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THE IMPACT OF THE SIX THINKING HATS STRATEGY ON THE DEVELOPMENT OF CREATIVE THINKING AND THE LEARNING OF SOME BASIC HANDBALL SKILLS FOR STUDENTS

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ABSTRACT

Thinking abilities and acquiring essential handball skills among students. An experimental methodology was applied, using a two-group design (experimental and control), as it aligns with the nature and objectives of the research. The study population consisted of second-year male students enrolled in the morning program at the Faculty of Physical Education and Sports Sciences, Al Ain Private University, during the academic year 2024–2025. A total of 56 students, representing 37.33% of the total population (150 students), were selected and randomly assigned to two groups: 28 students in the experimental group and 28 in the control group.

Findings revealed a significant improvement in the experimental group's performance, which received instruction based on the Six Thinking Hats model. This group demonstrated superior development in both creative thinking and the mastery of fundamental handball skills namely dribbling, passing, and shooting, compared to the control group that followed conventional teaching methods.

1- Introduction to the research

1-1 Introduction to the research and its importance

Teaching methods are among the key factors influencing education and its quality, as well as the educational process and its effectiveness. These methods vary between traditional and modern approaches, all of which aim to achieve specific educational goalsThe selection of teaching methods often depends on the goals of the lesson, the learners' characteristics, and the type of content. These factors influence how students engage with the material, how they understand it, and their overall enthusiasm for learning. By choosing appropriate teaching strategies, teachers can enhance the quality of the learning process and achieve the best results in education.

Given the developments that have taken place in recent decades, teaching strategies have evolved, shifting from traditional methods based on memorisation and rote learning to more collaborative and interactive strategies. This evolution reflects all the changes that have taken place in our understanding of the learning and teaching process.

Therefore, relying on modern strategies to develop creative thinking and teach basic skills has become an urgent and necessary requirement to keep pace with developments in the learning and teaching process. Among the modern instructional approaches, the Six Thinking Hats method stands out for its effectiveness in facilitating student-centered learning and enhancing cognitive engagement. It is an educational and intellectual approach that aims to develop critical and creative thinking by wearing different "hats," each of which represents a particular perspective or way of thinking.

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This strategy also encourages learners to look at problems and issues from multiple angles, thereby enhancing their ability to think broadly and innovatively. Through the structured application of the Six Thinking Hats approach, individuals can develop more effective strategies for analyzing problems and reaching sound decisions. This strategy can be applied in various fields, including education, business, and personal relationships.

In the realm of handball instruction, employing the Six Thinking Hats model can significantly enhance learners' capacity for both creative and analytical thinking, while simultaneously advancing their essential skill set. By wearing these different hats, stimulating their creativity, encouraging them to think and generating new ideas, which gives them the ability to devise new playing strategies or develop their handball skills. It helps students analyse educational situations by gathering information and data related to basic handball skills, and encourages them to face and analyse negatives and challenges.

Handball is a popular team sport enjoyed around the world. It helps players improve their overall fitness, build stronger muscles, and develop skills like running, jumping, passing, and shooting. The game also boosts speed, reaction time, and coordination. Just as importantly, handball encourages teamwork and communication, helping students connect with each other and work better as a group..

Among the basic skills in handball are dribbling, handling, and shooting, as these skills help learners control and dominate the ball, avoid opponents, and pass the ball between team members. They also help build attacks, organise play, and score goals in handball. It can put pressure on opponents and create opportunities to win, improve overall performance, and develop self-confidence and team spirit, as well as excellence in the game, where learners who master these skills can develop into outstanding players on the team.

Therefore, the importance of the research lies in promoting creative thinking and improving the level of teaching some basic handball skills (dribbling, handling, shooting) for students through the use of a modern and appropriate teaching strategy that facilitates learning and quick mastery of the skill to reach the appropriate technical performance level through the use of the six hats strategy as a scientific addition in the field of physical education and sports science.

1-2 Research problem

Handball is a comprehensive sport that promotes athletes' physical and mental health, provides them with the opportunity to build strong relationships and improves team spirit. As a researcher specialising in motor learning at the Faculty of Physical Education and Sports Sciences, I have observed that handball skills are taught at the faculty and that teachers of this game face challenges due to their use of traditional teaching methods, which often focus on repetition and rote learning without taking into account the creative and intellectual aspectsThis style does not increase learners' motivation, interaction, or speed of progress in learning and mastering the basic skills of the game. Creative thinking is a vital element in the learning process, as it helps learners generate different ideas and solve problems in more innovative ways. However, this area is often overlooked by teachers in physical education classes, who focus more on skills and physical abilities. **Hence,** the researcher decided to address this issue due to the need for modern teaching methods and strategies, One effective method is the Six Thinking Hats strategy, which helps boost creative thinking by encouraging students to explore different ways of approaching problems. This approach makes learning core handball skills—like dribbling, passing, and shooting—more engaging, dynamic, and impactful.

1-3 Research objectives

1. To create an instructional plan using the Six Thinking Hats method, with the goal of boosting students' creativity and helping them master basic handball techniques such as dribbling, passing, and shooting.

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2. To construct a tailored measurement tool for evaluating levels of creative thinking in handball among second-year undergraduates enrolled in the Faculty of Physical Education at Al Ain Private University.
3. To examine how the application of the Six Hats approach influences the advancement of creative thinking and supports the acquisition of essential handball techniques (dribbling, handling, and shooting).
4. To compare the outcomes of experimental and control groups in post-intervention assessments, identifying which method proves more effective in developing creative thinking and mastering core handball skills.

1-4 Research hypothesis

1- It is hypothesized that implementing the Six Thinking Hats approach will positively influence students' creative thinking abilities as well as their acquisition of fundamental handball skills (dribbling, passing, and shooting).
2- It is further hypothesized that post-test outcomes will reveal significant differences between the control and experimental groups, with the experimental group demonstrating greater progress in both creative thinking and the mastery of basic handball techniques (dribbling, handling, and shooting).

1-5 Research areas

1-5-1 Human Domain:
The study sample consisted of male students enrolled in the second year at the College of Physical Education and Sports Sciences, Al Ain Private University, during the 2024–2025 academic year.
1-5-2 Temporal Domain:
The fieldwork for this research was carried out over the period extending from November 3, 2024, to January 28, 2025.
1-5-3 Spatial Domain:
The experimental procedures were implemented on the handball court located within the Faculty of Physical Education and Sports Sciences at Al Ain Private University.

1-6 Definition of terms:

The Six Thinking Hats Strategy: This instructional approach is designed to streamline and strengthen the process of thinking, enabling learners to consciously shift between different modes of thought. The model is represented by six distinct colored hats, each symbolizing a particular perspective, and serves as a practical tool that individuals can employ in various contexts of daily life. By doing so, it promotes structured, systematic, and disciplined patterns of thinking.

Creative thinking: "One of the techniques necessary for practising lateral or additional (creative) thinking in a practical way, which makes creative thinking an essential part of our usual thinking. It is based on the assumption of six metaphorical hats representing six styles of thinking that an individual wears and takes off according to the requirements of the situation, and it is not a classification of human beings" (13:24).

2- Research methodology and field procedures

2-1 Research Methodology

The study employed an experimental design that relied on two groups—one experimental and the other control—since this type of design is particularly suitable for addressing the research problem and aligning with the stated objectives.

2-2 Research population and sample

The study population was defined as second-year male students in the Faculty of Physical Education and Sports Sciences at Al-Ain Private University for the academic year (2024–2025), with a total of (150) students.

Homogeneity and equivalence were applied, and then the study sample was selected, consisting of (56) students, representing 37.33% of the original study population, who were from two divisions (A and B). The control group was selected randomly by drawing lots, which was division (A), and the experimental group

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was division B. Each group consisted of (28) students. The exploratory sample was selected from the original study population, consisting of students from group C, and from outside the study sample, consisting of (10) students. The researcher excluded a number of individuals from the sample, namely students who played handball, those with various injuries, and those who were ill.

2-2-1 Homogeneity and equivalence:

researcher verified that the participants shared a sufficient degree of homogeneity. In addition, equivalence was established between the control and experimental groups to ensure that any observed differences in results could be attributed exclusively to the independent variable under investigation, as illustrated in Tables (1) and (2).

Table (1)

Presents the arithmetic mean, standard deviation, and coefficient of variation for the study variables.

Treatments / Variables	Unit of measurement	Arithmetic mean (s)	Standard deviation (p?)	Coefficient of variation* %
Chronological age	Year	22.64	1.81	7.99
Length	cm	176.31	5.63	3.19
Mass	kg	68.52	3.39	4.49

- The findings revealed that all values of the coefficient of variation were below 30%, which reflects a strong level of homogeneity among the participants in the variables examined.

Table (2)

Illustrates the equivalence between the control and experimental groups across the measured variables, including creative thinking, dribbling, passing, and shooting accuracy.

treatments / Skills / Statistical	Control group		Experimental group		Calculated t* value	Significance level	Statistical significance
	s	p?	s	p?			
Creative thinking (score)	44.71	4.87	42.33	4.91	2.532	0.13	Non Moral
Tapping (second)	7.35	0.25	7.31	0.21	0.902	0.27	Non Mora
Handling (degree)	14.46	0.69	14.52	0.65	0.465	0.11	Non Mora
Correction (degree)	1.62	0.37	1.61	0.45	0.126	0.08	Non Mora

* Significant at the 0.05 level with (54) degrees of freedom.

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According to Table (2), the calculated t-values for all study variables did not reach the threshold of statistical significance at the 0.05 level. This result suggests the absence of meaningful differences between the two groups. Consequently, it can be inferred that both groups were equivalent with respect to the research variables under investigation.

2-3 Methods, equipment and tools used in the research:

2-3-1 Methods used:

The study relied on a combination of sources and techniques, including both Arabic and international references, direct scientific observation, standardized tests and measurements, structured questionnaires, as well as information gathered from the internet.

2-3-2 Equipment and tools used:

Mobile phone (Redmi), computer (HP), medical scale, measuring tape, whistle, stopwatch, handballs, large and medium-sized plastic markers, small targets, office supplies.

2-4- Field Research Procedures:

2-4-1 Creative thinking scale:

The researcher adopted the creative thinking scale as a study tool, prepared by researcher Thaer Khamis Ahmed (5:132), consisting of (27) items aimed at measuring the level of creative thinking (Appendix 1). The scale was designed with three response options (agree, undecided, disagree). Its paragraphs included a number of negative items (3, 6, 13, 25), which are corrected with grades according to a scale (1–2–3), while the rest of the paragraphs were positive and corrected with grades according to a scale (3–2–1). The total score for the scale ranged from a minimum of (27) points to a maximum of(81) points.

To ensure the validity of the scale for application, the researcher presented its items to a group of experts specialising in physical education, whose task was to determine the validity of the items by placing a mark (✓) in front of the appropriate statements, regardless of their personal opinions. All experts agreed on the validity of all items for field application.

2-4-2 Identifying some basic handball skills and determining the test for each skill:

For the purposes of this study, three fundamental handball skills—dribbling, passing, and shooting—were selected in alignment with the second-year curriculum (boys) at the College of Physical Education and Sports Sciences, Al Ain Private University, for the academic year 2024–2025. The selection was made following consultation with experts in handball, motor learning, and teaching methodologies.

Each of the proposed skill tests received unanimous approval from the specialists, confirming their face validity. To further verify reliability, a pilot trial was carried out with a group of 10 students who were not part of the main sample. These tests were administered twice, separated by a five-day interval, which provided evidence of their stability.

Moreover, test objectivity was ensured through the use of independent evaluators who recorded the scores and calculated inter-rater correlation coefficients. The high levels of agreement obtained among the evaluators indicated strong reliability and objectivity of the testing procedures.

2-4-3 Test specifications

2-4-3-1 Dribbling skill test (9: 501)

- **Test name:** Continuous dribbling over a 15-metre zigzag course, performed back and forth.
- **Test Objective:** To evaluate the student's proficiency in executing the dribbling skill.
- **Tools Used:** Stopwatch, size 3 handball, and five cones/markers.
- **Task Description:** Five markers are positioned in a straight line, each separated by a distance of 3 metres. Both a starting line and a finishing line are placed 3 metres away from the first marker. The participant

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begins from behind the start line and, once the signal is given, dribbles the ball in a zigzag path through the markers until reaching the finish line.

- **Recording:** The performance is measured by the total time taken, starting from the signal until the player crosses the finish line..

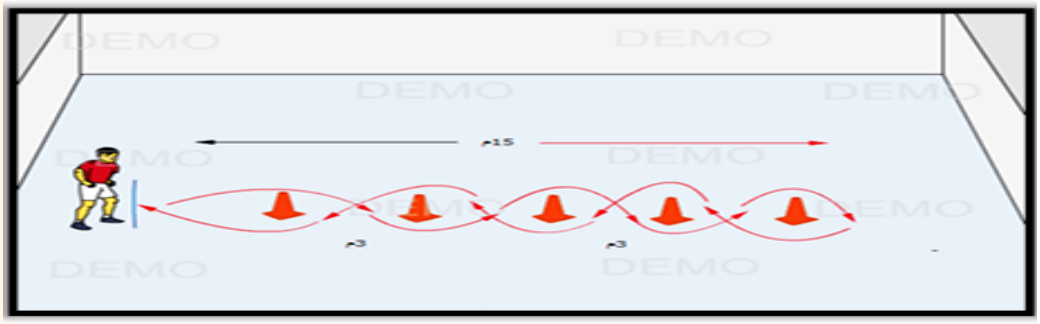

Figure (1) illustrates the handball dribbling skill test.

2-4-3-2 Handball handling skill test (7: 140)

- **Test name:** Handling test from head level towards an oval shape drawn on the wall, performed within (30) seconds from a distance of (3) metres.
- **Test objective:** To measure the level of mastery of the handling skill.
- **Equipment**:A flat wall with an oval shape drawn on it with a diameter of(70) cm and a height of (1.60) m above the ground, a size (3) handball, a measuring tape, a stopwatch, and adhesive tape to mark the distance.
- **Description of performance:** The participant positions himself behind a line placed 3 metres from the wall. At the given signal, he repeatedly throws the ball from head height toward the oval target, attempting as many successful passes as possible within 30 seconds.
- **Scoring:** The number of receptions is counted**.**

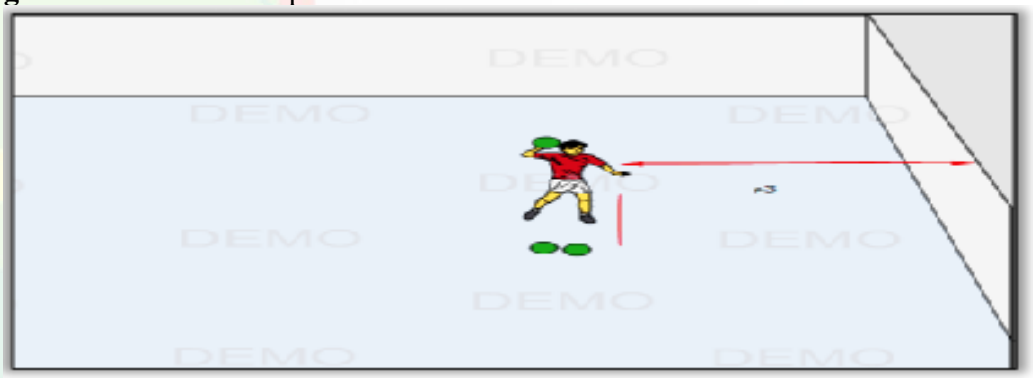

Figure (2) illustrates the handball dribbling skill test.

2-4-3-3 Handball shooting test (6: 207)

- **Test name: Shooting test from a stationary position**
- **Test objective**: To measure shooting accuracy from a stationary position.
- **Equipment used**: Eight handballs (size 3) and four squares, each measuring 40 × 40 cm.
- **Description of performance**: The participant positions himself behind the free throw line at a distance of 7 metres while holding the ball. At the start signal, he attempts to shoot sequentially at the designated

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squares—beginning with target (1), then (2), followed by (3), and finally (4). The procedure is repeated twice, and the best performance of the two trials is recorded.

- **Scoring**: - The student must keep one foot stationary throughout the performance and not move it.

- The throw must be made within three seconds of hearing the signal.
- One point is awarded for each correct shot within the designated square.
- Zero points are awarded if the student commits a legal error, such as moving their foot or exceeding the specified execution time.

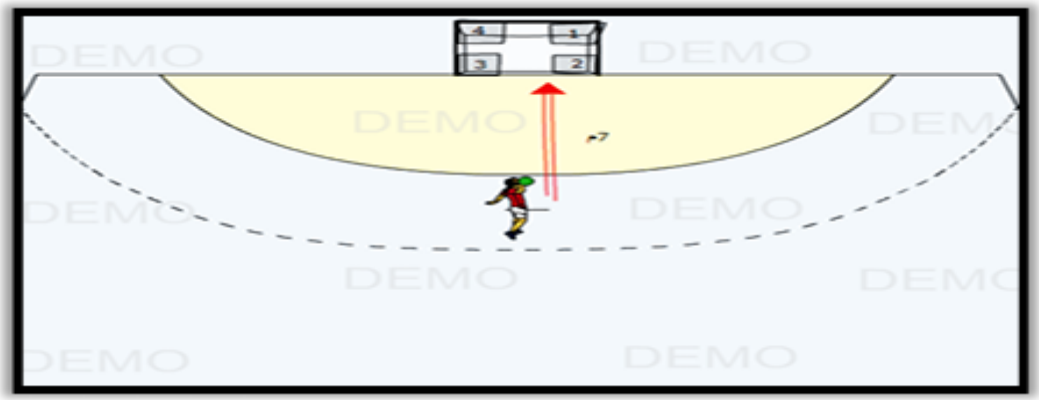

Figure (3) illustrates the stationary handball throw test.

2- 4-4 Pre-tests:

The pre-tests for both the control and experimental groups were administered on Sunday, 10/11/2024, at the handball court of the College of Physical Education and Sports Sciences, Al Ain Private University. A total of 56 students from the study sample took part in these assessments. The procedures were supervised and implemented by the researcher, with the support of the assisting team.

2-4-5 Main experiment - Educational programme

Following the pilot experiment, which helped organize the research process and refine its procedures, and after the completion of the pre-tests, the researcher initiated the implementation of the educational programme with the experimental group. The programme was developed based on a review of relevant literature and prior studies in teaching strategies, motor learning, and handball. Its structure was built around the Six Thinking Hats approach, with the purpose of fostering creative thinking and improving selected handball skills (dribbling, passing, and shooting).

An introductory unit was first delivered to familiarize students with the objectives of the programme, the skills targeted, and the types of learning situations they would face while applying the strategy. The intervention extended over nine weeks, with two sessions conducted each week (Mondays and Thursdays), amounting to a total of 18 instructional units. The main experiment commenced on Monday, 18/11/2024, and concluded on Thursday, 16/1/2025.

Within the experimental group, the programme combined the development of creative thinking with skill acquisition (dribbling, passing, and shooting) through the Six Thinking Hats strategy. In contrast, the control group was taught the same skills using the conventional method adopted by the course instructor, which relied primarily on explanation and demonstration. Each instructional unit lasted 90 minutes and was organized as follows:

- **Preparatory section** (15 minutes) including (introduction, general and specific warm-up).
- **Main section** (70 minutes):

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A. **Control group**: This group's session was divided into two parts: a 20-minute instructional period during which the teacher explained the target skill and clarified the required exercises, followed by a 50-minute practical segment devoted to executing the drills related to the skill, using the traditional method adopted by the instructor.

B. **Experimental group**: For this group, the session also included a 20-minute instructional phase; however, it was structured according to the Six Thinking Hats model. Four specific hats were applied in this context, as outlined below:

1- **White hat** (knowledge and information) (5) minutes

The teacher explains the theoretical information about the three skills (dribbling, handling, and shooting), presents basic information about the skills and their rules, and the correct steps for execution, shows short video clips of the correct skill, and conducts a quick discussion on the rules of motor performance.

2- **Red hat** (feelings and impressions) (5) minutes

The teacher begins by asking students questions about their feelings when performing the skills (e.g., does the student find it difficult? Do they enjoy it? Are they anxious when performing?). The teacher links these feelings to motivation to learn and discusses these impressions and feelings related to the skills, difficulties in performing, and students' expectations.

3- **Black Hat** (Criticism and Risks) (5 minutes)

The teacher asks students to analyse possible mistakes and problems that may arise with the skills and identify common mistakes in performance (e.g., incorrect body position, incorrect foot position, or incorrect ball grip), discussing the reasons for possible failure to master the skill.

4- **Yellow Hat** (Positives and Benefits) (5 minutes)

The teacher discusses the benefits and positives, such as how performance can be enhanced and results improved, as well as discussing the benefits of learning the skill on overall handball performance and promoting positive thinking in students.

The practical part (50 minutes**)** consists of two hats according to the six hats strategy, as follows:

5- **Green hat** (creativity and new solutions) (25) minutes

Divide students into small groups and assign them to come up with new ways to apply skills during exercises or mini-games (different angles, creative passes, improving team tactics), (e.g., one-handed handling from a different position, or shooting in an unusual way), to test their ideas, select the best ones and apply them in practice. For example, dribbling exercises:

- **Exercise (1)** Zigzag dribbling (5) minutes: The goal is to improve ball control and change of direction: the teacher places cones in a zigzag pattern, and the students dribble with their right hand and then their left, trying to come up with different ways to quickly get through the course. (**One minute rest)**
- **Exercise (2)** Double Dribbling (9) minutes: The objective is to develop coordination between the hands: In this exercise, each student dribbles two balls (one in each hand) at the same time or alternately (right-left). Students can be encouraged to invent new dribbling patterns. **(One minute rest)**
- **Exercise (3)** Creativity Race (9) minutes: The purpose of this activity is to enhance students' speed and creative performance. Participants are organized into small groups, and each group is tasked with inventing a novel form of clapping or movement—such as jumping, bending, or spinning. The groups then present their ideas in a competitive format, with the objective of identifying the most original and creative performance.

6- **Blue Hat** (Organisation and Evaluation) (25 minutes)

Develop a collective plan to apply skills in an organised manner, integrate creative ideas during group play, organise discussions and summarise what has been achieved, then hold a small competition between two

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groups (e.g., who can complete the most successful passes in one minute). The teacher then gives final comments on the students' performance and level of creativity. Example of dribbling skill:

- **Exercise (4)** (12) minutes: The teacher asks each group to determine the hand used (right/left/alternating), the required distance, and the number of dribbles before reaching the goal. The students agree verbally, then each student implements their personal dribbling plan (e.g., 10 dribbles with the left hand, then change direction), and the teacher monitors compliance with the agreed steps. (**One minute break is given).**
- **Exercise (5)** (12) minutes: In this activity, students are divided into small groups of three to four players. Each team organizes a dribbling sequence to be performed collectively. The first player dribbles the ball over a set distance and then passes it to the second player, who continues the drill using a zigzag movement pattern. The sequence concludes with the third player, who either attempts a shot at goal or returns the ball, completing the exercise.

- **Closing section (5)** minutes: Students engage in a closing discussion and review the objectives, perform light jogging around the field with cooling down and relaxation exercises, and are given a thinking task.

2-4-6 Post-tests:

The post-tests were administered on Monday, 20 January 2025, following the completion of the instructional programme, in order to evaluate students' creative thinking and their acquisition of basic handball skills (dribbling, passing, and shooting). These assessments were conducted at the handball court of the College of Physical Education at Al Ain University, under the same conditions and with the same support team as in the pre-tests, to ensure standardization of procedures and control of external variables.

2-7 Statistical methods:

The data gathered during the study were analyzed using SPSS (Statistical Package for the Social Sciences). Several statistical methods were applied in line with the study's objectives, including the arithmetic mean, standard deviation, coefficient of variation, percentages, Pearson correlation coefficient, paired t-test, and independent t-test.

3- Presentation, analysis and discussion of results:

3-1 Presentation of Results (Control Group)

This part of the study outlines the results observed in the control group regarding both creative thinking and the development of key handball skills—specifically dribbling, passing, and shooting. The findings are based on a comparison between the pre-test and post-test scores, followed by an analysis and interpretation of the outcomes.

Table (3)
Displays the statistical significance of the differences observed between the pre-test and post-test results for the control group's research variables.

Variables / Statistical treatments	Pre-tests		Post-tests		Value (t) Calculated	Significance level	Type Significance
	S	(p±)	S	(p±)			
Creative thinking (degree)	44.71	4.87	57.67	3.11	11.65	0.001	Moral

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Tremor (seconds)	**7.35**	**0.25**	**7.11**	**0.24**	**3.60**	**0.000**	**Moral**
Handling (degree)	**14.46**	**0.69**	**15.23**	**0.67**	**4.18**	**0.000**	**Moral**
Correction (degree)	**1.62**	**0.37**	**1.70**	**0.34**	**0.82**	**0.000**	**Moral**

* Table (3) shows the mean scores, standard deviations, and t-values for the control group in both the pre- and post-tests for creative thinking and specific handball skills like dribbling, passing, and shooting. The statistical analysis showed that there were significant differences ($p < 0.05$), which meant that the post-test scores were better.

This progress may be due to the students' participation in the standard instructional program, which relied heavily on practicing and repeating things over and over again during practical sessions. It is well known that being exposed to something over and over again can improve technical performance and help you master a skill. Repetitive training, in particular, is very important for improving motor accuracy and strengthening neuromuscular coordination.

Also, the fact that the training happened on a regular basis probably helped students get more hands-on experience, which helped them develop both technical skills and creative thinking skills. Adding guided practice, structured tasks, and discussions in the classroom may have helped strengthen basic cognitive skills even more. These results align with the observations of Wijdan Al-Hakak (2010), who indicated that continuous engagement in creative tasks can enhance cognitive performance, even in the absence of contemporary teaching methodologies.

3-2 Presentation, Analysis and Discussion of Results – Experimental Group

This part of the report highlights the results obtained by the experimental group in both pre- and post-tests, focusing on their progress in creative thinking and key handball skills—specifically dribbling, passing, and shooting. A detailed analysis and interpretation of the results is provided below.

Table (4)
shows the significance of statistical differences between the pre- and post-test results for the research variables specific to the experimental group.

Variables / Statistical treatments	Pre-tests		Post-tests		Value (t) Calculated	Significance level	Type Significance
	S	(p±)	S	(p±)			
Creative thinking (degree)	**42.33**	**4.91**	**60.21**	**3.42**	**15.52**	**0.001**	**Moral**
Tremor (seconds)	**7.31**	**0.21**	**6.80**	**0.19**	**9.35**	**0.000**	**Moral**
Handling (degree)	**14.52**	**0.65**	**16.90**	**1.67**	**6.90**	**0.000**	**Moral**
Correction (degree)	**1.61**	**0.45**	**2.72**	**0.37**	**9.40**	**0.002**	**Moral**

*** Significant at a significance level of 0.05 (<) and a degree of freedom of 27.**

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The results in Table (4) show the arithmetic means, standard deviations, and calculated t-values for the pre- and post-test results for the development of creative thinking and the learning of some basic handball skills (dribbling, passing, shooting) among students in the experimental group.

The researcher attributes this improvement in the post-test results of the experimental group to the effectiveness of the Six Thinking Hats strategy, which creates a diverse and active learning environment that integrates cognitive processing, emotions, and self-organisation among students. It also provided students with the opportunity to generate their own ideas, analyse performance and try out various alternatives, leading to improved creativity and higher quality execution. The diversity among the six hats also contributes to students' transition between multiple modes of thinking, which helped to develop motivation, guide the learning process, and clearly improve their skill and mental performance . This was confirmed by Azhar Naseef (2010) that "the use of the six thinking hats strategy will provide learners with ample opportunities for expression, discussion, and generating alternatives, which makes them more capable of creativity and excellence compared to traditional routine methods." (3:121), as Ahmed Shawky and Fayza Mohamed (2019) point out, "the use of modern strategies such as the six thinking hats strategy has a positive effect on students' academic achievement and the development of their creative thinking skills, and directs them towards the lesson, which reflects their satisfaction with the teaching method used." (1: 1-42).

3-3 Presentation of the results of post-tests in the development of creative thinking and learning some basic skills (tapping, handling, shooting) with a handball under study for the control and experimental groups, and their analysis and discussion:

Table (5)

shows the significance of statistical differences between the post-test results of the control and experimental groups in the research variable tests

Variables / Statistical treatments	Control group		Experimental group		Calculated t* value	Significance level	Statistical significance
	s	p?	s	p?			
Creative thinking (degree)	57.67	3.11	60.21	3.42	4.03	0.000	Moral
Tremor (seconds)	7.11	0.24	6.80	0.19	7.46	0.000	Moral
Handling (degree)	15.23	0.67	16.90	1.67	6.82	0.000	Moral
Rolling (seconds)	1.70	0.34	2.72	0.37	14.93	0.001	Moral

*** Significant at a significance level of 0.05 (<) and a degree of freedom of 54**

Table 5 shows the arithmetic means, standard deviations, and calculated t-values for the post-test results for creative thinking development and learning some basic handball skills (dribbling, passing, shooting) in the control and experimental groups. The data show that all statistical significance values were less than (0.05), indicating significant differences between the two groups in the post-tests, with these differences favouring the experimental group.

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The researcher attributes the superiority of the experimental group over the control group in the post-tests to the development of creative thinking and the learning of some basic skills (dribbling, passing, shooting) The hand ball under study to the implementation of the six thinking hats strategy by the experimental group and the greater benefit of this strategy in developing the intellectual, mental and skill capabilities of students, as it helped to improve creative thinking skills clearly and significantly improved motor skills resulting from continuous practical application and the use of positive feedback, increased motivation and active participation, which had a positive impact on the learning process, as confirmed by Badr Mohammed (2018) in "The impact of applying a modern and innovative strategy is important in diversifying teaching methods to enhance understanding and improve students' cognitive achievement and practical application of skills" (4:303).Adnan Musa(2023) that "as a result of implementing the six thinking hats strategy, the students in the experimental group were encouraged to show a spirit of challenge and initiative during educational exercises and critical and creative thinking before and during the performance of motor skills, which reflects the stimulation of multidimensional thinking in students and their active participation in the learning process"(2: 145-_164).

The researcher also believes that the Six Thinking Hats strategy helps to organise thinking and formulate ideas systematically, as it imposes a logical order of thinking during study or exercises, reduces confusion and makes the decision-making process clearer. It also makes it easier for teachers and learners to monitor ideas and discuss them in a more organised manner, as reinforced by Nabil Qutait (2014):This strategy aimed to train learners to practise various thinking patterns while solving problems, which helped to avoid confusion of ideas and to move between thinking patterns in an organised manner. (11:40)

The researcher also attributes that this strategy encourages group interaction and effective and constructive discussion through the participation of all students in sharing their ideas under each hat, which enhances the spirit of cooperation and positive participation. It also enhances the ability to self-critique and solve problems through the use of negative and creative hats, where the individual learns to evaluate performance, diagnose strengths and weaknesses, and propose appropriate improvements, which supports self-directed and continuous learning, as each of these hats represents a different type of thinking that may be positive, negative, creative, emotional, objective, or organisational. This helps students to think from different and diverse angles and generate new ideas and innovative solutions to problems, which improves their flexibility, fluency, originality, and creativity skills, thereby leading to the development of creative and multiple thinking. Eid Shafei (2023) , "The use of the six thinking hats method is based on simplifying thinking and makes these higher-order skills (analysis, synthesis, and evaluation according to Bloom) easy and simple for learners. It helps organise and direct thinking, analyse information, make comparisons, summarise information, reformulate it, and compile it in a new form, and express their opinions ." (10:19)

4- Conclusions and recommendations

4-1 Conclusions

1. The findings confirm that both the traditional method and the programme based on the Six Thinking Hats strategy positively influenced the development of creative thinking and the acquisition of key handball skills (dribbling, passing, and shooting) among students.
2. The experimental group, which was trained using the Six Thinking Hats strategy, achieved superior outcomes compared to the control group that relied on the conventional teaching approach, particularly in fostering creative thinking and mastering basic handball skills.

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3. The use of the Six Thinking Hats approach proved more effective than traditional teaching methods in stimulating creative thinking, as it encouraged learners to explore multiple perspectives and adopt innovative solutions to problems.
4. Implementing this strategy also enhanced student engagement and active participation during lessons, promoted critical thinking, and strengthened decision-making abilities during handball practice.

4-2 Recommendations

1. It is recommended to continue adopting the Six Thinking Hats strategy within physical education classes, as it contributes to enhancing students' creative thinking abilities and supports the development of fundamental motor skills.
2. It is advisable to integrate the Six Hats strategy with modern learning methods to achieve active and multidimensional education.
3. It is recommended that educational programmes be developed for teachers on how to use the strategy positively in teaching different sports.
4. It is necessary to expand the use of the strategy to include athletic skills in other sports, not just handball, in order to develop students' physical and intellectual abilities.

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Appendix No. (1) Creative Thinking Scale

S	Paragraph	Agree	Undecided	I disagree
	Sometimes I follow the correct and unfamiliar movements to learn a new skill			
	I am happy when I get the answers to all the questions in my mind			
	There are activities that do not interest me but interest others			
	Sometimes I am the voice of the group that tries to limit the effectiveness of some students			
	I spend a lot of time thinking about how to overcome obstacles			
	Students lose my respect if they are unsure of mathematical information			
	I monitor my inner feelings in order to excel			
	I can endure difficulties during the learning process for a long time			
	I am very enthusiastic about learning mathematical skills.			
)	Deep thinking helps me simplify most learning difficulties			
	I like to befriend students who are serious and objective in their learning			

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2	If I had to choose between being a handball player or playing other sports, I would prefer handball			
3	I have a keen sense of the learning process			
4	I strive to achieve a high level of learning			
5	I am very interested in introducing new and unusual ideas in learning			
6	There are many students who take things very seriously			
7	I evaluate knowledge and information from its source.			
8	I like students who are serious about their work			
9	When I am alone, I enjoy thinking			
0	I can maintain my motivation and enthusiasm for many sporting achievements even in the face of obstacles and setbacks			
1	I like innovative and good ideas			
2	I do not ask questions that are not interesting			
3	I express my feelings and emotions more than other students			
4	I feel superior to classmates who try to outdo me.			
5	I forget most of the athletic skills I have learned previously.			
6	I trust my feelings to guide me during my sporting experiences			
7	I start working on solving the problem that I feel is affecting my performance			