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The Effect of an Educational Approach According to Kolb's Theory on Developing Motor Coordination and Teaching Students the Skills of the Smash and Block Wall

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Abstract: *This research aims to identify the impact of an educational approach based on Kolb's theory of experiential learning on developing motor coordination and learning the skills of the smash and block among students in the targeted academic year. Kolb's theory is a modern educational theory that emphasizes that learning is an ongoing process based on direct experience, reflection, conceptualization, and active experimentation, which enables students to participate and be active participants in the learning process. The research problem is that traditional teaching methods in the field of physical education may not take into account individual differences among students and do not provide them with sufficient opportunities for practical experimentation and analysis. This weakens their ability to acquire basic skills in sports, especially volleyball, which requires a high level of motor coordination and precision in performance. The research also aims to develop an educational approach based on Kolb's theory, identify the extent of this approach's impact on developing motor coordination among students, and measure the approach's impact on learning the skills of the smash and block compared to traditional methods. The importance of this research lies in its aim to introduce a modern educational approach to physical education teaching, one that helps connect practical and theoretical aspects and enhances student participation in building their motor skills, thus contributing to improved learning of complex volleyball skills. The researcher relied on designing an educational approach consistent with Kolb's four stages of theory (concrete experience, observation and reflection, conceptual abstraction, and active experimentation) and applying it to a sample of students.*

Keywords: *Kolb's Theory, Motor Coordination*

Introduction

Volleyball is a sport that requires a high level of neuromuscular coordination, especially in complex skills such as the slam dunk and the block. These skills require precise motor coordination, quick response, and precise direction, in addition to the ability to integrate awareness of the movement path with real-time decision-making. These skills are the cornerstone upon which a team's tactical and collective performance is built. The slam dunk is the primary offensive means of scoring points, while the block dunk is the first line of defense against the opposing team's attacks.

Despite the widespread use of traditional skill teaching methods (explanation-model-repetition), their effectiveness may be limited when dealing with complex skills, as they do not provide students with sufficient opportunities for practical experience and self-analysis of performance. In practice, many students face difficulty learning these complex skills, whether in timing the rise, directing the ball, or forming an integrated and effective block dunk, underscoring the need for more effective teaching methods.

Kolb's experiential learning theory is a modern model suitable for teaching complex sports skills. It is based on four integrated stages: concrete experience → observation and reflection → conceptual abstraction → active experimentation. It allows students the opportunity to undergo direct practical experience, then reflect on their performance, extract rules and concepts, and reapply them in new situations. This sequence contributes to enhancing motor coordination and making the learning of complex skills such as the smash serve and block more effective and accurate. It integrates practical and theoretical aspects and motivates students to actively participate and learn, which reduces errors and increases performance quality.[1]

The importance of this research lies in its aim to develop physical education teaching methods by designing an educational curriculum focused on developing motor coordination and improving the learning of basic volleyball skills.[2] The research is expected to contribute to raising students' technical performance, increasing their motivation to learn, and providing physical education teachers with a more effective teaching method that can later be applied to other sports skills, enhancing the quality of the educational process and its outcomes.

Methodology

Research Problem

Field observations and teacher reports indicate that primary school students face difficulties in mastering the skills of the smash and the block. Errors are prevalent in timing, approach, elevation, aiming/directing the palm, reading the ball's trajectory, and establishing a correct blocking position. Part of these difficulties are attributed to the dominance of the declarative style of teaching and the limited opportunities afforded to students to experience the full learning cycle (experimentation-reflection-abstraction-experimentation).

Thus, the research problem is defined as: Does implementing an educational approach based on Kolb's theory lead to better motor coordination and accelerated learning and mastery of the smash and block skills among students compared to traditional methods?

Research Objectives

1. Develop an educational curriculum for the skills of the smash and block, based on Kolb's four stages of theory.
2. Identify the effect of the proposed curriculum on developing students' motor coordination.
3. Compare the effectiveness of the proposed curriculum with the traditional method in learning and mastering the skills of the smash and block.

Research Hypotheses

1. There are significant differences between the pre- and post-tests of the experimental group in favor of the post-test in motor coordination and in the performance of the smash and block.
2. There are significant differences in the post-test between the two groups (experimental and control) in favor of the experimental group in motor coordination and skill performance.
3. There is a significant positive correlation between the degree of improvement in motor coordination and the degree of improvement in performance of the smash and block skills among members of the experimental group.

Research Areas

- First: Human Subject Area: Third-year students at the College of Physical Education and Sports Sciences at the Islamic University.
- Second: Spatial Area: A closed hall within the college.
- Third: Temporal Area: From May 10, 2025 to July 2, 2025.

Research Methodology

"The researcher relied on the experimental approach due to its suitability for the nature of the study. He chose a two-group design: experimental and control, with pre- and post-tests. This type of design is one of the most prominent experimental methods, as the variables in the experimental group are measured beforehand, then the independent variable is introduced, and then measured again afterward to determine the effect of the independent variable. To analyze the significance of the differences between the arithmetic means of the pre- and post-tests, the researcher used a t-test for correlated samples to verify the results in a scientifically accurate manner."

Population and Research Sample

"The process of selecting a sample is closely related to the nature of the community from which it is drawn". The sample represents a part of the community being studied and aims to be an accurate reflection of it. According to (Abdullah and Muhammad Abdel Dayem, 1999, p. 109), the research population in this study included 122 third-year students at the Islamic University. From these, 30 students were selected as a research sample, representing 31.57% of the total study population. They were divided into two groups: an experimental group and a control group, each comprising (15) students. A pilot sample of (6) students was selected from outside the research sample.

Sample Homogeneity

To ensure the" homogeneity of the research sample and control for variables that might affect the accuracy of the results," the researcher examined the sample homogeneity through a set of variables related to anthropometric and morphological measurements. These variables included: mass, height, and chronological age. The researcher relied on the skewness coefficient to analyze the data, and the results are shown in Table (1).

Table 1. shows the homogeneity of the research sample

Variables	Units	Mean	SD	Median	Skewness

Mass	Kg	69.22	7.33	68	-0.487
Height	Cm	172.4	4.21	172	0.284
Chronological Age	Year	21.20	1.72	21	-0.116

*Since the results of the skewness coefficient were all between (+1), the research sample members were homogeneous in terms of the variables.

Methods, Devices, and Tools Used

Data Collection Methods

- Arab and foreign sources and references.
- Personal interviews.
- Questionnaire.
- Observation.
- Tests and measurements.

Devices and Tools Used

- (3) high-resolution cameras
- (6) indicators
- (15) volleyballs
- (4) colored tape
- blackboard, (10) chairs
- Office supplies (papers and pens).
- A closed room.

Research Field Procedures:

Description of Tests:

First // Ball Throwing and Receiving Test. [3]

- Test Objective: To assess eye-hand coordination.
- Equipment Required: Tennis ball, smooth wall.
- Performance Description: The student stands behind a line drawn on the ground, 5 meters away from the wall. The test is conducted as follows:
    1. The student throws the ball five consecutive times using the right hand, receiving the ball after it bounces off the wall with the same hand.
    2. The student throws the ball five consecutive times using the left hand, receiving the ball after it bounces off the wall with the same hand.
    3. The student throws the ball five consecutive times using the right hand, receiving the ball after it bounces off the wall with the left hand.
- Scoring: One point is awarded for each correct attempt. Therefore, the final score for the test is 15 points.

Second: Objective of the test: To test the slam dunk in volleyball.[4]

- Equipment Used: "A legal volleyball court and (5) legal volleyballs and colored tape to divide the court areas.
- Performance Specifications: The student will stand in the middle of the end line of the court (the half facing the designated half of the court), (9) meters from the net. At

this point, the student will hold the ball and perform a smash, allowing the ball to cross the net and reach the other designated half of the court.

- Performance Conditions: If the ball touches the net and crosses it, or if it lands outside the court, it is considered an attempt for the student (out of the five attempts).
- Scoring: The student will receive a score from the area in which the ball lands for each correct attempt. Each student will have (5) attempts, and the scores will be distributed across the zones from (1-5). The maximum score for this test is (25). Note that if the ball lands on the line separating two zones, the student will receive the score for the higher zone."

Third: The Block Wall Test[5]

- 5 attempts in each position (4, 3, 2).
- Recording: The student takes a score for each area where the ball lands on the other court, and the total for each position is calculated, followed by the total for the three positions.

Note: The teacher stands on a table to demonstrate the natural position for performing the smash.

- A 30-second rest period is given after every (5) attempt.

Exploratory Experiment:

"The pilot experiment was conducted before commencing the main experiment to identify the most significant obstacles and negatives, so that these can be addressed. The goal of the pilot experiment is to:

1. Determine the suitability of the tests for the research sample and measure their performance times.
2. Ensure the suitability of the hall and the tools used for the tests.
3. Prepare the support team and identify any difficulties they may encounter.
4. Identify any difficulties that may arise during the workflow and develop appropriate solutions."

Pre-tests

The researcher conducted the pre-tests on Tuesday, May 13, 2025, at 9:00 a.m., in the closed hall within the college. The two research groups (experimental and control) were tested according to the specifications and performance conditions for each test.

Main Experiment

The researcher designed and prepared the educational units based on Kolb's strategy, drawing on his personal experience in this field. Appropriate exercises within these units were applied to meet the requirements of the targeted skills on the experimental group during the period from May 14, 2025, to June 30, 2025. The process included teaching the course "Applications of Volleyball Skills Teaching Methods" to third-year students for the 2024/2025 academic year. The course used an innovative strategy known as Kolb's for generating new ideas. This strategy differs markedly from the traditional teaching methods students are accustomed to. The skills of the smash and block were explained, and problems and questions were posed to highlight strengths and weaknesses.[6] This was accomplished

by creating a learning-friendly environment, including giving students time to practice and the opportunity to reflect on the ideas presented, select the best ones, and evaluate them. This process helped unleash students' ideas freely, without any tendency to overly evaluate or criticize them at the outset. This could lead to students becoming fearful or focusing on quality over quantity, which slows down thinking and reduces the rate of creative ideas presented.[7]

The learning period extended over (6) weeks to teach the skills. During this period, preliminary tests were conducted to assess the students' level before the program began. The results were compared through subsequent tests conducted after the experimental design phase for each skill was completed.

Post-test Measurements

After completing the units according to Kolb's theory, post-tests were administered to the control and experimental groups on Saturday, June 31, 2025, at 9:00 AM, in the same location and under the same conditions as the pre-test.

Statistical Methods:

The researcher used SPSS to process and extract data.

Result and Discussion

Presentation and Discussion of Results

- Presentation of the results of the pre- and post-tests of the control group for the variables studied:

Table 2. shows the test results for the control research group

Variables	**Units**	Pretest		Posttest		(t) value	Sig. value	Indicator
		Mean	**SD**	**Mean**	**SD**			
Motor coordination	**Degree**	**8.4**	**1.054**	**10.2**	**0.991**	**3.832**	**0.007**	**Sig.**
Smashing serve	**Degree**	**12.17**	**1.332**	**16.14**	**1.017**	**6.902**	**0.000**	**Sig.**
Block wall	**Degree**	**4.1**	**1.012**	**5.81**	**0.932**	**3.162**	**0.002**	**Sig.**

- Displaying the results of the pre- and post-tests for the experimental group for the studied variables:

Table 3. shows the test results for the experimental research group

Variables	**Units**	Pretest		Posttest		(t) value	Sig. value	Indicator
		Mean	**SD**	**Mean**	**SD**			
Motor coordination	**Degree**	**8.2**	**1.123**	**12.4**	**0.856**	**5.117**	**0.000**	**Sig.**
Smashing serve	**Degree**	**13.14**	**1.017**	**18.1**	**0.942**	**5.122**	**0.001**	**Sig.**
Block wall	**Degree**	**5.85**	**0.932**	**7.69**	**0.995**	**3.031**	**0.004**	**Sig.**

- Displaying the results of the post-tests for the control and experimental groups for the studied variables:

Table 4. shows the results of the tests for control and experimental groups

Variables	**Units**	Pretest		Posttest		(t) value	Sig. value	Indicator
		Mean	**SD**	**Mean**	**SD**			

Motor coordination	**Degree**	**10.2**	**0.991**	**12.4**	**0.856**	**2.844**	**0.004**	**Sig.**
Smashing serve	**Degree**	**16.14**	**1.017**	**18.1**	**0.942**	**3.442**	**0.003**	**Sig.**
Block wall	**Degree**	**5.81**	**0.932**	**7.69**	**0.995**	**3.129**	**0.002**	**Sig.**

Discussion of the Results:

The results of Table (2) indicate statistically significant differences between the performance of the control group in the pre- and post-tests, in favor of the post-tests, regarding the research variables in volleyball among third-grade students. These results highlight the importance of clearly and specifically defining objectives within performance levels or tangible behavioral patterns, which contributes to enhancing the effectiveness of the educational process.[8]

The teacher relied on a traditional approach to managing the educational process, fully supervising educational activities, monitoring student performance, and providing direct feedback. This approach was positively reflected in the post-test results, consistent with the nature of the implementation of the practical skills studied. In addition, adherence to a specific teaching method played a major role in achieving the excellent results, confirming the quality of performance resulting from the application of this approach in the educational process.[9] "The results presented in Table (3) for the motor coordination tests and the two skills (smashing serve and blocking) in volleyball for students revealed statistically significant differences between the pre- and post-tests, in favor of the post-tests for the experimental group. The researcher attributes this progress to the positive impact of the educational unit based on Kolb's theory. A noticeable improvement was observed in the level of motor coordination among students in the experimental group, in addition to an improvement in their performance in the smashing serve and blocking skills in volleyball. This success is attributed to the curriculum's integration of practical experience, observation, and practical application. The student's role is not limited to simply listening to the explanation but rather undergoes repeated practical experience that includes continuous error correction."[10]

About motor coordination, repetition and gradual training contributed to enhancing students' ability to control their body movements and coordinate with appropriate timing, which positively impacted their overall performance. Regarding the smash skill, students benefited from the stages of Kolb's theory through direct practice and observing their teammates performing, which improved their awareness of movement timing and the correct arm and jump technique.[10 In the blocking skill, the combination of experience and observation played a key role in improving anticipation skills and response speed, resulting in greater accuracy and greater effectiveness in performance compared to the past.[11][12]

More broadly, the approach based on Kolb's theory proved superior to traditional methods, as it placed the student at the center of the learning process. Learning based on direct experience contributes to linking cognitive and physical aspects,[13][14] leading to clearer results in mastering sports skills. This is consistent with what Kolb (2015) indicated

that experiential learning increases the effectiveness of both mental and motor processes by integrating cognitive and practical aspects.[15]

Conclusion

1. Adopting an educational approach based on Kolb's theory clearly helped develop students' motor coordination compared to traditional methods.
2. Applying Kolb's steps (experiment - observation - understanding - application) makes learning the smash and block skills easier and more accurate for students.

Recommendations

1. The necessity of adopting Kolb's theory in teaching mathematical skills, as it provides opportunities for experimentation, interaction, and active participation for students.
2. Encouraging teachers to use learning methods based on direct practice and reflection rather than relying solely on theoretical explanation.

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