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The Impact of an Educational Curriculum Using Interactive Media and Manufactured Aids on Some Motor Abilities and Learning the Tennis Serving Skill for Students

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Abstract

The aim of the research is to develop an educational curriculum using highly interactive multimedia and manufactured tools to enhance some motor skills and teach the skill of tennis serve to students. Additionally, the study seeks to examine the impact of this curriculum. The researchers employed an experimental approach to align with the nature of the research problem. The research community consisted of third-year students at the College of Physical Education and Sports Sciences/ Thi Qar University for the academic year 2022-2023, totaling 163 students. The researchers selected a sample of 45 students, divided into three experimental groups, each consisting of 15 students. The researchers ensured homogeneity and equivalence in the research variables. The instructional units were implemented by the subject teacher over a period of 9 weeks, with one instructional unit per week, totaling 9 instructional units. This period extended from Sunday, March 12, 2023, to Wednesday, May 10, 2023.

Keywords: *Interactive Multimedia - Motor Skills - Tennis Serving Abstract*

1- Introduction

The significant progress in the field of sports is not coincidental but rather a natural result of employing modern sciences, concepts, and serious thinking in adopting teaching methods that leverage all modern technological means. Since the student is the focal point of the educational process, and the development of their capabilities is the goal of this process, comprehensive and meticulous attention is required to provide educational situations that rely on modern technology. This is crucial for offering opportunities to achieve optimal performance in the fundamental skills of each sport or athletic activity. Tennis, as one such sport, stands out due to its suitability for all age groups, from children to adults, and for both genders.

The success of learning this game depends significantly on the connection between the student and the teacher. The more appropriate the means of communication, the faster and better the learning process occurs, with significant savings in effort and time. This is especially true when the lesson is associated with the use of suitable educational tools that match the student's level, motor abilities, and capabilities. In the game of tennis, motor skills play a crucial role in acquiring and learning the basic skills of the game. The nature of these skills, characterized by speed of performance, necessitates that the student possesses adequate motor skills, serving as the foundation upon which mastery of the game's skills is built.

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Therefore, it was necessary to harness and utilize modern technology, represented by highly interactive media, in addition to developing and manufacturing educational aids to contribute to the utilization and invocation of all mental process requirements. This is crucial for the development of motor skills to enhance the level of performance of the fundamental skills of tennis for students. Through the researchers' experience and their review of most practical lessons, they observed that the majority of lessons lack the use of modern techniques and rely solely on available means. This may pose difficulty for students in acquiring and learning the basic skills of the game.

This observation prompted the researchers to address this issue and find suitable solutions that could significantly contribute to its resolution. The research aimed to develop an educational curriculum using highly interactive media and manufactured tools to enhance some motor skills and teach the skill of tennis serve to students. Additionally, the study sought to examine the impact of this curriculum. The researchers assume that the educational curriculum they developed, incorporating highly interactive media and manufactured tools, will have a positive impact on some motor skills and the learning of the tennis serve skill for students. The research population consisted of third-year students at the College of Physical Education and Sports Sciences at Thi Qar University. The research period extended from November 10, 2022, to March 1, 2024, and the research site was the tennis court at the College of Physical Education and Sports Sciences at Thi Qar University.

2-1 Research Methodology

The researchers employed an experimental methodology using the equivalent group design to align with the nature of the research problem. This approach allowed for a systematic investigation of the impact of the educational curriculum developed using highly interactive media and manufactured tools on students' motor skills and the learning of the tennis serve skill.

2-2 Research Population and Sample

The research population consisted of third-year students at the College of Physical Education and Sports Sciences, Thi Qar University, for the academic year 2022-2023, totaling 163 students. The researchers divided the students into five sections (A, B, C, D, and E). A sample of 45 students was selected for the study, divided into three experimental groups, with each group comprising 15 students.

The three experimental groups were as follows:

Group (A) was taught using hypermedia.
Group (D) was taught using assistive tools.
Group (C) was taught using a combination of hypermedia and assistive tools.

The sample represented a proportion of 27.6% of the total population.

2-2-1 Homogeneity

To control the variables affecting the accuracy of the research results, the researchers ensured homogeneity of the research sample in morphological measurements, including length, mass, and chronological age. The researchers utilized the skewness coefficient to assess homogeneity, as indicated in the tables below.

Table (3): Illustrates the Homogeneity of the Research Sample in Terms of Age, Weight, and Height for the Experimental Group (1).

Statistical Analyses of Variables	Measurement Unit	Mean	Standard Deviation	Standard Error	Torsion Coefficient	Significance Level
Mass	Kilograms	69,333	6,883	0,58	0,946	Homogeneous
Length	Centimeters	177,333	7,4	0,58	0,117	Homogeneous
Age	Years	22,4	0,91	0,58	0,315-	Homogeneous

Table (4): Shows the Homogeneity of the Research Sample Individuals in Terms of (Age, Weight, Height) for the Experimental Group (2).

Statistical Analyses of Variables	Measurement Unit	Mean	Standard Deviation	Standard Error	Torsion Coefficient	Significance Level
Mass	Kilograms	69,666	5,863	0,58	0,585	Homogeneous
Length	Centimeters	174,133	8,288	0,58	0,171	Homogeneous
Age	Years	22,066	0,883	0,58	0,142-	Homogeneous

Table (5): Illustrates the Homogeneity of the Research Sample Individuals in Terms of (Age, Weight, Height) for the Experimental Group (3).

Statistical Analyses of Variables	Measurement Unit	Mean	Standard Deviation	Standard Error	Torsion Coefficient	Significance Level
Mass	Kilograms	69,666	4,386	0,58	0,821	Homogeneous
Length	Centimeters	173,6	5,666	0,58	0,033	Homogeneous
Age	Years	22,466	1,125	0,58	0,616	Homogeneous

* All Values of the Skewness Coefficient were between (+1), Indicating the Homogeneity of the Individuals in the Group.

2-2-2 Equality of Research Groups: The researchers ensured the equality of the three research groups in the dependent variables by using the analysis of variance (ANOVA), as shown in Table (6).

Table (6): Demonstrates the Equality of Groups in the Research Variables.

Processing Statistical Variables	Unit of Measurement	Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	Calculated Value F	Sig Value	Statistical Significance
Agility	Number	Between Groups	0,044	2	0,22	0,084	0,919	Insignificant
		Within Groups	11,067	42	0,263			
Coordination	Degree	Between Groups	0,844	2	0,422	0,616	0,545	Insignificant
		Within Groups	28,8	42	0,686			
Balance	Degree	Between Groups	1,911	2	0,956	1,06	0.356	Insignificant
		Within Groups	37,876	42	0,902			
Serving	Degree	Between Groups	0,311	2	0,156	0,036	0,985	Insignificant
		Within Groups	182,933	42	4,356			
		Within Groups	130,933	42	3,117			

Significant at the Level < (0.05).

2-3 Research Tools and Instruments

The research utilized various tools and instruments to gather and analyze data, including:

Academic sources and references.
Scientific observation.
Personal interviews.
Questionnaire forms.
-Tests and measurements.

2-3-2 Devices and Tools Used

1. Laptops (17).
2. Nikon cameras (2).
3. Software used in developing and designing highly interactive media (Hypermedia): iSpring Suite, InShot Pro, Viva Video.
4. Flash drives.
5. DVD discs.
6. Tennis balls (30).
7. Tennis rackets (20).
8. 5-meter measuring tape.
9. Colored adhesive tapes.
10. Stopwatch.
11. Ground ladder (1).
12. Medical balls (4).

2-4 Tests Used in the Research

The research employed the following tests:

Agility Test (Lateral Side Shuffle) (Reference 121:3).
Coordination Test (Throwing and Receiving Balls) (Reference 258:5).
Dynamic Balance Test (Standing on the Foot Arch) (Reference 343:5).
Modified Hobby Test: Assessing the accuracy of the serve skill (Reference 212:4).

2-5 Experimental Surveys

2-5-1 First Exploratory Experiment

The researchers conducted the first exploratory experiment on a sample of 7 students from both within and outside the main experimental sample. This experiment took place on Sunday, February 26, 2023, with the following objectives:

Understanding the allocated time for the tests.
Ensuring the sample members' comprehension of the tests used.
Verifying the safety of the tools used in the tests.
Identifying obstacles and finding solutions to overcome them during the main experiment.
Extracting scientific principles for the tests.

2-5-2 Second Exploratory Experiment

The second exploratory experiment was conducted on Wednesday, March 1, 2023. It focused on implementing an educational unit using highly interactive media and assistive tools. The objectives were:

- Ensuring the efficiency and safety of the educational tools.
- Verifying the participants' understanding of each tool and its application method.
- Determining the time allocated for each exercise within the educational unit for time management.
- Understanding how to use highly interactive media within the educational unit.

2-6 Field Research Procedures

2-6-1 Pre-Tests

The pre-tests were conducted by the researchers and the assisting team on the research sample over two days, Monday and Tuesday, March 6-7, 2023, covering the research variables at the tennis court of the College of Physical Education and Sports Sciences at Thi Qar University.

2-6-2 Educational Units

The three experimental groups implemented their educational units over nine weeks, with one educational unit per week. The implementation period was from Sunday, March 12, 2023, to Wednesday, May 10, 2023, by the subject teacher. Each group's activities were structured as follows:

1. First Experimental Group (Hypermedia):

Preparatory Section: 15 minutes.
Main Section: 66 minutes (including a 15-minute educational activity).
Concluding Section: 9 minutes.

2. Second Experimental Group (Assistive Tools):

Preparatory Section: 15 minutes.
Main Section: 66 minutes (including a 15-minute educational activity).
Concluding Section: 9 minutes.

3. Third Experimental Group (Combined - Assistive Tools and Hypermedia):

- Preparatory Section: 15 minutes.
- Main Section: 66 minutes (including a 15-minute educational activity).
- Concluding Section: 9 minutes.

2-6-3 Post-Tests

After completing the educational units, post-tests were administered by the researchers and the assisting team on the main experimental sample under the same conditions as the pre-tests, on Sunday, May 14, 2023.

2-7 Statistical Methods

The statistical package IBM SPSS Statistics 24 was used for result analysis.

3- Presentation of Results

3-1 Presentation of Pre-test and Post-test Results for the Three Research Groups (Hypermedia, Assistive Tools, Hypermedia + Assistive Tools) for All Research Variables and Their Analysis

Table (7): Illustrates the Significance of Differences between Pre-Test and Post-Test Measurements in the Research Variables for the (First Experimental - Superior Means) Group.

Processing Statistical Variables	Unit of Measurement	Pre-tests		Post-tests		t-value Calculated Value	Significance	Sig Type
		Standard Deviation	Mean	Standard Deviation	Mean			
Agility	Number	3,466	0,516	4,2	0,676	4,785	0,000	significant
Coordination	Degree	13,133	0,833	14,266	0,703	5,264	0,000	significant
Balance	Degree	7,066	0,961	8,4	1,298	7,135	0,000	significant
Serving	Degree	10,6	2,197	14,4	1,992	12,192	0,000	significant

Table (8): Illustrates the Significance of Differences between Pre-Test and Post-Test Measurements in the Research Variables for the Second Experimental Group (Supportive Means).

Processing Statistical Variables	Unit of Measurement	Pre-tests		Post-tests		t-value Calculated Value	Significance	Sig Type
		Standard Deviation	Mean	Standard Deviation	Mean			
Agility	Number	3.466	0,516	4,133	0,516	4,183	0,001	significant
Coordination	Degree	13,466	0,743	15,2	0,676	8,404	0,000	significant
Balance	Degree	6,666	0,975	9,333	1,29	8,789	0,000	significant
Serving	Degree	10,4	1,992	17,466	1,597	9,903	0,000	significant

Table (9): Illustrates the Significance of Differences between Pre-Test and Post-Test Measurements in the Research Variables for the Third Experimental Group (Superior Means + Supportive Means).

Processing Statistical Variables	Unit of Measurement	Pre-tests		Post-tests		t-value Calculated Value	Significance	Sig Type
		Standard Deviation	Mean	Standard Deviation	Mean			
Agility	Number	3,466	0,639	5,2	0,676	6,104	0,000	significant
Coordination	Degree	13,333	0,899	15,933	1,099	8,51	0,000	significant
Balance	Degree	6,733	0,798	11,266	1,437	10,169	0,000	significant
Serving	Degree	10,466	2,065	19,133	1,884	13,142	0,000	significant

Statistically Significant at a Significance Level < (0.05).

3-2 Discussion of Pre-Test and Post-Test Results for the Three Research Groups

From the results presented in Tables (7, 8, 9), it is evident that the significance value (sig) for all variables was less than the significance level of (0.05). This indicates a significant difference in favor of the post-tests for the research groups, consistent with the first hypothesis of the study.

The researchers attribute this improvement in the research variables to the soundness of the educational methodology. It included scientifically selected exercises with accurate and consistent repetitions. The exercises were tailored to the level and capabilities of the sample individuals, whether they were exercises by the teacher or those specifically designed by the researchers. This methodology is based on the correct practice, as education and practice of a specific skill within a motor task lead to increased experience and development in students. Practice is considered a crucial variable in the learning process for both complex and simple skills.

Furthermore, progress and improvement in performance for any skill are achieved through practice, repetition, error avoidance, and practical performance by students during the educational units under the guidance of the teacher. This is a fundamental step in teaching motor skills, as emphasized by Zafar Hashim (2002), stating that "it is a natural phenomenon in the learning process that there must be development in learning as long as the teacher follows the basic steps of learning and teaching, practices correct performance, focuses on continuous repetitive attempts until the performance is consolidated and stable."

In conclusion, the positive outcomes in the research variables are attributed to the effective educational methodology, the selection of appropriate exercises, and the focus on correct and repetitive practice, which are essential elements in enhancing motor skills. The study confirms the interdependence of learning and practical experience in skill development.

Table (10): Shows the Results of the Analysis of Variance (ANOVA) in the Post-Tests for the Three Research Groups.

Processing Statistical Variables	Unit of Measurement	Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	Calculated Value F	Sig Value	Statistical Significance
Agility	Number	Between Groups	8,933	2	4,467	13,529	0,000	Significant
		Within Groups	13,867	42	0,33			
Coordination	Degree	Between Groups	16,133	2	8,067	11,656	0,000	Significant
		Within Groups	29,067	42	0,692			
Balance	Degree	Between Groups	46,711	2	23,365	9,693	0,000	Significant
		Within Groups	101,2	42	2,41			
Serving	Degree	Between Groups	97,378	2	46,689	10,064	0,000	Significant
		Within Groups	203,2	42	4,838			

Significant at a Level < (0.05).

Table (11): Shows the Results of the Duncan's Multiple Range Test (D.S.L) Indicating the Least Significant Difference Among the Three Research Groups in the Research Variables.

Abilities	Groups	Means	Means Differences	Sig	Significance	Group Superiority
Agility	Experimental Group 1 - Experimental Group 2	4,2-4,133	0,333	0,120	Non-significant	"Significant in favor of the third experimental group."
	Experimental Group 1 - Experimental Group 3	4,2 -5,2	-0,733	0,001	Significant	
	Experimental Group 2 - Experimental Group 1	4,133 – 4,2	-0,333	0,120	Non-significant	
	Experimental Group 2 - Experimental Group 3	4,133 – 5,2	-1,066	0,000	Significant	
	Experimental Group 3 - Experimental Group 1	5,2 -4,2	0,733	0,001	Significant	
	Experimental Group 3 - Experimental Group 2	5,2 – 4,133	1,066	0,000	Significant	
Coordination	Experimental Group 1 - Experimental Group 2	14,266 - 15,2	-0,733	0,020	Non-significant	"Significant in favor of the third experimental group."
	Experimental Group 1 - Experimental Group 3	14,266– 15,933	-1,466	0,000	Significant	
	Experimental Group 2 - Experimental Group 1	15,2 - 14,266	0,733	0,020	Non-significant	
	Experimental Group 2 - Experimental Group3	15,2 - 15,933	- 0,733	0,020	Non-significant	
	Experimental Group 3 - Experimental Group 1	15,933- 14,266	1,466	0,000	Significant	
	Experimental Group 3 - Experimental Group 2	15,933 - 15,2	0,733	0,020	Non-significant	
Balance	Experimental Group 1 - Experimental Group 2	8,4 – 9,333	-0,400	0,484	Non-significant	"Significant in favor of the third experimental group."
	Experimental Group 1 - Experimental Group 3	8,4 – 11,266	-2,333	0,000	Significant	
	Experimental Group 2 - Experimental Group 1	9,333 – 8,4	0,400	0,484	Non-significant	
	Experimental Group 2 - Experimental Group3	9,333 – 11,266	-1,933	0,001	Significant	
	Experimental Group 3 - Experimental Group 1	11,266 - 8,4	2,333	0,000	Significant	
	Experimental Group 3 - Experimental Group 2	11,266- 9,333	1,933	0,001	Significant	
Serving	Experimental Group 1 - Experimental Group 2	14,4 – 17,466	-1,933	0,021	Non-significant	"Significant in favor of the third experimental group."
	Experimental Group 1 - Experimental Group 3	14,4 – 19,133	-3,600	0,000	معنوي	
	Experimental Group 2 - Experimental Group 1	17,466 – 14,4	1,933	0,021	Non-significant	
	Experimental Group 2 - Experimental Group3	17,466– 19,133	-1,666	0,044	Non-significant	
	Experimental Group 2 - Experimental Group 1	19,133-14,4	3,600	0,000	Significant	
	Experimental Group 3 - Experimental Group 2	19,133-17,466	1,666	0,044	Non-significant	

3-3 Discussion of Post-Test Results for the Experimental and Control Groups

From the results in Table (10), it is observed that the significance value (sig) for all variables was less than the significance level of (0.05). This indicates a significant difference, and to determine the superiority of the groups, the (D.S.L) law was used. According to Table (11), the third group (combined media and assistive tools) showed a clear superiority over the other groups.

The researchers attribute this superiority to the effectiveness of the interactive media (hypermedia) prepared by the researchers and the use of educational aids manufactured by the researchers. Students in the third group witnessed the precision in skill presentations during the educational units, as well as the feasibility of slow-motion presentations. This provides a good opportunity to understand the nuances of movement and the speed of comprehension.

Moreover, using both modern media and manufactured educational aids allowed for the diversification of teaching materials. This, as supported by Singer (1981), emphasizes the importance of using diverse educational materials for their effective impact on the learning process of motor skills.

The researchers believe that creating suitable educational conditions and incorporating modern technology in the learning process of basic tennis skills had a significant positive impact on the performance of these skills in the third experimental group. The use of interactive media (hypermedia) and assistive tools allowed for the display of basic skills from all angles, explaining all parts comprehensively. Video clips help integrate the senses of the learner, making the learning process easier, more engaging, and more exciting due to the combination of audio and visual elements in the presented film.

Conclusion

The educational methodology prepared by the researchers had a positive and effective impact on the development of the tennis groundstroke skill.
The third experimental group, which utilized both manufactured educational aids and hypermedia, demonstrated a clear superiority in the post-test, indicating the effectiveness of combining modern media and assistive tools.

Recommendations

1- Emphasize the use of modern hypermedia in the learning process of tennis groundstroke skills.
2- Conduct further research and studies on other tennis skills to understand the impact of modern media on these skills.

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