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RESEARCH ARTICLE

# Cognitive Regulation and Its Influence on the Performance of Volleyball Serve Skil

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**Abstract**
This study aims to identify the level of cognitive regulation and the level of serve skill performance among female students, and to identify the relationship, contribution and impact of cognitive regulation to the performance of their serve skill. This descriptive correlational study targeted sophomores at the College of Physical Education and Sports Sciences for Girls/University of Baghdad. The study included a purposive sample of (32)، . Participants' opinions were surveyed using the cognitive regulation scale in volleyball for female students then skillfully testing then using the performance of serve skill considering their accomplishment of learning performing such a skill in their academic courses. Data were analyzed using the statistical package for social science (SPSS) to be the conclusions and recommendations that the level of cognitive regulation among students of the College of Physical Education and Sports Sciences for Girls was acceptable, as well as the performance of their serve skill was acceptable, and that cognitive regulation relates, contributes, and positively affects the performance of serve skill among the study participants. It is necessary to pay attention to mental measurement when teaching the serve skill, especially cognitive regulation owing to its positive role in the performance of this skill. It is also necessary to increase the teachers' experience with the importance of paying attention to improving the level of cognitive regulation of students, as this awareness is reflected in the positives in achieving the goals of improving performance in the physical education lesson for volleyball

**Keywords**
Cognitive Regulation, Serve Skill , Volleyball

## INTRODUCTION

The teaching process is marred by many variables that those responsible persons must exert control over these variables to ensure the achievement of its goals. (Ismail, 2022) believes that teaching process is considered as an essential pillar of the educational process through which the desired changes in the behavior of individuals are made and knowledge, values, habits, and other behavior patterns are acquired. Through this, we can create a conscious generation capable of successfully leading the educational process by raising the role of physical education by employing all possible mechanisms and tools that contribute to achieving the goals of this process, and this is what (Abbas, et al.,2023) see, they emphasizes the pioneering role of sports, which is reflected on public health and on creating a distinctive personality that possesses many successful personal characteristics in society. All these principles are the basis for the teaching process in various sports and activities, especially volleyball and its specificity in the performance of volleyball skills that require collective harmony among students. It must result in a cognitive regulation for each student to rely on herself in the skillful performance after investing that interaction and deriving from it what supports this performance, especially the serve skill, which requires awareness of the various elements of the teaching environment and the material assets

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contained in the volleyball court, "the cognitive movement emerged as a reaction to the behavioral movement that neglected the role of knowledge and cognitive processes in behavior. The cognitive movement sees that the individual is not a negative responder to environmental stimuli rather thinks, interprets, and conducts a lot of mental processes before responding to environmental stimuli. However, they agree with behaviorists about the importance of studying behavior objectively measurable. The cognitive movement agrees with the structural and functional movement on the importance of studying the structure of the mind and thought processes, and it also agrees with the deductive movement in that the perception of the whole differs from the perception of parts. However, what is new to the cognitivists is the study and analysis of the structure of the mind and cognitive processes, which make us perceive stimuli and situations in this way" (Al-Zaq, 2009).

Perception is defined as "a mental process that allows an individual to assimilate and comprehend information around him through his senses and experiences, and it includes a set of mental processes that work together to collect, process, and interpret various information from the environment" (Sternberg & Sternberg, 2016). Also, "perception in general and of all kinds means the way or style of the learner in organizing his reception, assimilation, and comprehension of information as a mental process that occurs within the brain. This mental process relies on the integrity of the senses and the activity of attention and concentration, followed by the process of storage and search in memory to make the decision later" (Goetz & Ash, 2006), this is what the volleyballers need, as Malaz Haider believes that the volleyballers need many capabilities and abilities to make the appropriate decision, even if the match is prolonged, and awareness includes many basic operations, including the following: (Eysenck & Keane, 2015)

1. Sensation: This process allows the body to receive information from the surrounding environment mediated by the senses such as vision, hearing, touch, smell, and taste.
2. Perception: After receiving information from the senses, it is processed and interpreted to form meaning, and this process includes the collection of various information and its transformation into an understandable image.
3. Attention: The ability to focus on specific information from the environment and ignore other information, which helps improve perception and facilitate understanding of important matters.
4. Memory: This process involves the ability to store and retrieve information and past experiences, and memory plays a vital role in shaping our understanding of the world by linking new information with past experiences.
5. Interpretation and Expression: After processing information and converting it into meanings, the individual can interpret those meanings and express them through language, actions, and interactions (Goldstein, 2014).
6. Thinking: This process allows the individual to process information and concepts and reach conclusions and solutions, and includes different types of thinking such as critical, creative, and deductive thinking (Neisser, 2014).

"The process of perception does not take place directly but is governed by mechanisms and principles called the principles of cognitive regulation through which individuals can understand and distinguish things." (Zaghloul & Zaghloul, 2017), as the process of perception is the most important mental process that contributes to the success of the thinking process later. This is confirmed by (Karim, 2022) who believes that the success of the educational process is linked to many important elements, foremost of which is the mental capabilities and abilities of female students. Cognitive regulation "is an important aspect of the perception process that includes the arrangement of the various information we receive from the environment, in order to form an understandable and logical meaning.

Cognitive regulation includes organizing, collecting, classifying, and linking information to each other, and helps in collecting diverse information from the environment and converting it into logical and understandable meanings. This important aspect plays a role in building our understanding of the world, our decision-making, and our interaction with our surroundings." (Reisberg, 2018), and Gregory identified two types of cognitive regulation abilities quoting Tafesh: (Tafesh, 2004)

***First***

***Perception***: It is the tool by which information is captured, and these capabilities appear in the form of the following two characteristics:

***Abstractness:*** It is an attribute that enables capturing information and has a concept and mental perception mediated by thinking, and that this attribute enables the individual to record and process what he has of information and special ideas, opinions, concepts, feelings, motives, and experiences, so abstraction attribute allows the individual to understand and realize what is not imagined or perceived for him in form mediated by various senses.

***Concreteness:*** This attribute enables the individual to receive information and record it in the mind by using the senses directly, and this attribute allows the individual to understand what is perceived and felt in the natural world through the different senses.

***Second***

***Organization (Ordering):*** The organizational capabilities are the means of providing the individual with a way to arrange and organize information and provide it with references, and that organizational capabilities appear in the form of two characteristics:

***Sequence:*** It is an attribute in which the mind is prepared to receive and organize information in a longitudinal, gradual, and systematic order predetermined, so information gathers each other, and its elements are linked, and implemented in the form of a sequential order, and that this attribute enables the individual to arrange the unrelated parts of the information and implement them sequentially and then classify them into categories, and this is the way in which individuals express their experiences and knowledge in an accurate, sequential, logical, and organized manner.

***Randomness:*** It is the way in which the individual prepares his mind to receive information, and then organizes it in a multi-directional way, and randomly the individual can receive a huge amount of information within a fraction of a second, and that the information remains in the mind of the individual subject to his attention and the chances of arousing and using it are usually equal to the individual. Thus, the individual can deal with multiple types of information at the same time. The individual can also express his knowledge and experience in an active, free manner that is not restricted by multiple controls and methods. Thus, the importance and role of perceptual organization for students cannot be disregarded when they continue to attend the physical education class to receive the improvements required to perform various motor skills, considering that perception is the third mental process responsible for skillful learning, and at the same time depends on receiving information from attention, concentration, and interacting with information and matching it in motor memory. Also, considering that perception or cognitive regulation cannot be observed unless it is psychologically measured. However, according to the aforementioned digression, it is necessary for skillful performance in the physical education class. From the scope of the field of work of the researchers in teaching volleyball skills, they noticed the apparent weakness of the students of the College of Physical Education and Sports Sciences in the performance of the serve skill, especially from beginners, to display a weakness in their skillful learning of serve skill, as well as in determining volleyball tracks in specific areas, to be reflected in increasing their effectiveness in the class and then reaching them to achieve those educational goals envisaged from this practical teaching, Thus, the research problem lies in an attempt by the researchers to answer the following questions:

What is the level of the perceptual regulation for the students of the College of Physical Education and Sport Science for Girls?

What is the level of performance of the serve skill for students of the Faculty of Physical Education and Sports Sciences for Girls?

What is the role, contribution, and influence of cognitive regulation on the performance of students of the Faculty of Physical Education and Sports Sciences for Girls?

This study aims to (1) what is the role, contribution, and influence of cognitive regulation on the performance of students of the Faculty of Physical Education and Sports Sciences for Girls? (2) Identifying the level of performance of the serve skill among students of the Faculty of Physical Education and Sports Sciences for Girls, and (3) identify the relationship, contribution, and influence of cognitive regulation on the performance of serve skill among students at the College of Physical Education and Sports Sciences for Girls.

## MATERIALS AND METHODS

According to the researchers mentioned in the problem of the current research, the descriptive research method was employed in the method of correlational relations, which is defined as "the study of the relationship between two variables or many variables as they are available as a phenomenon in a particular research population" (Abdel Fattah, 2022).

***Sample and Sampling***

The target population to be studied in this study is determined by the sophomores at the College of Physical Education and Sports Sciences for Girls / University of Baghdad who continue in the morning attendance for the academic year (2022-2023), whose total number is (71) students distributed by nature into two classes, of whom (32) students were purposively selected for the research sample by (45.07%) as they are the community of the current research problem, then they were treated as one total sample, and the rest of them were selected for the pilot study of (6) students representing (8.451%) of their original community.

This article's necessary ethics committee permissions were obtained with College of Physical Education and Sports Sciences for Woman / University of Baghdad, Iraq. Social Sciences Ethics Committee Commission Date: 18.01.2024 Issue/Decision No: 11. Regarding vulnerable groups, the authors took into account the needs and priorities of the groups/individuals in which the study was conducted, in accordance by Articles 19 and 20 of the WMA Declaration of Helsinki , and the situation that the study could not be carried out outside these groups and individuals was taken into account. "In this study, additional precautions were taken by the researcher(s) to protect the volunteers."

***Measures and Procedures***

The researchers used the cognitive regulation scale in volleyball for female students (Dunia, 2023), which is a measure that enjoys all scientific foundations and transactions and has not been built on the students of the College of Physical Education and Sports Sciences for Girls in Iraq for more than (6) months, and its details are displayed in Table (1):

**Table 1.** The structure of the cognitive regulation scale in volleyball for female students in its form as reported from its source

| | Dimensions | No. of items | Alternatives | Correction key | Range | Average |
|---|---|---|---|---|---|---|
| 1 | Visual fullness | 6 | Apply to me always | 5 | 6-30 | 18 |
| 2 | Auditory discrimination | 8 | Apply to me often | 4 | 8-40 | 24 |
| 3 | Visual completeness | 6 | Apply to me sometimes | 3 | 6-30 | 18 |
| 4 | Sequencing and audio linkage | 8 | Apply to me rarely | 2 | 8-40 | 24 |
| 5 | Visual Communication | 7 | Do not apply | 1 | 7-35 | 21 |
| | Total | 35 | 5 | | 35-175 | 105 |

Also, based on specificity of the current research, the validity of the scale was verified by presenting it to (19) experts to verify the face and logical validity of the paragraphs by adopting more than (80%) or more of their agreement on them. Considering that the dimensions, items, their alternatives, the key to correcting them, and the instructions of the scale have not been modified, and no items have been deleted or merged or added to them, the researchers statistically verified the reliability by processing the degrees of its application to the pilot sample of (6) students, as the result of the (Horst) coefficient (0.977) at the level of significance (0.05) and the degree of freedom (4) as the degree of (Sig)< (0.05). Thus, the image of the scale was adopted as it is without any change to it as shown in Appendix (1), and the test of Hassanein (2001, 247) was adopted, in this test the student's performance in the three attempts is evaluated by three experts. The distribution of the grade shall be as follows: the preparatory section: its grade (3), the main section: its grade

(5), the final section: its grade (2), as shown in Appendix (2). The scientific foundations and coefficients of this test were verified, and the face validity coefficient was (89.474%), and the objectivity coefficient was (0.944) and reliability by repetition (0.917) at the level of significance (0.05) and the degree of freedom (4), as the score was (Sig)< (0.05). Thereafter, the application main sample was surveyed (n = 32 female students) that was started using the Cognitive Regulation Scale in volleyball for female students, and then they were skillfully tested by the performance test of the serve skill at the College of Physical Education and Sports Sciences/ University of Baghdad for the period from May 5th, 2023 to May 31st, 2023 considering that they have finished learning to perform this skill in their school stage.

***Statistical Analysis***

After collecting the scores of each student on the scale and test, they were tabulated and then processed with the statistical package for social science (SPSS) to calculate the values of the percentage, arithmetic mean, standard deviation, independent-sample T-Test, Horst coefficient, simple Person coefficient, one-sample T-Test, and linear regression model.

## RESULTS

**Table 2.** Statistical parameters of the two study variables compared to the hypothetical mean of each of them

| Variable | Total degree | Hypothetical mean | X | SD | t | Sig. | P-value |
|---|---|---|---|---|---|---|---|
| Cognitive regulation in volleyball for female students | 175 | 105 | 122.5 | 15.244 | 6.494 | 0.000 | Significant |
| Serve skill performance | 10 | - | 7.09 | 1.957 | - | - | - |

Significant at $p \leq 0.05$, Degree of freedom = 30, Significance level = 0.05, df = 31, measurement unit = Degree, Arithmetic mean (X), Std. Dev. (SD)

**Table 3.** Simple correlation coefficient, linear regression, contribution ratio, and standard error of estimation

| Influential | Influenced | Simple correlation coefficient R | Linear regression coefficient $(R)^2$ | Contribution proportion | Standard error of estimation |
|---|---|---|---|---|---|
| Cognitive regulation in volleyball for female students | Serve skill performance | 0.947 | 0.896 | 0.893 | 0.641 |

**Table 4.** F-Test for investigating quality of linear regression model reconciliation

| Influential | Influenced | Variance | Sum of squares | df | Mean square | F | Sig. | P-value |
|---|---|---|---|---|---|---|---|---|
| Cognitive regulation in volleyball for female students | Serve skill performance | Regression | 106.399 | 1 | 106.399 | 259.1 | 0.000 | Significant |
| | | Errors | 12.319 | 30 | 0.411 | | | |

df: Degree of freedom (df = 30), Sig.: Significance, F is significant at $p \leq 0.05$ at p-value = 0.05

**Table 5.** Values of constant limit and inclination (influence)

| Influential | Variables | β | Standard error | t | Significance | P-value |
|---|---|---|---|---|---|---|
| Serve skill performance | Constant | -7.794 | 0.932 | 8.364 | 0.000 | Significant |
| | Cognitive regulation in volleyball | 0.122 | 0.008 | 16.097 | 0.000 | Significant |

Significance level = 0.05, df = 32, t is significant at p-value $\leq 0.05$

## DISCUSSION

The regression model displays that cognitive regulation positively relates, contributes, and influences the performance of the serve skill among students at the College of Physical Education and Sports Sciences for Girls. The higher the level of cognitive regulation, the higher the level of performance of the serve skill. The rest of the contribution percentage is attributed to random, unexamined factors. The researchers attribute the emergence of the result of linear regression to the students' possession of cognitive regulation, which exceeded the hypothetical mean of the scale, which helped them to realize the position of the body and feet, as the performance begins with a correct position of the body, the feet are far apart almost shoulder-width, with one foot slightly in front of the other. This helps in achieving a good balance during serve, and thus positively reflected on performance. This level of cognitive regulation helped the proper performance of the position of the hands and the ball, as the ball must be in the student's hand in a comfortable position, with the hands placed from below to support the ball, the fingers must be slightly adjacent to support the ball straight, the you understand that when you prepare to serve, you must point the object forward toward the target you intend to send the ball at. This helps in achieving better serve accuracy. The serve begins by moving the hands back slightly backwards and then going quickly, with the arms and feet used to transfer force to the ball, and the timing in the final touch of the ball is accurate. This finishing touch should be close to the moment when the ball touches the top of the hands. When touching the ball, it must be directed by engaging the wrist and hands to guide it precisely, breathing movements must be proportional to the serve execution, the focus must be on the ball and the target to be aimed, and serve requires strength in the arms and shoulders, so the player must be in good fitness to achieve sufficient strength in the serve. The reflection of cognitive regulation on the performance of the serve skill from below in volleyball depends on coordination among the body, hands, and feet, and accurate timing to obtain an accurate, strong serve. The kick-off time and rhythm of the ball can be used to achieve a more efficient serve, and the serve must be performed at the right moment after the ball has risen slightly. "Cognitive regulation is important in activating innovation, as when diverse ideas and innovative experiences are exchanged, an environment can be created that encourages innovation in the application of volleyball skills and students can be inspired by others' ideas to try new and effective methods." (Capranica et al.,2020), "the practice of mental processes and perception have an impact on growth and development and that this practice does not achieved without training and exercise, which work to attract the learner's mind in order to exercise the skills inherent to him, as his mental development emerges placing him in a rich, stimulating, and sound environment that contains a set of experiences, attitudes, and stimuli appropriate to the age of each learner." (Hamid, 2007). "The role of cognitive regulation of knowledge exchange comes as an important tool in achieving the continuous development and improvement of the learners' performance. This role includes managing and organizing the conveying knowledge and valuable experiences among them, whether they are learners or teachers" (Ribeiro et al., 2021).

Mental training requires allocating time to acquire mental skills in the light of daily exercises and determined times per week, if the learner decides to develop and control the mental aspect, as happens in the physical aspect, and work in a serious way in order to save the necessary time" (Chamoun, 2017). Also, "the cognitive regulation is important in investing the previous experiences through the exchange of experiences and advices, the team can benefit from previous experiences to avoid mistakes and continue to improve the skillful performance in volleyball." (Ribeiro et al., 2021). This is consistent with (Maysam, 2023) who indicates that learning would be more effective as a result of building new learning by relying on the learner's previous knowledge and experiences and linking them with new information. Bandura sees; as mentioned by Rajih, that "Individuals have the ability to influence their behavior and their environment, using cognitive processes, that is, when a person arranges the situational environmental variables, and creates cognitive foundations to produce the desired effects that can be derived from the variables, he exercises the attribute of self-control." Therefore, the energy, capacity, means, methods or strategies that enable us to continuously and successfully interact with

the environment" (Barakat, 2012). "Cognitive regulation of knowledge exchange leads to enhancing communication and collaboration among team members, shared knowledge can bring together different team members and increase their integration" (Crotty & Abrahams, 2018). "The ability of visual and sensory perception is one of the most important mental processes that play a role in giving meaning to our sense of different sports movements and is an important part of the information processing system, i.e., analyzing and understanding sensory information coming from the surrounding environment" (Naif, 2004). Individuals also differ in learning abilities and how to deal with, retain, and organize information in the situations facing each of them. One of the manifestations of individual differences among individuals is their difference in their mental characteristics, which are considered the active component of memory and responsible for processing information (Sakr, 2021). The cognitive regulation of knowledge exchange displays an important role in enhancing the skillful learning of volleyballers, by exchanging experiences and directing advice, as the focus must be on continuous learning and adaptation to new knowledge and experiences, and the team can benefit from continuous changes and improvements in performance" (Araújo & Davids, 2016). Since understanding and assimilating the environment in which we live is important and a distinct ability, this cognitive process of the world we live in is not without complexities" (Hassan 2017). As (Roaa Abdul Amir Abbas et al., 2019) believe that understanding these complexities requires the creation of new management systems and unconventional methods that fit with environmental variables and developments and are dealt with in a wonderful way. Also, "cognitive regulation can help guide learners toward reliable sources of knowledge, as cognitive regulation of knowledge exchange plays an important role in learning skillful performance in volleyball, by directing discussion, stimulating participation, and providing support. Continuous improvement in performance can be achieved. This role contributes to building an educational culture based on cooperation and knowledge sharing" (Launder & Piltz, 2015). The active mental perception of the performance of certain skills results in an activity of the muscles working in that skill, and may be limited, but its usefulness is evident in strengthening the pathways of nerve signals sent from the nervous system to those muscles, as well as the mental perception helps the student in achieving more knowledge (Tamimi, 2018).

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**Conflict of Interest:**

There is no personal or financial conflict of interest within the scope of the study.

**Ethics Committee**

Board Name: College of Physical Education and Sports Sciences for Woman / University of Baghdad, Iraq. Social Sciences Ethics Committee Commission Date: 18.01.2024 Issue/Decision No: 11.

***Author Contributions***

Study Design: DA, NA; Data Collection: DA, NA; Statistical Analysis: DA; Data Interpretation: DA, NA; Manuscript Preparation: DA, NA; Literature Search: DA, NA. All authors have read and agreed to the published version of the manuscript.

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