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The effect of educational exercises to increase joint flexibility in learning the forward handstand jump skill on the floor exercise mat for physical education students - University of Diyala

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Abstract. Artistic gymnastics is one of the individual sports that requires high physical fitness, including flexibility to perform skills. Any weakness in the flexibility of the body's joints affects the performance of players or students. The research problem is due to the lack of sufficient flexibility among students in performing skills. The researcher's goal is to prepare an educational curriculum for teaching the skill of the forward hand jump on the floor exercise mat, and to identify the percentage of flexibility achieved in the targeted body joints in teaching the skill of the forward hand jump on the floor exercise mat. The experimental method was used with a two-group design (experimental and control). The research sample was selected purposively, consisting of (30) third-year students from the College of Physical Education and Sports Sciences at Diyala University. These students were divided into two groups: the experimental group (section A) and the control group (section B). The statistical tool SPSS was used. After presenting, analyzing, and discussing the results obtained by the researcher during the pre- and post-testing period, the researcher concluded that exercises using assistive devices increased joint flexibility in the experimental group, particularly in the forward handstand jump, to a higher level than the control group, which showed less improvement. Therefore, the researcher recommended adopting flexibility exercises using assistive devices in learning gymnastics skills due to their positive impact on students' flexibility and the time savings achieved during instruction.

Keywords. joint flexibility, artistic gymnastics, forward handspring, educational exercises, physical education students

1.1 Introduction and problem statement.

Flexibility is a fundamental factor that directly affects the learning and execution of athletic skills. It is one of the elements of physical fitness that, along with strength, speed, and endurance, contributes to building and developing motor performance in young athletes and college students. Through the researcher's experience in skills teaching, he observed that athletic disciplines require this important element. An athlete with good flexibility will be able to utilize other elements of physical fitness with less effort and in a shorter time to improve learning, performance, and development, especially in gymnastics. A lack of flexibility in an athlete leads to weakness and sometimes even injury, while excessive flexibility negatively

impacts strength. Therefore, careful consideration must be given when teaching skills or during the development phase. Gymnastics is one of the games that requires flexibility in executing skills, applying modern exercises, and using assistive tools that greatly contribute to the speed of learning and mastering movements and achieving the desired goal in the educational program that was prepared, as most gymnastics movements are characterized by difficulty and require physical and skill abilities with special specifications, and the preparation of assistive tools greatly contributes to overcoming all the difficulties that the learner faces. Qasim Hassan Hussein (p. 292, 1998) believes that "developing flexibility in individual sports is achieved through motor coordination, as well as the use of flexibility exercises. The combined action of the central nervous and muscular systems within the range of the intended movement path is determined by the flexibility of muscles, ligaments, tendons, and joints. Therefore, flexibility exercises are very important in gymnastics, as most skills rely on them, regardless of other physical abilities. This leads the researcher (Qasim Hassan Hussein, p. 279, 1998) to the view that "the most important task of developing flexibility lies in increasing the range of motion of each part of the musculoskeletal system and ensuring the influence on elements of strength, speed, and endurance, as these qualities contribute to mastering the movement path and the art of movement performance. Several stretching exercises are among the most important means of achieving muscle, ligament, and tendon extension and increasing joint range of motion. Moreover, stretching exercises are essential for various muscle groups. Some tools can be used as ladders for athletes to perform exercises without assistance or equipment. Stretching exercises are used in the form of repetition during learning, with the necessity of gradually increasing the range of motion until reaching the desired level." Its maximum end and consideration of the absence of pain, which serves as a sign indicating the need to limit the increase in the range of the swing.

1.2 Research Problem:

Through the researcher's experience in teaching and teaching gymnastics at the College of Physical Education, he found that there is a weakness in the joint flexibility of students during the teaching of skills. To overcome the difficulty of performing the skill under investigation, the researcher decided to work on preparing exercises to increase the flexibility of the body's joints, especially the hip, shoulder, and spine joints, as these joints affect the performance of the skill under investigation. This, in turn, will generate desire, excitement, and motivation among students to learn the skill.

1-3 Research Objectives:

- To develop an educational curriculum for teaching the handstand jump on the floor exercise mat.
- To determine the degree of flexibility achieved in the targeted body joints when learning the handstand jump on the floor exercise mat.

1-4 Research Hypotheses

- There are statistically significant differences between the pre-test and post-test scores due to the educational curriculum.
- There are statistically significant differences between the post-test scores of the control and experimental groups in learning the handstand jump on the floor exercise mat, favoring the experimental group.

2- Research Methodology and Field Procedures:

2-1 Research Methodology: The researcher used the experimental method as it is the most efficient way to obtain reliable knowledge, employing a two-group design with equivalent experimental and control groups.

2-2 Research Sample: The research population consisted of (32) students from the College of Physical Education and Sports Sciences, University of Diyala. (30) students were selected purposively and divided into two groups: the first group, experimental (section A), and the second group, control (section B).

-Equivalence of the Research Sample: To verify the equivalence of the research sample in the study variable, the skill of the forward handspring on the floor exercise apparatus in artistic gymnastics.

Table (1)
shows the equivalence of the research sample

Skills	Group	Arithmetic mean	Standard Deviation	T-value	Sig	Type of signifiante
Front handspring skill	Control Group	1.200	0.316	0.574	0.571	Significant
	Experimental Group	1.267	0.320			
Cobre test	Control Group	86.800	2.933	0.600	0.553	Significant
	Experimental Group	86.067	3.712			

Information collection methods, equipment and tools used in the research.2-3

Arabic and foreign sources, tests, arbitration form, information network and the Internet, the assisting work team, floor exercise mat, balance beam device, Dell computer (1), Sony video camera (1), various visual aids (paper and visual), rotating roller, measuring tape, sponge mats.

2-4 Research Procedures

2-4-1 Pilot Test: The pilot test was conducted at 10:00 AM on Sunday, October 26, 2025, with three students outside the sample to determine the obstacles faced by the assisting team and the duration of the experiment.

2-4-2 Pre-Test: The researcher conducted the pre-test on Tuesday, October 28, 2025, in the gymnastics hall for students at the College of Physical Education and Sports Sciences, University of Diyala. The selected test was as follows:

1- Bridge Test: (Back Bridge or Arch) (Amin Fardous, 2005, p. 57).

Purpose of the test: To measure spinal flexibility.

Equipment used: Measuring tape, mat, chalk.

Positioning: Lie on your back with your legs bent and feet close to your hips, palms beside your head with fingers pointing towards your heels. Performance description: Upon signal, the

test subject raises the entire torso upwards while extending the arms and legs to form an arc in the back (dome) as far as she can.

Measurement Method: Determine the distance between the nearest point on the inside of the palms and the heels. Mark these two points with chalk, then measure the distance between them using a measuring tape. This distance serves as an indicator of spinal flexibility, as shown in Figure (1).

Note: The elbows and knees should not be bent while performing the backbend. The subject performs two attempts, and the better attempt is recorded.



Figure (1)
The Bridge test shows

:2- Performing the Forward Hand Jump Skill on the Floor Mat

2-4-3 Main Experiment: The main experiment was conducted from Sunday, November 2, 2025, to Tuesday, December 14, 2025. The experiment lasted for six weeks, comprising twelve (12) instructional units, with two units per week, each lasting thirty (30) minutes in the main session. The experiment utilized assistive devices in addition to the skill performance. The researcher ensured uniformity in the repetitions for the experimental group and provided extra opportunities for students with lower learning levels to prevent variations in performance. The researcher also ensured that the exercises prepared for the main session were implemented immediately after the warm-up phase for all instructional units. The experimental group performed these units, while the control group continued with the instructor's method.

2-4-4 Post-Test: After the completion of the instructional units, the researcher conducted the post-test under the same conditions and location on Tuesday, December 16, 2025. In the Artistic Gymnastics Hall of the College of Physical Education and Sports Sciences at Diyala University, in the presence of the esteemed judges and with the support of the research team.

2-5 Specialized Methods: The researcher used the Statistical Package for the Social Sciences (SPSS) to obtain the data.

:3- Presentation, Analysis, and Discussion of Results

To achieve the research objectives and hypotheses regarding the impact of educational exercises to increase joint flexibility on students' learning of the forward handspring skill, the researcher presented, analyzed, and discussed the results to verify the validity of the hypotheses.

Table (2)

shows the values of the arithmetic mean, standard deviations, t-value, and significance level for the experimental group.

Skills	Pre-test		Post-test		T-value	Sig	Type of significance
	Arithmetic mean	Standard Deviation	Arithmetic mean	Standard Deviation			
Front handspring skill	1.267	0.320	6.333	0.617	-34.871	0.000	Significant
Cobre test	86.067	3.712	74.400	4.748	15.349	0.000	Significant

Table (3)

shows the values of the arithmetic mean, standard deviations, t-value, and significance level for the control group.

Skills	Pre-test		Post-test		T-value	Sig	Type of significance
	Arithmetic mean	Standard Deviation	Arithmetic mean	Standard Deviation			
Front handspring skill	1.200	0.316	4.333	0.724	-18.963	0.000	Significant
Cobre test	86.800	2.933	80.200	3.448	6.703	0.000	Significant

Table (4)

shows the arithmetic mean, standard deviations, t-values, and significance levels for the experimental and control groups in the post-tests for the research variables.

Skills	Group	Arithmetic mean	Standard Deviation	T-value	Sig	Type of significance
Front handspring skill	Control Group	4.333	0.724	8.143	0.000	Significant
	Experimental Group	6.333	0.617			
Cobre test	Control Group	80.200	3.448	-3.828	0.001	Significant

	Experimental Group	74.400	4.748			
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At a significance level of (0.05) and degrees of freedom of (28).

*** Discussion of the results:**

The results presented showed that the amount of learning was clear and tangible for both the experimental and control groups, especially the experimental group, as it achieved clear and significant rates of development in its learning of the technical performance of the skills under investigation, even though the two groups were subjected to the same educational curriculum, except for the inclusion of the specific learning curriculum of the experimental group in the process of learning the skill of the front handspring jump under investigation in terms of technical performance. Because of this technique, the amount of learning and the percentages of its noticeable development increased. Therefore, the prepared curriculum facilitated the process of understanding and perceiving the detailed parts of the skills to be learned, through the clear progression in presenting and explaining the skill and its three sections (preparatory, main and final). This was confirmed by scientific sources from the use of illustrative pictures of the parts of the skill that descended in the paragraphs of the educational curriculum. (Amin Fardous et al., 2019, p. 7) Learning is defined as a change in behavior resulting from stimulation; that is, acquiring the means to understand needs and motivations in order to achieve goals.

(Ammar Khalil, p. 87, 2015) states that "clarity and specificity of goals in terms of behavioral patterns or performance levels are meaningful and effective.

The researcher believes that the experimental group, which used exercises within the prepared educational units, experienced a positive effect in increasing students' flexibility, leading to skill acquisition. This is because deliberate repetition corrects the motor pathway of skills and is fundamental to learning. (Muhammad Tawfiq, p. 76, 2018) states that "the more repetitions there are in performing a specific movement or skill, the greater the ability of motor memory to determine the appropriate program for that movement or skill.

4- Conclusions and Recommendations:

Conclusions: After extracting the results, the researcher concluded the following:**4-1**

- 1- The implemented educational method had a positive impact on developing the specific characteristic of flexibility in the experimental group.
- 2- The study revealed that the educational exercises helped develop the level of technical performance in the skills used in the research for the experimental group when compared to the performance level of the control group.
- 3- The experimental group's use of tools and aids, and the variety in their use, had a significant impact on the players' motivation and eagerness to learn the skill, leading to their superiority over the control group in post-tests.

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