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The Effect of an Educational Curriculum Used the Computer in Learning Some Basic Skills on the Weight Beam for Female Students in Artistic Gymnastics

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Abstract. The research aims to identify the effect of a computer-based educational curriculum on learning fundamental skills on the balance beam and to determine the most effective group in learning these skills. The researchers have hypothesized that the educational curriculum using the computer has a positive effect on learning some basic skills on the balance beam apparatus for the experimental group. The research sample included second-year female students of the College of Physical Education and Sports Science- University of Diyala. The experiment was carried out during (15/10/2023 – 1/2/2024) in the gymnasium hall and computer laboratory in the College of Physical Education and Sports Science. The researchers prepared a special learning curriculum for the experiment using a computer to learn the skills under study in terms of technical and cognitive performances. This was needed for six weeks from (22/10/2023 to 12/12/2023) during conducting the main experiment. In comparison, post-tests were conducted after completing the educational curriculum for all skills. The researchers have concluded that the use of a computer helps in understanding and comprehending the detailed parts of the skill (technical performance) better than without using the computer during learning skill.

Keywords. Educational Curriculum, Balance Beam Device, Artistic Gymnastics

1. Introduction:

The educational and illustrative means employed in learning processes are important for complex and intricate sports skills and movements, especially skills whose main parts overlap with each other. They cannot be easily separated such as certain floor movements for beginners in gymnastics. Ibrahim (1998,180), states that "Learning is the consistent improvement in performance resulting from training or scientific practice." Researchers have increasingly started to use computers due to their ability to handle many complex programs. Decides, this technology has a highly efficient capacity to getting the best actions, saving effort, time and resources. Ameen & Al-Fadhli (2009, 252**),** asserted that "the process of transferring the effect of learning is important and effective, whether in the educational, teaching process or sports process. Therefore, it is necessary to organize sports events and activities to invest in the transfer of learning effect". This process is great importance because it is one of the most difficult

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processes to learn since mathematical skills are characterised by numerous and intertwined terms.

The researchers have observed that advanced countries use computers as part of the lecture. This contributes to faster understanding and learning, thereby reducing the burden on the subject teacher. In this respect, studies were conducted in the same field to prepare educational curricula that help junior students develop their abilities independently. Al-Mustafa (1996,168 (defines that " Education is a lifelong process that aims to improve human behaviour".

1.2 Research problem

Gymnastics is one of the fundamental sports topics in the curriculum of the second and third academic years at the College of Physical Education and Sports Sciences. The gymnastics curriculum includes many skills with different technical aspects that require comprehensive physical and skill preparation to achieve the best results. The educational process also demands a continuous objective assessment based on tests and measurements to evaluate skill performance levels rather than relying on subjective estimated grades. From the researchers' experience in teaching gymnastics and their review of previous research and studies, they observed a limited use of technology in the process of learning basic skills. Teachers and trainers rely on means of presenting the (live) model in learning basic skills with their technical, cognitive, and planning aspects in all aspects of gymnastics. Therefore, the researchers decided to integrate computers into the learning process of three basic gymnastic skills. They prepared an educational curriculum that includes learning the technical performance of the skills studied for the game in general and the skills under study in particular, by introducing this device as a high-tech educational tool.

1-3- Purpose of the study:

The researchers design educational curriculum with computer-aided to develop some basic skills on the balance beam. They aim to identify the impact of the educational approach using the computer technology in learning these skills and to determine the best group in performance theses skills on the balance beam device.

2- Search procedures:

2-1 Research sample and community:

The research community was selected randomly with a total of (60) female students in The second stage at the College of Physical Education and Sports Sciences / University of Diyala. Then, the researchers chose 28 female students randomly from this community to form two equivalent experiment groups. The first group is a control group, including (14) students, and the second group is an experimental group with a total (14) students. Thus, the sample represented a percentage of (48%), which is an appropriate percentage to represent the research community in a valid and reliable way.

2-2 Sample homogeneity:

In order to achieve homogeneity among the research sample individuals, the researchers adopted some variables, using statistical methods, as shown in Table (1).

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Table (1)
The homogeneity of the research sample individuals

Variable	Mean	Deviation	*Median*	skewness coefficient 1±
Length/sm	**160.56**	**5.5**	**133**	0.23-
Weight/kg	**65.33**	**5.11**	**27**	0.46
Age	**20.32**	**5076**	**13045**	0,79
Open jump	**2.65**	**0.83**	**2.5**	0.54
forward roll	**1.9**	**0.74**	**1.7**	0.81
Libra movement	3.4	0.75	3.5	0.40

All variables fall within the range ±1, indicating that the research sample individuals are homogeneous in all the mentioned variables.
Statistical means include the arithmetic mean, standard deviation, and t-test for independent samples; comparing the control and experimental groups.

Table (2)
Pre-tests (equivalence) for research variables

Variables	Groups	mean	Standard Deviation	Calculated T	Significance level
Libra movement	**Experimental**	**4.714**	**0.726**	**.172-**	.864
	Control	**4.786**	**1.369**		
forward roll	**Experimental**	**3.500**	**0.941**	**.824-**	.417
	Control	**3.786**	**0.893**		
Open jump	**Experimental**	**4.143**	**0.864**	**1.428**	.165
	Control	**3.571**	**1.222**		

2-3 Research methodology:
The researchers used the experimental method because it is suitable for the nature of the research, as well as it is the best way to achieve accurate results.

2-4 Selective Variables:
The researchers utilize variables: Libra movement, forward roll, and Open jump to teach independent samples (the control and experimental groups).

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2-5 Tests

2-5-1 Specific Tests for General Balance Impairment:

After the experts reviewed the form of important tests, including general balance impairment, the following tests were chosen (Samir, 2004, 131).

1- Landing from a wooden box and maintaining body balance.

- **Purpose of the test:** To measure motor control, rhythm, balance

- Performance: The tester is instructed to perform the landing movement from the wooden box of one-meter-high maintaining the body stability on the ground. The evaluation score ranges between (1-4) points, with only three attempts.

2- Forward roll, stop and quick adjustment.

- **Purpose of the test: to** control, control of body parts, assess body compatibility.

- **Performance:** The test taker is instructed to perform the forward rolling movement, and immediately stand up and align the body.

- **Scoring:** The player has three attempts and the evaluation score ranges (1-4) points.

3- Standing on instep and raising arms to the sides.

- Purpose of the test: to evaluate control, lateral control, balance, and motor control.

- Performance: The tester is instructed to instep and raise the arms to the sides for (30) seconds).

-Scoring: The evaluation ranges (1-4) points.

2-5-2- Special tests for performing skills on the balance beam:

1- The front balance: (Ameen, 2015, 91)

- Purpose of the test: to control static balance during performance.

- Performance: The support leg is extended, the instep of the support foot is pointing forward, the free leg is raised high behind the support leg to its maximum extent and its instep ponts to outwards, the body is positioned horizontally and vertically on the support leg, the back is arched, the arms are raised in front or to the sides, the gaze is forward with a slight bend to the back of the neck.

- Evaluation: The evaluation ranges from (1 to10) degrees, following to the international laws of gymnastics

2- Forward roll with a squat: (Ameen,2015,75)

- Purpose of the test: to maintain balance during the performance for the longest possible period by controlling body movements during the roll.

Performance: the player rests the front of the head and hands on the bar with chest width, flexes the hands from the elbow, keeps the body with vertical position on the bar, and points with the tips of the toes.

- Evaluation: The evaluation ranges from (1 to10) degrees, according to the international laws of gymnastics.

3- Open jump on the balance beam:

Purpose of the test: to assess balance, fitness, and performance consistency

Performance: This skill is performed at the beginning of teaching to learn the students how to climb onto the beam and touch it as well as learn how to jump openly onto the vaulting platform. The student must end movement by standing on the beam with their feet and maintaining stability.

Evaluation: The scores ranges from (1 to10) degrees, according to the international laws of gymnastics.

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2-6 Main experiment

2-6-1 The Control experiment:

Before conducting the main experiment, the researchers conducted a pilot experiment. The sample included six female students from the College of Physical Education and Sports Sciences at University of Diyala, the experiment took place at ten o'clock in the morning on October 18, 2023.

2-6-2 Scientific procedures of tests:

1. Validity: the validity of a test refers to its ability to measure the intended variables. The researchers adopted content validity by sending the questionnaire form to experts and specialists to get constructive feedback.

Reliability: to ensure reliability, the researchers used the test-retest method. The researchers applied the test, and then reapplied it after seven days to the same sample. By processing the results statistically, using correlation law (Pearson), the coefficient showed a high correlation degree of (0.89).

2. Objectivity: a test is considered objective if it records consistent scores. By measuring two results for each test in the control experiment, the researchers found the correlation coefficient of (0.91), indicating objectivity

2-6-3 Pre-tests:

The pre-tests were conducted at 10:00 a.m. on Sunday, 10/22/2023, in the artistic gymnastics hall for female students at the college.

2-6-4 Educational curriculum:

The two different learning methods were used in the study: first, the instructional method of the teacher for the control group and the instructional method using a computer for the experimental group The researchers focused on learning the skills of front balance, front roll, and, open jump. The period of study was 24/10/2023 to 10/12/2023

The items of the Educational Curriculum included:

-The course spanned six weeks.
- each skill under study required two weeks to learn, except forward roll which took four weeks.
- There were two educational units per week.
- Each educational unit lasted (90) minutes.

The Educational unit sections included:

15 minute the preparatory item.

Main Section:

A- The theoretical consisted 30 minutes in the Computer lab. The experimental group used the computer in the classroom. After that, they went to the gymnastics hall only during the curriculum implementation period, displaying the assigned curriculum on the computers.

B- The practical part: the students performed the skills on the balance beam for 40 minutes. After these skills were presented and watched by the experimental group, they had three attempts to perform the skills.

- 5-minute final section

2-6-5 Post-tests

After the end of the educational curriculum period which included (12) educational units. The post-tests were conducted under the same conditions.

2-7 Statistical analysis:

The researchers used the statistical package SPSS to analyze the data.

3- Presentation, analysis and discussion of the results:

3-1 The results of the pre-and post-tests for the control group are shown in table (3).

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Table (3)
The pre-and post-tests of the control group.

Variables	Tests	mean	standard deviation
Libra movement	Pre-test	**4.690**	0.740
	Post-test	**6.310**	1.120
forward roll	Pre-test	**3.520**	0.920
	Post-test	**5.770**	1.060
Open jump	Pre-test	**4.130**	0.850
	Post-test	**6.010**	1.040

Table (4)
The mean and standard deviation, standard errors, and the error percentage of the control group

Variables	Tests	س-ف	ع ف	هـ	Tests T	
					T value	Significance Level
Libra movement	**Pre-test - Post-test**	**1.620**	**1.420**	**0.390**	**4.154**	.001
forward roll	**Pre-test – Post-test**	**2.250**	**1.510**	**0.400**	**5.625**	.000
Open jump	**Pre-test - Post-test**	**1.880**	**1.180**	**0.315**	**5.968**	.000
*** it is significant when the probability value of the error rate is ≤ 0.05**						

3-2 The results of the pre-and post-tests for the experimental group are displayed in table (5).

Table (5)
The means and standard deviations for the pre-and post-tests of the experimental group

Variables	Tests	mean	standard deviation
Libra movement	**Pre-test**	**4.760**	**1.360**
	Post-test	**7.950**	**1.060**
forward roll	**Pre-test**	**3.760**	**0.910**
	Post-test	**7.910**	**1.080**
Open jump	**Pre-test**	**3.590**	**1.210**
	Post-test	**8.160**	**1.100**

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Table (6)
The mean, standard deviation, standard errors, and error percentage of the control group

Variables	Tests	س-ف	ع ف	هـ	Tests T	
					T value	Significance Level
Libra movement	Pretest – Post-test	-3.190	1.080	0.295	-10.696	0.000
forward roll	Pre-test – Post-test	-4.150	1.520	0.405	-10.253	0.000
Open jump	Pre-test – Post-test	-4.570	1.750	0.470	-9.822	0.000
* it is significant when the probability value of the error rate is ≤ 0.05						

Table (7)

The means, standard deviations, (T) value, and error percentage of the experimental and control groups

Variables	Groups	mean	Standard Deviation	Value T	Significance level
Libra movement	Experimental	8.060	0.840	4.755	0.000
	Control	6.310	1.120		
forward roll	Experimental	7.910	1.080	5.335	0.000
	Control	5.770	1.060		
Open jump	Experimental	8.160	1.100	5.292	0.000
	Control	6.010	1.040		
• It is significant when the probability value of the error rate is ≤ 0.05					

*** Discussion of results:**

As described in Table (7), the results show that the three skills (balance skill, forward roll and open jump) were significant for the experimental group in the post-tests due to the use of computers during skill performance in educational units. The improvement in balance skill can be attributed to the quality of balance exercises used to female students in educational units and addressing their balance weaknesses. Regarding the skill of jumping open on the balance beam, the researchers incorporated more balance exercises in addition to conformity and fitness leading to significant development and improvement of their level as shown by the results. The learning this skill is difficult, as compared to other skills because general balance plays a crucial role in mastering various gymnastic skills performance. Any deficiencies in general balance can lead to shortening the learning process, which affects the performance of the skill, whether in the pre- or post-tests. In order to get rid of the weakness in balance, some illustrative aids were included in to educational units to improve students' performances. These exercises had the significant impact on developing their abilities in the balance test and "it is important to use the computer as an aid in learning, explanation, presentation, training, practice, simulation, problem-solving, programming and educational games" (Dyer, 1972,149). The results clearly demonstrate that the learning process was significant for both the experimental and control

groups, especially the experimental group which achieved significant development. As shown in the tables above, both groups learned to perform selective skills using the same educational curriculum, except with the use of computer-aided learning with the experimental group in the process of learning the skill performances. Technical performance improved due to a clear increase in learning quantity and development. According to Ameen (2016, p. 13), "The computer facilitates the process of understanding and comprehending the detailed parts of the skills required to be learned through clear progress in presenting and explaining the skill within its three sections (preparatory, main, and final)." Ali (2000,95) confirmed that "the use of illustrative images in skill parts included in the educational curriculum units with aid of computer enable the learner to understand, and comprehend the nature of the skill as well as divide it". Furthermore, providing appropriate educational conditions and environments, along with applying modern technology in the process of learning sports skills, had a significant and positive impact on the development of the individuals in the experimental group.

4- Conclusions and recommendations:

4-1 Conclusions:

1. The use of the computer helps in better understanding and comprehending the intricate detailed parts of skill performance compared to learning without using the computer.
2. The educational curriculum in the study plays a significant role in developing skills, especially in balance, alignment and the proper execution during performance.

4.2 Recommendations:

1- Researchers suggest that teachers adhere the designed curriculum in teaching other skills on the balance beam.
2- Computer applications can be used for all other gymnastics devices to train college students and club players.
3- Teachers can utilize performance analysis application to students.

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- **Appendix**
- ***Educational unit sections***

Sections	**time**	**Curriculum details**	**Notes**
Preparatory	15 min	(3 min) Attendance. (12 min) General and specific warm-up.	
Main	70 min	The educational part take place in the computer lab for 30 minutes, the skill is presented on the computer following the skill sequence, teacher's assistance to the player, the detailed explanation of the skill, and the common mistakes that occur during performance. The practical part (for the skills under study) lasts 40 minutes. After computer presentation , the students move to specific devices to perform the skills, including educational exercises on the balance beam.	The laptops of computer lab have been relocated to the gymnastics hall. Following using computer application, the learning process are performed on the devices.
Final	5 min	It includes guidance and relaxation exercises.	