

## The Effect of Using 3D Animations on the Performance Level of Crawl Stroke of Students of Physical Education Faculty in Menoufia.

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### Abstract

*This research aims to design a program to teach crawl stroke by using 3D animations and to recognize its effect on The performance level of crawl stroke of 1st year students of Physical Education Faculty in Menoufia , The differences between the two research experimental groups that use the 3D animations and the control group that uses the followed technique (explanation & example) in learning crawl stroke in students of Physical Education Faculty in Menoufia , The researcher used the experimental method as it suits the nature of this research, through the experimental design which depend on the after and before measurements of two groups one of them is experimental and the other is the control group , The research society is represented in the 1st year students of Physical Education Faculty of Menoufia University in the 1st term of the university year 2012/2013. Their number is (180) students , results ; The 3D animations program has a statistically significant positive effect on the performance level of crawl stroke , There are statistically shown differences between the two measurements (pre- post) of the control group in the performance level of crawl stroke in favor of the after measurement, There are statistically shown differences between the two experimental and control group in the after measurement of performance level of crawl stroke in favor of the experimental group , The experimental group which used the 3D animation program was superior on the control group in the performance level of abdomen crawl swimming.*

**Key Words:** 3D animations - crawl swimming – students.

### Introduction:

Physical education is a combination of information, rules and skills, therefore, all means of scientific progress such as methods and techniques should be used in order to facilitate the work of the teacher and the student so as to reach the aimed targets. Athletic activities need to apply modern scientific methods in order to achieve its targets. Skills became diverse, knowledge became wider and legal rules of athletic activities developed; and the followed methods in teaching became insufficient and does not achieve the required progress in learning the athletic skills and make the scientific process successful. [6]

The 3D animations are considered one of the latest technological means that has been discovered recently. As they impress who watch different films and matches. In addition, they are considered important teaching means because they attract the attention and the senses of the student toward all movement skills in general and to swimming in particular. Consequently, they have a great effect on the teaching process. [13] [14]

Swimming sport can be learned at any age, the earlier it is learned the better and easier it is to get rid of wrong performance. Because learning at late age especially in the university is often accompanied by mistakes which are hard to get rid of. As the students suffer from the difficulty

of breathe control, swimming movement coherence, the inability to relax and the increase of fear factor which hinder the fast learning. [18]

During the researcher teaching of crawl stroke to the 1<sup>st</sup> year students of Physical Education Faculty, Menoufia University, the researcher noticed that learning crawl stroke in the traditional method (the oral explanation and the example performance) does not take into consideration the individual differences between students. Hence, it does not achieve the wished targets with all the junior students. So, the researcher referred to using one of the modern technological teaching techniques which is using the 3D animations in a way that suits teaching crawl stroke which its teaching success depends on the correct knowledge, comprehension, and the technical analysis of performance in order to save the time designated to teaching this kind of swimming so as the student can recognize the performance technique along with correcting the technical and skill mistakes in the same time. Therefore, there was a need to use one of the modern technological means in swimming lessons to enhance the educational process through the different modern technological techniques in order to motivate the student, and increase their positive participation to gain the educational experience and fulfill their need to leaning. Moreover, the quick and easy transportation of information which helps to decrease the exerted effort and the time required for the educational

process and it also increases the efficiency of teaching process.

According to the mentioned previously and as far as the researcher knows, it is clear that there is a need to educational programs using 3D animations in learning abdomen crawl swimming, which urged the researcher to make this research in an attempt to design an educational computer program using 3D animations and to study its effect on the performance level of crawl stroke of the students of Physical Education Faculty in Menoufia.

#### Research Aim:

This research aims to design a program to teach crawl stroke by using 3D animations and to recognize its effect on:

- 1- The performance level of crawl stroke of 1<sup>st</sup> year students of Physical Education Faculty in Menoufia.
- 2- The differences between the two research experimental groups that use the 3D animations and the control group that uses the followed technique (explanation & example) in learning crawl stroke in students of Physical Education Faculty in Menoufia.

#### Research Thesis:

- 1- There are statically shown differences between the two measurement averages pre and post of the experimental groups using 3D animations on the performance level of crawl stroke in favor of the after measurement.
- 2- There are statically shown differences between the two measurement averages pre and post of the control group on the performance level of crawl stroke in favor of the after measurement.

- 3- There are statically shown differences between the two experimental and control research groups in the post measurement on the performance level of crawl stroke in favor of the experimental group.

#### Method:

The researcher used the experimental method as it suits the nature of this research, through the experimental design which depends on the pre and post measurements of two groups one of them is experimental and the other is the control group.

#### Research Society & Sample:

The research society is represented in the 1<sup>st</sup> year students of Physical Education Faculty of Menoufia University in the 1<sup>st</sup> term of the university year 2012/2013. Their number is (180) students. The research sample was chosen by the class deliberate method where (51) students were chosen as the basic sample who completely does know how to swim from the research society. (4) Students were excluded for not being regular. They were divided into two groups; each one of them consists of (16) students, one of them is the experimental group which used the 3D animations, the other is the control group which used the followed teaching technique (explanation & example), in addition to (15) students to perform the tests' scientific transactions. The researcher performed the consistency of research sample in the growth rates (age – height – weight – intelligence) and the physical changes (the muscles' ability of the legs – the muscle strength – the transitional speed – flexibility – agility) and the skill changes (floating and sliding on the abdomen – legs' strikes – arms' movements – regular breathing –level of abdomen crawl). All of this performed after the check of the scientific transactions of the physical, skill and intelligence tests studied in the research and table (1) shows that.

Table (1)

The statistical description of research society in the changes studied in the research N= 47

No.	Changes	Measure unit	mean	Standard deviation	mediator	Coefficient of torsion
1	Age	Year	18.48	0.28	18.50	-0.21
2	Height	Cm	176.53	1.27	176.60	-0.17
3	Weight	Kg	73.14	2.16	73.00	0.19
4	Intelligence	degree	115.58	1.59	115.00	1.09
5	Shoulder flexibility	Cm	9.14	0.85	9.00	0.49
6	foot articulator flexibility	Cm	10.71	0.86	10.00	2.47
7	Bending trunk from standing	Cm	7.92	0.82	8.00	-0.29
8	wide jump from stability	Cm	162.37	2.02	162.0	0.55
9	Forward jump on the rope	No.	11.96	0.98	12.00	-0.12

No.	Changes	Measure unit	mean	Standard deviation	mediator	Coefficient of torsion
10	legs' muscle strength	Kg	167.78	6.22	166.0	0.86
11	float & slide on abdomen	degree	0.61	0.61	1.00	-1.92
12	Legs' strikes	degree	0.57	0.54	1.00	-2.39
13	arms' movements	degree	0.49	0.50	0.00	2.94
14	Regular breathing	degree	0.16	0.37	0.00	1.30
15	level of abdomen crawl	degree	0.69	0.58	1.00	-1.60

Table (1) shows that the coefficient of torsion is between ( $\pm 3$ ), which signifies that the research society is moderate and consistent in these measurements.

### 1- Tools & equipment for data gathering:

- A restameter to measure height.
- Medical scale to measure weight.
- A stopwatch to measure time (second).
- A swimming pool.
- A number of CDs contains 3D animations program of free swimming (Mr. Smooth).
- A dynamometer to measure legs' muscle strength.
- Floating boards.
- Number of computer sets.

### 2- Tests & Measurements:

#### a) Mental Ability Test:

The researcher used the filmed intelligence Test prepared by "Ahmed Zaki Saleh" (1975) enclose no. (1)

#### b) Physical Ability Test:

- |                     |                               |
|---------------------|-------------------------------|
| Legs muscle ability | - wide jump from stability    |
| Trunk flexibility   | - bending trunk from standing |
| Flexibility         | - shoulders flexibility       |
| Flexibility         | - foot articulate flexibility |
| Harmony             | -forward jump on the rope     |
| Strength            | - legs' muscle strength       |
- enclose (4)

#### c) The measurement of skill performance level of abdomen crawl swimming:

By a committee of judges consists of 3 teaching staff members, enclose (5)

- Float & slide on the abdomen (10) degrees

- Legs' strikes (10) degrees
- Arms' movements (10) degrees
- Regular breathing (10) degrees
- Total level of abdomen crawl (10) degrees
- **Educational Program:** enclose (10)

### 1- General Aim of the Program:

This research aims to recognize the effect of using 3D animations on the performance level of crawl stroke of Physical Education students in Menoufia.

#### \* Skill Aim:

- The student performs crawl stroke in the correct way.
- The student can perform legs' strikes and arms' movements in the correct way.
- The student can gather legs' strikes and arms' movements in a good harmony.
- The student can breathe along with arms' movements.
- The student performs crawl stroke trainings in a gradual progress concerning difficulty.

### 3- Defining the Program Contents:

The educational program content using the 3D animations includes teaching crawl stroke through the skill aspects of the swimming which contained the following:

Body position (float & slide), legs' strikes, arms' movements, breathing, gathering and harmony.

### 4- The learning pattern used in applying the program:

The researcher used the individual learning pattern on the students of the experimental group, while the control group used the explanation & example technique in teaching abdomen crawl swimming.

## 5- The General Frame of Applying the Program:

The educational units of crawl stroke were put in the program, and were divided into (12) units as 2 units per week. The time designated for each swimming lecture is (90) minutes. According to that, the application of educational units took (6) weeks. The educational units details were as follows:

- The administrative works (10 min.)
- Watching the 3D animations program (15 min.)
- Warm-up (10 min.)
- Physical preparation (15 min.)
- Practical application of the skill (30 min.)
- Closure (10 min.)

### 6- Assistants:

The researcher implemented the program himself with (2) assistants of the teaching staff members, department of swimming in the faculty. enclose no. (8).

### 7- Displaying the program on a group of judges:

After finishing the program preparation, it was displayed on a group of experts to know their opinions about the educational program – enclose no. (7) – concerning:

- How far it is suitable and achieves the general aims of the program.
- How far the content display technique is suitable for the students' needs.
- How far the program is valid for application.

The results concluded that: the general aims of the program were suitable, the content display technique is suitable for students' needs, and the program is valid for application.

## The Production of 3D animations:

### 1- Preparation Stage:

In this stage, the researcher reviewed many scientific references, studies and researchers which addressed the preparation of educational programs by using computer and animations such as the study of Abdel Aziz Mohamed Abdel Aziz (2002) [1], Hussein Ali Abbass Hussien

(2009)[7], Manar Khairat Ali Ahmed (2010)[11], Dalia Hamdy Mohamed Shalima (2012)[4]. Then he put the scenario for the 3D animations through reviewing these studies.

After the researcher finished the scenario, he used MrSmooth program (22) which is a 3D cartoon program contains a display of Swimming method from more than one angle (side – upped side – horizontal upper – front forward – upper forward – behind). In addition to the ability to control the speed of strikes, and also displaying the performance without the water in order to supply a clear vision and consequently teaching swimming in a better and more accurate way.

### 2- The application stage:

The researcher prepared the program by using Microsoft PowerPoint Program. He designed the program by the scenario he put before, then divided the CD into parts; each part contains 5 axes (the technical steps – the educational steps – 3D photos (MrSmooth program) – stable photos – swimming trainings – evaluation questions). Next, the researcher put the 3D animations (MrSmooth program) in the program, along with the swimming trainings, and then he loaded a copy of the program on a CD in order to be used by the students after they are trained on the way of its using so as to be a reference in the case of mistakes.

### - Evaluation Stage:

The researcher evaluated the program by two methods:

**The First Method:** the researcher prepared the CD and displayed it on a group of experts specialized in swimming in order to define how far it is suitable and to state their opinion about how to use the program with the students.

**The Second Method:** the researcher applied 2 units of the program on a pilot sample of (15) students to recognize students' remarks about the program and how far it is suitable for them. This stage achieved its aim. enclose (9)

### The Basic Study (performing research application):

#### The Pretest:

The pre measurement was performed on the two groups (experimental – control) in the crawl stroke on 31/10/2012 in order to achieve the equality between the two research groups (experimental – control). Table (4) shows the equality between the two groups.

Table (4)  
The differences' significance of the pre measurements between the two groups  
(experimental – control) in the research changes N1= N2= 16

	Changes	Measureme nt unit	Control group		Experimental group		(T) value
			mean	St.dev.	mean	St.dev.	
Physical changes	Shoulders' flexibility	Cm	9.25	0.93	9.00	0.73	0.082
	Foot articulate flexibility	Cm	10.56	0.73	10.81	0.91	0.83
	Bending the trunk from standing	Cm	7.81	0.98	8.13	0.89	0.94
	Wide jump from stability	Cm	162.25	2.11	162.44	2.03	0.25
	Forward Jumping on the rope	No.	12.13	1.15	12.00	0.63	0.38
	Leg's muscles strength	Kg	168.75	7.57	168.13	7.90	0.22
Skill changes	Float & slide on the abdomen	Degree	0.69	0.60	0.56	0.63	0.58
	Legs' strikes	Degree	0.56	0.51	0.50	0.52	0.32
	Arms' movements	Degree	0.63	0.50	0.56	0.51	0.38
	Regular breathing	Degree	0.13	0.34	0.25	0.45	0.82
	Level of abdomen crawl	degree	0.75	0.58	0.63	0.62	0.55

\*(T) table value at level 0.05= 2.042

Table (4) shows that there are no statistically shown differences between the two groups in all the physical & skill tests studied in the research which indicate to the equality between the two groups.

#### The Basic Experiment:

The basic experiment of the research was applied on the two groups; the experimental group by using 3D animation program, and the control group by using the followed technique (explanation & example). The experiment application took (6) weeks in the period from 1/11/2012 to 13/12//2012 as two units per week and the unit time (90min.).

#### Results:

#### The Post test:

The post measurement in the crawl stroke was performed on the two groups (the experimental – the control) on 13/12/2012.

#### The Used Statistical Treatments:

The statistical treatments were used and were represented in the arithmetic means, the standard deviation, the coefficient of torsion, the coefficient of correlation and (T) test.

Table (5)  
The arithmetic means, the standard deviation and (T) value between the pre and post measurements  
of the experimental group in the skill performance level of crawl stroke N= 16

Skill performance level	pre measurement		post measurement		(T) value
	mean	St.dev.	mean	St.dev.	
Float & slide on the abdomen	0.56	0.63	8.06	0.68	*31.34
Legs' strikes	0.50	0.52	8.19	0.54	*39.73
Arms' movements	0.56	0.51	7.94	0.57	*37.37
Regular breathing	0.25	0.45	7.06	0.77	*29.57
Level of abdomen crawl	0.63	0.62	8.44	0.63	*34.22

\*(T) table value at level 0.05 = 2.131

Table (5) shows that there are statistically shown differences between the pre & post measurements of the experimental group in favor of the after measurement in the skill performance level of abdomen crawl swimming.

Table (6)

The arithmetic means, the standard deviation and (T) value between the pre and post measurements of the control group in the skill performance level of crawl stroke N= 16

Skill performance level	pre measurement		post measurement		(T) value
	mean	St.dev.	mean	St.dev.	
Float & slide on the abdomen	0.69	0.60	6.06	0.77	*21.31
Legs' strikes	0.56	0.51	6.13	0.81	*22.54
Arms' movements	0.63	0.50	5.88	0.81	*21.36
Regular breathing	0.13	0.34	5.38	0.50	*33.62
Level of abdomen crawl	0.75	0.58	6.56	0.51	*29.14

\*(T) table value at level 0.05 = 2.131

Table (6) shows that there are statistically shown differences between the pre & post measurements of the control group in favor of the after measurement in the skill performance level of abdomen crawl swimming.

Table (7)

The arithmetic means, the standard deviation and (T) value between the two groups (the experimental – control) in the post measurement of the skill performance level of crawl stroke N1= N2= 16

Skill performance level	The experimental		The control		(T) value
	mean	St.dev.	mean	St.dev.	
Float & slide on the abdomen	8.06	0.68	6.06	0.77	*7.54
Legs' strikes	8.19	0.54	6.13	0.81	*8.20
Arms' movements	7.64	0.57	5.88	0.81	*8.06
Regular breathing	7.06	0.77	5.38	0.50	*7.09
Level of abdomen crawl	8.44	0.63	6.56	0.51	*8.98

\*(T) table value at level 0.05 = 2.145

Table (7) shows that there are statistically shown differences between the two groups (the experimental – the control) in the post measurement in the skill performance level of crawl stroke in favor of the experimental group.

#### Discussion:

Results of table (5) showed that there are statistically shown differences at level 0.05 between the two measurements (pre – post) in the skill performance level of crawl stroke (float & slide on the abdomen – legs' strikes – arms' movements – regular breathing – level of abdomen crawl) in favor of the post measurement.

The researcher attributes this to the 3D animation program, in which the 3 dimensional animations were rich in its items and contents of direct & indirect information, beside its honest expressional potentials and its realistic image represented in colors and high quality of the pictures. Also its ability to represent the abstract reality which is difficult to be recognized by senses in a very live and impressive way. Therefore, it helped students to understand and absorb facts and knowledge related to every performance technique of each part of the body

when performing abdomen crawl swimming. Certainly, this gave the students the opportunity to learn and gain knowledge of the complete information about this skill, which positively affected the performance technique of swimming parts and increased the performance level of abdomen crawl swimming.

This result agrees with what Mohamed Saad Zaghlol and others (2001) indicated that using education technology result in the increase of material learned by the students of information and make it well memorized in the mind which in turn enhances the educational process. [15]

In addition, the 3D animations allow the designers to be more creative concerning the visual effects and the quick move to explanation via links. The 3D animations also help to reach the information in an easy and quick way and help to easily find the information as the students do not need to read a lot of texts to find the desired information. [21]

This result also agrees with the study results of : Mohamed Hassan Hassan Rakha (2003) [12], the study of Hussein Ali Abbass Hussein (2009) [7], and the study of Manar Khairat Ahmed (2010) [11], that the educational programs

which use the different modern technology either drawings, photos or multi media have a positive effect on learning movement skills in a better way.

Thus, the first thesis is proved true.

The results of table (6) indicated that there are statistically shown differences at level 0.05 between the two measurements (pre – post) of the control group in the skill performance level of crawl stroke (float & slide on the abdomen – legs' strikes – arms' movements – regular breathing – level of crawl on the abdomen) in favor of the after measurement.

The researcher attributes this progress in the educational process to the use of the followed technique (explanation & example) which all the students got used to in all school stages. As it is considered the followed technique since childhood in educational process either knowledge or movement. Moreover, it depends on the teacher explanation and performing an example then performing different trainings to raise the level of performance. All of that helped to improve the skill performance level of abdomen crawl swimming.

This also agrees with Mahmoud Abdel Halim (2006), that the teacher in this technique is the decision maker and the main controller of the educational process which assures the student's success and defines its path during the educational process. [9]

Mosston & Ashworth (1986) also indicate that in the traditional technique, the role of the teacher is restricted to lesson follow-up then the traditional performance without the ability to make decisions or initiatives in performing the movement homework by the students which affects the efficiency of the educational process. [17]

Thus, the second thesis is proven true.

Results of table (7) showed that, there are statistically shown differences at level 0.05 between the two post measurements of the two groups (experimental – control) in the skill performance level of crawl stroke (float & slide on the abdomen – legs' strikes – arms' movements – regular breathing – level of abdomen crawl) in favor of the experimental group.

The researcher attributes the progress of the experimental group over the control group to the efficiency of the 3D animations program and that it is more effective than the followed program (explanation & example); which was used with the control group. The 3D animations program took into consideration the individual differences among students and helped each student to learn as fast as suits his abilities, and also to choose the link through which he starts his educational process which raised their

motivation to learn. It also helped each student to learn according to his own style which resulted in raising the skill performance level.

Abdel Hamid Sharaf (2000) mentions that using different and diverse forms of educational technology increases the efficiency of the physical education lesson. This way, each student can find what suits him and copes with his abilities and potentials. This increases learning effectiveness and also allows the use of each frame individually. Thus, 3D animations program is able to raise the students' level and presents the correct performance form of abdomen crawl swimming. [2]

In this regard, Richard & Jensen (1997) refers that using educational technology affords two basic elements of learning elements which are: the element of effective participation from the student, and the feedback element which improve and develop the movement performance. [19]

This agrees with the study results of: Mohamed Hassan Hassan Rakha (2003)[12], Manar Khairat Ali Ahmed (2010)[11], Maged Mahmoud Mohamed Ibrahim (2011)[8], and the study of Dalia Ahmed Mohamed Shalima (2012)[4], that the educational programs using educational drawings and photos have a positive effect on learning movement skills in a better way more than the followed technique (explanation & example).

Thus, the third thesis is proven true.

### Conclusions:

- 1- The 3D animations program has a statistically significant positive effect on the performance level of abdomen crawl swimming.
- 2- There are statistically shown differences between the two measurements (pre- post) of the control group in the performance level of crawl stroke in favor of the post measurement.
- 3- There are statistically shown differences between the two experimental and control group in the post measurement of performance level of crawl stroke in favor of the experimental group.
- 4- The experimental group which used the 3D animation program was superior on the control group in the performance level of abdomen crawl swimming.

**Recommendations:**

- 1- The necessity to use 3D animation program in swimming as this study proved that it has a statistically significant positive effect on the skill performance level of Physical Education Faculty in Menoufia.
- 2- To pay attention to using the updated technological means in teaching and training for all different swimming styles.
- 3- To perform a similar study on different samples and other swimming styles.

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