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Effect of Smart Learning Strategy on Forward Roll Skill in Gymnastics: A Spatial Analysis

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Abstract : This research aims to identify the effect of employing the smart learning strategy on teaching the forward roll to first-year students. The researchers hypothesized that employing the smart learning strategy has a positive effect on learning the forward roll for first-year students. The research sample represented the first-year students in the College of Physical Education and Sports Sciences , Diyala. The researchers prepared educational units and applied them after the pre-test. Then the post-test was conducted and the results were extracted. They obtained that the educational units designed according to the smart learning strategy had a positive effect on learning the skill aspect of the forward roll skill better than the method adopted by the instructors.
Keywords: *Smart Learning Strategy , Forward Rolling , Students, sport science*

أثر استراتيجية التعلم الذكي في تعلم مهارة الدحرجة الأمامية في الجمناستك: تحليل مكاني

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المستخلص: يهدف هذا البحث إلى التعرف على أثر توظيف استراتيجية التعلم الذكي في تعليم مهارة الدحرجة الأمامية لطلبة المرحلة الأولى. وافترض الباحثون أن توظيف استراتيجية التعلم الذكي له تأثير إيجابي في تعلم مهارة الدحرجة الأمامية لدى طلبة المرحلة الأولى . تمثلت عينة البحث بطلبة المرحلة الأولى في كلية التربية البدنية وعلوم الرياضة في جامعة ديالى. وقد أعد الباحثون وحدات تعليمية وفق استراتيجية التعلم الذكي وتم تطبيقها بعد إجراء الاختبار القبلي. وبعد الانتهاء من تنفيذ الوحدات التعليمية، أُجري الاختبار البعدي وتم استخراج النتائج وتحليلها .أظهرت النتائج أن الوحدات التعليمية المصممة وفق استراتيجية التعلم الذكي كان لها تأثير إيجابي في تعلم الجانب المهاري لمهارة الدحرجة الأمامية، وتفوقت في نتائجها على الأسلوب التقليدي المعتمد من قبل المدرسين في عملية التعليم .وبناءً على ذلك، توصل الباحثون إلى أن استراتيجية التعلم الذكي تُعد من الأساليب التعليمية الفعالة التي تسهم في تحسين تعلم المهارات الحركية في الجمناستك لدى طلبة كليات التربية البدنية وعلوم الرياضة.

الكلمات المفتاحية *: استراتيجية التعلم الذكي؛ الدحرجة الأمامية؛ الطلبة؛ علوم الرياضة .*

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1.0 Introduction

All the changes and developments in the field of sports and the application of learning strategies have fundamentally impacted the methods and strategies used in teaching students, as well as the roles and functions of the instructor (Rudd et al ,2021). The instructor's role is no longer merely that of a transmitter of knowledge, but has become that of an organizer, guide, mentor, and facilitator of the learning environment. This allows students the opportunity for free interaction with the educational activity (Sutrisna ,2021). These changes have led to a decline in the traditional methods used by instructors in the educational process, replacing them with other strategies and approaches that focus on the individual differences among learners, their abilities, needs, and motivations (Khataybeh and Khasawneh, (2024).) . Gymnastics is one of the sports included in the Ministry of Education's curriculum (Gatia, 2024). Given the skill-based performance required, it has become essential to employ teaching strategies that effectively teach skills and movements. These strategies should be designed to encourage active student participation in the learning process. The goal is not merely to provide the student with information, but to help them master the skill through a variety of activities and information presented during the lesson (Mahdi et al, 2024) . This means making full use of the allotted lesson time, maximizing the effort expended, and maximizing the actual learning time, during which the student is engaged with the lesson content at a level appropriate to their ability to achieve a higher level of skill performance, while also addressing any errors that may arise during the learning process (Cai and Wang, 2025). Gymnastics is one of the sports taught within the Ministry of Education's curriculum. Several teaching strategies have emerged that have yielded positive results for female students, including the smart learning strategy. This is a type of cooperative learning strategy where the student learns the majority of the performance independently, consulting the instructor for correction. Since gymnastics is an individual sport where learning skills depends on the student's effort, the instructor must choose a strategy that suits the type of skills, physical attributes, and motor abilities that help students learn and develop their skills. Floor exercises are fundamental to all movements on other apparatus and are among the preferred and engaging skills for most practitioners due to their inherent connection and coordination (Ndzinisa, and Dlamini, 2022; Busquets et al, 2021). Learning them is linked to learning basic starting positions, as these are the foundation for learning and mastering these movements in a timely manner. This highlights the importance of this research in selecting the smart learning strategy for teaching the forward roll to first-year students on the floor exercise mat. This roll is fundamental to most artistic gymnastics skills for men, as it is engaging for most practitioners due to its connection and coordination. Furthermore, this method is effective in helping students reach the level targeted by the instructor (Jefferson et al, 2023). Most gymnastics instructors use strategies that do not suit students' abilities and may focus on strategies that rely on their own efforts, while the student is expected to execute and perform what is required of them. Therefore, researchers needed to use strategies that might have a positive impact (Portaz et al, 2024). To identify the effect of employing the smart learning strategy on first-year students learning the forward roll.

2.0 Research Methodology:

2.1 Research Hypothesis

Employing the smart learning strategy has a positive effect on first-year students learning the forward roll

2.2 Research groups

The researchers used the experimental method with an equivalent groups design using pre- and post-tests, as it was suitable for the nature of their research problem. The experimental method "represents the most reliable approach to many scientific problems, both practically and theoretically as shown in tbale 1.

Table 1. Illustrates two research groups.

Group	Pre-Test	Method Used	Post-Test	Comparison Between the Post-Tests of Both Groups
Control	Forward Roll Test	Traditional Method	Forward Roll Test	
Experimental		Smart Learning Strategy		

2.2 Research Population and Sample

The research population consisted of first-year students at the College of Physical Education and Sports Sciences/Diyala for the academic year (2024-2025), totaling (86) students. The research sample was randomly selected from the original population, consisting of (60) first-year students at the College of Physical Education and Sports Sciences/Diyala. The research sample was randomly distributed into two groups: the first group, consisting of (30) students, was experimental. The study included a student group using the smart learning strategy and a second control group (using the same method), totaling (30) students.

2.3 Homogeneity of the research sample

The researchers established homogeneity between the two research groups (the individuals in the research samples in terms of height, mass, and age). The results showed homogeneity among the individuals in both samples, as shown in Table (2).

Table 2. Shows the statistical parameters for the variables of height, mass, and age.

Variables	Mean	Standard Deviation	Median	Skewness Coefficient (±3)
Height (cm)	162.31	6.84	161	-0.574
Mass (kg)	62.74	5.73	61	-0.910
Age (months)	218.57	4.32	219	-0.298

2.4 Field Research Procedures

The researchers prepared six educational units, each containing exercises for the forward roll skill, according to the smart learning strategy. Each unit was divided into three parts: a 15-minute preparatory section, a 60-minute main section, and a 15-minute concluding section. The main section included the scientific material according to the smart learning strategy.

2.5 Pilot Study

The pilot study is a smaller-scale version of the main study experiment and must, as much as possible, meet all the conditions and circumstances of the main experiment in order for its results to be considered valid . The pilot study was conducted on Wednesday, December 11, 2024, with a sample of five students from the research population. The main objective of the pilot study was to identify the difficulties that researchers might encounter, to assess the research sample's readiness to perform the forward roll test, to determine the time required to conduct the tests, and to verify the suitability of the equipment and tools used, as well as the suitability of the testing

location.

2.6 Pre-Test

A test is defined as "a set of questions or problems designed to assess knowledge, intelligence, or other abilities and characteristics. The concept of a test implicitly involves requesting answers to a pre-prepared set of questions. Based on the examinee's responses, we obtain results in the form of numerical values reflecting the characteristics and abilities of the examinee who answered those questions. Here, the researchers administered a pre-test for forward rolling skills, a performance level test for the skill, on Tuesday, December 24, 2024, at 9:00 AM. The students' performance was evaluated by judges*, and the skill was scored out of ten points. The arithmetic mean of the scores was then calculated to determine each student's final score. 2-4-4 Sample Equivalence: The researchers ensured the equivalence of the two research samples for the forward roll skill. After analyzing the results, the t-values for all variables were less than the critical values at a degree of freedom of (58) and a significance level of (0.05), amounting to (2.01), which indicates sample equivalence.

2.7 Implementation of the Learning Units

To determine the effect of employing the smart learning strategy on learning the forward roll skill, the researchers implemented learning units for the forward roll skill. These units lasted six weeks and included an explanation of how to perform and apply the skill to the experimental group according to the smart learning strategy. The control group was taught the skill by the physical education teacher using the standard method.

2.8 Post-Tests

The technical performance level test was conducted on Monday, March 10, 2025, at 9:00 AM under the same conditions as the pre-test. The technical performance test for the skills under investigation was evaluated by the same judges, and the technical performance score was determined out of (10) points for each skill. The arithmetic mean of the scores was calculated to determine the student's final score.

3.0 Results and discussion

3.1 Pre- and Post-Tests

This indicates a statistically significant difference between the two tests, favoring the posttest. The mean score for the control group in the pretest forward roll test was 3.30, with a standard deviation of 1.12. The mean score for the posttest test was 5.66, with a standard deviation of 1.29. The calculated t-value was 7.24, which is greater than the critical t-value of 1.99 at 29 degrees of freedom and a significance level of 0.05. This indicates a statistically significant difference between the two tests, favoring the posttest.

Table 3. shows the arithmetic means, standard deviations, and calculated t-value for the pre- and post-tests of the forward rolling skill

Group	Pre-Test (Mean)	Pre-Test (SD)	Post-Test (Mean)	Post-Test (SD)	Calculated *t*-Value	Significance Type
Experimental	3.76	1.18	6.66	2.10	9.90	Significant
Control	3.30	1.18	5.66	1.29	7.24	Significant

Degrees of Freedom (29) and the tabulated t-value (1.99) at a significance level of (0.05). From Table (3), the arithmetic mean for the experimental group in the pre-test of the forward rolling standing skill is (3.76), with a standard deviation of The mean score for the pretest group in the forward roll test was 1.18, with a standard deviation of 2.10. The calculated t-value was 9.90, which is greater than the critical t-value of 1.99 at 29 degrees of freedom and a significance level of 0.05.

3.2 Investigation based on the Forward Rolling Skill

Based on the data presented in Table (3), the results showed statistically significant differences between the pre- and post-tests for both the experimental and control groups in the forward rolling test. The researchers attribute these differences for the experimental group to the use of a smart learning strategy that helped the learner understand and grasp the detailed aspects of performing the skill. This was achieved by presenting the skill slowly, enabling learners to perceive and comprehend all its components. Furthermore, this skill requires a gradual approach to learning, progressing from easy to difficult, and then performing it fully. This is because, as stated in the 1st, "Breakdown or division of the skill into parts through the posed questions and performing it in a piecemeal fashion is more suitable for beginners." The results also showed a significant improvement in learning the technical performance of the above skill among the control group. The researchers attribute this improvement to the number of educational units included in the curriculum, the appropriate number of repetitions within each unit, and the effective organization of the units to enhance skill learning, as well as the application of exercises appropriate to the level of difficulty. The skill level should be appropriate for the students' age group and abilities. The curriculum should be tailored to their specific needs and age. 3-3 Post-Test Results for the Experimental and Control Groups for Skills:

Table 4. shows the arithmetic means, standard deviations, and calculated t-value for the post-test for the experimental and control groups for the skill.

Test	Experimental (Mean)	Experimental (SD)	Control (Mean)	Control (SD)	Calculated *t*-Value	Significance Type
Forward Roll Test	6.66	2.10	5.66	1.29	2.38	Significant

Table (4) shows that the arithmetic mean for the experimental group in the post-test for forward roll is (6.66) with a standard deviation of (2.10), and the arithmetic mean in the post-test for the control group is (5.66) with a standard deviation of (1.29). The calculated t-value is (2.38) is greater than the critical t-value of (1.671) at 58 degrees of freedom and a significance level of (0.05), indicating a statistically significant difference between the two tests in favor of the experimental group.

3.3 Comparison between Experimental and Control Groups

By presenting and analyzing the results in Table (4), we find that the experimental group demonstrated a significant improvement in learning and performing the forward rolling skill more effectively than the control group. The researchers attribute these differences to the smart learning strategy employed in the experimental group's educational units. This strategy

empowered students to play a larger and more significant role in completing motor tasks and assignments by encouraging independence in creating situations that adapt to changing circumstances during performance. It also represents a method that allows students to develop their knowledge through direct, hands-on experiences, a positive approach that distinguishes them from the control group, who followed the teacher's method. This aligns with what Dhafer Hashem (2002) emphasized: that "the use of smart learning strategies increases the learning of skills by students who apply all the steps that constitute the performance. Because the smart learning strategy is a complex and integrated human behavior, it takes into account all the data of the situation it will address in order to achieve a specific goal with minimal error. It is the path leading to the goal, or the framework guiding the methods of work, and the guide that directs its movement. Therefore, we find that through the strategy, the objectives of the teaching situation are achieved with minimal resources and at the highest possible level, resulting in teaching procedures that accurately reflect what happens in the lesson, utilizing specific resources to achieve desired learning outcomes for the students. As for the emergence of significant differences in the development of the research variables for the control group, this was due to the program prepared by the subject teacher and the method used, which showed improvement for the control group, as it showed less difference than the experimental group.

4. Conclusion

The results of the statistical analysis of the experimental group's pre- and post-test data proved that there were differences in favor of the post-test for both groups. The method used by the instructor helped the control group learn the forward roll skill. The smart learning strategy had a positive effect on the experimental group's learning of the forward roll skill. The educational units designed according to the smart learning strategy proved superior to the method adopted by the physical education school in teaching the forward roll skill. Employ the smart learning strategy in teaching other skills, as this strategy is one of the modern teaching strategies. Conduct similar studies employing the smart learning strategy on samples of different genders. The need to focus on employing smart learning strategies and encouraging those involved in the educational process to develop their teaching and training capabilities. Conducting comparative studies between smart learning strategies and other strategies in teaching gymnastics skills to students.

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