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The Impact of Certain Cognitive Enhancers on Learning the Skill of Weightlifting for Students

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Abstract

The importance of the research is evident in exploring the use of cognitive enhancer strategies that can be practically implemented, contributing to the development of the educational process for learning the technical performance of the snatch skill in weightlifting among students. This aims to enhance the learning process and achieve optimal efficiency in weightlifting. The researchers employed an experimental design with two equivalent groups. The experimental group underwent an educational program developed by the researchers, which included the integration of cognitive enhancers into the instructional unit. Meanwhile, the control group followed a conventional teaching approach. The key findings highlighted the superiority of the experimental group that implemented the cognitive enhancer method in enhancing the technical performance of the snatch skill compared to the control group. The researchers recommend conducting further research and studies using cognitive enhancer methods in other educational contexts, both individual and group activities

Keywords: *cognitive enhancers, skill acquisition, weightlifting technique*

1.Introduction and Significance of the Research

Cognitive enhancers, aimed at stimulating students to think critically and enhancing their mental processes, play a crucial role in organizing and expressing thoughts in line with the tasks encountered in lessons. These enhancers facilitate information gathering, organization, analysis, interpretation, and evaluation, capturing students' attention and directing them towards the learning process. In the context of weightlifting, a part of physical education curricula, there is a need for diverse teaching methods to effectively convey the material to learners.

The research's significance lies in introducing a new approach by incorporating cognitive enhancers, aiming to accelerate and improve the learning process, benefiting teachers, saving time and effort.

1.1 Research Problem

The technical performance learning of the snatch skill in weightlifting depends not only on traditional teaching methods but also on finding alternative educational strategies that consider individual differences among learners. The researchers observed that conventional methods, relying heavily on explanation and demonstration by the teacher, may not sufficiently engage

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students or foster the development of cognitive abilities. The research aims to address this by utilizing cognitive enhancers as an instructional strategy to enhance learning and improve technical performance.

1.2 Objectives of the Research

1. Investigate the impact of cognitive enhancers on the technical performance learning of the snatch skill in weightlifting among students through pre- and post-tests.
2. Examine the differential effects of cognitive enhancers on the learning outcomes between the experimental and control groups.

1.3 Research Hypotheses

1. The use of cognitive enhancers positively influences the technical performance of the snatch skill in weightlifting among students.
2. Cognitive enhancers are more effective in enhancing the technical performance of the snatch skill compared to conventional teaching methods.

1.4 Research Scope

1.5.1 Human Scope: First-year students in the College of Physical Education and Sports Sciences at Al Ain University.

1.5.2 Time Scope: From March 6, 2023, to Tuesday, May 16, 2023.

1.5.3 Spatial Scope: Weightlifting sports hall/College of Physical Education and Sports Sciences/Al Ain University.

1.5 Definition of Terms

1.5.1 Cognitive Enhancers

The way in which the mind processes events, situations, topics, and objects around it, leading to knowledge, understanding, vision, insight, and the ability to retrieve them when needed" (57:6).

2. Research Methodology and Field Procedures

2.1 Research Method

The researchers employed an experimental design with two groups, experimental and control, aligning with the nature and objectives of the research.

2.2 Research Sample and Population

The collection of the individuals involved in this study consists of freshmen enrolled in the esteemed College of Physical Education and Sports Sciences at Al Ain University for the academic session of 2022/2023. This group is comprised of a total of 50 students who are distributed evenly across two separate classes. Once the researchers ensured that the group possessed a homogeneous and equivalent composition, they proceeded to carry out their field experiment on a subset of 20 students, which represents 40% of the original population. To maintain fairness, the sample was randomly split into two equivalent groups, with each group consisting of 10 students. The experimental group followed the proposed educational method incorporating cognitive enhancers, while the control group adhered to the traditional teaching method. The researchers ensured homogeneity and equivalence using the variance coefficient and t-test, as shown in Tables 1 and 2.

Table (1): Displays the Means, Standard Deviations, and Skewness Coefficients.

#	Statistical Analysis Variables	Measurement Unit	Mean (μ)	Standard Deviation (σ)	Median (M)	Skewness Coefficient (λ)
1	Age	Year	19.60	0.95	19.50	0.70
2	Height	Centimeter	175.10	2.84	175.50	0.43
3	Mass	Kilogram	72	1.76	71.50	0.64
4	Intelligence	Degree	52.51	2.59	52	0.33

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

Table (2): Illustrates the Equality of the Two Research Groups in the Study Variable.

Statistical Analysis Variables	Measurement Unit	Control Group		Experimental Group		Valuesignificances (t)	Significance Level (sig))	Significance
		Standard Deviation	Mean	Standard Deviation	Mean			
Snatch Skill	Grade	12.400	0.516	12.500	0.527	0.429	0.673	Insignificant

The Critical Value (f) is Significant at the 0.05 Level.

Through Table (2), it becomes evident that the calculated value (f) for all research variables shows a significance level greater than (0.05), indicating no significant differences. This implies the equivalence of the two research groups in the research variable.

2-3 Data Collection Methods

2-3-1 Data Collection Techniques

The information will be gathered through various methods, including Arabic and foreign sources, the internet, personal interviews, scientific observation, tests, and measurements.

2-3-2 Tools and Equipment Used

The tools and equipment used in the research include a 20-piece Chinese-origin Olympic weightlifting iron bar, a medical floor scale, a measuring tape (linen) – quantity (1), a laptop (Dell), an electronic stopwatch, adhesive tape, DVDs, and a projection screen.

3-4 Research Variables Definition

3-4-1 Definition of Mental Stimulants

To identify mental stimulants, totaling (9) before the start of the educational process, (6) during the educational process, and (5) after the educational process, the researcher prepared a survey questionnaire. This questionnaire was presented to experienced specialists, including professors specializing in sports psychology and teaching methods. Their input was crucial in determining the relative importance of mental stimulants in the research. The mental stimulants that received a value equal to or greater than the acceptance rate of (53.84) were selected, while those below this threshold were disregarded, as shown in Table (3).

$$\text{Relative Importance} = \frac{(\text{For the uppermost scale, the score is } 1/2.) + 2(\text{Highest Score} \times \text{Number of Experts})}{(\text{Highest Score} \times \text{Number of Experts})}$$

5 :111))

Table (3): Illustrates Mental Stimulants, Raw Scores, and Percentages.

Stimulant Timing	Mental Stimulant	Relative Importance	Acceptance Rate	Significance
Mental stimulants before the educational process	1. Educational Objectives	82,22	53,84	Accepted
	2. Sentences and Headings	48,88		Not Accepted
	3. Physical Sensory Images	53,33		Not Accepted
	4. Shapes and Tables	88,88		Accepted
	5. Mental Images	46,66		Not Accepted
	6. Introductions	75,55		Accepted
	7. Summaries	42,22		Not Accepted
	8. Information System	44,44		Not Accepted
	9. Memory Support Tools	51,11		Not Accepted
Mental stimulants during the educational process	10. Educational Questions	44,44		Not Accepted
	11. Restatement	82,22		Accepted
	12. Comparisons	52,22		Not Accepted
	13. Main Ideas	41,11		Not Accepted
	14. Mental Images	68,88		Accepted
	15. Memory Support Tools	80		Accepted
Mental stimulants after the educational process	16. Follow-up Educational Questions	85,55		Accepted
	17. Restatement	73,33		Accepted
	18. Summaries	43,33		Not Accepted
	19. Visual Information System	44,44		Not Accepted
	20. Reviews	81,11		Accepted

3-4-2 Definition of the Technical Performance Test for Snatch Skill

The researchers conducted a comprehensive review of previous studies and scientific references. The researchers then developed a performance evaluation test form for the snatch skill, which was presented to experts in the field of weightlifting and testing for the purpose of assessing the technical performance of each student in the snatch skill in the weightlifting subject. The form was designed to measure both the pre- and post-intervention performance.

3-5 Specifications of Weightlifting Performance Tests

3-5-1 Skill Performance Test for Snatch

Test Name: Technical Performance Test for Snatch Effectiveness.

The technical performance test for snatch effectiveness is based on the legal conditions of the game. Participants in the sample perform three attempts according to the kinetic performance stages of the snatch, divided into the first and second phases.

Test Objective

To assess the technical performance (technique) of snatch effectiveness for each student in both the first and second phases.

Performance Description

The tested student performs the snatch effectiveness activity under legal conditions, ensuring that the sections and stages of the lift are clearly visible during assessment.

Recording Method

A successful attempt is presented to the evaluator for the lift's sections and stages. Each stage is worth (5) points, and the total score of the evaluator indicating the sections is the final grade for the test. The total score for the test is (50) points.

Table (4): Illustrates the Stages of Nitrate Elevation and the Degree of Each Stage.

#	The Stage	The Grade	
Section One	1	Initiation and Initial Pull Stage	5
	2	Second Pull Stage	5
	3	Full Extension and Flight Stage	5
	4	Leg Bend and Arm Turn Stage	5
	5	Rise and Balance Stage	5
Section Two	1	Preparation and Flexion Stage	5
	2	Extension Stage	5
	3	Diving Stage	5
	4	Leg Opening Stage	5
	5	Foot Closure Stage	5
Total		50	

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

#	Test Name	Stability Coefficient	Significance Level (Sig)	Reliability Coefficient	Significance Level (sig)
1	Snatch Skill Test	0.801	0.000	0.93	0.000

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

2-6 Field Research Procedures

2-6-1 Pre-Tests

The ingenious scholars commenced their preliminary examinations on the central research specimen on the splendid day of Monday, March 6, 2023, at the early hour of 9:00 AM.

2-6-2 Main Experiment

The main experiment began on Monday, March 13, 2023, and concluded on Tuesday, May 16, 2023. The educational program for learning the snatch skill was implemented, consisting of (10) educational units with one unit per week for each group. The educational units for the experimental group were applied using mental stimulants in the instructional part (educational objectives, figures and tables, introductions), during the application part (rephrasing, mental images, memory support tools), and after the application part (rephrasing, reviews, post-instructional questions). Each instructional unit had a duration of (90) minutes, divided into three sections: preparatory section (20 minutes), main section (60 minutes), divided into instructional part (15 minutes) and application part (45 minutes, including 39 minutes of work and 6 minutes of rest), and concluding section (10 minutes).

2-6-3 Post-Tests

Post-tests were conducted on the research sample to establish scientific facts for the test. The diligent investigator made certain that the circumstances for the post-tests were akin to the pre-tests in regards to their whereabouts, chronology, and the accompaniment of the supportive squad. The identical procedures were employed in the post-tests as in the pre-tests.

3-7 Statistical Methods

The researchers used the statistical program (SPSS) to extract statistical results, including mean, standard deviation, skewness, Pearson correlation coefficient, paired samples t-test, and independent samples t-test.

4- Presentation, Analysis, and Discussion of Results

4-1 Presentation of Results for the Three Experimental Groups for Pre- and Post-Tests of Snatch Technical Performance and Analysis:

Table (6): Illustrates the Means, Standard Deviations, and Calculated T-Values for the Pre-Test and Post-Test Scores of the Experimental and Control Groups in the Technical Performance of the Snatch Skill.

Group	The Treatments The Variables	Pre-tests		Post-tests		t-value	Significance Level	Type of Significance
		Standard Deviation	Mean	Standard Deviation	Mean			
Experimental Group	Snatch Skill	12.500	0.527	22.600	1.577	17.824	0.000	Significance
Control Group	Snatch Skill	12.400	0.516	20.800	1.988	14	0.000	Significance

* Statistically significant at a significance level of $< (0.05)$.

Table (6) displays the means, standard deviations, and the calculated t-value between pre-test and post-test results in the artistic performance of the net skill for both the experimental and control groups. The results shown in the table indicate that the calculated significance level is lower than the significance level (0.05), suggesting the presence of statistically significant differences between pre-test and post-test performances, favoring the post-test results for both groups.

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

Table (7). Shows the Descriptive Statistics, Standard Deviations, and the Calculated T-Value for the Post-Tests of the Control and Experimental Groups.

Processors Skills	Pre-tests		Post-tests		t-value	Significance Level	Type of Significance
	Standard Deviation	Mean	Standard Deviation	Mean			
Snatch Skill	20.800	1.988	22.600	1.577	2.242	0.0038	Significance

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

Table (7) illustrates the means, standard deviations, and the calculated t-value between post-test results in the net skill for both the control and experimental groups. The results presented in the table indicate that the calculated significance level is lower than the significance level (0.05), suggesting the presence of statistically significant differences between post-test performances for both groups, favoring the experimental group.

4-3 Results Discussion

Through the presented results in Table (6), which showed significant differences between pre-test and post-test results in the net skill for both the control and experimental groups, the first

hypothesis was confirmed. The researchers attribute the good improvement in the experimental group to the fact that their proposed educational curriculum includes mental stimulant strategies. These strategies encompass goals, methods, techniques, and procedures that the teacher employs to develop learners' cognitive skills through educational situations. Therefore, the use of mental stimulants and cognitive activation strategies is crucial in the educational process.

The traditional method, relying on theoretical explanation, model performance, error correction by the teacher, and repetition by students, undoubtedly provides students with a good learning opportunity, positively affecting the efficiency of skill performance. This aligns with the findings of Anwar Mohamed El Sharkawi (2012), who emphasized the importance of repetition in the learning process.

Moving on to the results presented in Table (7), which demonstrated significant differences in post-test results for net skill between the control and experimental groups, the researchers attribute the improvement in the experimental group to the use of mental stimulants in the educational part before the lesson (introductions, conceptual map, shapes and tables, educational objectives). This aligns with Jalal Shante Jabr's (2012) assertion that the objectives set by mental stimulants before the lesson work to attract the learner's attention and stimulate their thinking about the study material, connecting it to prior learning.

Furthermore, the researchers explain the improvement in the experimental group's performance by the use of mental stimulants during learning. Mental stimulants such as mental images and visualizations were instrumental in helping students imagine the skill in a way almost free of errors that might occur during performance. Nadia Al-Sulti (2004) supports this idea, stating that mental imagery and cognitive visualization facilitate the process of storing and recalling information, as well as connecting information in memory.

Regarding the presentation of the mental stimulant "reformulation," the researchers hope that the reformulation of the exercise by the student for learning the skill or its artistic performance helped solidify the artistic performance of the snatch skill and organize it in their memory in a way they understand. Lamyaa Al-Diwan (2009) highlighted the significance of affording learners with the chance to acquire knowledge at their own rhythm, as it serves as a potent instrument in eradicating the distinctive dissimilarities that exist among learners.

In the presentation of the mental stimulant "memory support tools" in the form of videos and colorful static and moving images, the researchers believe that these visuals, sometimes presented in slow motion, attracted students' attention to the stages of the snatch skill, stimulating their mental processes and prompting them to think about the correct skill performance. Afaf Nazir (2004) noted that using mental stimulants before the learning process develops different mental processes than those developed during or after the learning process.

The researchers attribute the improvement in the experimental group to the use of mental stimulants after the learning process, introducing three mental stimulants in the evaluation process (follow-up educational questions, reformulation, reviews). Thus, learning according to mental stimulants helped students reformulate the exercise in a way suitable for them, contributing to improved performance. Hussein Mohamed Abu Riyash (2007) asserted that reformulation is necessary and assists in enhancing the artistic performance level.

The educational questions and reviews helped in improvement as well. These stimulants provided sufficient opportunities to discover students' abilities to achieve the goals for each

stage of the artistic performance of the snatch skill. Moreover, they assisted students in developing their learning through self-motivation and creativity by solving problems they encountered and making decisions to meet their educational needs. This aligns with the findings of Hala Mohammed Al-Sharqawi (2012), who considered questions essential for motivating students and promoting self-motivation and creativity.

In conclusion, the researchers believe that the use of mental stimulants in the educational process, whether before, during, or after learning, played a significant role in enhancing the students' performance. The mental stimulants helped students develop their cognitive skills, guided their imagination, and facilitated the recall and organization of information in memory. The proposed educational curriculum, enriched with mental stimulants, effectively engaged learners, creating a noticeable desire for learning and improvement. Therefore, the second hypothesis was realized.

5 Conclusions and Recommendations

5-1 Conclusions

1. The educational curriculum using mental stimulants positively influenced students' learning of the snatch skill.
2. The educational curriculum using mental stimulants demonstrated superiority in students' learning of the snatch skill.
3. The educational curriculum using mental stimulants succeeded in stimulating students and increasing their learning readiness.

5-2 Recommendations

1. It is essential to use the educational curriculum with mental stimulants according to their timing (before, during, after) to tailor it to the students' level, abilities, and capacities, considering the type and category of the skill and its performance environment.
2. Emphasis should be placed on using mental stimulants during learning, as they play a role in developing the artistic performance of the snatch skill in weightlifting.

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