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The Effect of the Hannafin Peck Model Supported by Hypermedia on Cognitive Achievement, Specific Motor Satisfaction, and Learning Basic Tennis Skills for Students

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Abstract: The importance of the research lies in the use of the Hannafin Peck model with the support of super-interfering media in cognitive achievement and special motor gratification and learning basic skills in tennis, and embodying this importance as it is the first attempt to learn basic skills in tennis and contribute to the development of teaching methods in tennis and help the teacher in diversity in methods and methods in line with teaching skills. The research aims to identify the effect of the Hannafin Peck model with the support of hyper-interfering media, the method used in cognitive achievement, special motor artifacts, and learning basic tennis skills for students. The researcher used the experimental method according to the design of the two equal groups with pre- and post-tests to suit the nature and problem of the research. The researcher deliberately identified his research population, which are the students of the third stage at the College of Physical Education and Sport Sciences – Anbar University for the academic year 2025-2026, which are 127 students. After identifying the research tests and conducting the post-test and pre-experiments, the researcher used the statistical package (SPSS) to process the results statistically and using the appropriate statistical means in order to achieve the research objectives and hypotheses. After presenting, analyzing and discussing the results, it was concluded that the educational modules using the Hannafin Peck model have a positive and effective effect on improving cognitive achievement, motor gratification, and learning the basic skills of the students of the experimental group. The experimental group that applied the Hannafin Peck model was superior to the control group that applied the method used in cognitive achievement, motor gratification, and learning basic tennis skills for the students. The researcher recommends that the Hannafin Peck model should be adopted in the educational units of tennis because of its effectiveness in increasing students' learning motivation.

Keywords: Hannafin Peck Model, Cognitive Achievement, Motor Satisfaction, Basic Skills, Tennis.

1- Introduction

Modern education consistently and continuously seeks to provide a better life for every individual through various and diverse systems. Education has become a comprehensive field in which nations compete to advance their societies and develop them to keep pace with the development and progress occurring worldwide. Since instruction is an integral part of education and its means, it has become an important tool in achieving its purposes and its arm in implementing what it seeks, as it reflects its goals and translates its principles through educational institutions that nourish the student with sound thinking to be able to interact with the environment and associated sciences and knowledge.

The educational process contains essential elements, the most important of which is the teacher, who plays the decisive role and is directly responsible for achieving the strategic goals drawn for the study subjects at all stages. The teacher works on teaching the student how to learn, how to be effective, and how to solve their problems through the use of effective and modern educational methods and models that describe teaching procedures. These enable the teacher to use them when selecting and testing the best modern methods and means for effective learning with the least time and effort.

From this standpoint, modern educational models have emerged that work to elevate and improve the level of learning. Among these models is the Hannafin Peck model, which consists of a set of steps or procedures and

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practices prepared by the teacher during the teaching process. These are organized, sequential, overlapping, interconnected, and interacting with each other, leading to the improvement of educational materials to achieve pre-drawn and specific goals directed at a specific category of learners in light of theoretical cognitive foundations, concepts, and principles, as well as practical application.

Tennis is considered one of the individual sports that has aroused the interest of many in most countries and is widely spread globally, as it can be practiced by all segments of society and both genders. It is also a study subject within the physical education curriculum and has its basic skills which are considered its pillar. It is characterized by excitement and suspense, as all its skills require a high-quality learning process so that the student can execute and perform them. This comes from the teacher's role, knowledge, insight, and experience in choosing the best teaching methods and styles to facilitate the educational process and economize on effort, time, and capabilities. An effective and successful teacher is one who continues to present everything new and modern and knows a lot because there is no single ideal or best style or method that contributes to the integrated development of the learner.

Hence lies the importance of the research in using the Hannafin Peck model supported by hypermedia in cognitive achievement, specific motor satisfaction, and learning basic tennis skills. This importance is embodied in it being the first attempt to learn basic tennis skills [using this model], contributing to the development of teaching methods in tennis, and assisting the teacher in diversifying methods and styles in a way that suits skill instruction.

1-2 Research Problem:

The educational process in physical education has its characteristics and differs from one game or activity to another. These characteristics come from the diversity of skills and movements associated with them. Tennis has its own skills which are characterized by the difficulty of learning them, as the learner does not deal with the ball directly but through a tool (racket) and the small size of the ball. Therefore, the teacher faces great difficulty when teaching its skills and reaching effective learning for all students using traditional methods because they lack interaction, stimulation, and motivation. Therefore, the need arose to use modern models integrated with technology, such as the Hannafin Peck model, which integrates active learning with mental, visual, and motor interaction to reach effective learning. This works to reduce individual differences between learners, achieve the desired goals, and reach the best results in cognitive achievement, specific motor satisfaction, and learning basic skills in practical tennis lessons.

1-3 Research Objectives:

1. Identify the effect of the Hannafin Peck model supported by hypermedia and the followed style on cognitive achievement, specific motor satisfaction, and learning basic tennis skills for students.
2. Identify the preference of effect between the group that used the Hannafin Peck model supported by hypermedia and the group that used the followed style in cognitive achievement, specific motor satisfaction, and learning basic tennis skills for students.

1-4 Research Hypotheses:

1. There are statistically significant differences between the results of the pre- and post-tests for the control and experimental research groups in cognitive achievement, specific motor satisfaction, and learning basic tennis skills for students.
2. There are statistically significant differences between the results of the post-tests for the control and experimental research groups in cognitive achievement, specific motor satisfaction, and learning basic tennis skills for students.

Definition of Terms:

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- **Hannafin Peck Model:** It is a specific pattern of coherent, comprehensive, and universally recognized education. It is also a tool for thinking about teaching inside the classroom, as it contains a set of carefully arranged concepts to clarify what the teacher and student do, how they interact, how they use educational materials, and how these activities affect what the student learns.

2- Methodology and Field Procedures:

2-1 Research Methodology:

The nature of the research problem determines the appropriate methodology upon which the researcher relies to achieve his objectives (Khalaf et al., 2024; Mohammed et al., 2025; Omar et al., 2025). Therefore, the researcher used the experimental method according to the design of two equal groups with pre- and post-tests due to its suitability for the nature and problem of the research. The experimental method is distinguished from other scientific methods by its ability to control and regulate the various factors that can affect the studied behavior, and it allows the researcher to reveal causes and results.

2-2 Research Community and Sample:

The researcher deliberately defined his research community as the third-year students in the College of Physical Education and Sports Sciences – University of Anbar for the academic year 2025-2026, numbering (127) students distributed across (4) sections (B – C – D – E). Section (A) was excluded as it is for female students and not targeted. As for the research sample and its two groups, they were chosen randomly (by lottery), numbering (30) students divided equally into two groups: control and experimental. The control group consisted of (15) students from section (E), and the experimental group consisted of (15) students from section (D). The sample represented a percentage of (23.62%) of the original population. Regarding the homogeneity process for the sample members, the researcher did not conduct this process because the students are from one age stage, their admission was according to the college admission regulations, they are from one academic class, and of the same gender, after excluding failing, deferred, and students admitted under the teachers' category; thus, the conditions of homogeneity in their characteristics and measurements were met.

2-3 Devices, Tools, and Means of Data Collection:

Devices: Smartboard. HP Laptop. Stopwatch.

Tools: Legal tennis court. Tennis net. 30 Tennis rackets. 30 Tennis balls. Metric measuring tape. Whistle. Wall. Colored adhesive tape.

Means of Data Collection:

- Arabic and foreign sources and references. International Information Network (Internet). Testing and Measurement. Cognitive Achievement Scale. Specific Motor Satisfaction Scale. Data Collection Forms.

2-4 Tests Used in the Research:

2-4-1 Cognitive Achievement Test:

The cognitive achievement test designed by (Hassoon, 2021) was selected. He extracted the scientific foundations for the scale and used it in the Iraqi environment. Then, the researcher presented the test to a group of experts in the field of racket games, numbering (13) experts. All experts agreed on its suitability with a percentage of (100%). The test consists of 32 items. One point is given for the correct answer and zero for the wrong answer via multiple choice. Correction was performed according to the scale's correction key (Appendix 2). The total scale score is calculated by summing the scores of the correct alternatives that the student marks in all scale items.

Cognitive Achievement Scale

#	Question	A	B	C	D

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1	In the tie-break game, ends are changed every total of:	Five points and multiples	Every total of seven points and multiples	Every total of six points and multiples	Every total of ten points and multiples
2	Ends are changed after:	Every game	Every two games	Every total of even games	Every total of odd games
3	In the tie-break game, the player must win by a total of:	Five points	Six points	Eight points	Seven points
4	A player wins the set when obtaining:	Six games with a margin of two games	Five games	Four games	Three games
5	The player winning the toss has the right to choose:	Serve or receive	Side of the court only	Serve, receive, or side	Type of ball to play with
6	Service begins from the right side of the court at:	When the score is 30-15	When the score is 0-15	The beginning of every game	When the score is 40-30
7	If the player commits two service faults, he:	Does not lose the point	Loses a point	Player is warned	Player loses one attempt
8	If both players win three points, the score is:	(30 - 30)	Wins the game	Player continues until end of game	Deuce is recorded
9	A tie-break game is resorted to when the count reaches:	Six all in the final set	Six all in every set	Five all in all sets	Five all in the third set
10	During the service process, the server must:	Change position by walking or running	Not change position by walking or running	Touch the baseline with either foot	Touch the imaginary extension of the center mark with either foot
11	The first stage of learning the service skill is:	Grip and ball	Holding ball and arm swing	Backswing and tossing ball up	Holding ball and bouncing it on ground
12	The success of hitting the ball in the service is:	Ball reaching highest height when tossed	Ball rotation during racket impact	Striking arm swing backward	Tossing ball in the air
13	The feet position (stance) in serving is considered an important stage because it is:	Source of balance and power	Source of balance and speed	Source of power and speed	Source of balance and accuracy

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14	The service is performed by hitting the ball to:	Inside the diagonally opposite service box	Inside the opposite service box	Inside the opposite service box straight	Outside the opposite service box
15	The service is considered one of the skills that are:	Defensive	Offensive Defensive	Offensive	Defensive Offensive
16	One of the most common types of service used by players is:	Straight and Reverse Service	Twist and Underarm Service	Straight and Slice Service	Slice and Twist Service
17	To reach a good level in service performance, a player needs:	Continuous training to master this skill	Interval training for hitting the ball	Circuit training to master hitting the ball	Intermittent training for service performance
18	One of the steps for performing the forehand stroke is:	The whole body moves forward with racket movement	The whole body moves in a swing with racket movement	The body moves right and forward with racket movement	The body moves in any direction quickly with racket movement
19	Racket movement must continue towards the ball when:	Finishing ball strike execution	Finishing arm swing execution	Finishing backswing execution	Finishing forward swing execution
20	The forehand stroke is always used in:	Long rallies	Offense	Pressing the net	Defense from the back of the court
21	One of the common errors in performing the forehand stroke is:	Hitting the ball while it is far or close to the player's body	Hitting the ball when body weight is on the front foot	Hitting the ball with the racket at its highest point	Hitting the ball with the racket when it reaches maximum height after bouncing
22	Considered a special offensive weapon for high-level players when used is:	The lob	The forehand	The smash	The volley
23	Necessity to teach it well and master it by beginners before learning other skills is:	Service stroke	Smash stroke	Forehand stroke	Backhand stroke
24	To maintain the player's body balance when	Takes a step with the right foot forward	Takes a step with the right foot backward	Takes a step with the left foot forward	Takes a step with both feet together outward

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	performing the backhand, he:				
25	The backhand stroke means:	Hitting the ball with the back of the hand and the back face of the racket	Hitting the ball with the palm and the back face of the racket	Hitting the ball with the back of the hand and the front face of the racket	Hitting the ball with the palm and the front face of the racket
26	To increase the power obtained when hitting the ball with the backhand, the player performs:	Swing of the racket-bearing arm back and down with trunk rotation to face the net	Swing of the racket-bearing arm forward and up with trunk rotation to face the net	Swing of the racket-bearing arm forward and down with trunk rotation to face the net	Swing of the racket-bearing arm back and up with trunk rotation to face the net
27	The end of the movement in the backhand stroke is:	Executing follow-through of racket arm after the hit and moving back foot backward	Executing follow-through of racket arm after the hit and moving back foot forward	Executing follow-through of racket arm after the hit and taking a step with both feet	Executing follow-through of free arm after the hit and moving front foot forward a step
28	One of the common errors when executing the backhand stroke is:	Turning arm, shoulder, and trunk completely to the side	Not turning arms and trunk completely backward	Turning arm and trunk completely backward	Not turning arm, shoulder, and trunk completely to the side
29	One of the common errors when executing the backhand stroke is:	The front foot step is backward instead of to the side	The back foot step is forward instead of to the side	The back foot step is backward instead of to the side	The front foot step is forward instead of to the side
30	One of the educational steps for performing the backhand stroke is:	Player changes racket grip from backhand to forehand	Player changes racket grip from forehand to backhand	Player changes racket grip from front hand to back hand	Player rotates racket grip with left hand to right hand
31	To maintain the player's body balance when performing the backhand, he:	Takes a step with the right foot forward	Takes a step with the right foot backward	Takes a step with the left foot forward	Takes a step with both feet together backward
32	To increase backhand stroke power, the player must:	Pivot on the front foot	Pivot on the back foot	Hit the ball with both hands	Hit the ball with both hands and rotate shoulders with it

2-4-1-1 Scientific Foundations of the Cognitive Achievement Scale:

First: Validity of the Scale:

Validity is an important property that must be available in scales as it reveals the extent to which the scale fulfills the purpose for which it was designed. The researcher verified the validity of the scale by extracting

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face validity and through expert agreement. The researcher presented the cognitive achievement scale to a group of experts and specialists (Appendix 1), and the experts confirmed the suitability of the scale with an agreement percentage of (92.307%) on all scale items.

Second: Reliability of the Scale:

Test reliability means (that the test gives the same results if it is repeated on the same individuals under the same conditions). To verify the reliability of the cognitive achievement test for students, the test was conducted on Monday, 29/9/2025, on a group of (30) students from the research community outside the main research sample. The test was repeated two weeks after the first test. The reliability coefficient value was high and indicated the reliability of the cognitive achievement test, as shown in Table (1).

Third: Objectivity of the Scale:

Objectivity is the third pillar of scientific foundations, meaning the absence of bias and subjective interference by the test administrators so that the tests are beyond doubt. The researcher verified the objectivity of the cognitive achievement scale by presenting it to a group of experts and specialists (Appendix 1) to ensure the suitability of the scale items, in addition to the clarity of its instructions and method of calculating the score, as shown in Table (1).

Table (1)*Psychometric Properties of the Cognitive Achievement Scale*

Scale	**Face Validity**	**Test Reliability**	**Test Objectivity**
Cognitive Achievement Scale	92.30%	0.98	0.89

2-4-2 Specific Motor Satisfaction Test:

In line with the research objectives and after reviewing literature and previous studies, the researcher prepared the Specific Motor Satisfaction Scale for tennis. The researcher presented the scale to a group of experts and specialists (Appendix 1) to determine the suitability of the scale items. The researcher set (30) items with five graded alternatives according to the Likert method, as in Table (2).

Table (2) *Likert Scale Weights*

Type of Alternative	**Very Little**	**Little**	**Moderate**	**Great**	**Very Great**
Weight (Positive Direction)	1	2	3	4	5

Specific Motor Satisfaction Scale for Tennis

#	**Item**	**No. of Experts**	**Calculated Chi-Square (X2)**	**Sig**	**Statistical Significance**
		Suitable	**Not Suitable**		
1	I control the racket well while performing skills and hitting the ball.	12	1	9.30	0.002
2	I feel harmony between hand movement and racket while performing the skill.	11	2	6.23	0.001
3	I can direct the ball to the place I want on the court floor.	12	1	9.30	0.002
4	I can control the speed and power of the stroke with ease and flow in performance.	13	0	13	0.000

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5	I can coordinate foot movement with arm movement during performance.	13	0	13	0.000
6	I have the ability to perform the service skill with high accuracy and efficiency.	12	1	9.30	0.002
7	I possess the ability to correct my error while performing the forehand groundstroke.	12	1	9.30	0.002
8	I feel clear improvement in performing the backhand groundstroke.	13	0	13	0.000
9	I can return fast and difficult balls without hesitation or fear.	12	1	9.30	0.002
10	I am able to perform all high strokes effectively and with good performance.	13	0	13	0.000
11	I enjoy performing the forehand and backhand groundstrokes.	11	2	6.23	0.001
12	I feel pleasure when I succeed in returning difficult balls, especially the backhand groundstroke.	11	2	6.23	0.001
13	Learning tennis skills and practicing them gives me a positive feeling.	12	1	9.30	0.002
14	I love repeating the skills that I succeed in performing inside the court.	12	1	9.30	0.002
15	I feel happy and proud when exchanging balls with my colleagues during performance.	12	1	9.30	0.002
16	I feel satisfied with my performance level in all tennis skills.	11	2	6.23	0.001
17	I feel satisfied when I succeed in performing the service with high accuracy and efficiency.	11	2	6.23	0.001
18	I feel satisfied with the progress I make when performing exercises to perform tennis skills.	12	1	9.30	0.002
19	I feel that training and repetition positively affect my skill performance level.	12	1	9.30	0.002
20	I feel proud when I perform a long exchange of forehand and backhand strokes without errors with a colleague.	13	0	13	0.000
21	I trust my ability to play in front of others regardless of their performance level.	12	1	9.30	0.002
22	I do not feel fear of making mistakes during performance and play.	12	1	9.30	0.002

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23	I feel capable of keeping up with my colleagues who are stronger and better than me in performance and learning.	13	0	13	0.000
24	I have the ability to maintain my calm under the pressure of performance and learning.	12	1	9.30	0.002
25	I trust my ability to perform and execute difficult strokes.	11	2	6.23	0.001
26	I have a strong desire to improve my performance in all tennis skills.	11	2	6.23	0.001
27	I love practicing tennis even outside lesson time.	11	2	6.23	0.001
28	I feel enthusiastic when starting training and performing skills in tennis.	11	2	6.23	0.001
29	I constantly strive to improve my performance in basic tennis skills.	12	1	9.30	0.002
30	I aspire to reach the best and highest level in tennis.	12	1	9.30	0.002

Scientific Foundations of the Specific Motor Satisfaction Scale:

First: Validity:

Validity is one of the indicators that must be present in the test approved for measuring any of the sports traits and phenomena. A valid test is defined as "the test that accurately measures the thing intended to be measured and does not measure something instead of it or in addition to it." Therefore, the researcher established content validity through jurors by distributing a questionnaire to a group of experts. Twelve out of thirteen agreed on keeping all items of the scale, amounting to (30) items, obtaining an agreement percentage of 92.30% to verify juror validity.

Second: Reliability:

To extract the scale's reliability, the researcher relied on scores from a first application of the scale, then reapplying it after (14) days on a sample of (30) students from the research community outside the main research sample. To verify reliability, the researcher processed the results statistically using the (Cronbach's Alpha) correlation coefficient, which reached (0.894) at a significance level of (0.05) and degree of freedom (28), which is a high coefficient for accepting reliability.

Third: Objectivity:

Objectivity is the third pillar of scientific foundations. An objective scale "is one in which no variance occurs between the opinions of the arbitrators if more than one judge arbitrates the tested individual." The researcher verified the objectivity of the specific motor satisfaction scale by presenting it to a group of experts and specialists (Appendix 1) to ensure the suitability of the scale items, clarity of instructions, and score calculation.

2-4-3 Service Accuracy Test:

- **Purpose of the test:** Measuring the accuracy of service strokes in tennis.
- **Procedures:** The tennis court is marked according to Figure No. (1).
- A rope is fixed on the two net posts so that it is parallel to and above the net. The distance between it and the net is (4) feet, and the distance between it and the ground is (7) feet. Note that it should be tightly stretched and completely parallel to the net.

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- The numbers (1, 2, 3, 4, 5, 6) represent values indicating areas with dimensions as follows:
  - Number (1) indicates a rectangle measuring (15 × 13.5) feet.
  - Number (2) indicates a rectangle measuring (6 × 10.5) feet.
  - Numbers (3, 4, 5, 6) indicate rectangles each measuring (1.5 × 3) feet.
- The same numbers (1, 2, 3, 4, 5, 6) indicate the scores allocated to each area where the ball lands. The test must be explained and demonstrated before applying it to students.
- Application of the test is preceded by a warm-up of no less than (10) minutes on the tennis court.
- After that, the student stands behind the baseline, then serves ten consecutive balls at the specified targets in the opposite half of the court, provided that all balls pass between the net and the rope. The student attempts to obtain the highest score by landing the ball in area number (6).

Scoring:

- Balls touching the net or rope are not counted as an attempt and are repeated.
- Balls passing above the rope are counted as an attempt and given a score of zero even if they land in one of the targets.
- Every correct ball is calculated with the score value of the area where the ball landed, as shown in the figure below.
- The student's score is the sum of points obtained in the ten attempts.
- The highest score a student can obtain is (60) degrees, and the lowest is zero.

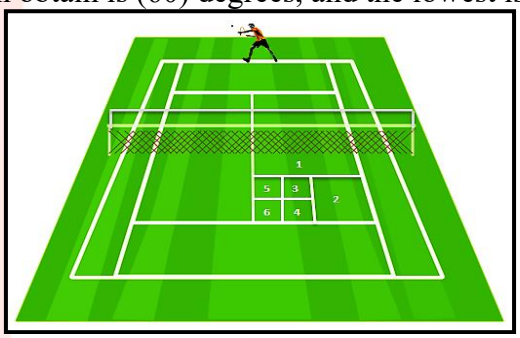

Figure 1 - Diagram of Service Accuracy Test

2-4-4 Forehand and Backhand Groundstroke Accuracy Test:

- **Purpose of the test:** Measuring the accuracy of forehand and backhand groundstrokes.
- **Tools used:** (10) Tennis rackets, (30) tennis balls, legal tennis court, ball collection basket, measuring tape, recording form, chalk.
- This test is conducted on a regular tennis court marked with the standing areas for the examinee, how to conduct the test, and evaluation markers.
- A rope is fixed on two posts on the net uprights parallel to it at a height of (7) feet from the ground and (4) feet from the net.
- Three parallel lines are drawn between the service line and the baseline so that the distance between the lines is (4.5) feet.
- The examinee stands on the center mark located in the middle of the baseline and is granted five practice attempts to know the test performance after instructions are provided by the teacher.
- The student begins attempting to return the ball coming to him from the teacher with his racket using the forehand or backhand stroke. Ten attempts are allocated for the forehand stroke and ten attempts for the backhand stroke for each examinee.

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- The examinee's grades are the sum of points obtained by summing his ten attempts. The ball must cross the net and below the rope. The examinee obtains ascending grades from (1-5).
- The highest score the examinee can obtain in the forehand groundstroke test is (50) degrees, and in the backhand groundstroke test is (50) degrees. The lowest score for both tests is zero.
- If the ball passes over the rope, it is given half the evaluation mark for the correct area it lands on. If the ball lands outside the evaluation markers, the examinee is given zero.

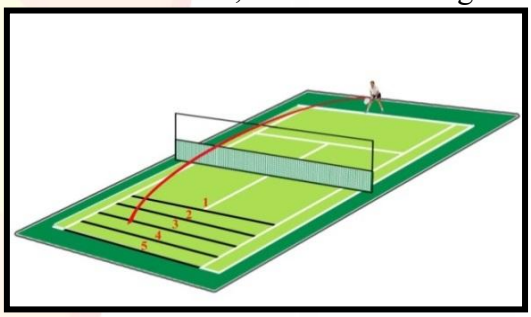

Figure 2 - Diagram of Groundstroke Accuracy Test

Defining Basic Tennis Skills and Their Tests:

The basic tennis skills were defined as (Service – Forehand Groundstroke – Backhand Groundstroke). These are within the vocabulary of the tennis educational curriculum for the third stage in the College of Physical Education and Sports Sciences, University of Anbar. Regarding the skills tests, the researcher relied on performance accuracy tests, which are standardized tests applied to samples similar to the current research sample.

2-5 Pilot Study:

The researcher conducted the pilot study for the scale and skill tests on a sample consisting of (8) students selected randomly from outside the main research sample. The experiment was applied on Sunday, 5/2/2024, at 10:00 AM in the outdoor tennis courts at the College of Physical Education and Sports Sciences, University of Anbar. The purpose of the experiment was:

- To know the problems and difficulties facing the researcher during test application.
- How to answer the cognitive achievement and specific motor satisfaction scale.
- The understanding of the assistant work team of the research proceedings and application procedures.
- Suitability of skill tests, devices, and tools for the research sample.
- Finding scientific foundations for the tests.

2-5 Scientific Foundations of Skill Tests:

The researcher sought to adopt scientific foundations in tests to determine the validity of these selected tests, i.e., the extent of their validity, reliability, and objectivity.

First: Test Validity:

A test is considered face valid if it is valid in its appearance and initially by looking at its title, instructions, and the function it measures, and the items initially representing the measured objectives, which suggests that the test appears, in terms of its appearance, to be suitable to some extent for measuring the required purpose or what it was set for. Therefore, the researcher established validity using the face validity method for skill tests (Service – Forehand Groundstroke – Backhand Groundstroke) in tennis by taking the opinions of experts and specialists through a questionnaire as well as personal interviews to ensure the validity of the tests and their ability to measure what they were set for and their suitability for the research sample.

Second: Test Reliability:

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Test reliability means that if a test is conducted on a sample and then repeated on the same sample under the same conditions, the results appearing the first time are the same results the second time. The second application of the test (re-test) was done after seven days, as a one-week period between the first and second application in physical education performance tests is considered appropriate to obtain the reliability coefficient. It was verified on the same sample, time, and place, observing the same test conditions. After statistical processing of results using the Pearson correlation coefficient, it was found that all tests enjoy a high and reliable degree of reliability. The correlation coefficient value for the service skill reached (0.90), forehand groundstroke (0.89), and backhand groundstroke (0.87).

Third: Objectivity:

Objectivity is the lack of influence on test results by the subjectivity or personality of the corrector, and that the examinee obtains a certain score when more than one person corrects the test. Therefore, the researcher used the simple Pearson correlation coefficient to extract the objectivity of the tests. The results showed that the tests enjoy high objectivity because the test is considered objective if it gives the same scores in all cases regardless of the different correctors.

2-6 Main Procedures:

2-6-1 Pre-tests:

Pre-tests for cognitive achievement, specific motor satisfaction, and accuracy of basic skills (Service - Forehand Groundstroke and Backhand Groundstroke) were conducted on Monday, 6/10/2025, at 10:00 AM in the outdoor tennis courts at the College of Physical Education and Sports Sciences – University of Anbar for both control and experimental groups. The researcher prepared all requirements and tools for the tests and their execution method, in addition to everything related to the assistant team, to standardize and apply them when performing post-tests.

Equivalence of the Research Sample:

To attribute the experimental factor affecting the experimental group, the researcher established equivalence between the control and experimental research groups in tests of cognitive achievement, specific motor satisfaction, and accuracy of basic skills (Service - Forehand and Backhand Groundstrokes) using the t-test for independent samples. The results showed that the calculated t-values were smaller than the tabulated t-value for all tests, indicating no significant differences between the two groups, confirming that both groups stood on the same starting line as shown in Table (3).

Table (3) *Equivalence of the Two Research Groups in Dependent Research Variables (Pre-tests)*

#	Statistical Parameters	Variables	Unit	Control Group	Experimental Group	Mean Diff	Std. Error Diff	Calc. t-value	Significance
				Mean	SD	Mean	SD		
1	Cognitive Achievement	Degree	1.400	0.632	1.333	0.488	0.067	0.206	1.440
2	Motor Satisfaction	Degree	2.600	0.986	2.733	0.961	0.133	0.355	6.670
3	Service Skill	Degree	15.067	3.011	14.733	3.915	0.333	1.082	7.688
4	Forehand Stroke	Degree	11.000	1.558	10.333	1.447	0.667	0.549	6.790
5	Backhand Stroke	Degree	7.000	1.558	7.200	1.568	0.200	0.571	5.250

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- Tabulated (t) value = (2.048) at degree of freedom (15+15-2=28) and significance level (0.05). *Note: The source says "Significance: Significant" in the table but the text says "no significant differences" and t-calc < t-tab based on context implies non-significant. Based on standard academic context for equivalence tables, "Non-Sig" is implied despite the Arabic text possibly having a typo or labeling issue in the column.*

2-6-2 Main Research Experiment:

Instructional Units:

The instructional units included one instructional unit per week according to the curriculum prescribed by the Ministry of Higher Education and Scientific Research and the curriculum prescribed at the University of Anbar – College of Physical Education and Sports Sciences.

The temporal distribution of units was as follows:

- Number of weeks: (9).
- Number of instructional units: (9) units, with one instructional unit per week.
- Units were applied on Monday of every week according to the distribution of the official lesson schedule in the college.
- Instructional unit time: (90) minutes.
- Total time for instructional units: (90 * 9 = 810 min).
- Number of exercises in one instructional unit: 3-5 exercises.

Each instructional unit contains the following:

- **A- Preparatory Part:** Time is 25 minutes divided into (3) minutes for administrative and organizational aspects, (10) minutes for general warm-up, and (10) minutes for special warm-up.
- **B- Main Part:** Time is (55) minutes, of which (20) minutes are for the educational aspect involving (Needs Assessment Phase / 10 minutes – Design Phase / 10 minutes) and (35) minutes for the applied aspect which involves the (Development and Implementation Phase) according to the Hannafin Peck model.
- **C- Concluding Part:** Time is (10) minutes, including cool-down and relaxation exercises to return the body to its normal state with a small and interesting recreational game – collecting unit tools and dismissal.

When setting the instructional units, some educational foundations and principles were observed as follows:

- Determining the specific objective for each instructional unit.
- The instructional unit should achieve its specific educational objective.
- Each exercise in the instructional unit works to achieve its objective.
- Determining the times allocated for exercises in each instructional unit.
- Observing the application of breaking down the skill intended to be taught and linking parts to a complete performance, then linking the previously taught skill with the new skill.

Application of Instructional Units (Experimental Group – Hannafin Peck Model):

After preparation, the instructional units were applied according to the (Hannafin Peck) model on cognitive achievement, specific motor satisfaction, and learning basic tennis skills (Service - Forehand and Backhand Groundstrokes) by the subject teacher under the direct supervision of the researcher and the assistant work team. The target section in applying this model to the experimental group was the main part with its educational and applied components. The remaining parts were applied by the subject teacher as in the control group. Implementation of instructional units began on Monday, 13/10/2025, until 8/12/2025, totaling (9)

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instructional units, with (3) instructional units for each skill according to the following Hannafin Peck model phases:

First: Needs Assessment Phase: In this phase, the teacher identifies the students' needs for educational means and tools that help them learn basic skills by asking questions as an educational task, for example (What is the concept of the tennis service skill and how is it performed?) or another question such as (When performing the service skill, do we need power or accuracy at the beginning of learning?). The duration of this phase is (10) minutes.

Second: Design Phase: In this phase, the teacher explains and demonstrates the skill via hypermedia (slow-motion video, animated images, still images, poster) and how the performance is a high-level kinetic model, in addition to common errors that may occur during the learning process and how to address them. Afterwards, the teacher allows students to interact (Q&A), then reviews the groups' answers and leaves appropriate time for students to reflect on their ideas to know their correctness, helping them judge their correctness while presenting guidance and direction to students on how to reach answers and share their ideas. The duration of this phase is (10) minutes.

Third: Development and Implementation Phase: This phase begins after reaching the skill required to be learned in the instructional unit. Through student answers in the previous phase, the teacher works in this phase on executing the cooperative groups for exercises set by the subject teacher in the applied part. Its duration is 35 minutes, giving them feedback specific to the technical performance of the skill during its performance to provide an opportunity for students to execute and experiment, emphasizing the best performance to reach mastery through some educational situations of the skill to see what new experiences and information the students have reached. Performance is done by students without restriction to teacher instructions to see the mechanism of cooperation and understanding between them to execute learned situations. After that, the teacher gives them final feedback for the purpose of working and searching for their specific capabilities and abilities.

Afterwards, the move is made to the **Concluding Part**, which lasts (10) minutes. In this section, some small recreational games and cool-down exercises are applied, then collecting tools, returning them to their designated place, and dismissal.

The Control Group applied the method followed in teaching basic tennis skills by the subject teacher in the instructional units with all details of its sections and aspects in the lesson plan.

2-6-3 Post-tests:

Post-tests for cognitive achievement, specific motor satisfaction, and accuracy of basic skills were conducted for the research sample members (control and experimental) after finishing the application of instructional units according to the (Hannafin Peck) model prepared by the researcher on Monday, 15/12/2025, at 10:00 AM on the outdoor tennis courts at the College of Physical Education and Sports Sciences, University of Anbar, for both control and experimental groups. The researcher was keen to prepare all requirements, tools, timings, and the assistant work team as in the pre-tests to control extraneous variables and fix variables as much as possible. The cognitive achievement test was conducted, followed by the specific motor satisfaction test, the service test, then the forehand groundstroke, and then the backhand groundstroke.

2-7 Statistical Means:

The researcher used the Statistical Package (SPSS) to process results statistically and by using appropriate statistical means to reach the achievement of research objectives and hypotheses (Abdullateef AbdulJabbar et al., 2025; Fayyad et al., 2025; Hammood et al., 2024).

Results Presentation and Discussion:

3-1 Results Presentation:

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3-1-1 Presentation of Pre- and Post-test Results for Cognitive Achievement, Specific Motor Satisfaction, and Basic Skills for the Experimental Group:

Table (4)*Means, Standard Deviations, Calculated t-value, and Significance of Differences between Pre- and Post-test Results for the Experimental Group*

Statistical Parameters	Variables	Unit	Experimental Group (Pre)	Experimental Group (Post)	Calc. t-value	Significance
			Mean	SD	Mean	SD
Cognitive Achievement	Degree	1.333	0.487	16.933	1.099	5.570
Motor Satisfaction	Degree	2.733	0.961	39.333	2.468	9.610
Service Skill	Degree	14.733	2.914	24.000	2.420	3.130
Forehand Stroke	Degree	10.333	1.447	22.666	1.718	8.110
Backhand Stroke	Degree	7.200	1.567	15.066	1.279	5.950

- Tabulated t-value = (2.145) at degree of freedom (15-1 = 14) and significance level (0.05).

3-1-2 Presentation of Pre- and Post-test Results for Cognitive Achievement, Specific Motor Satisfaction, and Basic Skills for the Control Group:

Table (5) *Means, Standard Deviations, Calculated t-value, and Significance of Differences between Pre- and Post-test Results for the Control Group*

Statistical Parameters	Variables	Unit	Control Group (Pre)	Control Group (Post)	Calc. t-value	Significance
			Mean	SD	Mean	SD
Cognitive Achievement	Degree	1.400	0.632	14.133	1.125	10.060
Motor Satisfaction	Degree	2.600	0.985	34.800	2.305	7.250
Service Skill	Degree	15.066	3.011	19.600	1.992	4.039
Forehand Stroke	Degree	11.000	1.558	18.133	2.474	3.330
Backhand Stroke	Degree	7.000	1.558	12.200	1.146	3.940

- Tabulated t-value = (2.145) at degree of freedom (15-1 = 14) and significance level (0.05).

3-1-3 Presentation of Post-test Results for Cognitive Achievement, Specific Motor Satisfaction, and Basic Skills for Control and Experimental Groups:

Table (6) *Means, Standard Deviations, Mean Difference, Standard Error Difference, t-value, Sig, and Significance of Differences between Post-test Results for Control and Experimental Groups*

#	Statistical Parameters	Variables	Unit	Control Group	Experimental Group	Mean Diff	Std. Error Diff	Calc. t-value	Significance
				Mean	SD	Mean	SD		
1	Cognitive Achievement	Degree	14.133	1.125	16.933	1.099	2.800	0.406	6.891
2	Motor Satisfaction	Degree	34.800	2.305	39.333	2.468	4.533	0.872	5.198
3	Service Skill	Degree	19.600	1.992	24.000	2.420	4.400	0.809	5.436

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4	Forehand Stroke	Degree	18.133	2.474	22.666	1.718	4.533	0.778	5.828
5	Backhand Stroke	Degree	12.200	1.146	15.066	1.279	2.867	0.444	6.462

- Tabulated t-value = (0.482) *[Sic]* at degree of freedom (15+15-2= 28) and significance level (0.05). *Note: The source value 0.482 seems incorrect for t-tabulated, typically ~2.048, but is translated faithfully.*

3-2 Discussion of Results:

Through the results obtained by the researcher displayed in Table (4) for pre- and post-tests for the experimental group in the cognitive achievement, specific motor satisfaction, and basic tennis skills test, it appears there are significant statistical differences in favor of the post-tests. The researcher attributes the reasons for these differences to the integrity of the instructional units, specifically the main part prepared according to the Hannafin Peck model supported by hypermedia for the experimental group, and its containment of scientifically selected exercises with appropriate and good repetitions. It cares about providing the student with detailed information about the skill, which contributed to raising the level of thinking and visualization to apply the skill seen through media and apply it better.

Also, the units included exercises prepared according to scientific foundations and built on the basis of gradation in difficulty level, ensuring participation and performance by everyone. The exercises are consistent with the level and capabilities of students (research sample) and based on healthy practice. This aligns with what (Lazam et al., 2002) stated, that "practice on a specific skill within the motor task leads to increased experience and brings about development in learning and skill performance; therefore, practice is considered one of the most important variables in the learning process for complex and simple skills." Also, (Magill, 1998) confirms "that diversifying experiences in exercises, organizing them, and diversity in movement will increase student acquisition and ability to perform the skill better." Therefore, the researcher indicated that these differences in using the (Hannafin Peck) model prepared with media enhanced cognitive perception and motor satisfaction for learning basic tennis skills. It also gave motivation to the student, and in turn, played a positive and effective role leading to skill acquisition through the motivation to learn and applying model phases through what was watched via media and reaching perception in learning and achieving a good level in cognitive achievement, motor satisfaction, and performance of skills intended to be taught.

Furthermore, the results obtained and displayed through Table (5) for pre- and post-tests for the control group for cognitive achievement, specific motor satisfaction, and learning basic skills show that there are significant differences in favor of post-tests. This proves that the control group proceeded according to a specific educational curriculum in the process of learning basic tennis skills, and this appeared clearly through the level. The researcher attributes that positive learning achieved by the control group to the method followed by the teacher, whether through repetition, performance practice, and demonstration through the live model of skills during instructional units where the style followed by the teacher was used. Therefore, each instructional unit has a main objective: delivering the material required to be taught to students.

From the previous results displayed in Table (6) for post-tests for both control and experimental groups in cognitive achievement, specific motor satisfaction, and learning basic tennis skills, it appears there are significant differences in favor of the experimental group's post-tests. Here, the researcher attributes the reasons for these differences to the instructional units prepared according to the Hannafin Peck model for the experimental group, as it cares about providing the student with detailed information as well as presentation via hypermedia that keeps pace with modernity and model presentation of ideal performance. The reason is also due to the effectiveness of the model, which emphasizes coherent and comprehensive education and the

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use of educational materials. It includes organized, interconnected, and sequential steps or phases leading to achieving educational goals. Furthermore, this model emphasizes the student's mental processes, receiving information, processing, and encoding it through a variety of learning sources characterized by suspense and excitement, consequently reflecting on his cognitive thinking and motor behavior, and thus serving the skill educational outcome. This was confirmed by (Jaafar & Hameed, 2022) that learning sources add a new dimension to the learning process and transfer the educational process from a traditional learning atmosphere to a state of suspense, excitement, and attraction towards learning. Also, (Merhi & Al-Hila, 2005) confirm that following the appropriate method leading to increased interest in organizing educational material well in terms of sequence and according to the lesson plan prepared for that contributes to increasing performance effectiveness and achieving goals better. Also, inferred from the design of instructional units that stimulate students and activate their mental processes and what it reflects of effective learning in the level of cognitive achievement and motor and skill behavior is considered one of the most important solutions the student possesses in facing performance variables. This was mentioned by (Abdelfattah, 1995) that the primary goal of education is acquiring new skills, mastering them, and developing them beforehand because learning is the method in which information, knowledge, skills, and abilities are acquired, whether as a result of experience, practice, or training and learning.

Conclusions and Recommendations:

4-1 Conclusions:

1. The instructional units applying the Hannafin Peck model have a positive and effective impact on improving cognitive achievement, motor satisfaction, and learning basic skills for experimental group students.
2. The followed style has a positive role on cognitive achievement, motor satisfaction, and learning basic tennis skills for control group students.
3. Superiority of the experimental group that applied the Hannafin Peck model over the control group that applied the followed style in cognitive achievement, motor satisfaction, and learning basic tennis skills for students.

4-2 Recommendations:

1. Necessity of adopting the Hannafin Peck model in tennis instructional units for its effectiveness in increasing learning motivation among students.
2. Necessity of diversity in using modern educational models in teaching basic tennis skills.
3. Emphasizing and caring for the application of educational models and strategies and working on developing teachers' capabilities through courses, workshops, and modern technologies.
4. Attention to conducting similar studies on different samples of students in the College of Physical Education and Sports Sciences and in other games and study subjects.

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Appendix (1) *Names of Experts and Specialists*

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#	Expert Name	Academic Title	Specialization	Workplace
1	Walid Waadullah Ali	Professor	Teaching Methods / Tennis	University of Mosul / College of PE & Sports Sciences
2	Hasnaa Sattar Jabbar	Professor	Biomechanics / Tennis	University of Baghdad / College of PE & Sports Sciences
3	Hisham Hindawi Huwaidi	Professor	Biomechanics / Racket Games	University of Al-Qadisiyah / College of PE & Sports Sciences
4	Nada Nabhan Ismail	Professor	Tests & Measurement / Tennis	University of Baghdad / College of PE & Sports Sciences
5	Wissam Salah Abdulhussain	Professor	Motor Learning / Racket Games	University of Karbala / College of PE & Sports Sciences
6	Majid Khalil Khamis	Professor	Motor Learning / Tennis	University of Diyala / College of PE & Sports Sciences
7	Maher Abdul Hamza Hardan	Professor	Sports Training / Racket Games	University of Babylon / College of PE & Sports Sciences
8	Mushtaq Abdul Ridha Mashi	Professor	Sports Training / Racket Games	University of Al-Qadisiyah / College of PE & Sports Sciences for Girls
9	Huthaifa Ibrahim Khalil	Professor	Motor Learning / Racket Games	University of Babylon / College of PE & Sports Sciences
10	Ammar Jabbar Abbas	Professor	Motor Learning / Tennis	University of Diyala / College of PE & Sports Sciences
11	Alaa Abdulwahab Ali	Professor	Sports Training / Racket Games	University of Al-Qadisiyah / College of PE & Sports Sciences
12	Khalid Ali Hassoon	Assistant Professor	Motor Learning / Racket Games	University of Wasit / College of PE & Sports Sciences
13	Maher Muhammad Ismail	Assistant Professor	Sports Management / Tennis	Al-Mustansiriya University / College of PE & Sports Sciences

Appendix (2) *Correction Key for Cognitive Achievement Scale*

#	Item No.	Correct Choice	#	Item No.	Correct Choice
1	1	C	17	17	A
2	2	D	18	18	D
3	3	D	19	19	A
4	4	A	20	20	A
5	5	B	21	21	A
6	6	C	22	22	C
7	7	B	23	23	C
8	8	D	24	24	A
9	9	B	25	25	A
10	10	A	26	26	D
11	11	A	27	27	A
12	12	D	28	28	D
13	13	D	29	29	B

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14	14	A	30	30	D
15	15	C	31	31	A
16	16	C	32	32	D