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The Effect of McCarty's Model on Learning Technical Performance, Achievement, And Cognitive Attainment of High Jump Activity For female students

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Abstract

The aim of the research was to develop educational units for teaching technical performance, achievement, and cognitive attainment in the high jump event for female students. The researchers used the experimental approach with two equivalent groups—experimental and control—with pre- and post-tests. The research sample consisted of first-year female students from the College of Physical Education and Sports Sciences. The researchers utilized the statistical package (SPSS) to extract the following results. They concluded that the educational units applied using the McCarthy model contributed to improving the technical performance, achievement, and cognitive attainment in the high jump event for first-year female students. The researchers recommended the necessity of using educational units based on the McCarthy model to teach technical performance, achievement, and cognitive attainment in the high jump event.

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1-1 Introduction and Importance of the Research

The principle of education is based on the learner's ability and the amount of time required for learning. Therefore, the teacher must select a model that aligns with achieving the objectives. Every learner should participate and benefit from the potential advantages of the process. The success and significance of instructional design lie in achieving these objectives, as the learner must be the central focus of the educational process. The primary goal is to contribute to developing the learner's cognitive and skill-based capabilities to achieve the predefined goals of the educational curriculum.

Efforts must be made to link the teaching and evaluation of skills and knowledge imparted to students. This process should include sufficient information about the learners' progress, both individually and as a group. Such information must be utilized to enhance the level of learning, based on the premise that assessment, as a key component of the curriculum, impacts its effectiveness and makes its implementation more efficient and beneficial.

The high jump is one of the activities taught to first-year female students in the Colleges of Physical Education and Sports Sciences at Iraqi universities. Teaching this activity requires students to possess cognitive attainment related to the event. Each instructional model has its specificity, and for teaching to succeed, it must encompass all variables and relationships involved in the teaching process, which share commonalities as sources of information processing and personal experiences for learners. Furthermore, these models contribute to improving learners' performance. The McCarthy model is one of the instructional design forms that focus on teaching experiences aligned with the preferred learning style of the learner. This model can enhance learning and cognitive attainment, improve performance and achievement, and foster positive attitudes among students.

(Haboush & Hamid, 2022) addressed the necessity of teaching motor education using the McCarthy model to improve cognitive flexibility and attainment among students of the College of Physical Education.

Cognitive attainment is one of the primary educational objectives, referring to the extent to which a student comprehends the concepts and knowledge related to the subject matter in the field of sports. Education does not merely focus on motor skills but also requires students to have a deep understanding of the theoretical concepts associated with athletic skills. Employing instructional models like the McCarthy model contributes to enhancing cognitive attainment by organizing information in ways that make it more comprehensible for students (Miller & Ewing, 2020).

In a previous study by (BadrKhalaf et al., 2021), the researchers examined the impact of the McCarthy model in teaching scoring. The study recommended developing an educational

curriculum based on the McCarthy model to teach skills and encouraging teachers to use this model. Through such methods, students can learn technical performance, achievement, and cognitive attainment.

Other studies have shown that the McCarthy model helps develop various skills among learners, including cognitive attainment and technical performance (Al-Hudaibeh & Abu Saeedi, 2016)

1-2 Problem Statement

Researchers with extensive experience in teaching high jump activities have found that traditional strategies and methods still dominate without supporting modern teaching practices or meeting students' needs. These methods mainly rely on technical patterns and do not benefit from modern teaching models. From observations, it has been noticed that the level of students' achievement varies significantly. This decline motivated us to address this issue by testing the McCarthy model, which is based on experimental learning and focuses on linking cognitive processing and addressing the existing information in learners. This helps enhance their personal understanding and link concepts effectively. Educational practitioners aim to achieve the best learning outcomes through modern teaching practices, thus addressing this problem in a practical and innovative way.

1-3 Research Objectives

1. Designing educational units to teach technical performance, achievement, and cognitive acquisition in high jump activities for female students.
2. Identifying the impact of the McCarthy model-based educational units on the effectiveness of high jump learning.

1-4 Research Hypotheses

1. There are significant differences in teaching technical performance, achievement, and cognitive acquisition between the experimental group (using the McCarthy model) and the control group in favor of the experimental group.
2. There are significant differences in post-test results of technical performance, achievement, and cognitive acquisition in favor of the experimental group.
3. There are significant differences between the control and experimental groups in the follow-up tests of technical performance, achievement, and cognitive acquisition in favor of the experimental group.

1-5 Research Scope

1-5-1 Human Scope: First-year female students from the College of Physical Education and Sports Sciences, University of Kufa.

1-5-2 Time Scope: From December 25, 2022, to January 25, 2023.

1-5-3 Location Scope: Track and field stadium at the College of Physical Education and Sports Sciences, University of Kufa.

Terminology:

McCarthy Strategy: This is a learning styles strategy that does not differ significantly from Kolb's strategy. It suggests that individuals learn new experiences and information or face new situations in one of two ways—either through emotions or through thinking (Lamyaa et al., 2019).

Cognitive Attainment: This refers to a type of achievement test that requires performance or work and focuses on measuring motor skills. It is frequently used by physical education teachers, as such tests are highly applicable in physical education classes. This type of achievement test achieves a high level of knowledge by linking the theoretical, cognitive, or informational aspects to practical application, which leads to consolidating and focusing information in memory (Aldewan, 2016).

2- Research Methodology and Procedures:

2-1 Research Method:

The researchers adopted the experimental approach with two equivalent groups (experimental and control) and pre- and post-tests.

2-2 Research Population and Sample:

The research population was defined as first-year female students from the College of Physical Education and Sports Sciences at the University of Kufa, with a total of (20) students. A sample of (16) students was randomly selected and divided into (8) students for the control group, who followed the teacher's usual method, and (8) students for the experimental group, who underwent training using the applied model (Makary's model). Additionally, (4) students were selected for the pilot experiment.

2-2-1 Sample Homogeneity and Equivalence:

Homogeneity was conducted for variables (height, weight, age), and the equivalence of the two research groups was tested through the pre-test for technical performance and achievement.

Table (1): Shows the equivalence of the research sample in variables (height, weight, age).

Variables	Measurem unit	Experimental Group		Control Group		Standard Deviation	(t)Valu	Sig	Statistical Significance
		X	Y	X	Y				
Technical performanc	Degree	56.5	2.0702	56.5	1.8516	0.6546	0.000	1.000	Not Signific
Achievemer	Cm	90.35	1.1892	90.287	1.1642	0.4116	0.106	0.917	Not Signific
Academic Achievemer	Degree	6.75	1.2817	6.875	1.2464	0.4406	-0.19	0.846	Not Signific

2-3 Tools and Instruments:

The references and sources in Arabic and foreign languages, the internet network, observation, technical performance evaluation form, digital stopwatch, high-speed video camera, and a ruler were used.

2-4 Field Procedures:

2-4-1 Description of the High Jump Technical Performance Test (Hussein, 2017):

The preparatory section is worth (20) points (approach phase). The main section is worth (70) points (take-off phase and flight phase over the bar). The final section is worth (10) points (landing phase). The test was as follows:

Test Name: Technical Performance for High Jump Efficiency

Purpose of the Test: To assess the technical performance of high jump efficiency.

Tools Used:

- High jump field
- Horizontal bar holders
- Horizontal bar
- Landing mat
- Measuring tape
- White and red flag

Procedures:

Performance Assessment:

Each student performs three attempts at each height, and the best attempt is recorded.

Technical Performance Evaluation:

The student's best attempt is evaluated based on a total score of (100) points. To ensure evaluation accuracy, the score is divided into four stages according to the specialists' opinions:

1. Approach phase: (20) points
2. Take-off phase: (10) points
3. Flight phase and clearing the bar: (35) points
4. Landing phase: (10) points Each phase is evaluated separately, and then the scores from the four stages are summed to determine the student's total score.

2-4-2 The Pilot Experiment:

The pilot experiment was conducted on Thursday, December 22, 2022, on a sample of (4) first-year students who did not participate in the main experiment. This was to assess the test's efficiency and ensure its validity and applicability.

2-4-3 Main Experiment Procedures:

2-4-3-1 Pre-Test:

The pre-tests for the control and experimental groups were conducted on Monday, December 26, 2022, on the Kufa University field. These tests aimed to assess the technical performance of high jump efficiency and academic achievement while ensuring consistent testing conditions.

2-4-3-2 Main Research Experiment:

The main experiment was conducted on Sunday, December 25, 2022, by implementing the first instructional unit according to the McCarthy model. The aim was to teach the technical performance and cognitive achievement of the high jump activity for first-year female students at the College of Physical Education and Sports Sciences, University of Kufa. Based on expert opinions, 8 instructional units were prepared, with 2 units per week, and each unit lasting 90 minutes.

Table (2) :Time Allocation for the Educational Unit Using the Makary Model with Visual Support for High Jump Performance Learning

N.	Description	Time allocat (minutes)
1	Watching educational images (tasks) and adding students participatio groups	15
2	Warm –up and general preparation	15
3	Practical application	50
4	Conclusion	10
Total		90 min.

2-5 Cognitive Achievement Test Procedures for High Jump Efficiency:

The researcher adopted the test prepared by Noor Hassan Hussein (2017) to measure the cognitive achievement for high jump efficiency. This cognitive test includes three domains: historical, legal, and technical. • These domains were distributed across (20) items: (4) for the historical domain, (4) for the legal domain, and (12) for the technical domain.

2-5-1 Scientific Basis for the Cognitive Achievement Test:

2-5-1-1 Test Validity:

Validity is one of the most essential concepts in the field of tests and measurement. The calculated Chi-square value (3.34) at the degree of freedom (1) and significance level (0.05) indicates the validity of the test paragraphs.

Table (3) : Experts' Opinions on the Validity of Test Items (Chi-square values) for Agreeing and Disagreeing Experts

N.	Scale numbers	Number of items	Expert opinion percentage			Chi-square value			Statistical significance
			Agreement	Percentage	Disagreement	Percentage	Calculated	Tabular	
1	1-4-5-8-10-11-13-18-19	9	11	100%	Zero	Zero	11	3.84	Significant
2	2-3-6-7-9-12-14-15-16-17-20	11	10	90.90 %	1	9.90%	7.36		Significant

2-5-1-2 Test Reliability

The researchers relied on the data of the exploratory sample of (4) students. The test items were divided into (20) items, comprising 10 verbal items and 10 non-verbal (multiple-choice) items. The final value was extracted by calculating the half-test correlation coefficients, where the total reliability value reached (0.90). When comparing it with the global reliability value of (0.80), it was significantly higher, indicating a higher consistency in the students' scores. For the non-verbal items, the reliability value was (2.53), indicating a higher consistency compared to the global reliability value. The reliability coefficient of the total score for both halves was calculated using the Pearson method via SPSS statistical software. The correlation coefficient between the two halves was (0.84), indicating a high internal consistency. Additionally, the

reliability value reached (0.95) when using the Spearman-Brown formula to adjust the half-test reliability, reflecting a high indicator of test stability

2-5-1-3Test Objectivity

Test objectivity refers to ensuring that the test provides consistent results when corrected by different individuals. This means the results should not be influenced by the grader's bias. This ensures objectivity in evaluating students' performance and eliminates subjectivity. Muhammad (1995) stated that objectivity is achieved when the evaluation criteria are clear and free from personal judgments.

2-6 Field Test

The training units for the experimental model were implemented on 25/1/2023. The "performance of the artistic and cognitive achievement" test for the long staff technique was administered. After completing the field test and the test for measuring effectiveness, the data were distributed using the Cognitive Achievement Test. This test was applied to the experimental and control groups under the same conditions.

2-7 Statistical Tools Used

- SPSS statistical software was used.

4 Results Presentation and Analysis 1

4-1 Presentation of Results: The table below shows the results of the technical performance, achievement, and cognitive achievement for the effectiveness of the long staff test in the experimental and control groups.

Table (4):It shows the mean, standard deviation, standard error, and the calculated (t) value for the results of technical performance, achievement, and cognitive attainment in the long jump activity for the pre-test and post-test of the experimental group.

Variables	Measurement unit	Pre-Test		Post - Test		Standard Deviation	(t)Value	Sig	Statistical Significance
		X	Y	X	Y				
Technical performanc	Degree	56.5	2.070	67.12	1.642	0.5805	-12.28	0.00	Significant
Achieveme	Cm	90.3	1.189	116.2	9.543	3.3740	-7.732	0.00	Significant
Academic Achievemer	Degree	6.75	1.281	16.62	1.060	0.375	-28.18	0.00	Significant

Presentation of the results of technical performance, achievement, and cognitive attainment in the long jump activity for the pre-test and post-test of the control group.

Table (5) :The table shows the mean, standard deviation, standard error, and t-value significance for the results of technical performance, achievement, and cognitive achievement for the effectiveness of the long staff in the experimental and control groups.

Variables	Meas men	Pre-Test		Post - Test		Standard Deviation	(t)Value	Sig	Statistical Significance
		X	Y	X	Y				
Technical performance	Degr	56.5	1.8516	61	0.9258	0.3273	-5.463	0.00	Significant
Achievemen	Cm	90.287	1.1642	101.375	5.5533	1.9633	-6.426	0.00	Significant
Academic Achievement	Degr	6.875	1.2464	14.75	2.2519	0.7962	-10.60	0.00	Significant

4-2 Presentation of the Results of the Cognitive Achievement and Technical Performance Tests .

Table (6):The table shows the mean, standard deviation, standard error, and t-value significance for the results of technical performance, achievement, and cognitive achievement for the long staff between the two experimental groups.

Variables	Measure ment unit	Experimental G		Control Group		Standard Deviation	(t)Value	Sig	Statistical Significanc
		X	Y	X	Y				
Technica performar	Degree	67.12	1.642	61	0.925	0.3273	9.19	0.000	Not Significa nt
Achievem	Cm	116.2	9.543	101.375	5.553	1.9633	3.81	0.002	Not Significa nt
Academi Achieveme	Degree	16.62	1.060	14.75	2.251	0.7962	2.13	0.051	Not Significa nt

Based on the results obtained from the post-tests, it was evident that there were significant differences between the experimental and control groups, in favor of the experimental group, in learning the technical performance and achievement of the high jump event. These significant differences are attributed to the effectiveness of the educational units applied to the group taught using the McCarthy model. This

model includes diverse activities that helped the students acquire the core concepts of the high jump event and emphasized interaction between the teacher and the students. This enabled the learners to positively acquire information through the educational activities designed by the researchers in the instructional units, which encouraged them to reflect, stimulate their thinking for learning, and increase their knowledge.As stated by (Layan & Qaraan, 2004), "One of the benefits of the 4MAT model is that it supports the idea of inclusive education and considers individual differences by facilitating learning in various ways".

Moreover, the students' cognitive attainment in the high jump event improved. They comprehended the experiences they learned during their study of the event, both as theoretical knowledge and practical field application, as measured by the scores obtained in the post-cognitive achievement test. These results showed an improvement in scores. (Zulfikar at all, 2017)" affirmed that "The methods of knowledge for athletes should be presented through questions so that learning and training occur in the field according to the competition's requirements. To increase knowledge, we first stimulate the athlete to provide theoretical answers, which then become practical objectives during performance. This approach benefits athletes by linking the theoretical aspect with practical application."

5- Conclusions and Recommendations

5-1 Recommendations:

1. The need to use teaching units based on the MacCarthy model to enhance technical performance, achievement, and cognitive knowledge in various educational fields.
2. Encouraging instructors to use this model in teaching strategies to develop technical skills and cognitive thinking among students.
3. Fostering an educational environment that supports active learning through modern teaching methodologies to align with global standards.

5-2 Recommendations

1. It is essential to use instructional units based on the McCarthy model to teach technical performance, achievement, and cognitive attainment in the high jump activity.
2. Prepare an educational environment that encourages and supports teachers in using teaching models and strategies that suit the activity being taught.
3. Organize training courses on teaching methods to utilize models and strategies that consider the type of activity being taught.

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Appendix (1) shows the cognitive achievement test for the effectiveness of the high jump

t	Paragraphs
:First: - Historical field	
1	The keel was passed by the dorsal method (curvature) A- 1968. B - 1958. .C - 1962
2-	The first method used by runners in the high jump is: a– Saddle method . b– Dorsal method . c– .Scissor method
3	In 1912 the model and the rider were passed in a lying position on the side and this method was named by: A- The Eastern Way. B- The Western way . .C - dorsal method
4	The dorsal method belongs to the player: A- Richard Fosbury. B- Soto Meyer. c. Jane Stewart.
.Second: - Legal field	
5	Touching the ground, including the landing area, behind the level of those in charge of any part of the body without passing the crossbar first, is prepared: A- A correct attempt. B- Failed attempt. .c. What the judgment deems appropriate
6	Three consecutive failed attempts lead to: A- Depriving the contestant from continuing in the competition. B- Give the contestant the opportunity to continue in the competition C. All of the above
7	The approach route should not be less than: A- 30 m. B - 25 m. C- 15 m
8	The landing area must not be less than: A- 5 pm × 7 m. B- 5 m × 5 m. C - 5 pm × 3 m.
.Third: - The field of performance	
9	The approach stage is followed by the stage of preparation for the upgrade, and the length of this stage is: A- Five running steps in the curve before upgrading. B- Three running steps in the curve before upgrading. .C- Seven running steps in the curve before rising
10	The process of passing the beam begins immediately after the stage of: A- Upgrade. B- Landing. .c. Aviation
11	The goal of the high jump is to pass the beam with a position: A- Vertical. B- Horizontal. .C - Italic
12	The process of rotation and facing the beam with the back is produced by: A- The movement of the man of promotion.

	B- Free Man Movement. .C - movement of the arms
13	The number of steps during the increase in speed in the approach phase of: A- 7-9 steps. B – 6-9 steps. .C- 5-9 steps
14	In order for the contestant to take the appropriate position to rise, he must: A- It automatically lowers the center of gravity of the body with the inclination of the body slightly backward and inward. B - Lowers the center of gravity of the body automatically with the inclination of the body back slightly and outward. C - raises the center of gravity of the body automatically with the inclination of the .body forward slightly and in the direction of the interior
15	The approach distance ranges from ... A- 7-9 steps and may reach 11 steps. B- 7-9 steps, up to 15 steps. .C- 7-9 steps and may reach 20 steps
16	In the dorsal method should be elevation: A- With the foot near the crossbar. B- With the foot far from the crossbar. .c. Any foot suitable for the contestant
17	The body of the contestant becomes above the bar in the form of: A- Straight. B- Bracket. .C - Department
18	The upgrading phase begins with the front pillar by: A- Placing the heel of the rise on the ground and tilting the body back and side away from the crossbar. B- Placing the heel of the foot on the ground and tilting the body forward and inward close to the crossbar. C- Placing the elevation foot comb on the ground and tilting the body forward and .inward close to the crossbar
19	In flight, the player will: A- Wrap the body around the transverse axis to face the crossbar with his back and pave the way for the curvature position. B- Wrap the body around the sagittal axis to face the crossbar with his back and pave the way for the curvature position. C- Wrap the body around the longitudinal axis to face the crossbar with his back and .pave the way for the curvature position
20	During the landing process the body of the rider resembles : A- The letter S (b) The letter L . .C - The letter T