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The Effect of the Hot Chair Strategy on Developing Cognitive Achievement in the Law of Volleyball among Female Students

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Abstract

The Hot Chair strategy is considered one of the cooperative learning strategies that relies on interactive dialogue and discussion among students to enhance cognitive understanding. This study aimed to identify the effect of the Hot Chair strategy on developing cognitive achievement in volleyball rules among female students. The study adopted a quasi-experimental approach using a two-group design (experimental and control) with pre-tests and post-tests. The study sample consisted of 60 female students from the College of Physical Education and Sports Sciences at the University of Baghdad during the 2025–2026 academic year. The experimental group included 30 students who were taught using the Hot Chair strategy, while the control group consisted of 30 students who were taught using the traditional discussion method. To measure cognitive achievement, a Cognitive Achievement Test for Volleyball Rules was developed. The test was a multiple-choice exam consisting of 20 items covering key topics related to volleyball rules. The test items were designed according to the curriculum content and relevant scientific references to ensure their suitability and validity. The results showed statistically significant differences between the experimental and control groups in favor of the experimental group. These findings indicate the effectiveness of the Hot Chair strategy in improving students' cognitive achievement in volleyball rules. The strategy provides an interactive learning environment based on dialogue, discussion, and active participation, which helps students better understand and comprehend the legal concepts of the game. Accordingly, the study recommends adopting the Hot Chair strategy

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in teaching volleyball rules in colleges of physical education and sports sciences and encouraging the use of active learning strategies in teaching different sports subjects.

Keywords: Hot Chair Strategy, Cognitive Achievement, Volleyball Rules.

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Introduction and Significance of the Research:

Physical education faces several challenges related to teaching methods and the effectiveness of female students' acquisition of legal knowledge related to the game, especially in light of emergency circumstances such as the COVID-19 pandemic, which has affected traditional teaching methods. From this perspective, the Hot Chair Strategy (Al-Saeedi & Aziz, 2018) is an effective approach to collaborative learning, as it provides an interactive learning environment based on dialogue and discussion among students, which contributes to the development of their knowledge of volleyball rules. Knowledge acquisition of the rules refers to the possession of accurate knowledge related to the rules governing the game under study, which makes the selection of appropriate teaching strategies extremely influential in the success of the teaching and learning process in physical education.

In addition, the hot chair strategy aligns with the three motivational components identified by (Keller, 2010) namely: attention, relevance, and confidence and satisfaction. The exploratory sequential model has highlighted the importance of providing relevant educational materials to increase students' cognitive, psychomotor (skills), and affective abilities. This educational approach is also one of the active learning strategies that enhance the role of the learner in the educational process, as this strategy aims to actively engage the learner in the learning process, focusing on their positive role and continuous activity. "Saad Zayer" (2014) referred to the hot chair strategy as a method used to stimulate students' thinking when discussing a topic from multiple perspectives and listening to different points of view. The teacher acts as a facilitator for the students by selecting students to carry out the discussion task and ensure its success, dividing them into groups, and asking questions to stimulate their thinking or guide them. This strategy has been proven to enhance participants' knowledge of volleyball rules. The content of physical education curriculum documents indicates that rules, terminology, and techniques (skills) represent basic knowledge related to volleyball that must be covered in teaching, which is consistent with research findings (Liya Sakarina Sari, 2013; Yudhianto, 2013; Moh. Latar, 2015). Before the course began, the students were unable to provide correct answers about the objectives of volleyball terms such as "served" or "spike," which are the most commonly used techniques in the game. The students also faced difficulties with additional concepts, such as the definition of volleyball, the objectives of serving, the definition of the concept of interest, and the definition of faults and their legal substance. The researcher believes that cognitive achievement is a fundamental pillar of the educational process, as it plays a pivotal role in enabling students to achieve a deeper understanding of the subject matter. It contributes to the development of critical and creative thinking skills, which gives students the ability to analyze information and make informed decisions based on knowledge. Cognitive achievement also enhances students' ability to solve problems in a creative and effective manner, whichThis has a positive impact on their

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academic and practical performance. Knowledge acquisition also encourages self-learning and continuous research, fostering in students a lifelong passion for acquiring knowledge in a sustainable manner.

Preliminary (exploratory) observations revealed a wide gap between the students' current knowledge and the expected level of proficiency. This gap prompted an investigation into the effect of the hot chair strategy on students' knowledge acquisition of volleyball rules. Therefore, there is an urgent need to use modern teaching strategies aimed at enhancing student participation in the learning process in an effective manner ( ), especially since third-year students often lack sufficient accumulated knowledge or practical experience. Considering the reality of teaching volleyball in physical education and sports science colleges, we find that it is dominated by a passive approach to receiving information by students, which contradicts modern trends based on constructivist theory in education, which emphasizes the importance of the active role of learners in educational situations. Based on this, the research problem was formulated to clarify the answers to the following questions:

- To what extent does the hot chair strategy affect female students' cognitive achievement in volleyball rules?
- Does the hot chair strategy have a significant (statistically significant) effect on the cognitive achievement of volleyball rules?

Research methodology and field procedures:

The research adopted a quasi-experimental approach due to its suitability for the nature of the problem, with the design of two equivalent groups (experimental and control) with pre- and post-tests for both groups.

Research community and sample: The research community was defined as third-year students at the College of Physical Education and Sports Sciences, University of Baghdad, for the academic year 2025/2026, numbering (549) students. The main research sample was selected by drawing lots from among the third-year female students, with a sample size of (60) students. The sample was randomly divided into two equal groups:

- The experimental group: consisted of (30) female students (Division A) and underwent educational units according to the hot chair strategy.
- Control group: consisted of (30) female students (Division B) and underwent educational units according to the traditional method.

Table1. Distribution of research sample individuals according to groups and teaching method

Group	Section	Number of students	Teaching method used
Experimental	A	30	Hot chair strategy
Controlled	B	30	Method used (traditional)
Total		60	

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Research Instruments

Application of the Hot Chair Strategy:

The researcher relied on the Hot Chair Strategy as one of the Active Learning Strategies that focuses on classroom interaction, critical thinking development, and knowledge building through structured dialogue and role-sharing among learners. This strategy is based on the principle of placing the learner in a stimulating educational situation that requires them to recall, analyze, and apply information in the context of direct questions, thereby promoting a deep understanding of the educational content (Prince, 2004; Bonwell & Eison, 2011; Alghamdi & Al-Salouli, 2020).

The strategy was applied during the educational units on volleyball rules, where a chair in the classroom known as the "hot chair" was reserved for one of the students to sit on after the lesson content had been presented. Before the discussion session began, the researcher set clear educational objectives related to the cognitive aspects of the rules, such as technical errors, refereeing situations, scoring mechanisms, and special playing situations. After that, the rest of the students ask direct oral questions to the student sitting on the hot chair, so that the questions are related to the lesson content and formulated in a way that requires understanding and interpretation, not just memorization and recall (Silberman, 2014; Sakarina Sari, 2019).During the activity, the researcher acts as the organizer and facilitator of the discussion, controlling the time of the session, directing questions when necessary, and providing corrective feedback in case of misconceptions, without directly interfering in the answering process, thus maintaining the active nature of learning. The principle of role rotation among students was also adopted, so that all members of the group participated in sitting on the hot chair during the various educational units, which contributes to achieving educational justice and increasing learning motivation (Johnson, Johnson, & Smith, 2014; Zayapragassarazan & Kumar, 2019).

This mechanism was consistent with the nature of learning the rules of sports, especially volleyball, which requires a precise understanding of changing refereeing situations and linking theoretical rules to practical application on the court. The hot chair strategy also contributed to enhancing classroom interaction, developing communication skills, and raising the level of cognitive achievement among students, which is confirmed by recent studies on active learning (Hattie, 2012; Alghamdi & Al-Salouli, 2020).

Cognitive achievement test:

The volleyball knowledge test consists of (20) multiple-choice test questions developed based on volleyball lesson plan standards. To ensure the comprehensiveness of the test, a Table of Specifications was constructed, through which the items were distributed across the first three cognitive levels (remembering, understanding, applying), with the remembering level comprising

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six questions (30%), the understanding level comprising seven questions (35%), and the applying level comprising seven questions (35%).

The test and its specifications table were presented to a group of experts (Expert Judgment) in teaching methods and volleyball to determine the appropriateness of the questions and their wording, and to review various sources to ensure that the questions were related to the subject matter. Since this research was conducted before the main study, the validity of the test was determined using the Validation Expert Method.

An indicator-referential rubric was also used to assess the quality of the educational process, and the researcher was the observer himself. The rubric received an expert validity score of 90%. The internal reliability of the test was estimated using the Kuder-Richardson equation, and the analysis resulted in a reliability coefficient of (0.71), which is classified as highly reliable and educationally acceptable (Moh. Latar, 2015; Liya Sakarina Sari, 2013).

Table 2. shows the specifications of the cognitive achievement test for volleyball rules distributed according to cognitive levels

Cognitive level	Number of items in the test	Number of paragraphs	Relative weight (%)
Knowledge	1, 4, 7, 10, 13, 16	6	30%
Comprehension	2, 5, 8, 11, 14, 17, 19	7	35%
Application	3, 6, 9, 12, 15, 18, 20	7	35%
Total	-	20 Paragraph	100%

Exploratory study:

The researcher conducted a preliminary study on 20/11/2025 on a sample of (30) female students in the third stage at the College of Physical Education and Sports Sciences, University of Baghdad. Five students were excluded for failing to attend, bringing the final sample size to (25) students, who were excluded from the main study sample. The experiment aimed to ensure the clarity of the instructions and verify the psychometric properties of the test.

The exploratory experiment aimed to determine the effect of the hot chair strategy on the cognitive achievement of volleyball rules among female students at the College of Physical Education and Sports Sciences, University of Baghdad. The participants were randomly divided into two groups; the experimental group was treated using the hot chair strategy, while the control group was treated using the traditional method. The treatment was provided in only two sessions. Data were collected by applying a test of knowledge of volleyball rules before and after treatment.

The data were analyzed using an independent t-test to compare the means of the experimental and control groups. Given the equal size of the two groups (30 students per group) and the similarity of the variance, the t-test was used assuming equal variance, with a degree of freedom of 58.

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Psychometric characteristics

Test validity: The researcher relied on two types:

- Apparent validity: by consulting a committee of experts in physical education and sports science at the University of Baghdad to approve the test items.
- Internal consistency validity: The researcher calculated the Pearson correlation coefficient between the score for each item and the total test score based on the exploratory sample of (25) female students. The results showed statistically significant correlations, indicating that the test is valid for measurement.
- Reliability: The researcher verified the reliability of the cognitive achievement test using the retest method. The test was administered to the sample (25 students) and re-administered after a seven-day interval. Pearson's correlation coefficient was calculated between the results of the first and second administrations. The value obtained indicated a high level of reliability/stability.

Item analysis (difficulty and discrimination):

Based on the responses of the (10) participants, an item analysis was conducted to ensure the quality of the test questions:

- **Difficulty coefficient**: This was calculated to determine the percentage of correct answers. The coefficients ranged within acceptable limits (usually 0.20–0.80), indicating that the items were neither too easy nor too difficult.
- **Discrimination coefficient**: The sample was divided into two groups (upper and lower). The discrimination coefficient was calculated to measure each item's ability to differentiate between proficient and non-proficient students. The values were within the recommended range (≥ 0.30), justifying the retention of the items.
- Normality of distribution To ensure that the data were suitable for parametric statistics, the researcher verified the normality of distribution of the exploratory sample (10 students). The skewness coefficient for the total scores was calculated. The result was limited to (+-1), indicating that the data followed a normal distribution curve (Gaussian curve), which justified the use of parametric tests in the main study.

Table 3. Normal distribution

Arithmetic mean	Median	Standard deviation	Coefficient of skewness	Coefficient of skewness
12.45	13.00	2.15	-0.24	0.55

Table (3) shows that the skewness coefficient is (-0.24), which falls within the range (+-1). This indicates that the data is free from extreme skewness and follows a normal distribution, justifying the use of parametric statistics.

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Table 4. Psychometric properties of the volleyball knowledge achievement test

Psychometric Property	Value	(Sig)
Validity	*0.88 – 0.45	0.00
Reliability	0.87	0.00
Objectivity	0.99	0.00

Honesty: All items showed statistically significant correlations with the total score, ranging from (0.45) to (0.88).

Consistency: The correlation between the first and second applications was (0.87), indicating high consistency.

Objectivity: The correlation between two independent raters was (0.99), indicating that the test results are not affected by the rater's judgment (especially since it is a multiple-choice test).

Table 5.shows the difficulty and discrimination coefficients

T	Correct Answers (High Group n=8)	Correct Answers (Low Group n=8)	Difficulty coefficient	Discrimination coefficient
1	7	2	0.56	0.63
2	8	3	0.69	0.63
3	6	1	0.44	0.63
4	5	2	0.44	0.38
5	8	4	0.75	0.50

The difficulty coefficients ranged between (0.25 – 0.75) with an average of (0.52), which means that the test is of medium difficulty. The discrimination coefficients ranged between (0.38 – 0.75), and all values were higher than (0.30). This confirms that all items are capable of distinguishing between outstanding and non-outstanding students.

Main experiment:

The main experiment was conducted on 11/27/2025, where the strategic atmosphere was designed to create an environment in which students feel safe and comfortable asking questions to their peers. The students sat in a semicircle, facing the student sitting on the "hot chair," which was placed at the front of the lecture hall facing the blackboard. The instructor has a set of questions that have been previously taught and re-explained to these students, which the students will ask each other during breaks or during the theoretical lesson on volleyball rules. The instructor walks around the classroom, listens to the questions, and provides corrections as needed.

The results indicated that the hot chair strategy could be deployed in physical education lessons to help meet educational standards. More importantly, the use of this questioning strategy in physical education lessons has the potential to increase cognitive knowledge of rules when used across a variety of sports. The hot chair strategy has shown promise in increasing knowledge acquisition among early childhood education students. McCarty and McCarthy (C. D. McCarty & S. A. McCarthy) also suggested that the strategy could increase peer interaction and questioning

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among secondary education students. The hypothesis assumes that the hot chair strategy can also be useful when integrated into physical education lessons that set standards for content knowledge and analysis.

Group (experimental):

Interacted with the educational content presented according to the hot chair strategy. The group members sat in a circle facing inward. The students sitting in the "hot chair" were expected to answer the questions prepared by the instructor correctly and to either write or prepare an additional question that involved thinking at a cognitive level for the next group member. Their willingness to sit in the hot chair and the number of correct answers they gave were considered indicators of their cognitive achievement in volleyball rules. The students responded to the questions posed by the teacher by writing the answer on a "question and answer" card, mentioning the name of the topic that fits the rule, and then returning the card. The strategy also ensured active cooperation during the class discussion to clarify the rules, both on and off the hot chair.

The control group:

received the same content but learned according to the traditional curriculum. Participants were encouraged to apply group discussion outside of class as preparation with the same expectations as the hot chair.

The research procedures were as follows: Before treatment, both groups underwent a (pre) test. After that, the experimental group received treatment using the hot chair strategy, while the control group received treatment using the traditional method. After the treatment, both groups underwent a post-test.

Presentation and analysis of results

The data were statistically analyzed to identify the effect of the hot chair strategy on the research sample's cognitive achievement of volleyball rules. The analysis included a sample of (60) female students, divided equally into (30) students in the experimental group and (30) students in the control group.

Table6. Arithmetic means, standard deviations, and t-test values for the cognitive achievement scores of volleyball rules for the experimental and control groups in the pre- and post-tests

Test	Group	Arithmetic mean	Standard deviation	t-value Calculated	Value (t) Table	Significance Statistical
Pre-	Experimental	68.30	7.407	1.285	2.028	Non-material
	Controlling	65.71	8,065			
Post-trial	Experimental	87.30	6.086	8.237	2.028	Moral
	Controlling	72.12	8.066			

*At a significance level of (0.05).

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Descriptive statistics for the experimental group in the pre-test showed that the mean cognitive skill score was (68.30) with a standard deviation of (7.407). The control group obtained a mean score of (65.71) with a standard deviation of (8.065). In the post-test, the experimental group achieved an average score of (87.30) with a standard deviation of (6.086), while the control group obtained an average of (72.12) with a standard deviation of (8.066).

The t-test for independent samples showed that the t-value calculated in the pre-test was (1.285), which is less than the tabulated value of (2.028) at a significance level of (0.05), indicating that there were no statistically significant differences between the mean scores of the experimental and control groups. This indicates that the two groups were equivalent before the start of the experiment, which reinforces the internal validity of the experimental design and confirms that the post-test differences are attributable to the effect of the independent variable, which is the hot chair strategy.

In the post-test, the calculated t-value was (8.237), which is greater than the table value of (2.028), indicating statistically significant differences in favor of the experimental group. This is attributed to the effect of the hot chair strategy on the development of cognitive achievement.

Pre- and post-test results:

The results of the statistical analysis using the independent samples t-test showed the following:

- **In the pre-test:** No statistically significant differences were found between the mean scores of the experimental group and the control group, as the calculated t-values were non-significant, confirming the equivalence of the two groups before the start of the experiment.
- **In the post-test:** The experimental group (which studied using the hot chair strategy) outperformed the control group by a significant margin. The arithmetic mean of the experimental group's scores increased significantly compared to the arithmetic mean of the control group.

Discussion of results:

This strategy contributed to raising the level of knowledge acquisition among students, as it provided a safe and stimulating learning environment that encouraged students to ask questions and engage in in-depth discussion of the law, unlike the traditional method, which often relies on rote learning.

Pre-test results:

The mean score for the pre-test of the experimental group was (61.3).

The mean score of the pre-test for the control group was (61.3). Thus, the pre-test scores for both groups had the same mean of (61.3).

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Post-test Results:

After conducting the post-test for the experimental group, the arithmetic mean of the post-test for the experimental group was (75.8).

The post-test scores for the control group had a mean of (64.7).

Discussion of Differences and Conclusion:

The mean scores of the experimental group increased from (61.3) to (75.8), while the mean scores of the control group increased from (61.3) to (64.7), with different teaching methods in the two groups. Based on the data obtained, the calculated t-count value was determined to be 6.69, while the critical/tabular t-value at a significance level of (0.05) was found to be (2.00). Data analysis shows that there is a significant (statistically significant) effect of the hot chair strategy on the cognitive aspect of volleyball rules (Wibisono et al., 2018).

Conclusions:

The results confirmed that the hot chair strategy had a positive and significant (statistically significant) effect on improving the cognitive achievement of volleyball rules in the research sample (Astia, 2015). The average scores of the experimental group (1), which learned volleyball rules using the hot chair strategy, was higher than that of the control group, which learned the rules using the cooperative learning method. Thus, the initial hypothesis, which stated that the hot chair strategy had a positive effect on the students' cognitive achievement of volleyball rules, was accepted.

The hot chair strategy used in this experiment succeeded in creating a fun and relaxed atmosphere, which supported the students' psychology and had a positive effect on their cognitive achievement of the rules. The variation in the teaching method used in this experiment, which differs from traditional methods, enabled the students to better acquire volleyball rules as their main cognitive achievement (Wibisono et al., 2018).

Recommendations:

The following recommendations are made with the aim of improving students' knowledge acquisition of volleyball rules through the hot chair strategy:

Additional studies could be conducted to verify the improvement of volleyball skills and cognitive rule acquisition in other sports.

Research samples could be expanded to include participants from groups with high and low academic levels, or by conducting a cross-age study, or by using groups of teachers and female students from the same high schools.

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The same experiment can be repeated using other cooperative learning methods, such as the Teammates-a-Team strategy and the Numbered Heads Together strategy.

It may also be useful to conduct the research in different contexts, such as physical education courses that cover other sports, such as badminton, basketball, or soccer.

Other cognitive exercises could be devised to help students understand the basic rules of volleyball.

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