairness.

Third: Test Objectivity: Since the tests were agreed upon by experts and reviewers and were characterized by fairness, this indicates a high degree of objectivity (Fauzan et al., 2024; Kamarudin et al., 2024).

Main Experiment:

Homogeneity of the Research Sample: The researcher conducted homogeneity testing of the main research sample (the experimental group), consisting of (12) female students, based on anthropometric measurements (height, body mass, and chronological age).

Table 4. shows the homogeneity of the research sample (the experimental group).

Variables	unit of measurement	Mean	Std	Mode	Skewness
Height	cm	166.04	0.59	165	0.657
Body Mass	kg	68.29	0.68	67	-0.527
Chronic Age	year	17.38	0.32	17.00	0.842

Table 4 shows that the skewness coefficient "values are less than" (± 1), indicating the homogeneity of the research sample (experimental group) within the normal curve.

Pre-tests: After fulfilling the requirements and selecting the tests for the research variables, the pre-tests were conducted as follows (Gustian et al., 2024):

- 1- Before commencing the project, the researcher conducted an introductory session on Sunday, October 29, 2023, with the research sample of (24) female students.
- 2- Pre-tests for the forward underhand pass skill were conducted on Tuesday, October 31, 2023, with the research sample of (24) female students.
- 3- Pre-tests for the receiving underhand pass skill were conducted on Sunday, November 5, 2023, with the research sample of (24) female students. *The tests were conducted on the field and grounds of Al-Hariri Secondary School for Distinguished Students, and the scores were recorded under my direct supervision (the subject teacher).

Equivalence of the two research groups:

Before starting to implement the elements of the active learning strategy, the researcher conducted a process of equivalence of the two research groups in the variables related to the skills tests in Table 5.

Table 5. Shows the equivalence of the two research groups.

Variables	Control group		Experimental group		Calculate d value(t)	Type of indication
	Mean	Std	Mean	Std		
The underhand serve in volleyball	5.67	1.44	5.33	1.67	0.58	Non-Sig.
Receiving the underhand serve in volleyball	4.71	0.34	4.62	0.41	0.43	Non-Sig.

Implementation of the Active Learning Strategy:

After confirming the schedule prepared by the school administration (two sessions per week, Sunday and Tuesday, each session lasting (45 minutes), and the curriculum for basic

volleyball skills, and after providing the necessary equipment and tools, the researcher began implementing the research plan with the experimental group as follows (Sari et al., 2024):

1- On Sunday (November 12, 2023), the students were taught the skill of the underhand serve in volleyball and how to implement it using the active learning strategy. This involved explanation, the use of a model, and participation from classmates. The students practiced the skill partially and in detail, and then fully.

*The students continued this practice for two weeks, with two sessions per week.

2- On Sunday, November 26, 2023, the students began learning the skill of receiving a forward pass from below. This included a detailed explanation of the skill, followed by its demonstration and application, and how to implement it using an active learning strategy through explanation, modeling, and peer participation.

*The students practiced the second skill for two weeks, "two units per week".

Thus, the educational units (8 units) were implemented over (4) weeks, two units per week.

Post-tests: Post-tests were conducted after the completion of the educational units with the same research group, under the same conditions as the pre-tests. The post-tests were conducted as follows:

1- The post-tests for the forward pass from below skill were conducted on Tuesday, November 28, 2023, with the research sample of (24) students.

2- The post-tests for the receiving pass from below skill were conducted on Sunday, December 3, 2023, with the research sample of (24) students. *The tests were conducted on the field and grounds of Al-Hariri High School for Distinguished Students, and the scores were recorded under my direct supervision (the subject teacher) (Musyarofah et al., 2024).

Statistical analysis

The researcher used the statistical toolkit (SPSS) to process the data and extract the results.

Results

Presentation, analysis, and discussion of the results of the volleyball serve and receiver tests for both the control and experimental groups in Table 6:

Table 6. Shows the calculated means, standard deviations, and t-values between the pre- and post-tests for the volleyball serve and receiver skills (control group).

Tests	unit of measurement	Pre-tests		Post-tests		Calculated value(t)	Type of indication
		Mean	Std	Mean	Std		
Technical performance of the underhand serve	degree	5.67	1.44	20.73	1.31	4.94	Sig.
Technical performance of receiving the underhand serve	degree	4.71	0.34	6.12	0.88	3.38	Sig.

Table 6 shows that the calculated "t-values between the pre- and post-tests" for the underhand serve and receiving skills "in volleyball for the control group are greater than" the critical value of (2.14) at a significance level of (0.05) and degrees of freedom of (11), indicating a statistically significant difference between the pre- and post-tests in favor of the post-test (Ningsih et al., 2025c).

Table 7. shows the means, standard deviations, and calculated t-values between the pre- and post-tests for the underhand serve and receiving skills in volleyball (for the experimental group).

Tests	unit of measurement	Pre-tests		Post-tests		Calculated value(t)	Type of indication
		Mean	Std	Mean	Std		
Technical performance of the underhand serve	degree	5.33	1.67	30.27	1.90	8.22	Sig.
Technical performance of receiving the underhand serve	degree	4.62	0.41	8.34	0.64	9.40	Sig.

Table 7 shows that the calculated t-values "between the pre- and post-tests for the underhand serve and volleyball receiving skills in the experimental group are greater than the critical value of (2.14) at a significance level of (0.05) and degrees of freedom of (11), indicating a statistically significant difference between the pre- and post-tests in favor of the post-test (N. A. Athab, 2019)."

Presentation, Analysis, and Discussion of the Post-Test Results for the Underhand Serve and Volleyball Receiving Skills in the Control and Experimental Groups:

Table 8. Shows the means, standard deviations, and calculated t-values in the post-tests for the underhand serve and volleyball receiving skills in the control and experimental groups.

Tests	unit of measurement	Control group		Experimental group		Calculated value(t)	Type of indication
		Mean	Std	Mean	Std		
Technical performance of the underhand serve	degree	20.73	1.31	30.27	1.90	13.96	Sig.
Technical performance of receiving the underhand serve	degree	6.12	0.88	8.34	0.64	5.23	Sig.

Table 8 shows that the "calculated t-values in the post-tests for the underhand serve and volleyball serve reception skills between the control and experimental groups are greater than the critical value of (2.05) at a significance level of (0.05) and (22) degrees of freedom, indicating a statistically significant difference between the control and experimental groups, favoring the experimental group (Saputra et al., 2024)."

Discussion

Based on the results in Tables (5, 6), significant differences were observed between the pre-tests and post-tests, favoring the post-tests for both groups, in the technical performance tests for the skills of the underhand serve and receiving the serve in volleyball. The researcher attributes this improvement in learning to the active learning strategy. Active learning encourages students "to interact and participate in group work". It is a method that focuses on learner participation, compelling them to engage in activities that force them to think and acquire the necessary educational skills and experiences through tasks such as reading, writing, asking questions, group or individual discussions, and decision-making. This helps them apply what they have learned to their daily lives (N. A. Athab et al., 2019).

Zaki Muhammad Hassan states that "a volleyball player needs precise performance according to specific timings, and this, in turn, requires a high degree of control over the execution of the motor performance and a significant amount of kinesthetic awareness

"What determines the extent to which a student acquires knowledge and information is their ability to perform practically, which contributes to linking the auditory and visual perceptions they have acquired with the kinesthetic perceptions, since practical performance is nothing but the application of knowledge and information (Alsayigh & Athab, 2016)."

The researcher attributes this superiority to the fact that the active learning strategy introduced in the educational units of the experimental group contributed to learning and developing skills. This is due to the importance of the active learning strategy and the impact it had on the learner in terms of knowledge, skills, and attitudes. It is also a form of learning that helps students "participate in activities that encourage them to think and reflect on the information presented to them", providing the learner with feedback at each step so they know the result of their work, increasing the learner's motivation with appropriate reinforcement after each response, and emphasizing the principle of gradual learning from simple to complex. From the familiar to the unfamiliar, he sees that complex behavior is a combination of simple forms of behavior, and that any learning depends on the learner's prior results (N. A. K. Athab & Hassan, 2010).

The researcher believes that the teacher's role focuses on participating in preparing appropriate questions (Al-Hadeethi et al., 2013), creating opportunities for discussion and cooperation among students, guiding them during their work, providing them with appropriate feedback on the type of work they are doing, and explaining and clarifying difficult concepts. Another use of learning cells is by having each student test the others on what they learned that day about different topics, and what mental or motor skills they acquired as a result of interaction with the teacher, peers, tools, and equipment. The active learning strategy increases learners' motivation to learn, clarifies and explains difficult concepts, and helps in effective scientific communication, cooperation, and positivity. (Ayat & Mohamed, n.d.)

Conclusions

The active learning strategy has a clear impact on learning and developing the skills of serving and receiving in volleyball for female students. Implementing this strategy during volleyball lessons is highly effective in teaching and developing students' volleyball serving and receiving skills. Significant differences were found between the pre-test and post-test scores of the experimental group on serving and receiving skills in volleyball.

Acknowledgment

I extend my thanks and gratitude to everyone who helped me complete this research, from the sample to the assisting team.

Conflict of interest

"I confirm that there are no personal or material interests that conflict with my responsibilities in this project."

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<https://doi.org/10.24036/jst.v8i4.1323>

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Cite this article as:

Sakhi, Rouaa Abdullah. (2026). The Impact of Active Learning Strategy on Learning the Skills of the Underhand Serve and Receiving Serve in Volleyball for Female Students. *Indonesian Journal of Physical Education and Sport Science (IJPESS)*, 6(1), 130-140.
<https://doi.org/10.52188/ijpess.v6i1.1942>