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SPECIAL ISSUE ARTICLE

The Impact of the Krubli Model on Complex Thinking and the Performance of Volleyball Setting and Spiking Skills Among Female Students

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Abstract

The study aimed to develop instructional units based on the Krubly model and to examine their impact on the development of complex thinking and the performance of serving and spiking skills in female volleyball players. The research hypothesizes that there are statistically significant differences between the pre- and post-test results of the experimental and control groups, in favor of the experimental group, in terms of complex thinking and performance in the skills of setting and spiking in volleyball among female students. The researchers employed an experimental approach on a sample of 25 female students. They administered tests of setting and spike skills in volleyball, distributed the complex thinking test, and then compiled and statistically analyzed the results. Based on the results, the researchers reached the following key conclusions: The instructional units designed according to the Krubly model and based on complex thinking proved effective in improving the students' performance in setting and spiking skills in volleyball. Furthermore, the results demonstrated the superiority of the experimental group (Krupeli model) over the control group in the post-tests, where the experimental group achieved an arithmetic mean of (130.84) for the "complex thinking" variable, compared to (125.33) for the control group, with a t-value of (1.746). The greatest superiority was also evident in the "multiplication" skill, with an arithmetic mean of 17.769 for the experimental group compared to 14.750 for the control group, with a highly significant t-value of 4.306 at a significance level of 0.00, confirming the effectiveness of the educational program in achieving the goal of quality education.

Keywords: Krubli model, Complex thinking, Preparation, Smash in volleyball

1. Introduction

Advances in sports activities are the result of scientific research and studies that have driven the educational process toward the adoption of modern teaching models that go beyond traditional frameworks. Furthermore, learning physical games requires methods that provide learners with broad horizons for developing their mental skills and stimulating creativity. Among the most prominent of these is the Krubli model, which links creativity to knowledge in order to acquire skills, considering the learner to be the most effective element through the activation of thinking skills and the development of creative ideas (Zainab Jassim, 2024). Here, the role of com-

plex thinking (critical and creative) stands out as a fundamental element in the learning process, as it involves the ability to analyze and evaluate information; as the learner capable of generating diverse ideas and finding solutions to problems achieves an intelligent motor response that combines critical thinking such as observing the ball's trajectory with creative thinking to select the appropriate angles, thereby supporting the accuracy of skill performance (Nima & Abdullah, 2024). Volleyball is also a sport in which advancement depends on mastering basic skills, particularly the serve and spike, as they form the foundation of offensive performance and are key to developing tactics for scoring points. In these two skills, the need for "motor creativity" emerges to

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overcome learning difficulties in complex skills (Farrow & Robertson, 2017). During performance, students need to engage in complex thinking to solve problems independently and overcome obstacles (Al-Khouli, 2012). Given the nature of the game, preparation is considered the pinnacle of tactical thinking for analyzing the opposing team's weaknesses, while a decisive strike is the culmination of mental processes that begin with anticipation and end with creative execution (Qatami, 2010).

Hence, the importance of this study lies in identifying the impact of the Krubly model on complex thinking and on the performance of the set and spike skills in volleyball among female students. As for the research problem, the researchers identified it through their teaching experience, noting that female students clearly struggled to learn and master offensive skills (set and spike), which led to poor overall performance. The researchers attribute this to a reliance on traditional methods that do not give sufficient attention to developing cognitive or mental aspects, and a failure to utilize modern educational models. Therefore, the researchers decided to highlight the "Krupeli Model" due to its distinctive emphasis on the learner's active role in expressing creative ideas and using critical thinking skills to find solutions, and to study its effectiveness in developing these complex skills within an active learning environment that integrates cognitive and motor aspects.

The research aims to develop instructional units based on the Krubli model and to identify their impact on the development of complex thinking and the performance of serving and spiking skills in volleyball among female students. The study hypothesizes that there are statistically significant differences between the pre- and post-test results of the experimental and control groups, favoring the experimental group in terms of complex thinking and the performance of the serve and spike skills in volleyball among female students.

The research sample consisted of third-year female students in the College of Physical Education and Sports Sciences at Al-Nusoor University during the period from February 9, 2025, to April 15, 2025. The research experiment was conducted in the indoor gymnasium of the College of Physical Education and Sports Sciences at Al-Nusoor University.

2. Methodology

The researchers employed an experimental design using a control and experimental group approach with pre- and post-tests, as this method was deemed appropriate for the subject matter, the nature of the problem, and the sample under study. The research

population consists of all objects, individuals, and elements possessing the characteristics to which the researcher wishes to generalize the results of their research and study (Obeidat et al., 2020). The research population was determined using a purposive sampling method and consisted of third-year female students in the College of Physical Education and Sports Sciences at Al-Nusoor University for the academic year 2025, totaling 50 students distributed across four sections (A, B, C, and D). The research sample was selected randomly by drawing lots, with Section B serving as the experimental group (13 students) and Section C as the control group (12 students), both selected randomly by drawing lots. The sample is homogeneous as the students are of the same age group and their average height ranges between 150 and 160 cm. As for the pilot study sample, consisting of 7 students from Group A, they were selected by the college based on specific criteria and measurements. Thus, the percentage of the research sample from the original population was 50%. The college curriculum was implemented with the control group, and the educational program based on the Krubli model was implemented with the experimental group to determine the effect of this model on the learning of the skills under study. The researchers utilized the following methods, tools, and equipment:

- Arabic and foreign sources
- Data collection and transcription form
- USB flash drive (USB 3.0)
- Metal measuring tape with adhesive tape
- CD with discs (Lenovo laptop calculator)
- The Internet
- A regulation volleyball court
- Lanhua volleyballs (12).

The researchers used the following tests:

2.1. Set-up test to points 2 and 4

Purpose of the test: To measure the performance level of the skill of setting the ball from in front of the head to points 2 and 4, as assessed by experts.

Equipment: A regulation volleyball court, volleyballs, a measuring tape, and the court as shown in Fig. 3. The backcourt is divided into two rectangles (A and B), each measuring 4.3×5 m, designated for the coach to stand in and pass the ball to the test subject.

Performance specifications: The test subject stands at point (3), and the coach, standing in area (A), passes the ball to him while he is in this position so that he can set it up and direct it toward point (2). The tester is given three attempts, and then given three more attempts to set it up and direct it toward the center of (4) after the ball is passed to him by the coach standing in area (B). **Scoring:** The trainee's performance on the six attempts is evaluated by experts, and the grading is as follows:

Table 1. Shows the equivalence of the two study groups in terms of the variables under investigation.

Variables studied	Experimental group		Control group		T-calculated	Error level	Significance
	S	n	s	n			
1- Complex thinking	65.769	7.551	68.500	8.039	0.876	0.390	Not significant
2- Setting	1.538	0.877	1.833	0.577	0.984	0.336	Not significant
3- Spiking	7.625	1.310	7.555	1.509	0.121	0.905	Not significant

Significance level (0.05) and degree of freedom (24).

A. The preparatory section, worth 3 points. B. The main section, worth 5 points. C. Concluding section: score (2). The final score was calculated by finding the arithmetic mean of the six attempts, as well as the arithmetic mean of the three experts' evaluations (Al-Fartousi & Al-Tamimi, 2024).

2.2. Straight-on smash test

Purpose of the test: To measure the accuracy of straight-on smashes into the inner triangle of the opponent's court. Unit of measurement: Points. Equipment: Five flying balls. The court is divided into two triangles (opposite halves of the court), and the inner triangle (net side) is further divided into three zones, each 3 meters wide. Performance specifications: After setting up, the tester performs a straight smash toward the inner triangle on the net side.

Conditions

1. Each participant has 5 attempts.
2. The set must be executed properly on each attempt.
3. Scores are calculated based on where the ball lands, as follows:

— In the first zone: 3 points — In the second zone: 1 point — In the third zone: 5 points
— Outside these zones, the participant receives 0 points.

Scoring: The examinee's scores from the five attempts are recorded; thus, the final score for this test is 25 points (Adnan Hadi Musa et al., 2023).

2.3. Complex thinking test

This test was developed by Abdulmousawi (2024) and consists of 33 items designed to measure the concept of complex thinking. These items are distributed across two areas of thinking: 16 items for creative thinking and 17 items for critical thinking. These statements were formulated as hypothetical statements, and each statement is followed by five ranked response options: (Always, Often, Sometimes, Rarely, Never). When grading these statements, the following scores are assigned: (1, 2, 3, 4, 5), respectively.

The researchers conducted a pilot study for each of the following: (Complex Thinking Test – Preparation Test – Multiplication Test – Educational Units) on the pilot study sample, which is a limited-scope exploratory study conducted prior to the actual study to test methodological aspects and ensure the validity and reliability of the measurement instruments, as well as the suitability of the equipment and tools used in the research (Aqil, 2022) on a sample of (7) female students at the College of Physical Education and Sports Sciences / Al-Nusoor University, with the aim of verifying the validity and reliability of the measurement instruments (Complex Thinking Test, Preparation Test, and Crushing Multiplication Test) and the suitability of the instructional units, according to the following sequence: The Complex Thinking Test was administered on Sunday (2/9/2025) in the computer lab to identify obstacles and determine response times, On Monday (February 10, 2025), the two skill tests (Setup and Crush) were conducted in the gymnasium to ensure the students' understanding of the performance mechanism and the interpretation of results. On Tuesday (February 11, 2025), the instructional model was tested to ensure the appropriateness of the exercises, repetitions, and performance time, which helped in preparing the final instructional units.

Second: The Main Experiment (Pre-tests), Following the pilot study, pre-tests were administered to both research groups (experimental and control) to ensure objectivity and standardize spatial and temporal conditions. The complex reasoning test was conducted on Wednesday, February 12, 2025, in the computer lab, and took 17 minutes to complete. The skill tests (set-up and smash) were also administered on Sunday (February 16, 2025) in the gymnasium. To ensure a level playing field, the researchers conducted statistical equivalence tests between the two groups on the variables (complex reasoning and basic volleyball skills), as shown in Table 1.

Table 1 shows that there are no significant differences between the experimental and control groups in the pre-tests for the research variables (composite reasoning, addition, and multiplication), indicating that the two groups are equivalent in terms of these variables. After reviewing the references and sources and

utilizing the results of the pilot study, the researchers prepared instructional units based on the Krubli model for the experimental group. The model consists of five stages tailored to the research population and sample and was divided into (8) units, distributed as one instructional unit per week for the skills of setting and spike in volleyball. The researchers implemented the instructional program according to the model on the experimental group. The instructional units were presented to a group of experts with relevant specialization and experience, as detailed in [Appendix No. \(1\)](#). The experiment was conducted on Sunday, February 23, 2025, and concluded on Sunday, (April /13/ 2025). The Krubli model consists of the following steps:

- 1- Pre-test: Assessing learners' prior knowledge and experience related to the skill by asking questions designed to stimulate students' thinking.
- 2- Information: This involves recalling and organizing prior knowledge and experiences in the learner's mind by presenting complex ideas related to the skill, analyzing them, and building on prior experiences, with students discussing these ideas collectively.
- 3- Preparation: Students develop knowledge by gathering and analyzing complex ideas together, acquiring related concepts, and preparing to apply them.
- 4- Implementation: The gathered and analyzed ideas and experiences are applied in the form of developmental exercises to perform the skills of setting and spiking in volleyball.
- 5- Evaluation: The teacher evaluates what has been learned and implemented and motivates students to devise ideas and movement solutions that serve the skill.
- 6- Post-test: A post-test is administered to assess the acquired skill-based experiences, along with measuring the ideas reached. After completing the main experiment, the researchers administered the final tests to the control and experimental groups on Monday and Tuesday, April 14–15, 2025. The Complex Thinking Scale was administered on Monday in one of the class-

rooms, and after the students completed their responses, the data was collected. and analyzed using specialized forms for statistical processing. On Tuesday, April 15, 2025, skill tests in setting and spiking in volleyball were conducted on the college's private court for both groups. The researchers ensured that the conditions of the pre-tests were replicated in terms of location, equipment, timing, and skill sequence to achieve objective results through the use of statistical methods, specifically standard deviation, SPSS statistical software, the arithmetic mean, and the correlation coefficient ([Al-Fartousi & Al-Husseini, 2020](#)).

3. Results and discussion

The table shows the results of the pre- and post-tests for the control group across three variables (complex reasoning, addition, and multiplication). We observe clear statistically significant differences between the results of the two tests, as the mean scores increased significantly in the post-test for all variables, confirming that the improvement is not a result of chance but has true statistical significance at the (0.05) level.

[Table 3](#) shows the results of the pre- and post-tests for the experimental group. The data reveal significant improvement across all variables (complex reasoning, addition, and multiplication). We observe higher mean scores on the post-test compared to the pre-test, which demonstrates the effectiveness of the program or curriculum used. Furthermore, the calculated t-value reached very high levels, confirming the existence of statistically significant differences in favor of the post-test. Since the significance level (0.00) is lower than 0.05, these results reflect superior performance in both skills and knowledge among the research sample.

A review of the results in [Table 2](#), [Table 3](#), and [Table 4](#) above reveals statistically significant differences between the experimental and control groups in the research variables (complex thinking, addition, and multiplication) in favor of the post-tests. This indicates that the Krubli model used by the researchers

Table 2. Shows the significance of differences in the pre- and post-tests for the control group across the research variables.

The examined variants	Pre-test		Post-test		s f	n f	T-calculated	Error level	Significant
	S	n	s	n					
1- Complex thinking	68.50	8.039	125.33	6.90	56.83	8.757	22.480	0.00	significant
2- Setting	1.83	0.577	6.08	1.24	4.250	1.422	10.352	0.00	significant
3- Spiking	7.55	1.50	14.75	1.76	7.333	2.708	9.381	0.00	significant

Significance level (0.05) and degree of freedom (11).

Table 3. Shows the results of the t-tests for the pre- and post-tests of the experimental group on the research variables.

The examined variants	Pre-test		Post-test		s f	n f	T-calculated	Error level	Significance
	S	n	s	n					
1- Cognitive flexibility	65.76	7.55	130.84	8.687	65.07	12.42	18.88	0.00	Significant
2- Setting	1.53	0.87	6.538	1.198	5.00	1.47	12.24	0.00	Significant
3- Spiking	7.62	1.31	17.769	1.739	10.00	2.58	13.96	0.00	Significant

Significance level (0.05) and degree of freedom (12).

Table 4. Shows the results of the significance of differences in the post-hoc tests for the control and experimental groups in the research variables.

Variables	Experimental group		The control group		T-calculated	Error level	Significant
	s	n	s	n			
1- Cognitive flexibility	130.84	8.687	125.33	6.906	1.746	0.045	significant
2- Setting	6.538	1.198	6.083	1.240	0.933	0.360	not significant
3- Spiking	17.769	1.739	14.750	1.764	4.306	0.00	significant

Significance level (0.05) and degree of freedom (23).

and the teaching method employed both played a role in the development of creative and innovative complex thinking skills, which in turn contributed to the learning of setting and spiking skills. This demonstrates the scientific application of the curriculum by the teacher, and the progress due to repetition and practice, all of which contributed to the development of serving and spiking in volleyball. The researchers also attribute the development of the experimental group, which applied the Kropeli creative model, to the control group, which used the standard teaching method, and this improvement is attributed to the application of the Krubli model, which fosters learning from the general to the specific, thereby leading to the growth of creativity among learners. This is achieved by stimulating their thinking, which enables them to effectively integrate knowledge across diverse fields and make decisions and solve problems with high efficiency (Al-Shuwayli, 2019). In addition, teaching models play a pivotal role in improving the learning environment through their direct impact on the interaction between the teacher and the learner, with the aim of motivating and encouraging learners and exchanging ideas. The learner transitions from a passive recipient to an active and engaged participant by reconstructing information in light of their prior experiences, thereby fostering the development of learners' skills through in the educational process (Al-Saadi, 2020). The researchers also attribute this improvement to the experimental group's superior performance compared to the control group in the skills of setting and spiking in volleyball. This is due to the correct and effective implementation of the exercises designed by the researchers, as well as the steps incorporated into them, which helped make the lesson more dynamic by requiring complex thinking skills through the students' ability to generate several

ideas to arrive at a single idea, thereby realizing and refining the idea skillfully. Therefore, it is necessary to use instructional models or strategies that focus on and organize the skill-based aspect, such as the Krupeli model and its structured steps that address creative and skill-based aspects, which contributed to improving the students' skill level (Al-Khatib, 2021). The researchers also attribute this positive change in the students to the active role of the learner, who constructs meaning for what they learn independently through interaction with their peers. This has a significant impact on the development of volleyball skills, especially since the game is a team sport rather than an individual one; the learner does not construct their learning in isolation from their peers but rather through participation and discussion to address problems, which enhances their understanding and connection to skill performance (Raji, 2020). The researchers also attribute this development to the creation of an ideal learning environment that stimulates thinking skills which integrate prior experiences into the learning process, helping to build connections between new and existing information, thereby making the learner more effective within the educational environment, and the use of complex thinking, which encompasses multiple dimensions such as critical thinking, communication, problem-solving, collaboration, and lifelong learning. This approach enables the application of knowledge to solve multifaceted problems faced by learners, thereby enhancing their role in active interaction and communication. This, in turn, increases their motivation to learn and participate while acquiring the skills of preparation and in volleyball (Al-Toubji, 2023). The research results showed that the instructional units designed according to the Krupeli model and based on complex thinking had a positive impact on the development of the

students' setting and spiking skills in volleyball, This development is attributed to the fact that the Krubli model organizes and sequences the learning experience in a way that helps students understand, then apply and analyze, which led to improved skill performance and fewer errors during execution (Raouf, 2020). Furthermore, the use of complex thinking helped link the cognitive aspect with the motor aspect, which assisted the students in understanding the technical performance steps and making appropriate decisions during play, especially in the smash skill, which requires high coordination and precise timing. Consequently, this approach contributed to better skill learning compared to the holistic methods used and led to a noticeable improvement in performance levels (Shu'ayr, 2025).

Conclusions and Recommendations: The researchers reached a set of conclusions

- 1- The instructional units designed according to the Krupeli model and based on complex thinking proved effective in improving the performance level of the students' serve and spike skills in volleyball.
- 2- The results demonstrated the superiority of the experimental group, which was trained using the Krupeli model, over the control group, which used the conventional approach to complex thinking, indicating the model's effectiveness in stimulating higher-order cognitive processes.
- 3- The use of creativity-based strategies, such as the Krupeli model, helps bridge the gap between cognitive and motor performance, which positively impacts the field performance of third-year female students.
- 4- Integrating thinking skills with motor performance according to this model creates an interactive learning environment that helped students understand and connect the skill components of addition and multiplication more effectively than the conventional method.

Author's declaration

Conflicts of interest

None.

I confirm that all tables and figures in this article were prepared and written by me personally.

Ethical-clearance

This manuscript was approved by Assistant Teacher Noor Ayad Abbas. And Assistant Teacher Murtaza Ali Joda on (2/4/2026).

Author's contributions

All contributions to this study were prepared by the researcher, Assistant Teacher Noor Ayad Abbas and Assistant Teacher Murtaza Ali Joda You contributed to this research by designing and implementing an educational program based on the Krubli model, through which you translated the theoretical aspects of creativity into practical application on the volleyball court. Your role was also evident in your field supervision of a sample of third-year female students and in measuring the statistical variables of complex thinking and motor skills to derive accurate results that demonstrate the model's effectiveness in improving athletic performance.

Facilitate the task

Students from the Third-year female students at Al-Nusoor Private University.

Roles of each researcher in the research

First researcher: My role in this research project, which I conducted independently as an assistant Teacher , Nour ayad Abbas , focused on developing and designing instructional units based on the Krubli model and implementing them in the field with the research sample, as well as administering and scoring the pre- and post-tests for the skills of preparation and multiplication. I also conducted a statistical analysis of the data to identify differences between the control and experimental groups, ultimately demonstrating the model's effectiveness in developing students' complex thinking and motor performance.

Second Researcher: Murtaza Ali Joda his role involved reviewing the study's theoretical framework and ensuring its alignment with the standards of sports science. He also participated in the linguistic and academic editing of the research, assisted with supervision during the data collection phase, and took part in the discussion of the final results to ensure their scientific consistency.

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Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Appendix (1)

A sample of a selected instructional unit designed according to the Krubli model

Unit Objective: To learn the crushing strike technique

Duration: 90 minutes

By the end of the lesson, students will be able to: -Understand the concept of the spike in volleyball and its importance in offensive play. -Recall the basic phases of the spike (approach – jump – hit – landing). -Explain the correct body position during the approach and jump. -Execute the spike with accurate timing and proper technique following a setter's pass.		Behavioral Objectives
Volleyball court – Volleyballs – Whistle – Whiteboard – Teaching aids – Stopwatch – Measuring tape .		Tools and Equipment
-Introduction (4 min): Take attendance, line up, perform the athletic salute, and set up equipment. -General Warm-up (8 min): Conduct a series of exercises to prepare the body physically and mentally. -Specific Warm-up (8 min): Conducting specific drills for smash technique, including warm-up with balls.		Preparatory Section: (15) min
- Present and explain the smash technique and its importance, including the correct body position for performing the skill, then demonstrate the skill to the students using illustrative images based on the Krubli model The steps of the Krubli creative model are as follows: First: Pre-test The pre-test is administered to assess the students' theoretical and practical knowledge of the volleyball spike before beginning the instructional unit. This is done through (by asking questions or showing videos, illustrative images, or slides) to stimulate the students' analytical thinking, in addition to a standardized skills test. The results are recorded on special forms for comparison with the post-test results. For example (We show a video of a spike performed correctly and another video of one performed incorrectly. The teacher asks, "What is the difference? Why did the second spike fail?" Here, we draw on their prior experiences.) Second: Information The students propose ideas to find innovative solutions—for example, "jump only vertically," "hit the ball only with the wrist," or "change the angle of the torso"—with the aim of applying them. As they gain experience, they compile complex and multifaceted ideas to analyze them together. The teacher's role is to help the teacher helps clarify the diverse ideas and, together with the students, selects the best creative idea from among them. Third: Preparation , This involves linking theoretical knowledge with motor skills and applying them in a practical way. For example: A discussion among students about the characteristics of a successful smash, Student: We need to plan the approach steps and time the jump with the ball Teacher: Well done! This is called timing, and without it, the skill fails		Main Section: (60) min - Educational segment: (15) min - Practical aspect: (45) min
Organization	Exercises	Time
  	Fourth: Implementation Phase: The intellectual insights discussed are put into practice. The students' analytical ideas and insights are as follows: ♦ One student suggests, "Move the takeoff point back slightly." ♦ A student suggests "using the wrist to direct the ball upward and then downward." ♦ A student suggests "reducing the force of the hit to ensure accuracy." The school's role: Testing these ideas in practice by performing trial hits based on their analysis. ♦ Moving targets: Place colored targets on the opponent's court; the ball is tossed to the student, and a specific color is called out, prompting the student to smash the ball at the designated color. ♦ Peripheral vision: Place colored hoops on the net at the far corners of the court; a ball is tossed to the student serving, and a teammate calls out a specific color, prompting the student to smash the ball into the hoop of that color. ♦ Divide the court lengthwise into three zones near the net. The student is asked to hit three consecutive balls, each into a different zone, using the same arm motion while controlling the ball's landing angle and the power of the hit, all while maintaining the same approach speed to confuse the defenders (movement deception).	10 min 15 min 20 min
- Fifth: Assessment: Reinforcing correct concepts and correcting errors; asking assessment questions - Sixth: Post-test: The post-test is administered after completing the instructional unit to measure the level of improvement in smash performance. Each student performs five smashes as part of the post-test, which assesses whether the thinking and analysis in the previous steps have indeed led to tangible results.		Closing Session: (15) minutes

اثر انموذج كروبولي في التفكير المركب واداء مهارتي الاعداد والضرب الساحق بالكرة الطائرة للطالبات

نور اياد عباس، مرتضى علي جودة

الجامعة التكنولوجية ، قسم النشاطات الطلابية

ملخص البحث

هدفت الدراسة الى اعداد وحدات تعليمية وفق انموذج كروبولي والتعرف على اثرها في تطوير التفكير المركب واداء مهارتي الاعداد والضرب الساحق بالكرة الطائرة للطالبات . ويفترض البحث بأن هناك فروق ذات دلالة احصائية بين نتائج الاختبارات القبالية والبعدية للمجموعتين التجريبية والضابطة ولصالح المجموعة التجريبية في التفكير المركب واداء مهارتي الاعداد والضرب الساحق بالكرة الطائرة للطالبات، وقد استخدم الباحثان المنهج التجريبي على عينة مكونة من (25) طالبة وتم تطبيق اختبار مهارتي الاعداد والضرب الساحق في الكرة الطائرة، وتوزيع اختبار التفكير المركب، ثم تفرغ النتائج ومعالجتها إحصائياً، توصل الباحثان في ضوء النتائج الى ابرز الاستنتاجات ، حيث أثبتت الوحدات التعليمية المصممة وفق أنموذج كروبولي وباعتماد على التفكير المركب فاعليتها في تطوير مستوى أداء مهارتي الاعداد والضرب الساحق بالكرة الطائرة لدى الطالبات وفي ضوء هذه الاستنتاجات، كما أثبتت النتائج تفوق المجموعة التجريبية (نموذج كروبولي) على المجموعة الضابطة في الاختبارات البعدية، حيث حققت المجموعة التجريبية في متغير (التفكير المركب) متوسطاً حسابياً قدره (130.84) مقابل (125.33) للضابطة، وبقيمة (t) بلغت (1.746). كما ظهر التفوق الأكبر في مهارة (الضرب الساحق) بمتوسط حسابي (17.769) للمجموعة التجريبية مقابل (14.750) للضابطة، وبقيمة (t) معنوية جداً بلغت (4.306) بمستوى دلالة (0.00)، مما يؤكد كفاءة البرنامج التعليمي في تحقيق هدف (التعليم الجيد).

الكلمات المفتاحية: انموذج كروبولي ، التفكير المركب ، الاعداد ، الضرب الساحق بالكرة الطائرة .