The impact of the use of S.A.Q. training on the level of technical performance and the digital achievement of the butterfly swimming

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Research Summary

The aim of the study was to identify the impact of the S.A.Q. training on the level of achievement of the young swimmer by using the experimental method in the design of two groups, one of which is experimental group and the other is control group, (10) young swimmers for the experimental group and (10) young swimmers for the control group. The most important results were statistically significant differences between the pre and post measurements of control and experimental groups in the variables of the level of achievement of the butterfly swimming in favor of the post measurements of both groups with the superiority of the post measurements of the experimental group over the control group. We recommend carrying out many programs of S.A.Q. training for different types of sports.

Introduction and Research Problem:

S.A.Q. training are considered one of the most common training used by beginners and high-level athletes.

Mario Jovanovic et al. (2011) indicated that the term S.A.Q is derived from the initial letters of **S**peed, **A**gility, and **Q**uickness. (14:1285)

Velmurugan & Palanisamy (2011) added that S.A.Q. training are considered a modern training system that findings in integrated effects of many physical abilities within a single training program. (23:432).

Remko Polman et al. (2009) noted that S.A.Q training are considered a complete training system designed to improve the level of acceleration, as well as the degree of compatibility between the eye and hand, as

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well as the explosive and response

et al. (2000) showed that there is a correlation between the three training elements (Speed, Agility and Quickness). The speed is the ability of the player to perform consecutive and similar movements in the shortest possible time, while agility is the ability of the player to change his position in the air; the quickness is the maximum contraction or motor response of the muscle in the shortest possible time. (8:14).

Vikram Singh (2008) explained the difference between the speed and the quickness. The speed needs time to reach maximum speed, which must be increased. This is evident in the races, where the player needs a sufficient time to reach from zero speed to maximum speed, whereas the quickness doesn't need this time, but maximum muscle contraction in the shortest possible time and appear in the explosive movements of some sports. (24:12).

Velmurugan and Palanisamy (2011) indicated that S.A.Q. training are considered one of the modern training forms in the field of sports and that the studies that dealt with their physical and physiological effects on young and adult players differed in their findings, depending on the way they are dealt with in the sports field. (23: 432).

Through the practical observation and reference studies, I noticed that the reason for the delay in numbers of swimmers in many butterfly races digitally may be due mostly to the delay in the rotation time and the lack of some important physical requirements for the butterfly swimming, which may explain the problem of research and its significance, this prompted the researcher to know the extent of the impact of the S.A.Q training on the level of technical performance of the butterfly swimming.

Objectives and research hypotheses

Objective of the study: The study aimed to identify the impact of some S.A.Q. training on the level of technical performance and digital achievement of the butterfly swimming and some of the physical variables under research.

Research hypothesis: There are statistically significant differences between the experimental and control groups to improve the time of the technical performance and the digital achievement of the butterfly swimming, rotation and physical variables of the sample under research in favor of the experimental group.

Research Methodology: The researcher used the experimental approach in designing the two groups, one experimental and the other is control by following pre and post measurements of the experimental and control groups.

Research population: The research population represents the young swimmers in Mansoura Youth Center. 10 were excluded for the following reasons: the high percentage of their absence in the exercise, the discrepancy between the pre tests and the anthropometric measurements that were conducted before the application started, so the research population is 30 young swimmers.

Research sample: A sample of (20) young boys was selected in Mansoura Youth Sports Center. They were divided into two groups, each consisting of (10) young swimmers after the equivalence. The sample was divided between groups, in addition to 10 young swimmers. The pilot study was applied on them and they were excluded from the two experimental and control groups of the research.

Normality of the distribution of the research sample: The researcher conducted the pre measurement to ascertain that the members of the research sample are included under the normal curve in the variables that were selected and determined after referring to previous studies and scientific references. Growth variables: (Chronological age- Weight- Arm length – Trunk length - Foot length-Leg length). The level of technical and digital performance of the skills under research: (Time of rotation distance (7.5) meters - Swimming time (50 meters) with rotation).

Table (1)

Normality of distribution for members of the research sample in some of growth variables n= 10

Variables	Unit of measurement	Mean	Median	Standard deviation	Coefficient of skewness
Chronological age	Year	10.444	10.300	0.29	0.561
Training age	Year	4.37	4.25	0.42	0.534
Length	cm	139.650	35.500	4.243	0.32
Arm length	kg	40.028	40.00	2.595	0.033
Trunk length	cm	62.550	63.000	3.587	1.666
Leg length	cm	80.200	81.000	4.958	0.550
Foot length	cm	210625	22.000	0.868	0.406

It is clear from Table (1) that all the values of the calculated skewness coefficients ranged between (0.032 and 1,666). All these values are limited to (-3: +3). This indicates that the research sample falls under the normal curve in all growth variables. Chronological age, weight, length, arm length, trunk length, leg length, foot length.

Table (2)

Normality of distribution for members of the research sample in some of Physical variables and Digital level n= 10

Tests	Unit	Mean	Median	Standard deviation	Coefficient of skewness
Physical variables					
Speed	S	6.96	7.11	0.478	0.446
Agility	S	23.51	23.14	1.595	2.533
Quickness	S	27.91	28.91	28.08	0.347
Level of (Technical) Achievement					
Beginning dive	Score	6.45	6.00	1.80	0.78
First 25m	Score	3.47	4.00	0.78	-1.08
Rotation	Score	5.95	6.00	1.60	0.36
Second 25m	Score	3.30	4.00	0.96	-0.65
End	Score	3.40	3.00	1.44	0.064
Digital level					
Time of rotation distance (7.5) m	S	19.425	19.000	1.767	0.629
Swimming time (50) meter with rotation	S	56.175	54.500	3.941	1.749

It is clear from Table (2) that the values of calculated skewness coefficients ranged between (0.629 and 1.749). All these values are limited to (-3: +3), indicating that the research sample falls under the normal curve in the level of technical performance

Equivalence of Research Sample: After confirming the normality of the basic research sample (20) young swimmers in the selected variables under the study, they were randomly divided into two groups (10) for the experimental group and (10) for the control group.

- Experimental group: S.A.Q. training that have been identified under research are applied on this group.

- **Control group**: The traditional performance followed is applied on it and the researcher conducted the equivalence between the two research groups in the variables under research.

Table (3)

Equivalence between the two research groups (Experimental-Control) in the growth variables "Chronological age- Weight-Length)" N1=N2=10

Variables	Unit of measurement	Experimental group		Control group		T
		Mean	Deviation	Mean	Deviation	
Chronological age	Year	10.426	0.285	10.462	0.301	0.383
Training age	Year	34.750	4.278	36.300	4.169	1.160
Length	cm	139.450	6.108	139.850	7.110	0.191
Arm length	kg	62.650	2.961	62.450	4.199	0.174
Trunk length	cm	38.550	4.513	38.850	4.475	0.211
Leg length	cm	80.700	4.758	79.700	5.212	0.634
Foot length	cm	21.400	0.940	21.850	0.745	1.677

Tabular T value at significance level 0.05 is 2.093. It is clear from Table (3) that all T values calculated for the variables of the two groups (Experimental-Control) ranged between (0.174 and 1.677). These values are less than the tabular T values of (2.093) at significance level 0.05 indicating the equivalence of the two groups of research in those variables.

Table (4)
**Equivalence between the two research groups (Experimental-
Control) in the level of technical and digital performance of the
skills under research N1=N2=10**

Variables	Unit of measurement	Experimental group		Control group		T
		Mean	Deviation	Mean	Deviation	
Level of Technical Achievement						
Beginning dive	reSco	6.90	1.88	6.80	1.76	0.17
First 25m	Score	3.40	0.75	3.55	0.82	0.60
Rotation	Score	6.10	1.77	5.80	1.43	0.57
Second 25m	Score	3.40	0.94	3.20	1.00	0.65
End	Score	3.20	1.32	3.60	1.56	0.87
Digital level						
Time of rotation distance for wimming (7.5) m	S	19.400	1.698	19.450	1.877	0.88
Swimming time (50) meter with rotation	S	56.900	4.436	55.450	3.322	1.169

Tabular T value at a significance level of 0.05 = 2.093

It is clear from Table (4) that all calculated values of the skill level between the two groups (experimental-control) ranged between (0.88 and 1.169). These values are less than the tabular T value which reached (2.093) at significance level 0.05 indicating the equivalence of the two groups of research in those variables (Skills under research).

Duration of the proposed program is (8 weeks at the rate of 3 units per week with a total of 24 educational units for the proposed program. Unit time is 60 minutes; duration of S.A.Q within each unit is 30 minutes).

Implementation of the research: After ensuring the availability of all conditions and devices for physical tests,

skills tests and anthropometric measurements of the groups under research as they are necessary to implement the proposed program, the researcher made the following:

Pre measurement: The pre measurement of both groups was carried out as follows:

- The selected growth variables under research. The physical variables under research.

- Measuring the technical and digital performance of the skills under research.

During the period from Thursday 12/01/2017 to Saturday 14/01/2017

Basic research experiment: The researcher applied the proposed program to the experimental group for (8) weeks from Tuesday 24/01/2017 to Tuesday 14/03/2017, by 3 units per week for the experimental group

Post measurement: After the completion of the application of the proposed program, the researcher carried out the post measurement on Thursday dated 16-3-2017 for both experimental and control groups under the same conditions through the same tests selected in the post measurements of the two groups in the variables under research and the level of performance of the skill of rotation for crawl swimming under research.

Statistical Treatments:

The researcher used the following statistical methods to process data statistically:

Arithmetic mean .Standard Deviation. Coefficient of skewness. Change Percentages Coefficient. Coefficient of correlation. Median "T" test for one group and two groups

Presentation of findings:

Presentation of findings of the experimental group

Significance of the differences between the mean of the two measurements (Pre-Post) of the experimental group in the variables of performance time under research

Table (5)

Significance of the differences between the mean of the two measurements (pre - post) of the experimental group in the variables of the performance time under research N=10

Variables		Unit of measurement	Pre measurements		post measurements		T. value	Percentage of improvement
			Mean	Deviation	Mean	Deviation		
Level of Technical Achievement	First 25m	Score	3.40	0.75	8.80	1.36	*16.09	%٥٨.٨٢
	rotation	Score	6.10	1.77	8.50	1.10	*6.43	%٣٩.٣٤
	Second 25m	Score	3.40	0.94	7.30	0.97	*11.48	%١١٤.٧٠
	End	Score	3.20	1.32	2.30	0.47	*2.85	%٢٨.١٢
	Total	**Score**	**23.00**	**2.12**	**37.00**	**2.40**	***29.09**	%٦٠.٨٧

abular at significance level 0.05= 1.729   *=Function

Table (5) shows statistically significant differences between the two means of the (Pre-Post) measurements of the experimental group in the two variables of performance time in favor of the post measurement. The calculated T values for the two variables of performance time ranged from. These values are higher than the tabular T value which was (1.729) at significance level 0.05.
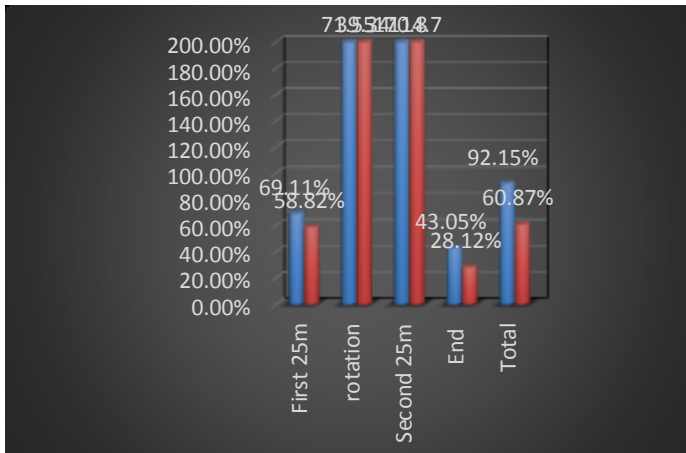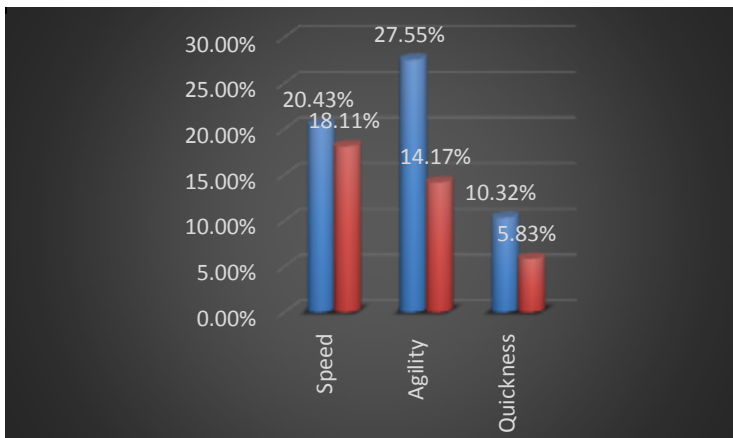
Presentation of findings

Table (6)
Significance of the differences between the pre and post measurements and the percentage of improvement of the experimental group in physical variables inside water n = 10

Variables		Unit of measurement	Pre Measurement		Post measurement		Difference between the two means	T value	Percentage of improvement
			Mean	Deviation	Mean	Deviation			
Performance time	Speed	S	6.90	0.51	5.49	0.41	1.41	*8.61	20.43%
	Agility	S	24.10	2.09	17.46	0.49	6.64	*11.70	27.55%
	Quickness	S	27.90	0.59	25.02	0.34	2.88	*15.87	10.32%

* Tabular T value at (0.05) = 1.83

Table (6) shows that there are significant differences between the pre and post measurements of the experimental group in favor of the post measurement at level 0.05 in the physic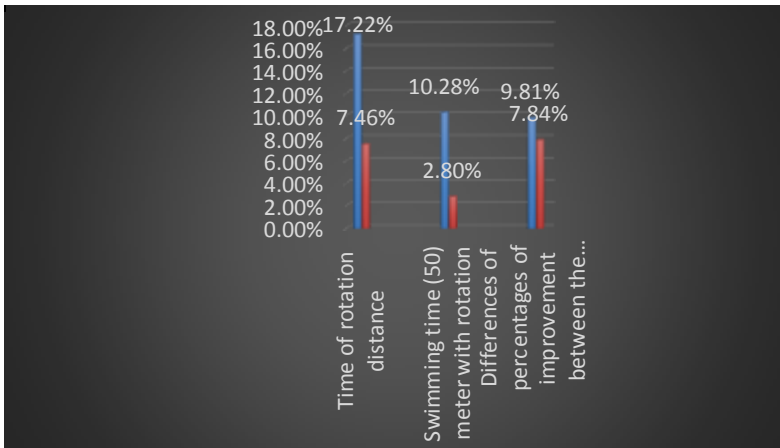al variables inside water where the value of the calculated (T) is greater than the tabular (T) value. It shows also the percentage of improvement between the pre and post measurements which ranged between (10.32% - 27.55%).

Table (7)
Percentages of improvement of the experimental group in the
performance time variables under research: N = 10

Variables		Unit of measurement	Pre measurement		Post measurement		Difference	Percentage of improvement
			Mean	Deviation	Mean	Deviation		
Performance time	Time of rotation distance for swimming (7.5m)	S	19.400	1.698	16.050	2.259	3.350	**17.22%**
	Time of 50m with rotation	S	56.900	4.436	51.050	5.850	5.850	**10.28%**

It is clear from Table (7) that the performance time variables have improved among the members of the experimental group with percentages of improvement of (17.22%, 10.28%).

Presentation of the findings of the control group:

Significance of the differences between the mean of the two (Pre-Post) measurements and the percentages of improvement of the control group in the two variables of the performance time under research:

Table (8)
Significance of the differences between the mean of the two (pre-post) measurements of the control group in the two variables of performance time under research

Variables		Unit of measurement	Pre measurement		Post measurement		T value	Percentage of improvement
			Mean	Deviation	Mean	Deviation		
Performance time	Time of rotation distance (7.5m)	S	19.450	1.877	18.000	1.777	*5.253	7.46%
	Time of swimming 50m with rotation	S	55.450	3.332	53.900	3.538	*6.601	2.80%

Tabular at significance level 0.05 = 1.729   *=Function

Table (8) shows statistically significant differences between the two means of the (Pre-Post) measurements of the control group in the two variables of performance time in favor of the post measurement. The calculated T values for the two variables of performance time ranged from (5.253:6.601). These values are higher than the tabular T value which was (1.729) at significance level 0.05.

Table (9)
Significance of the differences between the pre and post measurements and the percentage of improvement of the control group in physical variables inside water n = 10

Variables		Unit of measurement	Pre Measurement		Post measurement		Difference between the two means	T value	Percentage of improvement
			Mean	Deviation	Mean	Deviation			
Physical variables inside water	Speed	S	6.90	0.51	5.49	0.41	1.41	*8.61	20.43%
	Agility	S	24.10	2.09	17.46	0.49	6.64	*11.70	27.55%
	Quickness	S	27.90	0.59	25.02	0.34	2.88	*15.87	10.32%

* Tabular T value at (0.05) = 1.83

Table (9) shows that there are significant differences between the pre and post measurements of the experimental group in favor of the post measurement at level 0.05 in the physical variables inside water where the value of

the calculated (T) is greater than the tabular (T) value. It shows also the percentage of improvement between the pre and post measurements which ranged between (5.83%-18.11%).

Presentation of the findings of the difference between the two post measurements of the two groups under research:

Significance of differences between the two means of the two post measurements of the two groups (control-experimental) in the two variables of performance time.

Table (10)

Significance of the differences between the two means of the two post measurements in the two groups (control-experimental) in the variables of performance time   n = 10

Variables		Unit of measurement	Experimental group		Control group		T	Differences of percentages of improvement between the experimental and control groups
			Mean	Deviation	Mean	Deviation		
Performance time	Time of rotation distance	S	16.050	2.259	18.000	1.777	*3.34	9.81%
	Swimming time (50) meter with rotation	S	51.050	5.850	53.900	3.538	*2.181	7.48%

Tabular T value at significance level is 0.05=1.697. Table (10) shows that there are statistical differences between the two post measurements of the two groups (experimental-control) in the variables of the performance time under research in favor of the experimental group. The computed T values of the performance time variables were (3.034, 2.181). These values are higher than the tabular T value, which reached (1.697) at significance level of 0.05.
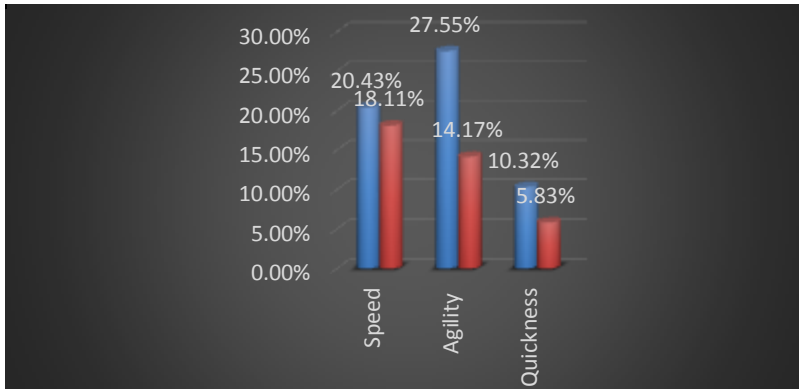
Table (11)

Significance of the differences between the two post measurements and the percentage of improvement of the control group in physical variables inside water n1=n2=10

Variables		Unit of measurement	Pre measurement		Post measurement		Difference between the two means	Percentage of improvement	T value
			Mean	Deviation	Mean	Deviation			
Physical variables inside water	Speed	S	5.74	0.46	5.49	0.41	0.25	18.11%	1.32
	Agility	S	19.67	0.48	17.46	0.49	2.21	14.17%	*10.14
	Quickness	S	26.30	0.30	25.02	0.34	1.28	5.83%	*9.70

*Tabular (T) value at significance level (0.05) is 2.10. Table (11) shows statistically significant differences between the two post measurements of the experimental and control groups in favor of the post measurements of the experimental group at level 0.05 in the physical variables inside water (Agility - Speed 35 meters)). The value of (T) was greater than the tabular (T) value. There were no statistically significant differences in the variable (Quickness) between the two post measurements of the control and experimental groups.

Significance of the differences between the two post measurements and the percentage of improvement of the control group in physical variables inside water

Discussion of results: First: the physical variables of the experimental group.

It is clear from Table (6) that there are statistically significant differences between the pre and post measurements of the experimental group in favor of post measurement at level 0.05 in physical variables inside the water. This progress in the level is due to the effect of the use of the S.A.Q training as they care about the elements of (Speed, Agility and Quickness). The speed is the ability of the swimmer to perform successive and similar movements the shortest possible time, while agility is the ability of the swimmer to change the state of his body in the air or inside water, and quickness is the maximum motor contraction or response

of the muscle in the shortest possible time. This is confirmed by both "Badea Ali" (2011) (7) and Velmurugan & Palanisamy (2012) (23) as S.A.Q. training stimulate muscle spindles, resulting in high tension in the motor units released and the stimulation of other receptors that increase the number of active motor units, which is the reason for increasing the resulting force. The findings of this study are in line with Vikram Singh (2008)(24), Remco Polman et al. (2009) (21) and Mario Jovanovic et al (2011) (14) that S.A.Q. training are considered one of the training forms that contribute to the improvement of acceleration time and muscular capacity of legs, agility and quickness. This is also consistent with what was mentioned by Zoran Milanović, et al. (2012) (25) that S.A.Q. training are one of the training forms that contribute to the improvement of some special physical abilities, the most important one is the speed of all types and these findings also compatible with what was mentioned by "(6) (4) that the use of S.A.Q. training developed the strength characterized by the speed of the two legs, which contributed

significantly and directly to the improvement of speed as the increase in the strength characterized by the speed is a result of using S.A.Q. training , which stimulate the motor units, leading to the participation of a large number of them resulting in strong and fast contraction to increase explosive performance and speed. This is in line with what was mentioned by Marwan Ali (2003) (15) concerning the necessity of matching the prevailing muscular contractions of the selected special training to the extent possible with that incident during the performance of the skill itself, whether of the type or severity of these contractions. These findings are also compatible with the studies of Ahmed Noor El-Din Mohammed Selim (2016) (3), Mohammed Saeed Meselhy (2015)(18) which concluded that the use of S.A.Q. training has a positive effect on physical and skill abilities.

Second: Physical variables of the control group

Table (9) shows that there are statistically significant differences between the pre and post measurements of the control group in favor of the post measurement at

significance level 0.05. This indicates that the differences and the percentage of improvement were in favor of the post measurement. This improvement in the physical aspects is due to the regularity of the control group in the (traditional) training program of the team and the findings of this study are in line with the findings of the studies of "Mahmoud Abd El-Mohsen"(2013)(12), "Marwan Ali" (2013), (16) "Mohammed Farouk Ibrahim" (2009) (17) that the traditional programs can't be disregarded as they help to learn and training correctly in addition to their positive impact on the level of both physical and performance skills and digital level.

Third: The differences of the physical variables of the two post measurements of the experimental and control groups.

The findings of Table (9) and (6) show that there are statistically significant differences between the two post measurements of the control and experimental groups in favor of the post measurement of the experimental group at 0.05 in the physical variables inside the water, the high percentage of improvement of the experimental group compared to the control group in the physical variable inside the water for each of (Agility-Speed) goes back to the impact of S.A.Q. training (Speed, Agility, Quickness) of the two arms and legs have contributed to a better performance level for the experimental group than the control group and as a result of the development of muscular performance of these muscles in line with the kinetic trajectory of performance,

This is confirmed by Enrique Lopez et al. (2007) (10) that strong muscles are necessarily fast muscles, so muscle strength is one of the main physical elements that must be developed to improve quickness.

The findings of the current study are consistent with what Mona Hamdy Salem (2013) (19), Marwan Ali (2013) (16), noted that the improvement in the level of fitness due to the speed component and that the fitness is very relevant to the components of fitness and motor abilities. As a result, the

use of S.A.Q. training , which took into account the scientific method in terms of the order of training according to the degree of difficulty, made great progress both in the speed, agility and quickness under research.

Fourth: (Technical performance and digital achievement) and the digital level of the experimental group:

It is clear from Table (7) that there are statistically significant differences between the pre and post measurements for the experimental group in favor of the post measurements at (0.05) in the variables under research, this shows that the differences and the percentage of improvement were in favor of the post measurements and this indicates the progress of the level of swimmers in the level of skill performance and digital level, so this improvement goes back to the positive effect of the use of the proposed S.A.Q. training including the training of (speed, agility, and quickness) on the skill performance and the digital level under research.

Fifth: Performance level: Technical performance and

digital achievement of the control group:

Table (8) shows that there are statistically significant differences between the pre and post measurements of the control group in favor of the post measurement at the level (0.05) in the variables under research. This shows that the differences and the percentage of improvement were in favor of the post measurement. This goes back to the improvement in these variables of the control group as a result of the program followed which was applied without discussing the scientifically-trained groups of S.A.Q. training as the control group was subjected to them and also their regularity in the training leads to the upgrading of the variables under research and the digital level.

Sixth: Skill level and digital level of the two post measurements of the two research groups

The findings of Table (10) show that there are statistically significant differences between the two post measurements of the control group and the experimental group in favor of the post measurement of the

experimental group at level (0.05) in the variables under development. There is a notable improvement in the digital level and physical efficiency and this is represented in the findings of the tests. These differences go back to the impact of the use of S.A.Q. training s. The findings of the current study are consistent with the findings of the studies of Ahmed Mohammed Al-Tantawi (2005) (2), Ahmed Ali Hussein (2007) (1), which indicated the close correlation between the elements of fitness and physiological variables and this gives an indicator to the extent of the physical efficiency of the player and this is compatible with what was mentioned by "Kamal Abd El-Hameed" and Sobhy Hassanien (2001) (11) that the success in performing any skill requires the development of physical components that contribute to his performance in an ideal manner. This is in line with the findings of Amr Hamza (2010)(5) that skill training alone is not sufficient to improve this skill and to achieve fruitful findings. In addition to skill development,

it is necessary to develop the motor abilities of the skill itself. This is demonstrated by the fact that skill performance is closely related to motor physical abilities. The mastery of the skill performance depends on the development of the requirements of this performance of physical and motor abilities, but the level of this skill is often measured by the extent of the individual's acquisition of these special physical and motor characteristics. He also shows that the improvement of physical abilities and the development of motor skill performances can occur together, and when the individual has high physical abilities, the performance level of motor skills performances becomes good, and access to an advanced level of motor skill performances also confirms improved physical abilities. The beginning and rotation skill is considered one of the most important skills upon which the result of racing is determined as the beginning processes contributes to the improvement of the digital level of swimmers. These are in line with the findings of the

studies of Vikram Singh (2008), (24) (Remco Polman et al., 2009) (21) (٢٢), Mario Jovanovic et al. (2011) (14) "Velmurugan and Palanisamy (2012) (23), Zoran Milanović et al. (2012) (25) in the positive impact of the use of the S.A.Q. training and this is what emerged from the differences between pre and post measurements in light of the above. It is clear that the use of the S.A.Q. training had a positive impact on the improvement of the performance of the rotation, technical performance and digital level of butterfly swimming in the experimental research sample.

Conclusions: There are statistically significant differences between the pre and post measurements of the control and experimental groups in the variables of the level of achievement of the butterfly swim in favor of the post measurements of both groups. There are also statistically significant differences between the two post measurements of the control and experimental groups in the physical variables and the level of completion of the butterfly stroke in favor of the experimental group.

Recommendations: In the light of the research findings, the researcher recommends the following:

Application of S.A.Q. training to other swimming methods

Diversity in S.A.Q. training between the upper and lower limbs, taking into account the gradation of intensity, individual differences and motivation for each individual separately.

To conduct more similar studies on the role of S.A.Q. training in improving the physical and skill variables of athletes in different sports.

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