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THE EFFECT OF SPEED-STRENGTH TRAINING ON DEVELOPING LEG MOVEMENTS FOR VOLLEYBALL PLAYERS AT AHLULBAYT UNIVERSITY.

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ABSTRACT

One of the most important sports sciences that guides learners to achieve optimal performance in most team sports skills is motor learning. This comprehensive and diverse approach necessitates the use of various educational tools and physical exercises that directly influence the learning of motor skills and the development of their associated physical attributes, all within a structured framework. The goal is to achieve the desired objective through the use of different equipment, tools, exercises, and techniques that help learners grasp the details of performing any volleyball skill. Through his observation of the volleyball skills learning process and his review of the volleyball curriculum for the second year at the College of Physical Education and Sports Sciences, Ahlulbayt University, the researcher found a scarcity of exercises that develop leg speed and thus contribute to learning the desired skill. The principle of repetition alone in the educational process does not guarantee skill acquisition and performance development but rather ensures continuity in motor performance. In other words, the teaching methods used in the motor learning process yield varying success rates due to insufficient attention to the physical aspect, which is the crux of the problem. Therefore, the need arose to use physical exercises that focus on speed-strength, enabling learners to develop the speed of their leg movements and learn the technical execution and accuracy of the setting skills in volleyball. The research population consisted of 98 second-year students at the College of Physical Education, Ahlulbayt University, during the academic year 2025-2026. The researcher used the SPSS statistical package.

KEYWORDS: *Speed, strength, training, movements and volleyball.*

INTRODUCTION

One of the most important sports sciences that guides learners to achieve optimal performance in most team sports skills is motor learning. This comprehensive and diverse approach necessitates the use of various educational tools and physical exercises that directly influence the learning of motor skills and the development of their associated physical attributes, all within a structured framework. The goal is to achieve the desired objective through the use of different equipment, tools, exercises, and technical methods that help learners grasp the details of performing any volleyball skill.

Volleyball is distinguished from other sports by its lack of a fixed time limit, the small size of its court, and the player's ability to transition between offensive and defensive duties. Furthermore, it incorporates numerous fundamental technical skills—purposeful and varied movements—that players must execute as quickly and efficiently as possible. These skills form the bedrock of the game, and a player's or team's success and excellence depend on mastering them. Therefore, learners must master these skills and become familiar with all their technical aspects. Without a solid grasp of basic skills, executing plans, whether individually or as a team, will be difficult.[1]

The speed of leg movement (forward, backward, and lateral movements) and speed-strength are key attributes in the successful technical performance of volleyball players, especially in setting, which is fundamental to the success of the team's attack and preventing points from being lost. Therefore, this research highlights the importance of developing speed-strength exercises to improve leg movement speed and teach the movement patterns of volleyball setting skills. These exercises will focus on techniques that embody skillful execution and muscular action.

RESEARCH PROBLEM

One of the most important goals of the educational process that the teacher strives for is to bring the learner to a good and effective level in learning various sports skills during the educational units. Practice is considered every learning activity whose goal is rapid progress in both physical and mental aspects, and to increase the learning of technical performance and its accuracy in various skills in sports, including the skill of setting (passing) in its various forms. This skill is one of the most important skills, and learning its forms requires advanced and sophisticated methods and techniques in order to reach the optimal level of performance, in addition to the role of specific and necessary physical and motor qualities in performance. Through the researcher's observation of the volleyball skills learning process and his review of the volleyball curriculum for the second year at the College of Physical Education and Sports Sciences, Ahlulbayt University, it was found that exercises designed to develop leg speed and thus contribute to learning the desired skill were infrequent or nonexistent. The principle of repetition alone in the educational process does not guarantee skill acquisition and performance development, but rather ensures continuity in motor performance. In other words, the teaching methods used in the motor learning process yield varying success rates due to insufficient attention to the physical aspect, which is the crux of the problem. Therefore, the need arose to use physical exercises that focus on speed-strength, enabling learners to develop the speed of their leg movements and learn the technical execution and precision of the movement patterns involved in setting up volleyball.

RESEARCH OBJECTIVES

This research aims to:

1. Develop speed-strength training exercises to improve leg speed for setting up volleyball for Ahlulbayt University students.
2. To identify the effect of speed-strength training on developing the speed of leg movements for volleyball setting among students at Ahlulbayt University.

RESEARCH HYPOTHESIS

1. Speed-strength training has a positive effect on developing the speed of leg movements for volleyball setting among students at Ahlulbayt University.

RESEARCH SCOPE

- Human Scope: Second-year students in the College of Physical Education and Sports Sciences, Ahlulbayt University, for the academic year 2025-2026.
- Time Scope: October 14, 2025, to May 8, 2026.
- Location: The outdoor volleyball court at the College of Physical Education and Sports Sciences, Ahlulbayt University.

RESEARCH METHODOLOGY

The researcher must choose the appropriate methodology to solve a problem, as "methodology is the path leading to the discovery of truth in science to reach a specific conclusion" [2]. Therefore, the researcher used the experimental method with an equivalent groups design, as it is suitable for the nature of the research problem.

RESEARCH POPULATION AND SAMPLE

The research population was defined as the second-year students of the College of Physical Education at Ahlulbayt University for the academic year (2025-2026), totaling (98) students. The random method was used to select the research sample, "ensuring that each individual had equal opportunities to be included in either of the two groups" (4). The sample

consisted of (32) students. The researcher selected two sections from among three sections by lottery: the female students' section, since the scope of the research is limited to male students only, as well as the students who practice volleyball, and the students of the first and second pilot experiments. Section (B) was chosen to represent the control group, consisting of (16) students, and Section (D) was chosen to represent the experimental group, also consisting of (16) students. Thus, the percentage of the research sample was (47%), which is a suitable percentage for accurately and truthfully representing the research population.

SAMPLE HOMOGENEITY AND EQUIVALENCE OF THE TWO RESEARCH GROUPS

- Sample Homogeneity: The researcher conducted a homogeneity process for the research sample members in terms of the variables (age, height, and weight), as shown in Table 2.

Table 1: shows the means, standard deviations, mode and skewness coefficient for the variables of age, height and weight

Variables	Mean	Std	Mode	Skewness
Age/years	20.15	0.778	20	0.192
Height/cm	176.76	5.25	175	0.33
Weight/kg	68.92	8.44	66.50	0.28

METHODS, TOOLS, AND EQUIPMENT USED

The researcher used the following methods, tools, and equipment:

- Arabic and foreign sources.
- Observation.
- Interviews.
- Questionnaires.
- A regulation volleyball court.
- (16) regulation volleyballs.
- A metal measuring tape.
- Adhesive tape.
- (4) AKMA whistles.
- (10) cones.
- (3) manual timers.
- (2) Sharp scientific calculators.
- A medical device for measuring weight and height.
- A Sony video camera.

IDENTIFYING THE TESTS

To identify the most important tests related to the research topic, the researcher undertook the following:[3]

1. SELECTING A TEST FOR LEG SPEED

After reviewing specialized scientific sources on testing, measurement, and volleyball, the researcher found a specific test for measuring the speed of leg movements in volleyball.

2. IDENTIFYING A TEST FOR TECHNICAL PERFORMANCE IN SETTING

The researcher relied on a standardized test to evaluate the technical performance of the setting skill in volleyball. This test was based on the apparent structure of the skill in the evaluation process, according to the three sections of the skill and the scores allocated to each section.

3. DETERMINING A TEST TO EVALUATE SETTING ACCURACY IN VOLLEYBALL

After reviewing the scientific sources specializing in testing, measurement, and volleyball, the researcher found that the existing tests were unsuitable for measuring setting accuracy because they were far removed from the actual game situation or because they were applied outside the volleyball court. This was confirmed by previous research and studies regarding the lack of connection between existing tests and the game of volleyball, as "the method of performing the test to measure the accuracy of setting performance is an incorrect test and does not simulate the conditions of performing the skill during actual game situations." Therefore, the researcher prepared a special test to measure the accuracy of setting in volleyball. The researcher drew inspiration for this test from actual game situations, so he designed an accuracy testing device to be placed inside the volleyball court, with the help of a specialized engineer to prepare a device with engineering specifications in terms of measurements and heights to be suitable for this test. Then, the researcher prepared a special questionnaire* in which he explained the shape of the proposed device, its measurements, and the method of performing it, drawing inspiration from the spirit of the previous test in terms of the distribution of scores and the distance between the device and the tester. It was presented to a group of experts and specialists to determine the validity of this test. In addition to determining the appropriate distance for placing the instrument within the volleyball court.

PILOT TEST

In order to control the study variables, identify obstacles to the work, and confirm the methodology, the researcher must conduct a pilot test before the main research experiment. The pilot test serves as "practical training for the researcher to personally observe the strengths and weaknesses encountered during the test in order to avoid them." Therefore, the researcher conducted a pilot test on November 15, 2025, focusing on tests of leg movement speed and technical performance in volleyball setting. The test was administered to a sample of (12) students from the research population who did not participate in the main experiment.

TEST DESCRIPTION

LEG SPEED TEST

- Test Name: Leg Speed Test (1)
- Test Objective: To measure the leg speed of volleyball players.
- Performance Specifications:

Four cones are placed so that the distance between point (A) and each cone is (3) meters, which is the distance determined by experts.

The student being tested stands at point (A) in a ready position to perform any skill. Upon hearing the start signal, they move to cone (1) using lateral movements to touch the cone with their hand. They then return with the same movement to cone (2), using forward movements, passing through point (A). They then move backward to cone (3), passing through point (A) to touch the cones with their hand, then to cone (4), passing through point (A), and finally back to the starting point (A). At this point, the timekeeper stops the clock and records the performance time.

PERFORMANCE REQUIREMENTS

When performing a lateral movement (right or left), the student must maintain a defensive movement pattern suitable for the competition (crossing the foot or crawling with both feet without crossing).

RECORDING

The student's time is recorded from the starting signal until reaching the starting point, including touching the four cones. The time is recorded in seconds, as shown in Figure (12).

TECHNICAL PERFORMANCE TEST FOR SETTING

The researcher used a standardized test, previously used in research, to evaluate the technical performance of volleyball sets. This test relied on the apparent structure of the skill in the evaluation process, according to the three skill sections and the corresponding marks for each section, as shown below:

1. Preparatory Section (3 marks).
2. Main Section (5 marks).
3. Final Section (2 marks).

- Objective of the Test: To evaluate the technical performance of setting formations through the three sections of the skill (preparatory, main, and final).
- Equipment used: Regulation volleyball court, (3) volleyballs, pre-prepared evaluation form, video camera, CDs.
- Performance procedure: The student performs the setting skill in the designated setting area, i.e., from center (3), attempting to execute the setting correctly as follows:

1. Three attempts at a forward overhead setting.
2. Three attempts at a backward overhead setting.
3. Three attempts at a jumping overhead setting.
4. Three attempts at a falling setting, provided that the ball and the student's body do not touch the net, nor do they cross into the opponent's court, as illustrated in Figure (16).

- Recording: The researcher filmed the three attempts for each student in the experiment and then presented them to three evaluators to assess each student's three attempts. Three marks were awarded for each evaluator's assessment, with the final evaluation score for each attempt being (10) marks, divided into the three skill sections: (3) marks for the preparatory section, (5) marks for the main section, and (2) marks for the final section. The best score from each evaluator was then selected, and the mean of the three best scores was calculated to determine the final score for each student.

PRE-TESTS

Pre-tests were conducted for the selected research sample after the completion of two initial educational units. These units included an explanation of the preparation skill, using relevant images and diagrams, and a demonstration of the skill from outside the sample. Sufficient time was then given for the research sample to practice the skill multiple times. At the end of the second unit, the sample was divided into two groups as follows:

1. The experimental group (which worked on speed-strength training).
2. The control group (which followed the established curriculum)
3. Pre-tests were then conducted on November 25, 2025.

POST-TESTS

After the completion of the curriculum and the implementation of the speed-strength exercises for both the experimental and control groups, post-tests were conducted on May 5, 2026, under the same conditions as the pre-tests.

STATISTICAL METHODS

The researcher used the SPSS statistical package.

RESULTS

PRESENTATION AND ANALYSIS OF THE DIFFERENCES BETWEEN PRE- AND POST-TESTS FOR THE CONTROL AND EXPERIMENTAL GROUPS

1. Presentation and Analysis of the Pre- and Post-Test Results for the Control Group: To determine the differences in the research tests (speed of leg movements, technical performance of the kinetic patterns, and accuracy of volleyball sets) for the control group, the researcher used a t-test between the pre- and post-tests, as shown in Table 2.

Table 2: shows the means, standard deviations, and calculated and tabulated t-values between the pre- and post-tests for the control group

Variables	Pretest		Posttest		Calculated t value	Type of indication
	Mean	Std	Mean	Std		
Leg movement speed / seconds	11.07	0.91	10.45	0.80	2.034	Non sig.
Technical performance of the overhead forward set / marks	3.62	0.78	7.10	1.07	2.71	Sig.
Technical performance of the overhead backward set / marks	3.11	0.79	6.87	0.69	3.75	Sig.
Technical performance of the overhead jump forward set / marks	3.35	1.20	6.18	0.88	1.51	Non sig.
Technical performance of the overhead falling set / marks	2.62	1.26	5.50	0.79	2.30	Sig.
Setting accuracy test / marks	11.69	3.73	12.75	2.88	0.086	Non sig.
The tabulated value of (t) = (2.13) at a significance level of (0.05) and at a degree of freedom of (15)						

Table 2 shows the means, standard deviations, and calculated t-value between the pre- and post-tests for the control group in the research tests (leg movement speed, technical performance of set formations, and set accuracy in volleyball).

The results of the pre-test for leg movement speed showed an mean of (11.07) with a standard deviation of (0.91), while the mean in the post-test was (10.45) with a standard deviation of (0.80). The calculated t-value was (2.03), which is less than its critical value of (2.13). This indicates no statistically significant difference between the pre- and post-tests in the leg movement speed test.

PRESENTING AND ANALYZING THE RESULTS OF THE PRE- AND POST-TESTS OF THE EXPERIMENTAL GROUP

After processing the initial data of the pre- and post-tests with the test for paired samples, the researcher was able to obtain the results of the experimental group for the speed of leg movements and the technical performance tests of the movement patterns of the sets and the accuracy of the sets in volleyball, as shown in Table (3).

Table 3: shows the means, standard deviations, and calculated and tabulated values between pre- and post-tests of the experimental group

Variables	Pretest		Posttest		Calculated t value	Type of indication
	Mean	Std	Mean	Std		
Leg movement speed / seconds	11.34	0.50	9.60	0.45	3.63	Sig.
Technical performance of the overhead forward set / marks	3.56	0.70	8.18	0.63	6.16	Sig.
Technical performance of the overhead backward set / marks	3.22	1.22	7.80	0.70	3.60	Sig.
Technical performance of the overhead jump forward set / marks	3.42	0.91	7.40	0.70	3.66	Sig.
Technical performance of the overhead falling set / marks	2.60	1.50	6.10	0.59	2.66	Sig.
Setting accuracy test / marks	12.31	3.91	16.75	2.35	3.79	Sig.
The tabulated value of (t) = 2.13) at a significance level of (0.05) and at a degree of freedom of (15)						

Table 3 shows the means, standard deviations, and calculated and tabulated t-values between the pre-test and post-test for the experimental group in the tests of leg movement speed, setting technique, and setting accuracy in volleyball.

The results of the pre-test for leg movement speed showed an mean of (11.34) with a standard deviation of (0.50), while the mean in the post-test was (9.6) with a standard deviation of (0.45). The calculated t-value was (3.63), which is greater than the tabulated value of (2.13). This indicates a statistically significant difference between the pre-test and post-test in the leg movement speed test, favoring the post-test at a significance level of (0.05) and with (15) degrees of freedom. As for the technical performance tests for volleyball setting movements, the results were as follows:[4]

* In the pre-test for the overhead forward setting, the mean was (3.56) with a standard deviation of (0.7), while the mean in the post-test was (8.18) with a standard deviation of (0.63). The calculated (t) value was (6.16), which is greater than the tabulated value of (2.13) at a significance level of (0.05) and under (15) degrees of freedom. This indicates a significant difference between the pre-test and post-test in favor of the post-test for the overhead forward setting. * In the overhead backward counting test, the pre-test mean was (3.22) with a standard deviation of (1.22), and the post-test mean was (7.8) with a standard deviation of (0.7). The calculated t-value was (3.6), which is greater than the tabulated value of (2.13) at a significant level of (0.05) and (15) degrees of freedom. This indicates a significant difference between the pre-test and post-test, favoring the post-test in the technical performance of overhead backward counting.

* In the technical performance test for overhead jumping, the pre-test mean was (3.42) with a standard deviation of (0.91), and the post-test mean was (7.4) with a standard deviation of (0.70). The calculated t-value (3.66) is greater than the critical value of (2.13) at a significance level of (0.05) and (15) degrees of freedom, indicating a significant difference between the pre-test and post-test in favor of the post-test in technical performance for overhead jumping.

* In the technical performance test for overhead jumps from a falling position, the mean in the pre-test was (2.6) with a standard deviation of (1.5), while in the post-test the mean was (6.1) with a standard deviation of (0.59). The calculated (t) value (2.66) is greater than the tabulated value of (2.13) at a significance level of (0.05) and under (15) degrees of freedom. Thus, there is a significant difference between the results of the pre-test and post-test, in favor of the post-test, in the technical performance test for overhead jumps from a falling position.

* In the volleyball setting accuracy test, the mean in the pre-test was (12.31) with a standard deviation of (3.91), while in the post-test the mean was (16.75) with a standard deviation of (2.35). The calculated (t) value (3.79) is greater than the tabulated value of (2.13) at a significance level of (0.05) and under a degree of freedom of (15). Thus, it appears that there is a significant difference between the results of the pre-test and the post-test in favor of the post-test in the accuracy of setting in volleyball.

DISCUSSION OF RESULTS

Based on the pre- and post-test results for the control and experimental groups, as presented in Tables 2 and 3, significant differences were found between the pre- and post-tests for both groups in the tests of leg movement speed and the technical performance and accuracy of volleyball sets.

The control group did not achieve significant differences between the pre- and post-tests in the tests of leg movement speed, technical performance of overhead jump sets, and set accuracy.[5] This is attributed to the influence of certain educational curricula, and the researcher also attributes it to the control group's failure to utilize speed-strength exercises that contribute to developing leg movement speed. While the experimental group showed significant differences between the pre-test and post-test results in the research tests, this is a natural consequence of the educational program that included speed-strength exercises. The importance of speed-strength in volleyball stems from its crucial role in sudden and rapid movement; a player's transition from one position to another requires speed-strength in their leg muscles [6]. Therefore, the observed improvement is attributed to speed-strength exercises, which are part of the requirements for players trained to successfully perform this skill. The researcher believes these exercises had a significant impact on the development of leg speed in the experimental group.

In the technical performance tests for volleyball setting movements, both groups showed improvement in the overhead forward set due to their respective training methods. However, a significant difference favored the experimental group, which incorporated speed-strength exercises into its curriculum. This difference was greater than that of the control group, as clearly demonstrated by the calculated t-value. Similarly, in the technical performance of the overhead backward set, both groups showed a difference, but the calculated t-value again indicated that the experimental group was higher than the control group.[7]

In the technical performance test for the overhead jump set, the t-value shows that the control group did not achieve a significant difference, unlike the experimental group, which did. This is because "using speed-strength exercises leads to the development of lower limb strength" [8]. Since this movement requires lower limb strength and involves jumping during the set, the experimental group performed better.

In the technical performance test for the overhead jump set, both groups showed a difference, but the difference in the experimental group was greater than in the control group. This is clearly evident from the calculated t-value, which shows that the experimental group's score was higher than the control group's.

In the volleyball setting accuracy test, the experimental group achieved a significant difference, while the t-value for the control group was not significant.[9] The researcher attributes this difference to the development of the speed of leg movements, the technical performance of the movement patterns for setting, and the accuracy of performance in volleyball. This came about as a result of the speed-based strength exercises that were included in the educational curriculum, which led to the development of the speed of leg movements. These abilities, through their multiplicity, diversity, and method of learning, enable the learner to perform various skills, as "multiple activities form the cornerstone for the learner to reach the highest athletic levels"[10]. These two factors together contributed to the development of the technical performance of the movement patterns for setting and its accuracy in volleyball. Learning the correct performance of setting and developing the speed of leg movements helps the learner to quickly reach the setting position and obtain the time necessary to perform the setting, which in turn affects accuracy, as "using fast movements helps to refine the performance… and thus the accuracy of the performance will inevitably increase"[11], and thus the goal of the research was achieved.

CONCLUSIONS

1. Speed-strength training contributed positively to developing the leg movement skills of students at Ahlulbayt University.
2. Speed-strength training helped raise the level of neuromuscular coordination among the research sample.
3. Speed-strength training contributed to improving the ability to change direction and respond quickly to different situations during play.

RECOMMENDATIONS

1. Incorporate speed-strength training into the training program for students at Ahlulbayt University.
2. Diversify the use of training exercises that combine strength and speed.
3. Conduct periodic tests to measure the level of speed-strength and observe the principle of progressive training load.
4. Conduct similar research on other samples and age groups.

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