مجلة سيناء لعلوم الرياضة

The effectiveness of using three-dimensional interactive models on learning to perform some gymnastics skills for female students of the Faculty of Physical Education, University of Sadat City

*** Dr/ Mona Yahya Amin Al-Bassal**

*** Lecturer in Faculty of Physical Education, University of Sadat City**

Introduction to research :

We now live in an era characterized by the explosion of knowledge in various fields, and this explosion of knowledge is the result of the revolution in scientific rch, which helped to find resea solutions to many problems in modern ways, which led to reaching the best results in solving problems, and thus helped the tremendous technological progress in all fields in general and in the field of physical education in ular, as well as helped the partic emergence of a new boom in the field of education that helped to speed up .learners' mastery of motor skills

Contemporary educational trends emphasize the need to keep pace with the times, as well as the requirements of the future expected to occur, and the modern view of education is concerned with preparing the individual in order to be able to coexist with this world, so there has become a need to introduce the appropriate change in the curricula and methods of education, because traditional methods have become useless in this era, so it has become inevitable that education turns from mere memorization, indoctrination and passive participation of the learner to a completely different type, namely effective education where effective participation On the part of the learner in order to integrate the educational process through the prevailing educational technology methods. (34: 37)

A lot of research in the field of learning sports activities indicates the importance of the relationship between the effectiveness of teaching and the means of technology and educational techniques, and therefore must focus in the field of physical education on those means during the education

Using educational technology in an effective way may help solve many educational problems as well as achieve a great return and save a lot of effort and fatigue, as research has proven the great potential provided by educational technology in the teaching and learning process and how it effectively contributes to achieving various educational goals by attracting students' attention towards school subjects, bringing ubjects closer to their level of s perception, and improving their .attitude towards advanced subjects

Recently, there has been a new trend towards education based mainly on the use of technology, and this trend consists of three main axes: deep -r relationship learne-teacher) digital learning -learning tasks resources and tools) and the third axis related to digital learning tools and resourcesDLTR plays a role of particular importance in activating, expanding and accelerating the learning process in ways that were not ***previously imagined.*** (٥١) (٤٦) (٤٤)

Interactive models are one of the new methods of doing school tasks, as they help in learning the skills of sports activities, simplifying real things, facilitating some parts as ip with each well as their relationsh other, and also helping to identify the process and on the feedback that places mastery during learning and places of error Vnclarh and modify it for the better, and thus all of this will be reflected on the educational process, which ultimately leads to access the learner to the maximum degree of proficiency in learning the skills of sports activities, and can not Making a change in the learner while teaching skills without creating an appropriate educational environment, and this can only be achieved through educational technology, which works by its means to create that environment through which the learner can form his educational experience by learning how to use all sources of knowledge and technological means to access information himself. (3:24)

Educational technology, like technology in other fields, works to improve educational application velop performance in and de educational facilities in accordance with systems that ensure interaction between all the pillars that make up the educational system, and it is broader than the concept of educational aids as it starts from ecede planning activities that pr application and extend to the stages of implementation, evaluation and .modification

the researcher ,various databases noted that the contents of digital learning resources and tools are diverse and different, such as (written texts, graphics, audio files, video files, dimensional stereoscopic -three dels), so the vast majority of mo different educational programs combine images, sounds, written texts, drawings, Graphic, but include a -few of those Studies programs three dimensional educational models due .to the difficulty of designing

the Which prompted to propose an educational **researcher** dimensional -program using three imaging and to know its impact on the level of performance of some methodological skills for school .students in the State of Kuwait

Second: Research Objective

This research aims to:

- Recognize the impact of the proposed tutorial using three-dimensional imaging (**interactive three-dimensional** models) on:
    - Cognitive attainment of the skills under research under research.
    - The level of skill performance of the .skills under research

internal parts and address various problems such as the spatial and .temporal dimension

the work of the Through she noticed that teaching **,researcher** is done in the traditional way, which y and mainly on the depends mainl theoretical explanation and then the performance of a model in addition to exerting a lot of time and effort, which leads to the inability of students to absorb the skill and understand it technically and thus the and learn it inability to perform because the motor performance passes through successive technical stages that are difficult to separate from each other, and when the model is performed, the kinetic sequence passes Quickly, students cannot put a kill in their correct perception of the s to **the researcher resorted** minds, so trying to find a solution to this problem, so she searched and reviewed the scientific references and reference studies that dealt with the educational process, and the use in the **was interested** researcher **dimensional -of interactive three** in the educational process, as **models** it is considered a creative model in addition to that it is also one of the Modern technological means through which this problem can be solved, and through the reference survey of reference studies and research and

dimensional environment so that the length, height and width (X ,Y, Zof (thus the the player are clarified and player can move and rotate within the (three axes." (Definition procedural

:First, Research Methodology

The researcher used the experimental method due to its suitability to the nature of the research using the experimental onal design with dimensi measurement for the control and .experimental groups

Second: Research population and : sample

1- Research Community

The research community year female -second (٩٠)included students, who were enrolled in the .AD ٢٠٢٣AD / ٢٠٢٢academic year

2- Research Sample

The research included more than one sample, in order to achieve the objectives of the research, where the research sample :was as follows

أ. :Kinetic analysis sample

The sample of kinetic analysis was selected intentionally, hed players distinguis (١)consisting of from the Egyptian international team, due to the need for the performance to .be as exemplary as possible

search HypothesesThird: Re

1. **statistically** There are between **significant differences** -and post -the average pre the control **of** measurements of (skill **in the level** group under **of the skills (**performance **-of the post** research in favor .**measurement**
2. **ally statistic** There are **significant differences** of the **between the average of** measurements-and post -pre **group in the** the experimental **skill performance) of**) of **level** under research in **the skills -of the post** favor .**measurement**
3. **statistically** There are between **cessignificant differen** the average dimensional **the control** measurements of group in the **and experimental** of **(skill performance**) level of **in** the skills under research **favor of the dimensional measurement of the** .**experimental group**

Fourth: Terminology

Three-dimensional imaging or (three-dimensional representation) or (three-dimensional interactive models):

They are "computerized models -that are designed in a three

(١)Table
Egyptian national team player

Age	13 years
Height	145
the weight	38 kg
The club	Wadi Degla
Number of years of training	8 years
Practice level	Egyptian national team player

- **The control group:** (15) students, who used the traditional method "the usual method of teaching" represented in explanation and presentation.
- **The survey group**: (20) students to conduct scientific transactions **and the survey sample was used as follows:**

- Conducting scientific transactions to test intelligence on (20) students.
- Conducting scientific transactions for the rest of the study variables on (10) students (**non-distinguished group**), compared to (10) students practicing gymnastics (**distinguished group**).

Thus, the research sample (basic and exploratory) included (50) female students, representing 55.56% of the total research population.

The following table shows the description of the basic and exploratory research sample:

Table (1) shows the description of the kinetic analysis sample, where the player performed 3 attempts (three attempts for the skill under research) and the attempts were presented to the experts to choose the best attempt and subject it to the kinetic analysis program. (Appendix 2)

Research Sample :

The research sample was deliberately selected from the second-year students and their number was (30) students by 33.33% of the total research community, while the size of the exploratory study sample was (20) female students by 22.22% of the total research population and from outside the basic research sample in order to calculate the scientific coefficients of the research variables, and experiment with the program **(interactive three-dimensional models).**

The experimental group: (15) students, which used interactive three-dimensional models.

Table (2)
100٪

Number	Percentage	Research groups	the sample
16.67٪	**15**	Experimental group	the basic
16.67٪	**15**	Control group	
22.22٪	**20**	Survey group	Survey
55.56٪	**50**	Total sample of the basic and exploratory study	
44.44٪	**40**	The rest of society	
100٪	**90**	Total	

(g) Tests of the physical fitness elements of the skills under consideration.

- Identify fitness elements.
- Determine the tests of physical fitness elements (physical tests).

(h) Skill tests to measure the level of learning of the skills under consideration.

- **Scientific transactions for intelligence testing:**

- **Authenticity of the test**

The validity of the test was calculated by applying the test to a group of (20) students **,** and the data were arranged in descending order and comparing both the upper quartile and the lower quartile , and the significance of the differences between them in the level of intelligence was found.

The following table shows the significance of the statistical differences between the upper and lower quartile averages in the IQ test.

:Reasons for selecting the sample -

- Students have never learned **.in question** the skills
- Availability of all capabilities ve the that help achie .objectives of the research

Third: Means and Tools of Data :Collection

identified the **researcher** The means used to collect data and took into account the following conditions :when selecting

.Easy to implement -

- Scientific transactions must be available.

These means and tools were as follows:

(a) Personal interview.

(b) Analysis of content and documentation.

(c) Data registration forms.

(d) Tools and devices used in research.

(e) Expert opinion questionnaires.

(f) Test of the level of mental abilities (intelligence).

Table (3)

Wadi Degla	Clubz١	kg ٣٨	Weight	١٤٥	Length	years ١٣ old	Age
٠.٠٠٨	٢.٦٤٣	٤٠.٠٠	٨.٠٠	Egyptian national team player	Level of practice	Years ٨	Number of years of training
		١٥.٠٠	٣.٠٠	٥	Lower quartile		

applying the test on a random -and re which ,students (١٠)sample of indicates the stability of the test and the following table shows the correlation coefficient between the first application and the second :application of the intelligence test

shows that there are (٣)Table statistically significant differences d the between the upper quartile an lower quartile in the IQ test at a which ,(٠.٠٥)significant level of .indicates the validity of the test

- **:Test Stability**

The stability coefficient of the test was calculated by applying

Table (4)

Basic	Percentage		Number		Research Groups	Sample
	15	Control group	±ع	16.67٪		
55.56٪*	50	Total sample of the basic and exploratory study70	22.22٪85	2000	**Exploratory Group**	Exploratory

Table (4) shows a statistically significant correlation between the first and second applications in the IQ test at a significant level of (0.05), which indicates the stability of the test.

-Identify fitness elements:

The researcher identified the elements of physical fitness for **the skills under research** by referring to reference studies and scientific references No. (5, 15, 17, 11, 8, 15) and then **the researcher** put these elements in a form (Appendix 3) in which the addition and deletion were taken into account

(g) Tests of the physical fitness elements of the skills under consideration:

(appendix 2) In order to identify the most important of these elements:

to suit the opinion of the expert, and was presented to a number (5) experts in the field of gymnastics

Table (5)

Percentage of expert consensus on the most important physical variables

Total	44.44٪	40		The rest of the community
60%	3	- Leg muscle strength 3		
60%	3	- Arm muscle strength 3		
100%	5	- Abdominal muscle strength 5	100٪	90
60%	3	- Back muscle strength 3		
100%	5	- Static balance 5		
Unit of measurement	audition	- Dynamic balance audition	Balance	2
Total ranks	Average ranks	Number		Groups
Grade	wits	Level of significance		
40	8.00	5		Spring Top
100%	5	0.008		2.
15.00%	3.00	5		Lower Spring

-Determine the tests of physical fitness elements (physical tests):

Flexibility...Between (20% - 100%) The researcher was satisfied with (80%) of the opinions of the experts to choose the components of the elements of physical fitness, namely **as follows**:

Table (6)
Expert opinions on the most appropriate tests that measure the fitness elements of the skills under consideration

Second application nominated by experts	First application Centenary	Variable	M	Elements	م
Going to stand with the instep on a cube	±	Going to	Standing test with instep on a cube*	Physical Static balance	Correlation coefficient
	42.00	IQ test	1 Stand with your feet crossed on the bar		
	-	-	0.988*		
Modified bass for dynamic balance	20%	1	Jump and balance test over marks		2
	Strength	1	Percentage Adjusted bass for dynamic balance *		
3 Broad jump from standstill	- Strength of the muscles of the arms	1	Vertical jump test from stability	60	3
	5	-	Test the vertical force of a jumper		
	60	3	-Back muscle strength *		
Sitting-lying test	80%	100%	5 Sitting from lying down *	- Fixed balance	homeostasis
	Flexibility%	3	100% raise the legs at a high angle from lying down		
5	100%	5	Agility	4	
	Muscular ability%	6	40% Shuttle running		
Torso forward bend test from standing	20	1	Endurance	7	100%
	The strength of the abdominal muscles.	Muscular capacity	Dynamic		

*** Tests nominated by experts.**

The researcher **used the** sincerity of differentiation to find the coefficient of validity of the test by applying it to two groups, one of which is distinct consisting of (10) students (practicing gymnastics in club teams) and the other is not distinguished consisting of (10) students (non-gymnastics practices), and the following table shows the significance of the differences between the two distinct and non-distinctive groups in physical tests:

It is clear from the previous table Table (6) that the percentage of expert opinions to determine the most appropriate tests that measure the physical elements of the skills under research ranged between (zero: 100%) and the researcher was satisfied with (80%) or more of the opinions of experts to choose physical tests.

- Scientific transactions for physical tests:

- **Honesty:**

Table (7)

PHYSICAL ELEMENTS	M	Featured		Featured		measruing unit	Physical tests	FLEXIBILITY.
			Fixed balance	**1**				
7.479*	**1.85**	**0.14**	**20**	**1**	**Transverse foot standing test**	second	Stand with the instep on a cube	**Metatarsal standing test**
20	**1**		**Dynamic Balance**	**2**	**93**	-	-	**Longitudinal foot stand test on the crossbar**
Muscular ability	**3**	**0.10**	**80%**	**4**		meter	Broad jump from standstill	
-	**-**	**Vertical strength test**	**11.41**	**5.44**		20	1	
Abdominal muscle strength	**4**	**0.87**	**80%**	**4**		second	Barrow test	**5**
20	**1**	**Test**	**8.79**	**1.37**		80%	4	

Tabular value of "T" at a significant level (18, 0.05) = 2.101

differences between the two distinct and non-distinguished

It is clear from Table (7) that there are statistically significant

The researcher calculated the stability of the physical tests under research by applying the test and re-applying it with a time difference of (7) days on a sample of (10) students, a sample similar to the research sample and other than the basic sample,

groups in favor of the distinguished group, and therefore the physical tests are able to distinguish between students, which confirms the sincerity of these tests in measuring what they were developed for.

- **Constancy:**

Table (8)

80%	4		Barrow Test 3m×4.5m*		Agility	Physical tests	م
	±ع	20	1	Shuttle Running			
Test the bending of the torso in front of the long sitting	0.12	**0.78**	**Test of bending the trunk forward from standing**	**80%**	**4**	**Test of bending the trunk forward from standing**	**Flexibility**
949**	**8.81**	**75.00**	**10.28**	**73.50**	**degree**	**20**	**1**
Unmarked	**Characteristic**	**Unit of measurement**	**Physical tests**	**M**	meter	**Broad jump from standstill**	**3**
Going to	**±**	**Going to**	**1.71**	**11.41**	second	**Value of t**	**The difference between the two averages**
0.77	**2.62**	**second**	**Stand with the metatarsal on a cube**	**1**	second	**Barrow test**	**±**
93	**degree**	**Dynamic Rate Bass Test**	**2**	**7.479***	**1.85**	**0.14**	**0.77**

Tabular value of "t" at a significant level (0.05) = 0.632

significant level of (0.05), which indicates the stability of the tests.

Table (8) shows a statistically significant correlation between the first application and the second application in physical tests at a

The validity of the spatial ability test and the questionnaire for evaluating the level of performance of the skills under research were calculated by finding the validity of differentiation, by applying them to the sample of the exploratory study. **which were divided into two groups**:

- The first group: numbered (10) students (practicing gymnastics in teams and clubs).
- The second group: (10) students (non-gymnastics practitioners) from the same research community and from outside the basic research sample.

(h) Skill test to measure the level of learning of the skills under research: **Appendix (6)**

- **Scientific coefficients for the skill test:**
- **Arbitrators believed**

The researcher relied on the sincerity of the form to assess the level of skills under research, on the opinions of experts in physical education in the departments of exercise and gymnastics from professors of faculties of physical education.

Sincerity of differentiation:

Table (9)

The significance of the differences between the measurements of the two distinct and non-distinct groups in ن1 + ن2 = 20

5.752*	19.5		10.28		73.50	3.01	
	1.01	0.16	1.32	meter			
11.41	5.44	16.96	second	Sit down in 20 seconds	4	4.941*	
0.52	8.36	second	Barrow Test	5	3.077*	5.55	
16.22	poison	Test of bending the trunk forward from standing	6	9.591*	3.10	0.87 Sideways on hands with a quarter turn	0.31

Tabular value of "T" at a significant level (0.05) = 2.101

distinctive group of the skill test at a significant level (0.05), which indicates the validity of the test.

Table (9) shows that there are statistically significant differences between the distinctive and non-

community and from outside the basic sample, and the following table shows the stability coefficient for the skill test.

–Stability of the test:

Where the test was applied and re-applied with a time difference of (7) days on (10) students representing from the research

Table (10)

Correlation coefficient between the first and second application of an evaluation form 0.987 on the hands with a quarter roll**

11.381*ر)		7.43		1.53	8.79	1.37	
0.944**	0.71	Correlation coefficient	Second application	First application	Unit of measurement	Physical tests	
Stand with the metatarsal on a cube	1	3.40	±	Going to	±	Going to	M
Dynamic Rate Bass Test	2	936**	0.12	0.78	0.14	0.77 Sideways on hands with a quarter turn	

Tabular value of "t" at a significant level (0.05) = 0.632

some gymnastics skills in the light of kinetic analysis on the skill side of the skills under research.

2- Foundations for developing the program:

When building and designing the educational program and before applying it to the sample, the researcher took into account the following:

- The skills should be taught in the same sequence of performance without changing the sequence of motor performance.
- The educational steps are graded from easy to hard and from simple to complex.

Table (10) shows a statistically significant correlation between the first application and the second application (re-application of the test) in the skill test at a significant level of (0.05), which indicates the stability of the test.

Fourth: Educational program using interactive three-dimensional models:

The researcher designed the educational program using interactive three-dimensional models according to the following steps:

1. Objective of the tutorial:

Identify the effect of three-dimensional educational models of

and an accuracy *of 1920 * 1080* pixels, and a calibration cube of 4 points was used on a scale 1m x 1m and was placed in the middle of the camera staff and in the place where the skill under research was performed.

- **Analysis Procedure**

The researchers conducted a kinetic analysis of the technical performance of the skill under research and used an analysis model consisting of 14 reference points representing the parts of the player's body during the various stages of performance (Figure 1), and used the program (Tracker 5.0.2) for kinetic analysis to extract biomechanical variables , and determine the stages of technical performance of the skill under research.

A number of (23) different cadres - fields, each representing skill performance at different and sequential moments of the technical performance stages, were analyzed. The researcher relied on the biomechanical variables of performance and mainly on the angle of body parts in the analysis to be used later in the design of educational models of the skill.

Absolute angles were relied on, so the measurement of

- The program fits with the objectives set for it.
- Adapting the content of the program to the level and capabilities of the sample members.
- Availability of the capabilities and tools used in the program under consideration.
- Provide the right place and capabilities to implement the program.
- Program flexibility and acceptance of practical application.
- Taking into account security and safety factors when applying it to students.

- **Preparation and filming procedures**

A number of successful attempts were filmed to perform the skill under research, and the best attempts were selected for the purpose of biomechanical analysis to extract the most important variables, where the camera was placed 5.50 meters from the place of performance and at a height of 1.10 meters from the ground, and the researchers took into account that the camera is vertical to the level of motor performance (***Sagittal plane***), and that the movement is in the middle of the photography staff, and the shooting was at a speed of 30 frames / second

- **Biomechanical variables of the skill under consideration**

The total time to perform the side somersault skill with a quarter lap on the ground movements device took 2.165s from the beginning of the movement until the end of the movement after the stable landing on the ground, Table (11) shows the chronology of skill performance and biomechanical variables of the general center of gravity.

angles for body parts was relative to the positive horizontal axis (x+), while the center of the coordinate system (x, y) was placed on the axis of rotation of the joint of the part to be measured (z), in order to ensure the stability of angle measurements when used in the process of designing educational models, as this method of measurement follows the principles of direct linear transition theory, which gives fixed measurements of angles regardless of the change of distances, scale or size .

Table (11)

3	**949****	**8.81**	**75.00**	**10.28**	**73.50**	**degree**
956**	**0.10**	**1.03**	**0.10**	**1.01**	**meter**	**Wide jump of stability**
			11.41	second	Sit down in 20 seconds	4
11.45	0.87	11.46	Second	Barrow Test	5	993**
1.53	8.79	poison	Test of bending the trunk forward from standing	6	973**	0.74
0.227	-0.055	-0.22	0.807	986**	1.55	8.88
0.328	-0.041	-0.326	0.807	-0.235	12	0.394

Table (12)

6						0.197						0.134	0.006 الإطار
12	0.394	0.227	-0.055	-0.22	0.807	-0.213	9	0.295	0.179	0.053	0.171	0.818	
Vertical speed	Horizontal speed	Vertical distance	Horizontal distance	Frame	Time	186°	128°	112°	0.328	0.041	0.326	0.807	-0.235
-0.106	-0.518	0.799	-0.277	15	0.492	v	v_{y}	v_{x}	and	x	frame	t	Resultant velocity
-0.198	-1.029	0.764	-0.43	21	0.689	0.798	-0.177	-0.779	0.786	0.337	18	0.59	0.529
0.002	-1.614	0.733	-0.683	27	0.886	1.293	-0.156	-1.283	0.747	-0.54	24	0.787	1.048
0.507	-2.3	0.823	-1.074	33	1.082	2.041	0.454	-1.99	0.747	-0.858	30	0.984	1.614
-1.058	-2.362	0.773	-1.545	39	1.279	2.407	-0.255	-2.393	0.847	-1.31	36	1.181	2.355
-0.164	-2.499	0.578	-1.998	45	1.476	2.504	-0.99	-2.3	0.639	-1.775	42	1.378	2.588
0.57	-1.897	0.66	-2.453	51	1.673	2.649	0.418	-2.616	0.606	-2.267	48	1.574	2.505
0.053	-1.102	0.745	-2.713	57	1.87	1.61	0.432	-1.551	0.719	-2.605	54	1.771	1.98
0.403	-0.642	0.638	-2.867	63	2.067	1.076	-0.546	-0.928	0.729	-2.804	60	1.968	1.103
torso	Left side of the limbs	Right side of the parties	Frame number	318°	328°	304°	239°	224°	0.808	-2.904	66	2.165	0.758
TR	HA	FO	HU	TH	SH	FT	HAS	FO	HU	TH	SH	FT	12
85°	104°	105°	106°	272°	274°	186°	128°	112°	123°	275°	273°	189°	1
87°	105°	104°	107°	246°	248°	193°	112°	117°	121°	276°	272°	189°	2

Table Function (12)

278°						281°						186°	3 الإطار
276°	299°	208°	4	84°	107°	106°	108°	224°	223°	172°	113°	117°	
271°	315°	232°	5	97°	125°	119°	122°	228°	225°	177°	130°	124°	133°
274°	327°	241°	6	113°	173°	130°	140°	233°	233°	181°	144°	139°	**174°**
282°	335°	250°	7	119°	145°	137°	149°	230°	244°	177°	150°	146°	153°
302°	340°	264°	8	130°	158°	150°	161°	262°	253°	174°	153°	155°	158°
330°	352°	288°	9	152°	186°	182°	196°	226°	270°	177°	166°	172°	173°
26°	37°	344°	10	188°	203°	205°	225°	236°	282°	191°	176°	184°	178°
61°	66°	56°	11	244°	218°	239°	254°	266°	292°	234°	204°	207°	194°
85°	89°	87°	12	250°	213°	263°	277°	318°	328°	304°	239°	224°	215°
105°	109°	111°	13	258°	268°	276°	290°	351°	354°	325°	230°	239°	221°

237° FT = القدم, SH = الساق, TH =, HU =, FO =, TR =

Similarly for other skills under consideration Appendix 10.

for a skill Side somersault with a quarter roll
After designing the interactive three-dimensional models of the skills under research, the researcher followed the following procedures to implement the research experiment:

- Take advantage of the imaging recordings of the kinematic analysis process and prepare them **as an educational medium** to be used during the implementation of the program.

The method of using the educational medium **has been determined**, as it is displayed inside an exhibition hall or any place that suits those media, **and it has been used as follows:**

- Presentation **of the educational medium** (three-dimensional educational models) that achieve the goal of the educational unit.
- Students interact with what is displayed for the motor performance to be learned, whether at a slow speed or at a normal speed, accompanied by instructions that appear on the three-dimensional model on the details of motor performance achieved for the purposes of the

- **Designing educational models**

After the mechanical analysis of the skill under research, the researcher used the data resulting from the analysis and guidance by measuring the angles of the joints according to the method used previously referred to in the research procedures to design educational models for the skill of side somersault with a quarter turn on the ground movements device using ***DAZ Studio 4.9 (64-bit) software*** to design three-dimensional models, according to the biomechanical variables, angles of body parts and stages of technical performance of the skill.

Where it was possible to reach the design of (23) fixed models, each of which represents a framework in each instantaneous situation of the technical stages of the performance, Figure (5), with the possibility of adding many information related to the technical points of performance, using ***the Activepresenter program***, and depending on the fixed models as a basis, (630) additional models were designed to produce a complete three-dimensional moving model to perform the skill under research according to the biomechanical variables and performance determinants extracted from the results of kinetic analysis.

- The wording of the program units was modified according to the suggestions and opinions of the experts, and the proposed educational program was prepared in its final form Appendix (9).
- The program was tested on a sample of an exploratory study consisting of (20) students in order to identify the extent of their response during the presentation of the program, in addition to identifying the clarity and appropriateness of the effects and the clarity of the models, and this experiment resulted in the clarity of all the contents of the program among the students in addition to the suspense and motivation that appeared on the sample of the survey study when they watched the program, and thus the acceptance and validity of (three-dimensional interactive models) after presenting them to experts and testing them on the survey sample.
- The educational program was applied using interactive three-dimensional models on the basic study sample, as shown in Table (13).

educational unit in order to imagine the correct motor path of performance.

- After completing the viewing **of the educational medium**, the learners move on to completing the rest of the unit's activities (applied, closing).
- An expert opinion poll form was prepared on the general framework of the proposed educational program, Annex (8), and presented to experts in the field of gymnastics and teaching methods, Annex (2).
- The initial picture of the proposed educational program was prepared in light of the results of the opinion poll on the general framework of the proposed educational program.

- The proposed educational program was presented in its initial form to a group of experts in the field of gymnastics and teaching methods Appendix (2) to identify the following occasion:
  - The content of the modules is suitable for the category **"under research experiment".**
  - The appropriateness of the overall objectives of the program.
  - The validity of the program for the application.

Table (13)

	84°	270°	253°
1.1.1	309°	83°	81°
	269°	268°	291°
	134°	152°	14
	269°	258°	129°
	120°	129°	253°
	326°)	332°	125°

Table (13), where **the researcher** was teaching to the control group, and supervision and guidance to the experimental group.

A- Homogeneity (moderation of sample distribution):

The **researcher** conducted homogeneity on the members of the research sample (basic and exploratory numbering 50 students) in order to ensure the moderation of the distribution of the sample under the normal curve (+, -3) in the following research variables:

Growth rates (age, height, weight), IQ test, physical tests, and skill test, as shown in the following table:

It is clear from Table (13) that the duration of the implementation of the educational program took 8 weeks, with two educational units per week.

- The temporal distribution of the program for both groups has been standardized with differences in teaching method only.

Fifth: Application procedures (steps to conduct the research experiment):

The researcher carried out the research experiment on the basic study sample of (30) students, according to the time distribution of the program, which was explained in

Table (15)

Statistical processors				measruing unit	303°	310°
torso	Left side of the limbs	Right side of the parties	Frame number			
					FT	
SH	FT	HA	FO	HU	TH	1
193°	15	TR	HA	FO	HU	
150°	180°	258°	277°	261°	148°	
255°	16	320°	298°	305°	308°	152°
					200° Physical:	
297°	201°	186°	254°	293°	290°	
260°	206°	313°	17	345°	293°	
299°	259°	208°	310°	302°	312°	184°
301°	213°	312°	18	16°	311°	
323°	298°	212°	318°	323°	313°	
305°	249°	353°	19	40°	325°	
					354°	
354°	343°	341°	303°		351°	
37°	22°	297°	265°	250°	20	353°
18°	16°	13°	280°		350° Sideways on hands with a quarter turn	

The researcher conducted equivalence between the experimental and control groups in the light of the same previous variables, namely: growth rates (age, height, weight), intelligence test, physical tests, and skill test, as shown in the following table:

Table (15) shows the arithmetic mean, median, standard deviation and torsion coefficient of the variables under research, where the values of the torsion coefficient ranged between (±3), which gives a direct indication that the data are free from the defects of non-moderate distributions.

B- Equivalence of the research sample:

Table (16)
Significance of the differences between the averages of the tribal measurements of the variables under consideration in the two groups

73°	74°	270° ن=15		269° ن=15		354°	21	46°
		53°	56°	53°	271°			
							268°	
75°	73°	271°	271°	351°	83°	91°	87°	353°
93°	100°	91°	269°	270°	°353	23	81°	
0.671	HA=	84°	95°	86°	85°	270°	272°	
0.489	1.06	5.97	42.33	5.98	41.26	degree	Mental abilities (intelligence)	2
							Physical tests:	
0.113	0.01	0.11	0.80	0.11	0.81	second	Stand with the instep on a cube	
0.089	0.33	9.67	74.00	10.76	73.66	degree	Dynamic modulated bass test	
8 weeks	Number of weeks	2	Two months	Duration of application of the program	1	Time distribution	Content	3
45s	Time per unit	5	16 Count	Total number of program units	4	Two units	Number of Units	
0.407	0.13	0.95	11.47	0.82	11.60	720s (12	Total time of program units	
0.806	0.44	1.40	8.88	1.56	8.44	cm	Trunk forward bend test from standing	
							Variables	
Torsion coefficient	Deviation	Broker	Average	0.58	3.63		Statistical Treatments	
0.076	2.487	141.20	141.43	poison	Length		Growth rates:	M
Age	0.10	-0.183	2.008	42.00	41.50	degree	Weight Sideways on hands with a quarter turn	

Tabular value of "T" at a significant level (0.05) = 2.048

group was implemented through each student alone dealing with the interactive models program (in the school's computer lab) and each student a computer (with a total number of 15 computers). In the laboratory "equal to the number of members of the experimental group") where learning was carried out through the educational program of interactive three-dimensional models, and **the role of the researcher** was to direct and supervise.

E- Dimensional measurements :

After the end of the period specified for the application, the researcher conducted the dimensional measurements of the two research groups to identify the level of skill performance through the test prepared for this on 19/12/2022 AD, through a committee consisting of (3) arbitrators from specialists in the **field of gymnastics** (Appendix 2).

Seventh: Statistical Treatments:

The **researcher** collected, tabulated and processed the results statistically, and the following statistical coefficients were used:

- Arithmetic mean.Broker.Standard deviation.torsion coefficient.Mann Whitney non-barometric test.Test (T). Correlation coefficients.

Table (16) shows that there are no statistically significant differences between the two groups in the variables under research, which indicates the equivalence between the experimental and control groups in those variables.

C- Tribal measurements:

The researcher conducted pre-measurements on the experimental and control research groups in the variables under research on 15/10/2022 AD to measure the skill performance of the skills under research.

D- Application of the program:

After the end of the pre-measurements, the researcher applied the use of three-dimensional interactive models to the experimental group and the traditional method used with the control group from 15/10/2022 AD to 17/12/2022 AD by two educational units per week, and the unit time is (45) minutes, and for a period of (8) weeks, and accordingly The implementation of the program took two months.

The implementation was carried out for the control group through the method of explanation and presentation of the skill by the researcher, and for the experimental

(there are **statistically significant differences** between the averages of the **pre- and post-measurements** of the **control group** in the level **of (skill performance)** of the skills under research **in favor of the post-measurement**.**)**

Presentation and discussion of results

In order to achieve the objective of the research and test its hypotheses, the researcher will review the results of the research according to the following order: -

First: Presentation and discussion of the results of the first hypothesis

Table (17)

The significance of the differences between the averages of the pre- and post-measurement in 11.118

2	-0.138	0.797		13.00		13.07	year	
		-0.076	5.82	40.00	41.88			
Dynamic Rate Bass Test	1.17	-0.240	0.1178	0.780	0.799	second	Stand with the metatarsal on a cube	Skills under investigation
1.01	meter	Wide jump of stability	4.41	0.181	9.98	72.50	73.75	
1.822	11.32	11.76	second	Sit down in 20 seconds	1.72	0.850	0.1015 Sideways on hands with a quarter turn	

Tabular "T" at a significant level (0.05) = 1.761

the skill of side somersault on the hands with a quarter of a rollThis indicates that the traditional program has a positive impact on the level of technical performance, and the researcher attributes this progress to the control group to the traditional method used (explanation and presentation) based on verbal explanation, model performance and correction of errors by the physical education teacher, practice and

It is clear from Table (17) and Figure (6) that there are statistically significant differences at the level of significance (0.05) between the pre- and post-measurements of the control group in the performance of the skills under research in favor of the post-measurement, where the value of (T) ranges between (3.500) for the skill front balance as the smallest value, and (11.118) as the largest value for

performance by the teacher during the teaching process and thus benefiting students from the information and concepts of the skill to be implemented by the teacher, and this indicates that learning in this way has a positive impact on learning the skills under research.

Thus, the first hypothesis is achieved, which determines the existence **of statistically significant differences between the average** of the pre- and post-measurements **of** the control group **in the level** of (skill performance**) of the skills** under research in favor **of the post-measurement**.

Second: Presentation and discussion of the results of the second hypothesis (there are **statistically significant differences** between the average **pre- and** post-measurements **of** the experimental **group in the level of (skill performance**) of the skills **under research in favor of the** post-measurement**.)**

repetition on the part of the student, which leads to learning properly matching the technical performance of the skill and then positively affect learning and performance efficiency, and this result is consistent with the results of the study of **each of "Muhammad Al-Qatt, Mohamed Dawi 2018"(29), "Ahmed Hassan 2017"(8), "Shadi Abdel Moneim 2016" (15).**

The researcher attributes the level of progress and improvement in these results to the use of the usual method used in teaching "explanation and presentation", and this indicates that learning using the method of explanation and presentation has a positive impact on learning the skills under research among students and their knowledge of the content of the performance of the skill through verbal explanation and information Which helps to form a clear picture of those skills.

The reason for these differences indicates that the method used in teaching led to strengthening

Table (18)
The significance of the differences between the averages of the pre- and post-measurement in 12.883

11.23	11.51	second		Barrow Test		measruing unit	0.381	
		ع 8.69	poison	Test of bending the trunk forward from standing ع	سَ			
0.62	3.50	3.63	degree	Front Scale	3.63	Skill test:	4	
8.999	1.206	0.62	3.50	3.31	3.27	Side Scale	Side scale	
12.883	3.96	1.32	0.378	0.81	1.53	1.69	Side somersault on hands with a quarter turn	-0.245

Tabular "T" at a significant level (0.05) = 1.761

represented in the three-dimensional interactive models, which created a good and new educational environment that helps the student to acquire the skills under research and make her proceed in the educational process according to her desire, speed and abilities, which led to her mastery of the skill and its correct performance.

The above is consistent with the results of the study of **"Ahmed Amin 2022"(5), "Saleh Al-Qawqaza 2018"(17), and "Asma Hosni 2017" (9)."Ahmed Talha 2017"(45)**

Thus, the researcher indicates that the reason for these differences is due to the experimental

It is clear from Table (18) and Figure (7) that there are statistically significant differences at the level of significance (0.05) between the pre- and post-measurements of the experimental group in the level of skill performance in favor of the post-measurement in all variables, where the value of (T) ranges between (8.999) for the side balance skill as the smallest value, (14.323) for the front balance skill As the largest value this indicates that the use of interactive models have a positive impact on the level of skill performance.

The researcher also attributes the progress of the experimental group to the experimental variable, which is

Thus, the second hypothesis is achieved, which determines the existence of **statistically significant differences between the average** of the pre- and post-measurements **of** the experimental **group in the level** of **(skill performance)** of the skills under research **in favor of the post-measurement**.

Third: Presentation and discussion of the results of the third hypothesis (there are **statistically significant differences** between the average dimensional measurements of **the control and experimental** group in the level of (**skill performance)** of the skills under research **in favor of the dimensional measurement of the experimental group**.**)**

variable only, which is represented in the educational program using interactive models, where the researcher attributes the progress that occurred to this group to the dependence on the proposed educational program and its diversity of images, models, sound and video, and thus the positive impact On the research variables due to the attractiveness and effectiveness of the three-dimensional interactive models program.

The researcher also attributed the reason for these differences to the impact of the multimedia computer program, which helped to arouse the interest of students and motivate them to exert effort in learning, not to feel bored and to understand well the skills under research and absorb them better, which contributed to learning the basic skills under research.

Table (19)
Significance of the differences between the average of the two dimensional measurements in skills

Unit of measurement	Variables	M		Control group		measruing unit	Variables	
		ع ±	سَ	Value of tع	The difference between the two averages			
Length	1.30	Growth rates:	1	0.77	4.70	±	Going to	
Weight	1.09	0.168	0.16	2.65	141.56	2.56	141.40	
Age	1.36	0.272	0.20	1.98	41.76	2.03	41.56 Sideways on hands with a quarter turn	±

Tabular "T" at a significant level (0.05) = 2.048

The researcher attributes that the reason for the progress of the members of the experimental group over the members of the control group in the level of skill performance to the use of interactive three-dimensional models, which took into account the level, abilities, tendencies and needs of students and individual differences between them, in addition to helping students to see good performance through interactive three-dimensional models from different angles so that students can see different body angles such as trunk inclination, knee flexion and arm position.

As for the progress of the experimental group students compared to the control group students to the fact that the educational program for interactive

It is clear from Table (19) and Figure (8) that there are statistically significant differences at the level of significance (0.5) between the two dimensional measurements of each of the control and experimental groups in the level of skill performance in favor of the experimental group, where the value of (T) ranges between (3.032) for the side somersault on the hands with a quarter roll as the smallest value and (5.053).) of the front scale as the largest value, which indicates that the use of interactive three-dimensional models is more positive and effective at the level of skill performance than the traditional method used (explanation and presentation method).

Internet or computer. This leads to an increase in the element of suspense and an increase in the tendency towards learning by arousing the learner's interest and motivating him to exert effort and not feel bored.

First: Conclusions:

In light of the objective of the research and the results reached, the following was concluded:

- The proposed educational program using interactive three-dimensional models contributed in a positive way to improving the level (skill performance) of the skills under research for the members of the experimental group.
- The educational program used using the traditional method (explanation and presentation) contributed in a positive way to improving the level of (skill performance) of the skills under research for the members of the control group.
- The educational program using interactive three-dimensional models was more positive in improving the level (skill performance) of the skills under discussion.

models was more efficient and had positive results compared to teaching in the style of explanation and model.

This also indicates that there is a preference for the experimental group compared to the control group that the students of the experimental group had the opportunity to visualize the proper performance free of errors due to the benefit of positive models when watching the skill under research on the computer , where they were briefed on the best technical aspects of the skill, which reflected positively on the skill performance of the experimental group students compared to the control group.

The above is consistent with the results of the study of **"Ahmed Amin 2022"(5), "Saleh Al-Qawqaza 2018"(17), and "Asma Hosni 2017" (9)."Ahmed Talha 2017"(45)**

The researcher **also points out** that the use of educational software in general in the educational process has a positive impact on the skills under research due to the attractiveness and effectiveness of these programs, whether using multimedia, models, animation, or that are generally used by one of the technological techniques via the

2 Second: Recommendations:

In light of the previous conclusions, the researcher recommends the following:

- The use of interactive three-dimensional models in raising the level of performance of the skills under research.
- Work on the introduction of programs designed through interactive models in schools of education.
- Interest in using interactive three-dimensional models in learning the skills of various sports activities.
- The need to benefit from the expertise of specialists in educational media by holding seminars and lectures in clubs, schools, faculties of physical education and sports federations to raise awareness of the importance of educational models.
- Directing the attention of researchers to conduct similar scientific research on different mathematical skills.
- The need to find scientific solutions to the problems that hinder progress and development in the field of sports and club sports in particular by taking advantage of educational technological techniques.

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