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The Empact of the Developed Caffarel Model on Cognitive Knowledge and Learning the Effectiveness of Long Jump for Students

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Abstract: *This research aimed to identify the effect of the developed Caffarel model on cognitive knowledge and learning the long jump skill. The researchers used the experimental method with a two-group design (experimental and control). The research population included first-year students in the College of Physical Education and Sports Sciences, Al-Nusour University College, for the academic year (2024-2025). The population included (213) students. They were divided into five sections. After excluding failed students and club and team players, the researchers randomly selected the sample from sections (A) and (B) into two groups: the control group, including (12) students, followed the curriculum provided by the college, while the experimental group, including (12) students, followed the developed Caffarel model. The model was introduced to the same exercises followed in the college. Ten students were selected for the purpose of the pilot study. Thus, the sample constituted (11%) of the research population. In order to avoid factors that affect the results of the experiment and attribute the differences to the experimental factor, the researchers conducted homogeneity on their research sample in the variables of height, weight and age. Moreover, they conducted a pre-test and prepared two units per week for a period of 8 weeks. The number of educational units was 16, with a duration of 90 minutes for each educational unit. After that, the post-test was conducted. The SPSS was utilized to reach the results and conclusions. The results showed that the developed Caffarel model had a positive impact on the cognitive process. The experimental group outperformed the control group in cognitive knowledge experience. Furthermore, the developed Caffarel model had a positive impact on learning the long jump, as demonstrated by significant differences in favor of the post-test for the experimental and control groups. Thus, this research recommended adopting the developed Caffarel model when teaching track and field activities, including the long jump. It also recommended adopting cognitive knowledge as a basis for educational curricula, in accordance with the requirements for learning various skills.*

Keywords: *Developed Caffarel Model, Cognitive Knowledge, Long Jump.*

Introduction

The field of sports, particularly educational sports, has received a significant global attention, as it facilitates the management of the educational process. It does so according to an integrated scientific system which is specifically designed to achieve development in all areas of this process. To achieve development in the educational process, trainers and teachers have long sought modern and diverse educational models that help students organize their own learning and raise their level by allowing them to participate in the educational process. One of the most prominent models of self-regulated learning is the

developed Caffarel model, which is characterized by the degree of guidance provided by the teacher. The researchers chose this model because it allows learners to rely on themselves and self-regulate themselves in learning the motor effectiveness of the long jump and in finding solutions to problems encountered in the learning process. Furthermore, the results of using this model on learners will enhance their capabilities and abilities in learning the long jump, as well as their mental processes, which are essential factors in learning any skill. Furthermore, cognitive knowledge is the interaction of several senses simultaneously. In this respect, distinguishing or differentiating between sensation and cognitive knowledge can help us better understand these terms. Here, sensation refers to the reception of a stimulus, while perceptual knowledge refers to the interpretation of the stimulus. Perceptual knowledge is thus of great importance in various fields, given its importance in all normal daily activities. It involves recognizing most things in our external environment through our senses, which we can interpret to align with appropriate and varied responses in the external world in which we live.

Cognitive knowledge occupies a significant space in the field of physical education. It is inherent to the specificity of each sport. We observe this in the long jump, which is one of the most important events in field sports. This sport requires mental processes such as attention and cognitive knowledge. Therefore, cognitive knowledge contributes to the continued progress and development of the sport. It is the process of organizing received stimuli and interpreting them to form meaning. Here, meaning is influenced to some extent by previous experience. Furthermore, cognitive knowledge is a process that complements the sensation process. Significantly, it is not equal for everyone, even if the environmental stimuli are the same, as cognitive knowledge is influenced by subjective and objective factors. Therefore, it is relative knowledge, not absolute knowledge. It also has a fundamentally holistic form, meaning that the individual first perceives the whole, and then it is analyzed into its constituent parts. The learner's cognitive knowledge interprets sensations through information stored in memory and as a result of previous experiences in this situation. Through cognitive knowledge, the player can determine the appropriate position and other various situations in the game.

Research Significance:

The importance of the research lies in the fact that Caffarel's developed model works to develop the learners' cognitive knowledge by making them participants in the learning process, rather than merely performers. This occurs by providing them with the opportunity to practice learning methods and processes themselves through their own thinking and reasoning, utilizing their own information and thinking methods to arrive at logical conclusions for learning the long jump skill.

Problem Statement:

The mental aspect, with all its cognitive procedures and tools, plays a fundamental role in creating a positive impact on motor performance. This is because it is linked to other aspects of learning, such as physical and psychological aspects. It is also because the mental aspect helps the learner focus and cognitively recognize the positive aspects that help predict good responses and performance. Those aspects can prevent negative perceptions

that harm skill performance through negative emotions that cause increased anxiety and failed expectations. Correct responses and good performance come from the learner's understanding and interpretation of information related to the effectiveness of the long jump. This can only happen when the learners organize themselves, their capabilities, and their mental abilities. It occurs by following different educational models. Therefore, the researchers saw the need to develop educational units based on Caffarel's developed model. According to this model, the teacher poses a number of questions that help the student move freely in educational situations by reviewing all the details of the skill. This is more effective than the standard model, as it gives the student a role in demonstrating what they have learned about the effectiveness of the long jump and identifying its impact on cognitive knowledge and learning the long jump skill.

Research Objectives:

1. To develop educational units based on the developed Caffarel model.
2. To identify the impact of the developed Caffarel model on cognitive knowledge.
3. To identify the impact of the developed Caffarel model on learning the long jump skill.

Research Hypotheses:

1. There are no significant differences between the results of the experimental and control groups in the pre- and post-tests of cognitive knowledge.
2. There are no significant differences between the results of the control and experimental groups in the pre- and post-tests of the long jump effectiveness test.
3. There were no significant differences between the results of the experimental and control groups in the post-test of cognitive knowledge and the long jump effectiveness test.

Research Limits:

1. Participants: A sample of first-year students in the Department of Physical Education and Sports Sciences, Al-Nusour University College.
2. Time Period: The second semester, from February 16 to May 13, 2025.
3. Venue: The sports field planned for the long jump event in the Department of Physical Education and Sports Sciences, Al-Nusour University College.

Methodology

The experimental approach was used to examine the effect of the Developed Caffarel Model on cognitive knowledge and learning the effectiveness of long jump for students. The researchers designed two groups (experimental and control) with pre- and post-tests.

Population and Sample:

The research population included all first-year students in the Department of Physical Education and Sports Sciences, Al-Nusour University College, for the academic year 2024-2025, as the long jump activity is part of the curriculum at this stage. The population included 213 students. Furthermore, the population was divided into four

classes (Class A: 54 male students, Class B: 54 male students, Class C: 56 female students, and Class D: 49 male students. The sample was randomly selected from Classes A and B, comprising two groups; the control group, consisting of 12 male students, followed the syllabus provided by the college, while the second, the experimental group, consisting of 12 male students, followed the developed Caffarel model, which was incorporated into the same exercises used at the college. Ten students were selected for the pilot study. Thus, the research sample constituted 11% of the research population.

To avoid factors that might affect the results of the experiment and attribute differences to the experimental factor, the researchers tested the homogeneity of the research sample on the variables of (height, weight, and age). The results in Table 1 showed that the research sample was homogeneous, as the calculated skewness coefficient was within (±3). This is a good indicator that the distribution is normal or close to normal.

Table 1. Sample homogeneity in the variables of height, weight, and age

Sig. Level	Skewness	Median	STD	Means	Unit of measurement	Variables	No.
Random	0.03	176	83,5	175.95	Cm	Height	**1**
Random	0.18	70.5	8.16	70	Kgm	Weight	**2**
Random	**0.70**	**20.9**	**72,0**	**20.73**	**Year**	**Age**	**3**

The researchers also evaluated equivalence between the two research groups on the cognitive knowledge test and long jump effectiveness. Table (2) shows that the calculated t-value between the results of the two research groups was less than the tabular t-value (2.05) with a degree of freedom of (22) and a significance level of (0.05). This indicates that the two research groups were equivalent.

Table 2. Equivalence of the experimental and control groups on the research variables

Statistical sig.	Calculated t value	Control group		Experimental group		Unit of measurement	Variables	No.
		STD -+	S	STD -+	S			
Insignificant value	1.726	3.30	109.83	3.33	112.17	Degree	Cognitive knowledge	**1**
Insignificant value	1.741	0.40	1.46	0.82	1.92	Distance	Long jump effect	**2**

Table 2 shows that the calculated t-value was smaller than the tabulated t-value for all pre-tests. This indicates no significant differences between the experimental and control groups. Moreover, it indicates sample equivalence in the pre-test.

Research Tools:

Data collection tools included observation, questionnaire, information collection methods, scientific sources and references, the Internet, tests and measurements, data analysis methods, data collection and transcribing forms, an electronic calculator, and a handheld calculator.

Auxiliary Equipment:

1. A long jump arena.
2. A Korean-made Sony electronic stopwatch to measure the time taken to complete the cognitive test.
3. A Sony camera.

Field Research Procedures:

Determining the Effectiveness of the Long Jump:

The long jump is part of the Track and Field Sports curriculum, and is a curriculum approved by the sectoral authority. It is in effect in the Faculties of Physical Education and Sports Sciences and other similar colleges. The curriculum was implemented in the second semester.

Long Jump Effectiveness Test: (396:1)

The researchers used a single Sony video camera with a 24-frame-per-second rate, mounted on a tripod 15.30 m from the center of the right approach field and 1.20 m high, so that it was perpendicular to the center of the take-off board. This camera recorded the entire motor performance of the event, from the initial run to the landing area (the pit). The researchers then relied on a technical performance evaluation form for the long jump event, which determined how to distribute scores for each stage of the long jump. This form included five fields:

Field 1: Sequence of the participants
Field 2: Approach Run Phase
Field 3: Take-off Phase
Field 4: Flight Phase.
Field 5: Landing Phase.

The testers' technical performance scores were based on the four divisions of this activity (approach run, takeoff, flight, and landing). The values for each of these stages are given as follows: approach run (2) points, takeoff (4) points, flight (2) points, and landing (2) points. The maximum score for the entire event is (10) points. The technical performance was evaluated by experts with expertise and experience in track and field sports. They watched slow-motion video recordings of the technical performance of the two groups (control and experimental). The arithmetic means were then calculated as the sum of the evaluators' scores.

Cognitive Knowledge Test (18:2):

The researchers relied on the cognitive knowledge scale developed by Kazem Mohsen Kuwaita (2020), which consists of 32 items based on a five-point Likert scale. The highest score on the scale is 190, the lowest score is 32, and the hypothetical mean is 96. The scale's reliability is 0.89 and its reliability is 0.84.

Exploratory Experiment:

The experimental experiment was conducted on (10) first-year students from outside the research sample on February 16, 2025, at 10:30 a.m. in the track and field playground; that is, in the same location where the main experiment will be conducted. The cognitive

knowledge test was administered to the students within the allotted time. Long jump effectiveness tests were also conducted to identify the difficulties facing the researchers, determine the validity of the devices and tools used, ensure the suitability and ease of the tests used in the research, determine the time required for the tests, and ensure the preparedness of the support team to implement the tests.

Field Experiment Procedures:

The main field experiment procedures included the following:

Introductory Units: The researchers conducted two introductory units, the first on February 17, 2025, and the second on February 18, 2025. They initially addressed the effectiveness of the long jump and cognitive knowledge, the subject of the current research. The duration of the units was (90) minutes.

Pre-tests: The pre-tests were conducted after the completion of the introductory units, on February 21, 2025, at 10:00 a.m. The cognitive knowledge test was administered according to the specified time. The long jump effectiveness test was then conducted in the track and field games area.

Preparing the Instructional Units According to the Developed Caffarel Model:

The researchers reviewed numerous interrelated research papers, theses, and dissertations that explored the topic of self-regulated learning. The researchers then prepared (8) instructional units according to the Developed Caffarel Model. The duration of the instructional unit was (90) minutes, at a rate of two units per week, as follows:

a. Preparatory Section: 40 minutes.

   The researchers expanded the educational portion of the main section to the preparatory section due to the model's requirements for presenting the long jump activity and physical abilities exercises on educational films and a screen. The researchers allocated 20 minutes (this time is reduced over time and added to the application of physical and skill exercises). Here, the researchers employed identifying main ideas, presenting experiences, and creating figures and tables to present the skill. The teacher used slow-motion images and sound to present the skill, detailing the skill to the students in a classroom designated for viewing the videos before moving onto the field.

   i. The administrative aspect included 2-3 minutes to monitor student attendance and sports uniforms.
   ii. The introduction and physical exercises were allocated 6-7 minutes, and the exercises varied between physical and physical skills.

b. Main Section: 40 minutes.

   20 minutes were allocated for practical activities, including performing physical and skill development exercises for the long jump activity. The learners' needs are identified after the teacher explains and presents the theoretical and practical material. The homework sheet is then distributed to the groups (each group contains 3 students). They perform the exercises attached to the homework sheet, using the pre- and post-performance measures.

c. Final Section: 10 minutes.

This section includes recreational exercises and competitive races for the students. This involves a coordination phase that links the components and divisions of the long jump skill.

It is worth noting that the researchers emphasized a set of principles that must be followed when designing the educational unit, namely:

1. Diversity of Alternatives:

   Activities: Provide a variety of long jump activities, such as jumping from different positions and speed training before jumping.

   Tools: Use different types of tools (such as hurdles and ropes) to make the learning experience fun and interactive.
2. Defining Program Ideas:

   Defining educational objectives, such as improving jumping techniques and increasing awareness of the psychological and physical aspects of the long jump.

   Considering the needs of learners based on their varying levels of experience and physical ability.
3. Determine program priorities and organize ideas:

   Arrange lessons based on skill levels, starting with basics such as warm-ups and moving on to advanced jumping techniques.

   Emphasize the importance of physical and mental preparation before each session.
4. Write program objectives: Specifically formulate objectives, such as increasing students' ability to jump a certain distance within a month or improving jumping technique by 20%.
5. Design the educational plan: Include study sessions that include practical and theoretical instruction, and distribute lessons according to the proposed activities.
6. Elicit and communicate educational ideas: Share educational experiences through video clips of both the long jump technique and various training methods. Formulate assessment plans: Develop periodic tests to measure student progress, such as determining the required jump distance and analyzing jumping technique.
7. Present results and make recommendations: Provide a presentation on students' skill progress and share feedback on activities to inform future program development.
8. Determine Performance Metrics:

   Establish performance metrics before and after the program:

   Pre-performance: Identify students' basic abilities.

   Post-performance: Measure improvement in technology and tactics during implementation.

   Final performance: Measure final performance results after the program's completion.

9. Prepare a budget: Estimate costs related to tools and equipment needed for training, such as purchasing jumping equipment or equipping the arena.
10. Explore marketing methods: Organize school or sports events to encourage student participation, and promote the activity through social media and school billboards.
11. Evaluate effectiveness: Provide students with questionnaires about the program, assessing their understanding of the acquired skills, and their desire to continue learning.

The educational modules were implemented from February 28, 2025, to April 22, 2025.

Post-tests:

The post-tests were conducted in the same manner as the pre-tests, on April 30, 2025. The cognitive knowledge test was conducted according to the specified time, as was the long jump effectiveness test.

Statistical Methods:

The researchers used the Statistical Package for Social Sciences (SPSS).

Result and Discussion

Presentation and Analysis of the Results of the Experimental Group on the Cognitive Knowledge and Long Jump Test:

Table 3. Statistics of the pre- and post-tests of the Experimental Group on cognitive knowledge and long jump effectiveness

Sig.	Tabulated t value	Calculated t value	TD	- F	Post-test		Pre-test		Unit of measurement	Research
					TD		TD			
Significant	2.20	5.02	6.60	4.08	6.79	36.25	1.33	12.17	Degree	Cog
Significant		4.39	2.79	.58	.85	.5	7.82	1.92	Degree	Lon

Table 4 shows the values of the arithmetic means, standard deviations, mean differences, mean deviations, calculated and tabulated t-values, and the significance of the differences in the pre- and post-tests of the experimental group on cognitive knowledge and long jump effectiveness.

Table 4 evidently shows significant differences in the cognitive knowledge test for the experimental group, in favor of the post-test. The researchers attribute this improvement

to the effectiveness of the educational units designed according to the developed Caffarel model. The units were used by the experimental group and enhanced the connection between previous and subsequent information. This contributed to improving the learning process for students. By enhancing their understanding of basic concepts, students are able to apply new knowledge more effectively, leading to better educational outcomes using the Caffarel model. It is an educational model built on the foundations of constructivist theory, which emphasizes that prior learning informs subsequent learning and includes in its contents figures, tables, material resources, scales, and correlative formative tests" (2670:3). The researchers agree with Alaa (2024) that Caffarel's model is a set of steps followed by the teacher during the lesson preparation time and during the lesson to achieve the research goal and advance learning. Moreover, they assert that Caffarel's developed model is extremely important in developing students' cognitive knowledge, as it has contributed to enhancing critical thinking and analytical skills. It achieved this by providing integrated teaching strategies that enable students to develop a deeper understanding of concepts and apply them in diverse contexts, thus contributing to improved academic performance. Alaa (2024) asserts in this regard, “They are processes whose function is to plan, monitor, and evaluate individuals' performance in solving a problem. Their mission is to guide thinking in solving and managing the problem, and they are one of the components of intelligent performance or information processing.” (38:4)

Learners use a variety of intellectual processes, such as comparison, application, guesswork, analysis, inference, and innovation, to discover facts and patterns on their own. Therefore, the model works to develop students' mental processes through a series of questions posed by the teacher and their responses to these questions. This helps students better understand the nature of long jump performance, enabling them to perform the long jump more effectively and play an active role in completing the educational process. They can develop self-regulated learning skills by reflecting on the concept of correct performance and applying the knowledge they have discovered to practice, thus acquiring cognitive knowledge in performance.

The results of the control group in the cognitive knowledge and long jump test:

Table (5): Statistics related to the control group in cognitive knowledge and long jump effectiveness

Sig.	Tabulated t value	Calculated t value	TD	- F	Post-test		Pre-test		Unit of measurement	Research variables
					TD		TD			
Significant	2.20	4.89	.15	1.5	.60	21.33	.30	09.83	Degree	Cognitive knowledge
Significant		11.55	.99	.29	.92	.75	.40	.46	Degree	Long jump

Table 5 shows the arithmetic means, standard deviations, mean differences, calculated and tabulated t-values, and the significance of the differences in the pre- and post-tests for the control group in cognitive knowledge and long jump effectiveness.

The results of the cognitive knowledge and long jump tests for the experimental and control groups in the post-tests:

To determine the arithmetic means, standard deviations, calculated and tabulated t-values, and significance levels for the post-tests for the experimental and control groups in cognitive knowledge and long jump, the researchers used the statistical parameters shown in Table 6.

Table 6. Statistics of the post-tests for the experimental and control groups in cognitive knowledge and long jump.

Sig.	Tabulated t-value	Calculated t-value	Experimental group		Control group		Unit of measurement	Research variables
			S	STD	S	STD		
Significant	2.07	2.739	16.79	1	18.25	1.60	Degree	Cognitive knowledge
Significant		7.607	0.85	7.5	0.92	4.75	Degree	Long jump

Table 6 evidently unveils that the differences are significant in favor of the experimental group. This is due to the importance of Caffarel's developed model and the questions it includes, which were included in the educational curriculum for the educational units and answered by the students. The researchers confirm the effectiveness of Caffarel's developed model by involving the student in the learning organization process and identifying the details of the skill through the student's cognitive knowledge. This is observed in the long jump sport, which is one of the sports that require mental processes such as attention and cognitive knowledge. Therefore, "cognitive knowledge contributes to the continued progress and development of the game. Without cognitive knowledge, the habit does not occur because the player acts according to the requirements of the situation they are aware of." (21:5)

Caffarel's model relies on several steps and alternatives aimed at improving learning effectiveness. This model includes presenting information in an organized manner that reflects priority and importance, focusing on elements such as input behavior, the nature of the curriculum content, and the desired learning outcomes (305:6).

It is noted that the learning environment, based on Caffarel's model, has contributed to embracing students and providing them with educational and pedagogical experiences based on an educational vision adopted by the teacher or educational designer of the educational environment, in line with the students' psychological and cognitive needs, their

mental abilities, and their developmental and psychological characteristics. In this regard, the educational environment plays an important and influential role in the primary education stage. Moreover, it is urging for curriculum planners to focus on setting goals and defining educational activities. They must also pay attention to how to organize the educational environment to achieve the set goals (79:7). Thus, designing an appropriate learning environment is one of the most important skills a teacher must possess, as this process is one of the most important technical steps upon which the teacher's success in the educational process depends. (116:8)

It is confirmed that constructivist models are effective tools for enhancing students' cognitive knowledge, as they contribute to building a deep understanding of concepts by linking new knowledge to existing knowledge. These models encourage students to think critically and foster creativity, which improves problem-solving skills. They also allow teachers to present information in an organized manner that makes it clearer and easier to understand, leading to deep and sustainable learning. Through the interactive process provided by constructivist models, students become better able to absorb and apply information in multiple contexts, which positively impacts their academic performance and increases their motivation to learn (46:9).

Furthermore, it is confirmed that the educational units based on the developed Caffarel model, which were applied to the experimental group, had a clear impact on learning the long jump skill at all its technical levels. Cognitive knowledge helped in understanding the skill and performing it effectively. In this regard, the cognitive aspect influences the behavior and character development of individuals, their thinking, and their ability to confront situations or changes generated by the surrounding environment. During competition, the athlete needs to restore psychological balance and adapt to create a means for them to understand and successfully interact with situations. They adopt a method for resolving the situations they encounter during competition. This method varies from one person to another, which is reflected in the athlete's behavior and decisions during competition." (99:10) Furthermore, no individual can be skilled in motor performance without a complete and effective cognitive function. The higher the level of cognitive knowledge, the higher the level of skill performance in the long jump effect (45:11). Shaalan (2017) confirms this by stating that the degree of change in cognitive knowledge depends on the nature of the situation in which the person obtains information, its sources, its method, and the degree of mastery (99:12).

Conclusion

1. It has been confirmed that the developed Caffarel model has a positive impact on enhancing students' cognitive knowledge, helping them better understand the methods and techniques of the long jump.
2. Using the Caffarel model improved learning effectiveness, as students became able to apply theoretical knowledge to practical long jump practices, which contributed to improving their performance.

3. The model was designed to enhance students' motivation to learn and practice, as levels of interest and active participation in long jump-related activities increased.

Recommendations:

1. It is recommended that the developed Caffarel model be included in the physical education curriculum to enhance cognitive knowledge and effectively learn motor skills.
2. It is essential to provide programs and workshops for teachers on how to apply constructivist models to teaching long jump, enabling them to use innovative and effective teaching strategies.
3. The impact of the Caffarel model on student learning should be periodically evaluated, and the results of these evaluations should be used to continuously modify and improve teaching and training methods.

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