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The Effect of Some Cognitive Stimulants according to their Timing on Learning the Snatch Skill in Weightlifting for Students

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Abstract

The significance of this research lies in attempting to apply educational methods using certain cognitive enhancers according to their timing (before, during, and after) and their impact on learning the snatch skill for students, a topic not previously addressed. This enables practical application in the field and in a suitable manner that can contribute to the development of the educational process for learning the technical performance of the snatch for students, thereby enhancing the learning process to achieve a higher level of effectiveness in weightlifting. The researchers employed an experimental approach with three experimental groups. The key findings indicated the superiority of the second experimental group that implemented the cognitive enhancer method during its timing in enhancing the technical performance of the snatch skill compared to the two experimental groups that implemented the cognitive enhancer method before and after. The researchers recommend conducting similar research and studies using the cognitive enhancer method according to its timing and comparing it with other educational methods in individual and group sports activities.

Keywords: Cognitive Stimulants, Timing (Pre - During - Post), Snatch Skill

1. Introduction and Research Significance

1-1 Definition of the Research

Cognitive enhancers, designed to stimulate students to think about what they are learning, play a crucial role in activating their mental processes effectively. By organizing their thoughts and expressing them in a way that aligns with the tasks and situations encountered in class, these enhancers enable students to gather, organize, recall, analyze, interpret, and evaluate information. They have the ability to capture students' attention and direct them toward the learning process, making their learning deeper and more ingrained in memory. Additionally, cognitive enhancers assist students in focusing on the key ideas and essential points of the skill they are learning, connecting new information with previously acquired knowledge. This aids in comprehension, storage in long-term memory, and retrieval when needed.

The sport of weightlifting, being part of the curriculum of physical education and sports science colleges, requires the implementation of effective and varied teaching methods to convey the material to learners. The importance of the research lies in the researcher's utilization of a novel method not previously employed – an attempt to apply teaching methods using cognitive

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enhancers according to their timing (before, during, and after). This, in turn, leads to accelerated and more significant progress in the learning process, benefiting both educators and saving time and effort.

1-2 Research Problem

The learning of the technical performance of the weightlifting snatch skill is not solely dependent on conventional teaching methods. It also involves finding new educational alternatives that consider individual differences among learners. Additionally, the use of diverse teaching aids plays a significant role in the learning process. Through the researchers' observation and monitoring of certain educational units for students, they noticed that the development of the snatch skill in weightlifting does occur but not in a manner that aligns with the rapid evolution of the sport. The researchers attribute this to the adoption of traditional methods that rely on a single knowledge source – lecture, explanation, and demonstration by the teacher. In this approach, the teacher often plays a positive role, while the learner's role tends to be more passive, and there may be a lack of attention or focus on teaching methods that work to enhance and activate cognitive abilities in instructional units.

To address this issue and improve the learning and technical performance of the snatch skill, the researchers decided to implement a new teaching strategy: the use of cognitive enhancers as an educational tool. This strategy aims to simplify understanding and perception of the correct execution of the snatch skill, helping students learn with better comprehension. The researchers view cognitive enhancers as an option that enables teachers to teach complex concepts with relatively less time and significantly improves the technical performance of the skill. This approach serves teachers in achieving better levels of instruction and performance.

1-3 Research Objectives

1. To investigate the impact of the timing of cognitive enhancers on learning the technical performance of the snatch skill in weightlifting for students through pre-tests and post-tests for the research groups.
2. To examine the influence of the timing of cognitive enhancers on learning the technical performance of the snatch skill in weightlifting for students between the post-tests of the three experimental groups and determine the superiority of these groups.

1-4 Research Hypotheses

1. The use of cognitive enhancers (before, during, after) has a positive impact on the technical performance of the snatch skill in weightlifting for students.
2. The use of cognitive enhancers (during) is superior in enhancing the technical performance of the snatch skill in weightlifting for students.

1-5 Research Fields

1-5-1 Human Field: First-year students at the College of Physical Education and Sports Science at Al Ain University.

1-5-2 Temporal Field: From Sunday, November 27, 2022, to Tuesday, February 7, 2023.

1-5-3 Spatial Field: Weightlifting sports hall/College of Physical Education and Sports Science/Al Ain University.

1-6 Definition of Terms

1-6-1 Cognitive Enhancers

"Refers to the way the mind processes events, situations, topics, and objects around it, leading to knowledge, understanding, insight, and the ability to retrieve them when needed" (57:7).

2- Methodology and Field Procedures

2-1 Research Methodology

The researchers utilized the experimental method with three experimental groups to align with the nature and objectives of this study.

2-2 Research Population and Sample

The research population consists of first-year students at the College of Physical Education and Sports Science at Al Ain University for the academic year (2022/2023), totaling 87 students distributed across three sections. After ensuring homogeneity and equivalence, the researchers conducted their field experiment on a sample of 45 students, representing 51.27% of the original population. The exemplar was serendipitously partitioned into three equitably sized clusters of 15 scholars each, and the suggested pedagogical approach was actualized by the investigators. The inaugural experimental cluster executed their educative modules with the cognitive booster technique prior to the lecture, the second experimental cluster during the lecture, and the third experimental cluster subsequent to the lecture. The researchers conducted homogeneity and equivalence tests for the research sample using the skewness coefficient and the (f) test, as tables 1 and 2 provide a visual representation of the information.

Table (1): Elegantly Presents the Means, Standard Deviations, and Skewness Coefficients with Poetic Precision.

#	Statistical Treatment Variables	Measurement Unit	Mean (μ)	Standard Deviation (σ)	Median (M)	Skewness Coefficient (λ)
1	Age	Year	19,18	0,28	19,25	0,71
2	Height	cm	174,67	7,37	175	0,14
3	Mass	kg	71,67	8,96	71,5	0,06
4	Intelligence	Degree	50,56	4,25	51	0,31

* All Skewness Coefficients were between (± 1), Indicating Homogeneity among the Sample Individuals in the Above Variables.

Table (2): Illustrates the Homogeneity of Research Groups in Study Variables.

#	Statistical Treatment Variables	Source of Variation	Sum of Squares	degrees of Freedom	Mean Square	Calculated (f)	Significance Level
1	Age	Between Groups	98.31	2	49.155	1.15	0.07
		Within Groups	881.63	21	42.45		
2	Height	Between Groups	102.63	2	51.315	1.08	0.08
		Within Groups	992.72	21	47.272		
3	Mass	Between Groups	55.81	2	27.905	0.94	0.06
		Within Groups	623.01	21	29.667		
4	Intelligence	Between Groups	78.53	2	39.26	1.24	0.08
		Within Groups	663.51	21	31.59		
5	Snatch Skill	Between Groups	44,967	2	14,989	1,663	0.07
		Within Groups	1045,4	21	9,012		

* The Critical (F) Value is Statistically Significant at the 0.05 Level.

2-3 Results from Table (2) indicate that the calculated (f) value for all research variables is greater than the significance level of (0.05), indicating no significant differences. This implies the equal importance of the research teams in every aspect of the research factors.

2-3-1 Data Collection Methods

The sources include Arabic and foreign literature, the internet, personal interviews, scientific observation, tests, and measurements.

2-3-2 Tools and Devices Used

- Olympic weightlifting iron bar, 20 Chinese-made.
- Floor medical scale.
- Measuring tape (linen), quantity (1).
- Laptop (Dell) device.
- Electronic stopwatch.
- Adhesive tape.
- DVD discs.
- Projection screen.

3-4 Definition of Research Variables

3-4-1 Definition of Cognitive Enhancers

To define cognitive enhancers, with a total of (9) cognitive enhancers before the educational process, (6) cognitive enhancers during the educational process, and (5) cognitive enhancers after the educational process, an exploratory questionnaire was prepared and presented to experienced specialists in sports psychology and teaching methods. The questionnaire aimed to determine the relative importance of cognitive enhancers in the research. The cognitive enhancers that obtained values greater than or equal to an acceptance rate of (53.84%) were selected, while those below this value were disregarded, as shown in Table (3).

Relative Importance =

$$\frac{(1 / (2)) + (2 \times (\text{Highest Score} \times \text{Number of Experts})) / \text{Total Possible Score}}{(\text{Highest Score} \times \text{Number of Experts})} \quad (111:5)$$

Table (3): Illustrates Psychotropic Substances, Raw Score, and Percentage.

Stimulant Timing	Mental Stimulant	Relative Importance	Acceptance Rate	Significance
"Cognitive Stimulants Before Commencing the Educational Process"	1. Educational Objectives	82,22	53,84	Accepted
	2. Sentences and Headings	48,88		Not Accepted
	3. Visual Material Images	53,33		Accepted
	4. Shapes and Tables	88,88		Not Accepted
	5. Mental Images	46,66		Accepted
	6. Introductions	75,55		Not Accepted
	7. Summaries	42,22		Not Accepted
	8. Information System	44,44		Not Accepted
	9. Memory Enhancement Tools	51,11		Not Accepted
"Cognitive Stimulants During the Educational Process"	1. Educational Questions	44,44	53,84	Not Accepted
	2. Rewriting	82,22		Accepted
	3. Comparisons	52,22		Not Accepted
	4. Main Ideas	41,11		Not Accepted
	5. Mental Images	68,88		Accepted
	6. Memory Enhancement Tools	80		Accepted
"Cognitive Stimulants in the Educational Process"	1. Secondary Educational Questions	85,55	53,84	Accepted
	2. Rewriting	73,33		Accepted
	3. Summaries	43,33		Not Accepted
	4. Visual Information System	44,44		Not Accepted
	5. Reviews	81,11		Accepted

3-4-2 Definition of the Snatch Technical Performance Test (Form)

The researchers conducted a comprehensive review of previous studies and scientific references, leading them to develop a test form for evaluating the technical performance of the snatch skill. The form was presented to experts in weightlifting and testing to assess the technical performance of each student in the snatch skill in weightlifting. The form is designed for both pre-test and post-test measurements for the sample.

3-5 Specifications of the Weightlifting Technical Performance Tests

3-5-1 Snatch Skill Performance Test

Test Name: Technical Performance Test for the Snatch Skill.

The snatch skill performance test is based on the legal conditions of the sport. Participants in the sample perform three attempts following the stages of the snatch skill movement.

Test Objective: Evaluate the technical performance of the snatch skill for each student.

Performance Description: The tested student performs the snatch skill under its legal conditions, with the stages of the lift clearly visible during evaluation.

Recording Method: A successful attempt is recorded and presented to the evaluator, with each stage (1-6) earning five points and the remaining stages each worth (10) points. The total score for the test is the sum of the indicator parts, with a total score of (50) points.

Table (4): Illustrates the Stages of Weightlifting Snatch and the Degree of Each Stage.

#	Stage	Degree
1	Set-Up and Starting Position	5
2	First Pull	10
3	Second Pull	10
4	Full Extension	10
5	Shrug and Drop Under the Barbell	10
6	Recovery and Stabilization	5

Table (5): Illustrates Stability and Objectivity Coefficients for Snatch Skill Tests.

ت	Test Name	Stability Coefficient	Significance Level	Objectivity Coefficient	Significance Level
1	Snatch Skill Test	0.715	0.000	0.91	0.000

* Statistically Significant at a Significance Level < (0.05).

2-6 Field Research Procedures

2-6-1 Pre-Tests The researchers conducted pre-tests on the main research sample on Sunday, November 27, 2022, at 9:00 AM.

2-6-2 Main Experiment The main experiment began on Monday, December 5, 2022, and concluded on Tuesday, February 7, 2023. The following procedures were implemented:

Implementation of the educational program for learning the snatch skill.

Conducting 10 educational units, with one unit per week for each group.

Application of educational units for the first experimental group using the pre-lesson use of mental stimulants (educational objectives, shapes and tables, introductions).

Application of educational units for the second experimental group using the during-lesson use of mental stimulants (rephrasing, mental imagery, memory support tools).

Application of educational units for the third experimental group using the post-lesson use of mental stimulants (rephrasing, reviews, post-educational questions). Each instructional unit had a duration of 90 minutes, divided into three sections: preparatory section (20 minutes), main section (60 minutes), and closing section (10 minutes).

2-6-3 Post-Tests were carried out on the research sample in order to amass scientific information for the purpose of analysis. The circumstances surrounding the post-tests were carefully fashioned to mirror those of the pre-tests, encompassing factors such as the setting, timeframe, and the accompaniment of the supportive team. The identical procedures were meticulously adhered to, just as they were during the pre-tests.

3-7 Statistical Methods The researchers utilized the statistical program SPSS for statistical analysis, including mean, standard deviation, skewness, The ethereal dance of the Pearson correlation coefficient, the harmonious duet of the paired-sample t-test, the captivating symphony of the analysis of variance (ANOVA), and the enchanting melody of the Least Significant Difference (LSD) test.

4- Revelation, Examination, and Deliberation of Findings 4-1 Manifestation of Conclusions for the Triad of Experimental Assemblages for the Preliminary and Conclusive Trials of the Snatch Technical Mastery.

Table (6): Displays the Means, Standard Deviations, and Calculated (T) Values for the Pre-test and Post-test Performance in the Snatch Skill for the Three Experimental Groups.

Group	Processes Variables	Pre-tests		Post-tests		Calculated (t) Value	Significance Level	Type of Significance
		Mean (μ)	Standard Deviation (σ)	Mean (μ)	Standard Deviation (σ)			
Experimental Group 1	Snatch Skill	10.80	0.788	21.70	2.11	16.169	0,000	Significance
Experimental Group 2	Snatch Skill	10.70	0.823	27.60	3.687	15.507	0,000	Significance
Experimental Group 3	Snatch Skill	11.10	0.737	19.10	2.131	8	0,000	Significance

- * Statistically Significant at a Significance Level $< (0.05)$ with Degrees of Freedom (18).

Table (6) illustrates the means, standard deviations, and calculated (t) values between pre-test and post-test results for the technical performance of snatch skill for the three experimental groups. The results presented in the table show that the calculated significance level is less than the significance level of (0.05), indicating statistically significant differences between pre-tests and post-tests in favor of the post-tests for all three groups.

4-2 Presentation and Analysis of Post-Test Results for Experimental Groups

Table (7): Shows the Analysis of Variance for the Technical Performance in Both Snatch and Clean and Jerk Weightlifting Skills for the Four Research Groups in the Post-Test.

#	Variables Source	Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	Calculated (f) Value	Significance Level
1	Snatch Skill	Between Groups	354,6	2	177,3	15,96	0,00
		Within Groups	305,1	27	11,3		

Table (7) illustrates the analysis of variance for the technical performance in the snatch skill for the four research groups in the post-test. The results presented in the table show that the calculated significance level is less than the significance level of (0.05), indicating statistically significant differences. This led to the use of the Least Significant Difference (L.S.D) test to examine the significance of the differences.

Table (8): Illustrates the Significance of Differences between the Means for the Technical Performance in Both Snatch and Clean and Jerk Weightlifting Skills for the Four Research Groups Using the Least Significant Difference (L.S.D).

ت	Variables	Group	Mean	Difference Between Means		
				1-2	1-3	2-3
1	Snatch Skill	Experimental Group 1	7,40		0,77*	
		Experimental Group 2	18,33	10,93**		10,16**
		Experimental Group 3	8,17			

** Statistically Significant at the 0.01 Significance Level.

* Statistically Significant at the 0.05 Significance Level.

4-3 Discussion of Results

Based on the presented results in Table (4), which demonstrated significant differences between pre-test and post-test results for the snatch skill in favor of the post-test results for all experimental groups, the researchers attribute the notable improvement in the first experimental group to the inclusion of the proposed educational curriculum, which incorporates mental stimulant strategies. These strategies encompass objectives, methods, techniques, and procedures that teachers use to engage learners' cognitive skills through educational situations. Therefore, the use of cognitive stimulant strategies is crucial in the educational process. Jalal Shanta Jabr (2012) emphasized that "the objectives of mental stimulants before the lesson begin to attract the learner's attention, stimulate their thinking about the subject matter, and connect it to prior learning. They represent the organized collection of key ideas about the material before delving into the learning process" (3:47).

The researchers employed mental stimulants in the pre-lesson section (introductions, concept maps, shapes and tables, educational objectives). Affan Nazeer (2004) highlighted that "stimulants used before the start of the learning and teaching process may develop cognitive processes different from those developed by stimulants used during or after the learning and teaching process" (2:139).

In the pre-lesson section (introductions), the researcher used cognitive stimulants such as summaries of technical performance in the snatch skill to evoke previous information, harness it for receiving new learning, and serve as a foundation for increased learning. Affan Nazeer (2004) affirmed that one of the essential justifications for using mental stimulants is their ability to focus the learner's attention, making their perception of correct performance deeper and more firmly embedded in memory. This helps them concentrate on important ideas and points, link new experiences to previous ones, and enhance their ability to visualize and form mental images that aid in better understanding the skill compared to not using such cognitive stimulants (2:140).

The researchers also attribute the improvement to the use of video clips, mind maps, shapes, and tables in the educational curriculum. Mind maps are an effective way to explain the skill to be learned by constructing and drawing a mind map, specifying all the details and particulars related to the skill, and presenting it to students using one of the presentation methods that sparked their motivation toward learning at the beginning of the learning process. Ahmad Yasin Hamdan (2012) emphasized that "video presentation gives students the opportunity for control and positive participation, allows for consideration of their capabilities in learning the skill, and has a visual impact that makes learning attractive when students watch those who excel in performing that skill. The explanatory presentation as well as the use of tables and mind maps containing the technical stages of the snatch skill" (1:245).

5-3 Conclusion

The researchers attribute the improvement observed in the second experimental group to the educational program's use of three mental stimulants accompanying performance stimulants during the learning process (mental imagery and visualizations, rephrasing, and memory reinforcement tools). The strategic administration of mental stimulants in the educational program was considered crucial. Providing mental imagery and visualizations at a time when students are in a relaxed mental state was designed to benefit the learning of technical performance in the skill. This aligns with the findings of Amer Mohammed Saudi (2017), who stated that "mental imagery of motor skills helps the student achieve a better understanding of the nature of skill performance, undoubtedly assisting them in becoming more familiar with the requirements for successful skill performance" (6:147).

The improvement in the third experimental group is attributed to the use of mental stimulants after the learning process, introducing three mental stimulants into the assessment process (post-learning educational questions, rephrasing, and reviews). Learning according to mental stimulants helped students rephrase the exercise in a way that suited them, contributing to improved performance. Hussein Mohammed Abu Riash (2007) supported this idea, stating that "rephrasing is necessary and helps increase the level of technical performance because it works to simplify and understand the student's correct performance" (4:379).

The post-learning educational questions and reviews helped enhance the performance of this third experimental group. The use of post-learning educational questions and reviews provided ample opportunities to discover students' capabilities to achieve the objectives for each stage of the technical performance of the snatch skill. Additionally, it "helps students develop their learning through self-motivation and creativity by solving the problems they face and making decisions to meet their educational needs" (8:527).

Based on the mystical Tables of (8, 7), behold! All the (F) values shone with significance, like radiant stars in the night sky. In our quest to unveil the true might of one group above all others, the enchanting LSD test unveiled the undeniable superiority of the second experimental group, standing tall and proud like a majestic phoenix. The researchers attribute this superiority to the use of mental stimulants (mental imagery and visualizations, rephrasing, and memory reinforcement tools) during learning, especially the use of mental imagery and visualizations. This had a significant role in the superiority of the second experimental group, as mental imagery facilitated the application of the skill, making it almost error-free. This is consistent with Nadya Al-Salti's (2004) assertion that "mental imagery and mental visualization contribute to facilitating the process of storing information in memory and retaining it for a longer period.

It also facilitates the process of remembering information and retrieving it faster, and facilitates the process of linking information together in memory" (10:143).

The use of rephrasing, as a mental stimulant, is expected to help students solidify the technical performance of the snatch skill in their memory in a way that they understand. This allows students to learn at their own pace, eliminating individual differences among learners (9:22).

The presentation of mental stimulants (memory reinforcement tools) in the form of video clips and colored static and animated images, sometimes in slow motion, worked to attract students' attention to the stages of the presented or required snatch skill. This stimulated students' cognitive processes, prompting them to think about the correct skill performance and scrutinize it by introducing information and storing it in short-term memory. These foundations contributed to improved test results and the superiority of the second experimental group compared to the other two experimental groups.

In conclusion, the educational curriculum using cognitive stimulants during learning met the needs of learners, as they interacted well with learning technical performance in a way that allowed them to demonstrate their abilities significantly. The approach enabled them to show remarkable interest in learning, achieving the desired learning goals. Thus, the third hypothesis was achieved.

5-4 Recommendations

1. It is recommended to use the educational curriculum with cognitive stimulants according to their timing (before, during, and after) to match the level, abilities, and capabilities of students, taking into account the nature and type of the skill and the environment of its performance.
2. Emphasis should be placed on using cognitive stimulants during learning as they contribute to the development of technical performance in weightlifting snatch skill.

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