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Contribute to the pivotal thinking skills in performing the transmission skill from Volleyball Fourth preparatory grade adolescents

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Abstract

The aim of this study was to identify the level of critical thinking skills among fourth-grade middle school students and to determine the performance level of the underhand volleyball pass, with the assumption that there is a positive relationship between critical thinking and skill performance. The study population included 281 students from Basra Preparatory School for Girls under the Second Baghdad Education Directorate for the 2024/2025 academic year, of whom 275 students were intentionally selected as the research sample (97.865% of the population). The experimental procedure involved applying a critical thinking scale and a technical performance test for the underhand pass on 25 students per day over 11 days, from February 9 to February 23, 2025, excluding Fridays and Saturdays. During this period, students had already been taught the underhand pass within the curriculum. Data were analyzed using SPSS, and results indicated that students possessed an acceptable level of critical thinking skills and an acceptable level of performance in the underhand pass. Moreover, higher levels of critical thinking were associated with improved skill performance, demonstrating a direct positive impact. The study recommends that physical education teachers incorporate critical thinking assessment and training into volleyball lessons to enhance both cognitive and practical skill development.

Keywords Critical Thinking Skills, Pivotal Thinking, Volleyball, Underhand Serve Performance.

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Introduction

The task of thinking lies in finding appropriate solutions to theoretical and practical problems that learners face in nature and society, and this task is continually renewed, prompting an ongoing search for new methods and strategies to overcome difficulties and obstacles. Therefore, thinking, as a cognitive process, is considered a fundamental element in the learner's cognitive construction, characterized by its social nature and systemic function, which allows it to interact with other cognitive processes such as perception, imagination, and memory, as well as with emotional, affective, and social aspects (Rzouqi et al., 2019, p. 11).

Skill is defined as "a performance characterized by a high degree of quality and consistency, minimizing the effort and time expended by the individual, whether applied mentally or physically" (Zayer et al., 2019, p. 85). Accordingly, critical thinking skills are defined as "a relatively discrete cognitive process that can be considered as building blocks of thinking" (Alwan, 2012, p. 106). They are also described as "a mental process applied uniformly to achieve a specific goal, comprising a list of twenty-one fundamental sub-skills categorized into eight main groups" (Nofal & Al-Rimawi, 2008, p. 33), and as "a set of mental processes that students must possess to understand, comprehend, and recognize the relationships, ideas, and main concepts involved" (Bayoumi, 2023, p. 92).

It is essential that the development of cognitive skills proceeds alongside physical fitness, with skills such as attention, mental visualization, and memory retrieval planned for development like strength, flexibility, and speed. Integrating both mental and physical preparation, especially in early stages, supports the enhancement of physical, skill-based, cognitive, and affective competencies, while neglecting such integration hinders competitive achievement (Basel, 2018, p. 222). Studying thinking, its methods, and structural characteristics is fundamental for applying appropriate thinking strategies to situations encountered in life, with thinking methods reflecting individual preferences and adaptability depending on the context (Al-Fahdawi & Al-Hayani, 2016, p. 219).

Jalabi notes that Robert Marzano and colleagues classified twenty-one central thinking skills into eight main categories, providing students with a framework to organize their thinkin skills and become effective thinkers. Teaching critical thinking skills can occur at any stage of formal education and supports other cognitive dimensions, including critical and creative thinking, with the skills interconnected rather than separate (Jalabi, 2024, p. 5).

The most common classification of critical thinking skills includes: 1) Focus skills: problem identification and goal setting; 2) Information-gathering skills: observation and question

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formulation; 3) Memory skills: encoding and retrieval; 4) Organization skills: comparison, classification, sequencing, and representation; 5) Analysis skills: identifying features, patterns, main ideas, and errors; 6) Generation skills: inference, prediction, and expansion; 7) Integration skills: summarization and reconstruction; 8) Evaluation skills: setting criteria and verification (Sufih, 2023, pp. 57–59).

The importance of thinking skills for learners and teachers lies in enabling students to consider diverse perspectives, evaluate ideas objectively, enhance learning enjoyment, boost self-confidence and self-esteem, and support teachers in addressing various learning styles, increasing motivation, engagement, and instructional effectiveness (Al-Afoun & Abdul-Sahib, 2012, pp. 37–39).

Volleyball, characterized by its fast-paced skill execution, requires facilitating thinking processes to improve the application of technical skills and achieve multiple objectives simultaneously. The underhand pass is a fundamental skill in volleyball, defined as “the stroke used to start play or resume it after a point or error, typically executed by the player in the back-right position using an open or closed hand or any part of the arm to send the ball over the net to the opponent’s court” (Marwan, 2001, p. 67).

Through observing fourth-grade students, the researchers noted that many need to focus on body movements while performing the underhand pass, necessitating detailed attention to skill execution. Hence, the research problem seeks to answer the question: Do critical thinking skills contribute to the performance of the underhand volleyball pass among fourth-grade students? Accordingly, the study aims to identify the level of critical thinking skills among these students and assess their numerical performance in the underhand pass, hypothesizing a positive relationship and influence of critical thinking on skill performance.

Methodology

The study adopts a descriptive approach with a correlational method according to the specifications of the current research problem. The research population consists of fourth-grade students at Basra Preparatory School for Girls, under the Second Karkh Baghdad Education Directorate for the 2024/2025 academic year, including both scientific and literary branches in the morning study schedule. The total population comprises 281 students, divided naturally into five classes. After excluding six students who did not meet the research criteria for various reasons, 275 students were intentionally selected as the research sample, representing 97.865% of the total population.

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To measure critical thinking skills in volleyball, the study employed the scale developed by Muhammad (2025, p. 115), specifically designed for this sample, which is scientifically validated and has been constructed within the last six months (see Appendix 1). Its detailed components are presented in Table 1.

Table 1: Structure of the Critical Thinking Skills Scale in Volleyball for Fourth-Grade Students

Scale Dimension	Number of Items	Response Options	Scoring Key	Score Range	Hypothetical Mean
Focus Skills Dimension	5	Always applies, Sometimes applies, Does not apply	3 2 1	5 – 15	10
Information-Gathering Skills Dimension	5			5 – 15	10
Memory Skills Dimension	5			5 – 15	10
Information Organization Skills Dimension	5			5 – 15	10
Analysis Skills Dimension	5			5 – 15	10
Generation Skills Dimension	5			5 – 15	10
Integration Skills Dimension	5			5 – 15	10
Evaluation Skills Dimension	5			5 – 15	10
Total	40	3	3	40 – 120	80

Note: The scale includes guiding instructions for the students to answer the items.

To measure the technical performance of the underhand serve, a performance test graded out of ten points was adopted (Nassif et al., 2012, p. 111). The research experiment began with the application of the critical thinking skills scale and the technical performance test of the underhand serve, at a rate of 25 students per day over a period of 11 days, from February 9, 2025, to February 23, 2025, excluding Fridays and Saturdays each week. This timing was chosen based on the fact that, during this period, the students had already received instruction in the underhand serve in volleyball as part of their scheduled curriculum for the first semester of the academic year.

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Statistical Analysis

The research data were processed automatically using the Statistical Package for the Social Sciences (SPSS) to calculate the values of percentages, arithmetic mean, standard deviation, the t-test for independent samples, Pearson's simple correlation coefficient, Cronbach's Alpha equation, Pearson's skewness coefficient, the t-test for a single sample, and the simple linear regression coefficient.

Results

Table 2: Comparison of the Arithmetic Mean with the Hypothetical Mean for Both Variables

Variables	Total Score	Hypothetical Mean	Arithmetic Mean	Standard Deviation	Mean Difference	t	Sig.
Critical Thinking Skills	120	80	84.2	1.954	4.204	35.668	0.000
Underhand Serve Performance in Volleyball	10	5.0	6.78	1.403	1.778	21.015	0.000

Table 3: Results of the Correlation, Simple Linear Regression, Contribution Ratio, and Standard Error

Predictor Variable	Dependent Variable	Simple Correlation Coefficient (R)	Linear Regression Coefficient R^2 (Coefficient of Determination)	Contribution Ratio	Standard Error of Estimate
Critical Thinking Skills	Underhand Serve Performance in Volleyball	0.937	0.879	0.878	0.489

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Table 4: Results of the F-Test for Examining the Goodness of Fit of the Simple Linear Regression Model

Predictor Variable	Dependent Variable	Variance Source	Sum of Squares	df	Mean Square	F	Sig.
Critical Thinking Skills	Underhand Serve Performance in Volleyball	Regression	474.118	1	474.118	1980.595	0.000
		Residual	65.351	273	0.239		

Table 5: Results of the Estimated Values of the Constant Term and the Slope (Effect)

Dependent Variable	Predictor Variable	Beta (β)	Std. Error	t	Sig.
Underhand Serve Performance in Volleyball	Constant	49.896	1.274	39.171	0.000
	Critical Thinking Skills	0.673	0.015	44.504	0.000

Discussion

Referring to the results presented in Table (2), it is evident that the arithmetic means of both investigated variables among fourth-grade secondary school students exceeded their hypothetical means, indicating the availability of the desired level for each. Furthermore, the regression model results shown in Table (3) revealed that critical thinking skills are significantly associated with and contribute to the underhand serve performance in volleyball. This was further confirmed by the regression model fit in Table (4), while the remaining proportion of contribution is attributed to other random, unexamined factors. In addition, Table (5) demonstrated that an increase in critical thinking skills has a direct positive effect on enhancing underhand serve performance in volleyball. These results indicate that critical thinking skills play an essential role in improving the level of performance in underhand serve, as the researchers attribute these findings to the fact that the specific educational objectives in physical education rely on knowledge-based performance. Such knowledge requires detailed and comprehensive thinking to master the requirements of the motor skill and achieve the correct performance in class. Hence, critical thinking skills become a necessity for students to activate information during the practical phases of learning tasks, enabling knowledge-based and meaningful performance after careful thinking through the details of the three stages of the skill, while also avoiding common errors before practical application. This is particularly important for beginners, as it requires teaching

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them to think through practical applications tailored to classroom situations, thereby achieving multiple purposes simultaneously.

Indeed, it has been confirmed that "the brain operates on the principle of 'use it or lose it,' and thus, thinking must be emphasized as it sustains brain activity" (Al-Afoun, 2012, p. 213). Moreover, "many scholars have highlighted the importance of teaching thinking by linking it with academic subjects, as such integration strengthens students' confidence in themselves and enables them to apply it more effectively" (Yousef, 2011, p. 73). In this regard, "teaching critical thinking skills can take place at any educational stage, as these skills are fundamental and indispensable for employing other dimensions of thinking, such as metacognitive thinking, critical thinking, or creative thinking. They serve as the building blocks of cognition and an effective tool for enabling learners to acquire knowledge and cope with the demands of contemporary life. Critical thinking also helps learners independently access information and facts rather than relying on others" (Khalil & Jameel, 2020, p. 180). Furthermore, "the surrounding environment has a clear impact, sometimes even constraining most of one's thinking. A psychologically healthy environment supports sound thinking, whereas a weak or unstable environment may lead to disturbances in one's thought processes" (Mikhail, 2022, p. 42). It has also been emphasized that "all thinking requires an input of information received by the brain through the senses, which is supported by visual stimuli in magnetic field applications. Thus, attention and focus must be increased on relevant stimuli for learners to effectively cope with classroom situations" (Shamoun, 2017, p. 60). Additionally, "when diverse ideas and innovative experiences are exchanged, an environment that fosters creativity can emerge. In the context of volleyball, students can be inspired by the ideas of others to experiment with new and effective techniques" (Capranica & Others, 2020, p. 165). As noted, "the importance of critical thinking lies in deep and deliberate reflection on a topic or situation, analyzing events from multiple perspectives, consolidating learning through meaningful tasks, and fostering creativity in students while enabling them to deal with real-life challenges effectively" (Abdul-Karim & Al-Jarrah, 2021, p. 326). Likewise, "critical thinking can develop diverse abilities and skills among students, such as planning, inference, observation, evaluation, and problem-solving, while also enhancing academic performance and achieving a deeper understanding of content" (Ibrahim, 2021, p. 197).

Conclusions

The study concluded that fourth-grade secondary school students possess an acceptable level of both critical thinking skills and underhand serve performance in volleyball. Moreover, the findings demonstrated that an increase in the level of critical thinking skills directly and positively

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contributes to the improvement of underhand serve performance, indicating a strong and proportional relationship between the two variables.

Recommendations

Based on these conclusions, it is recommended that physical education teachers adopt the critical thinking skills scale in volleyball when applying modern teaching strategies for skill performance. Furthermore, there is a need to emphasize the integration of critical thinking skills into practical volleyball lessons, ensuring that their development goes hand in hand with the enhancement of technical performance in the game.

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