

## **Educational Program, Using The Brainstorming Method, and Its Effect on Some Physical Variables and Knowledge Acquisition Related to Learning Butterfly Stroke.**

**Mohamed AL Azab Behery Al Azab**

Department of Aquatic Sports, Alexandria University, Egypt.

### **Introduction:**

The learning process is one of the basic stages for sustaining a high level of performance. Owing the performance method which is closer to the ideal technical performance is the fundamental base for Excellency and performance level improvement. Among the learning methods are (command learning, reciprocal learning, cooperative learning, discovery learning, problem solving learning scientific Journeys learning – learning using the brainstorming method – computer learning and others).

Education as one of the important areas of knowledge needs an efficient teacher of a good knowledge with more than one teaching method so that he can constantly offer the new and know a lot about the entrances to each method so that he can help learner to take a positive attitude enables him to interact during the learning process so as to help him to develop the creative mentality of the student to store and retrieve information only. Modern curricula should enable the student to deal with the world of today and tomorrow. This will not take place but through forming the intellectual mentality which has experienced the art of debate and trained on proper scientific thinking. (1: 4)

Among these methods is the brainstorming method, which is one of the methods that stimulate creativity and creative treatment of solving problems of the educational fields and other fields which take the latest innovations based to the scientific knowledge and the results of scientific research. Brainstorming means ideas that could lead to solve the problem of a certain research. (2:37)

Beebe & Masterson argue that the brainstorming method is the entrance for solving any certain problem and that it has been designed to help the members of a group to find multiple creative solutions. Abdel Razeq Mahmoud Mukhtar (2004) has also referred to it as the method which encourages creative thinking and promotes students' potentials so that it can help proposing all opinions and ideas. This is because it depends on free thinking and is used to generate as many ideas as possible to address some subject.

Teacher needs to use brainstorming in many situations such as planning and implementation. He will find this method useful as to generate ideas and solutions for problems. It also helps increasing and developing academic achievement of students and keeps boredom away of them.

So we need to develop minds that have the ability to solve problems in a manner characterized by flexibility and fluency and originality. It is important to promote creative thinking of students by providing a secure appropriate atmosphere free from fear or embarrassment, through the presentation of course material and encouraging them to think and participate through suggesting their own perspectives.

The Butterfly swimming is one of the most difficult types of swimming as many swimmers feel frustrated when they start to learn. Even those who has participated in its competitions without being proficient in, failed to achieved good results. However, there are many swimmers who are fond of it and therefore they continue to try to learn it until they become fully mastered in. (21: 145)

Muhammad Ali el Cot et al. (2003) indicate that the butterfly swimming with the vertical strikes technique (dolphin) proved faster speed in performance and thus attic second place in terms of speed after the front crawl stroke. (13: 112)

Through the use of brainstorming method to learn the butterfly swimming the students will activate their minds for the use of the previous thinking skills mentioned what makes personal motivation to learn this skill greater. Motivation helps them to work and make technical stages they are learned easy, through the method of sound scientific thinking, which helps them to innovate methods and tools to help them in the learning and performing those technical stages. Hence, was the idea of the research as the researcher believes that if students participated with their ideas in the way of learning to perform the butterfly swimming, which proceed the performance skills and their proposed tools that help the performance of technical stages will facilitate the process of learning through teaching method easy and interesting helped forge a cognitive inventory helps Butterfly swimming speed

learning style appropriate to their abilities and these methods brainstorming method.

according to the knowledge of the researcher and his theoretical reading and exploring the study associated with the clear failure to address the use of brainstorming method to learn the butterfly swimming so the researcher studying the impact of brainstorming on some of the physical variables and the collection of knowledge and its relationship to quickly learn the butterfly swimming for students of Northern Borders University, Saudi Arabia - Ar'ar.

**Aim of the research:**

Facilitating The Learning of Butterfly Stroke for the students'

**Research hypotheses:**

1. There are significant differences between the pre and post measurements of the experimental group in some physical variables, the level of knowledge acquisition, and the quick learning of the butterfly swimming of the students at the Northern Borders University, in favor of the pre measurement.
2. There are significant differences between the two pre and post measurements of the control group in some physical variables the level of knowledge acquisition, and the quick learning of the butterfly swimming of the students at the Northern Borders University, in favor of the pre measurement.
3. There are significant differences between the two post measurements of the experimental and control groups in some physical, the level of knowledge acquisition, and the quick learning of the butterfly swimming of the students at the Northern Borders University, in favor of the experimental group.

**Search Terms:**

Brain Storming

"An educational and training method which is used in order to generate the maximum ideas to address an issue in an atmosphere of freedom and safety in suggesting ideas away from confiscation and assessment" (5: 144)

**Knowledge Acquisition**

"How much in formation has the student acquired during her learning of the skills of the High Jump. This is represented in the marks she gets in the knowledge acquisition test."

**Research Procedures**

**Research Methodology:**

The researcher has used the empirical method, using the experimental design to two groups, an experimental group and a control one, depending on the pre and post measurements appropriate to the nature of the study.

**Research population:**

The research population was chosen of the students of the University of the Northern Borders, Saudi Arabia - Ar'ar who are enrolled in the courses of swimming for the academic year 2013/2014, with a total number of 80 students.

**Research sample:**

The sample was randomly selected of the students of the University of the Northern Borders in Saudi Arabia, Ar'ar-total number of (52) students were picked up (40) students were The basic research sample that have been divided into two groups as an experimental group and control group

Table (1)  
Division of the subjects of the research sample

Research population	Research Sample		
	Experimental	Control	Exploratory
Students of the Northern Borders University	20	20	12

Controlling the variables of the research:

The researcher have tested homogeneity between the subjects of the basic and the exploratory samples in terms of some variables that may have an impact on the

experimental one, such as growth (age- height - weight), level of mental abilities and physical variables of the research as shown in Table (2).

Table (2)

Normality of the distribution of the (the basic – the exploratory) research sample in terms of the variables of growth, intelligence, physical tests and cognitive acquisition under research.

Variables		Measurement unit	mean	median	St. deviation	Skewenss	Kurtosis
growth	Age	Year	20.442	20.000	1.092	1.215	1.279-
	Height	Cm	177.058	177.000	1.697	0.102	0.515
	Weight	kilogram	74.577	75.000	2.127	0.597-	0.773
Intelligence		degree	65.269	65.500	1.069	-0.648	0.925
The Physical	Legs muscles strength	Kilogram	115.856	116.000	1.214	0.356-	0.933-
	Back muscles strength	Kilogram	76.938	77.000	2.097	0.088-	0.164-
	Vertical jump from the constancy	Cm	29.952	30.000	1.443	0.100-	0.950-
	Forward-below flexion of trunk from standing	Cm	6.412	6.000	0.556	2.219	0.528-
	The two shoulders joints flexibility	Cm	15.787	16.000	0.748	0.856-	0.120
	Heels flexibility	Cm	10.300	10.000	0.684	1.315	0.187-
	Flexibility of the dorsum of foot	Cm	4.608	4.000	0.858	2.125	0.655-
The cognitive test		degree	6.413	6.000	0.811	1.529	

Table (2) shows that all the values of the torsion coefficients for the rates of growth, intelligence, the physical variables, and knowledge acquisition were between (-0.856, 2.215) i.e. they were between ( $\pm 3$ ). This reflects the normality of the distribution of the subjects of the sample in terms of these variables.

The researcher has then conducted parity between the two groups of the research (experimental and control) in terms of the growth variables (age- height - weight), mental abilities and physical variables under research, in order to make verify equality between the two groups in these variables. This measure is to be considered as the pre measurement of the two groups, as is illustrated by table (3).

#### Means and tools of data collection

##### First, tools and devices used:

- Restmeter apparatus for height and weight
- standard Swimming Pool .

- a computer.
- the Data Show apparatus.

##### Second: IQ Test: appendix (1)

The researcher has applied the verbal IQ Test, which was prepared by "Jaber Abdul Hamid, Mahmoud Ahmed Omar" (2007). The test was proved to be reliable and stable to measure the characteristic for which it was developed. The statistical treatment was then conducted.

##### Third: The physical tests: (Appendix 3)

In order to determine the physical variables which were measured by these tests, the researcher has studied the specialized scientific references and previous studies, through identifying the physical variables of the butterfly swimming. These variables were then submitted to 7 experts in the field of training and swimming (Appendix 2) to determine the most important tests that measure all of these variables. The researcher has embraced the ratio of 75% or more. Table (4) illustrates this:

Table (4)  
Percentage of the experts' opinions for determining the most important tests which measure each variable.

Muscular strength	The back muscles strength	٪80
	The legs muscles strength	٪80
	The arms muscles strength	٪20
Muscular ability of legs	Sargent vertical jump test	٪100
	Broad jump from constancy test	٪0
Sprint speed	Low start running for 25 Meters	٪40
	Flying start running for 25 Meters	٪40
	High start running for 5 seconds	٪20
Flexibility	Forward-below flexion of trunk from standing	٪100
	The two shoulders joints flexibility	٪100
	Heels flexibility	٪100
	Flexibility of the dorsum of foot	٪100
Compromise	15 seconds forward jump rope	٪40
	15 seconds backward jump rope	٪35
	Numbered circles test	٪25

Table 4 shows that the rates of the opinions of the experts regarding the tests which measure the physical variables of Butterfly swimming was between (20% -100%). The researcher has chosen the percentage of 75% or more for the most important physical variables

According to that the following tests were accepted:

legs muscles strength            muscular strength of legs  
back muscles strength

Fourth: knowledge acquisition test: (Appendix 4)

It is a test designed by the researcher, who followed the following steps: -

1. Identifying the aim of the test: The test aims to: -

Measure the research sample student's acquisition of knowledge aspects of Butterfly swimming, provided that the test is consistent with the level of the age of the research sample. It is to be taken into account the formulation of the overall objectives of the cognitive test in the form of behavioral objectives which can be measured as follows:

- The student ought to recognize the technical performance of the Butterfly swimming.
- The student has to remember Butterfly swimming law.
- The student should remember the common injuries.

2. Preparing the basic factors of the test:

In light of the test target, it was prepared depending on the previous studies on butterfly swimming. The researcher has then determined the scientific material which is included in the test represented in (3) basic pivots, namely, (technical performance of Butterfly swimming, law, common injuries). The material covered by the test was submitted to 5 experts in teaching methods and in the field Swimming

With experience of at least ten years (Appendix 2) in order to express an opinion with respect to the cognitive objectives intended to be achieved and measured and proposing what may be added or deleted. The relative importance of each factor has been determine as stated in table (5).

table (5)  
The relative importance of the pivots of the cognitive test.

Pivot No.	The Pivot	Percentage given by the expert
1	Technical performance of Butterfly swimming,	100%
2	Law	100%
3	Common injuries	80%
4	The cultural aspect	65%
5	The psychological aspect	60%
6	Common mistakes	40%

Table (5) shows the discriminant percentages of the pivots of the knowledge acquisition test in question. The pivots of technical performance of the Butterfly swimming and the law have got a percentage of 100%. The common injuries pivot has got (80%), the pivot of the cultural aspect (65%), and the psychological aspect (60%). The pivot of common mistakes got the lowest percentage of (40%). As the researcher has adopted the percentage of the (75%) or more, therefore the pivots of the cultural aspect, the psychological aspect, and the common mistakes were deleted because of their low relative importance. The other three pivots were retained.

- Identifying the type of questions: the right and wrong, the multiple choice and the picture multiple choice questions were selected. The following condition have been taken

into account: The question ought to be appropriate for the level of students, the test has to include the three determined pivots, the word must have no more than one meaning.

Identification of items: The test was submitted to experts in the field of Swimming and Teaching Methods with experience of at least ten years (Appendix 2) in order to determine which are appropriate and the exclusion of the inappropriate, as well as making sure that the questions are appropriate to the level of students and comprehensive to the aspects of cognitive learning of the skills under discussion. The necessary adjustments were then conducted in the light of the experts' opinions. Number of the test items in its final form was (15). Table (6) illustrates this.

Table (6)  
Distribution of the phrases of the cognitive test on the different pivots and the types of the questions in their primary forms.

The pivot/the type	Right and wrong	Multiple choice	Picture questions	total
The technical performance of Butterfly Swimming	4	-	2	6
Law	4	-	-	4
Common injuries	2	2	1	5
Total	10	2	3	15

3- Test instructions: The test instructions are of the most important factors for its application as through it can the students know what is required and therefore can give the correct answer. It has taken into account that the instructions be in a sound and correct language so far from prolongation, as well as the method of recording the correct answer in the place specified. It was also important that the student was to write his statements in the answer sheet.

4. Test marking: The researcher identified one mark for each correct answer and zero for each wrong answer. The test marking key was also prepared.

5. Analysis of test phrases: this means applying the same test on an exploratory sample of (12) students of the

original population of the research and from outside the basic sample, in order to determine the extent of difficulty of the phrases, recognize its appropriateness, as well as calculating the coefficients of facility and difficulty. The following equation was used to calculate the facility coefficient:

The relationship between facility and difficulty is an inverse one i.e. their total is equal to one:

\* Facility coefficient = 1- Difficulty coefficient.

\* Difficulty coefficient = 1- facility coefficient.

Table (7)  
The facility, difficulty and discriminant coefficients for the phrases of the test

Phrase number	facility	difficulty	Discriminant	Phrase number	facility	difficulty	discriminant
3	0.50	0.50	0.25	5	0.48	0.52	0.25
7	0.33	0.67	0.22	1	0.40	0.60	0.24
11	0.53	0.47	0.25	4	0.38	0.62	0.24
12	0.32	0.68	0.22	10	0.42	0.58	0.24
9	0.43	0.57	0.25	8	0.42	0.58	0.24
2	0.33	0.67	0.22	14	0.30	0.70	0.21
6	0.30	0.70	0.21	15	0.35	0.65	0.23
13	0.33	0.67	0.22				

Table 7 shows that all phrases have meet the conditions of its acceptance within the knowledge acquisition test.

Thus, it was possible to determine the knowledge test time with 15 minutes.

6- determining the time required for the test

Scientific coefficients of the knowledge test:

Table (8)  
The correlation coefficient between the mark of each phrase and the total of the pivot to which it belongs. In terms of knowledge acquisition

Technical performance of butterfly swimming				The law				Common injuries			
Ser.	Phrase number	Correlation with the mark of the pivot	Correlation with the whole mark of the test	Ser.	Phrase number	Correlation with the mark of the pivot	Correlation with the whole mark of the test	Ser.	Phrase number	Correlation with the mark of the pivot	Correlation with the whole mark of the test
1	1	*0.558	*0.632	1	5	*0.603	*0.751	1	9	*0.665	*0.707
2	2	*0.547	*0.679	2	6	*0.767	*0.693	2	10	*0.766	*0.691
3	3	*0.782	*0.698	3	7	*0.589	*0.681	3	11	*0.546	*0.532
4	4	*0.779	*0.579	4	8	*0.529	*0.866	4	12	*0.535	*0.690
5	13	*0.529	*0.582					5	15	*0.746	*0.632
6	14	*0.513	*0.592-								

The tabular value of "t" at the level of significance of (0.05) = 0.576

The tabular value of "r" at the level of significance of (0.05) = 0.576

Table (8) shows that there is a statistically significant correlation between the mark of each phrase and the total of the pivot to which it belongs. This reflects the validity of representation of this phrase to the pivot it belongs to and the test under research.

Table (9) shows that there is a statistically significant correlation between the mark of each phrase and the total of knowledge acquisition test. This reflects the validity of representation of this phrase to the pivot the knowledge test.

Table (9)  
the correlation coefficient between the mark of each pivot and the whole mark of the pivots of the knowledge acquisition test.

**The knowledge test reliability:**

The pivots of the test	Correlation coefficients with the whole mark of the test
Technical performance of Butterfly Swimming	*0.761
Law	*0.625
Common injuries	*0.703

The test reliability was accounted in two ways:

Testing and re-testing:

The researcher has applied the test, which included (15) phrases on the same (12) students technical sample and outside the basic sample of the research under the same conditions and with the same instruction at one week interval between the first and second applications. Table (10) shows the correlation coefficients between the scores of the first two applications of the phrases of each pivot.

Table (10)

The correlation coefficients between the scores of the first and second applications of the phrases of the cognitive test.

Technical performance of Butterfly swimming			The law			Common injuries		
Ser.	Phrase number	Correlation coefficient between the two applications	Ser.	Phrase number	Correlation coefficient between the two applications	Ser.	Phrase number	Correlation coefficient between the two applications
1	1	*0.695	1	5	*0.691	1	9	*0.784
2	2	*0.670	2	6	*0.678	2	10	*0.639
3	3	*0.779	3	7	*0.728	3	11	*0.768
4	4	*0.835	4	8	*0.617	4	12	*0.683
5	13	*0.617				5	15	*0.816
6	14	*0.568-						

The tabular value of "t" at the level of significance of (0.05) = 0.576

Table (10) shows that the values of the correlation coefficients between the scores of the first and second applications of all values are statistically significant at the 0.05 level. This means that they are of high reliability coefficients.

The following table shows the correlation coefficients between the scores of the first and second applications of the phrases of the cognitive test the mark of each pivot and the whole mark of the pivots of the knowledge acquisition test.

Ser.	Pivots of the test	Correlation coefficients between the two applications
1	Technical performance of Butterfly Swimming	*0.821
2	Law	*0.742
3	Common injuries	*0.664
	The whole mark of the test	*0.616

The tabular value of "R" at the level of significance of (0.05) = 0.576

Table (11) shows that the values of the correlation coefficients between the scores of the first and second applications of the test pivots were between (0.664, 0.821). the whole mark of the test was (0.616). All values are statistically significant at the 0.05 level. This means that they are reliable.

The researcher has accounted the reliability coefficient of each pivot on a case-by-case basis and the total of the test using the split-half method through the obtaining the correlation coefficient between the single and the multiple phrases of each pivot separately and the test as a whole. The researcher has then marked using the Alpha Cronbach's coefficient as shown in the following table.

Table (12)

Correlations coefficients between the scores of the first and second applications for the pivots of the test and the whole score of the test

Ser.	Pivots of the test	Number of the phrases	Correlation coefficients by the split-half method	the Alpha Cronbach's
1	Technical performance of Butterfly Swimming	6	*0.761	0.766
2	Law	4	*0.644	0.654
3	Common injuries	5	*0.659	0.686
	The whole mark of the test	15	*0.727	0.723

The tabular value of "R" at the level of significance of (0.05) = 0.576

Table (12) shows that the correlation coefficients by the split-half method were between (0.761,0.644). the whole mark of the test was (0.722). Up on correction using the alpha Cronbach, the values of reliability coefficients of the pivots of the test were between (0.654 – 0.766) and (0.723) in terms of the total of the test. This reflects their reliability and the high reliability coefficient of the knowledge acquisition test. The test has in its final form ready to be applied on the subjects of the research sample.

**Fifth: the skill level of Butterfly swimming**

The level of performance of the students was evaluated by a committee of three (referees). The evaluation includes an individual evaluation of each table in terms of (arms movements – legs strokes – breathing – level of the whole performance of swimming. The referee committee has stated that each performance would be of 10 marks.

**The exploratory study:**

The researcher has conducted the exploratory study during the period from 25/1 to 02/06/2014 on a sample of 12 students of the research population and outside the basic sample.

**The aim of the exploratory study:**

- Overcoming obstacles that may confront the researcher during the application of the basic study.
- making sure of appropriateness of tests used in the research .

- Training assistants on conducting the measurements of the variables under consideration.

- Making sure of the validity of the tools and equipment used in the research.

- Calculating the scientific coefficients of the tests used (validity - reliability).

**Results of the exploratory study:**

- Difficulties that may face the researcher during the implementation of the basic search experience have been overcome.

- Appropriateness of tests used in the research was verified.

- The validity of the tools and equipment used in the research was ascertained.

- Assistants have been trained on how to conduct measurements of the variables under consideration.

- The scientific coefficient (validity - reliability) of the tests under considerations has been verified.

**Scientific coefficients used:**

**Validity**

Validity coefficient was accounted by validity of the terminal comparison between the high scores and the low ones. This is through the descending ordering from the highest to the lowest and calculating the difference between the 12 subjects of exploratory sample, as shown in table (13).

Table (13)

The arithmetic mean, standard deviation and the value of (t) and its significance between each of the lower quarter and the top one of the sample of the exploratory study

Variables	Measurement unit	Lower quartile		Upper quartile		“t”	
		mean	St.dev.	mean	St.dev.		
Legs muscles strength	Kilogram	114.500	0.500	117.333	0.577	*7.419	
Back muscles strength	Kilogram	73.800	0.346	80.333	1.528	*8.342	
Vertical jump from the constancy	Cm	28.167	0.764	32.333	0.577	*8.704	
Forward-below flexion of trunk from standing	Cm	5.933	0.115	7.533	0.503	*6.197	
The two shoulders joints flexibility	Cm	15.033	0.153	16.600	0.693	*4.417	
Heels flexibility	Cm	9.667	0.577	11.533	0.503	*4.874	
Flexibility of the dorsum of foot	Cm	3.900	0.173	6.233	0.252	*15.275	
The cognitive test	degree	5.333	0.577	7.667	0.577	*5.715	
Skill level	The level of the performance of arms movements	degree	0.167	0.058	0.800	0.346	*3.607
	The level of the performance of legs strokes	degree	0.393	0.095	0.767	0.115	*5.004
	The level of performing breathing	degree	0.700	0.173	1.633	0.153	*8.083
	The level of the whole performance of swimming	degree	0.150	0.000	0.717	0.058	*19.630

The tabular value of (t) at the level of 0.05= 2.776



Table (13) shows that there are significant differences at the level (0.05) between the lower and the upper quartiles in the physical tests, knowledge acquisitions, skills. This **Reliability**

The coefficient of reliability of the knowledge tests and the level of performance of the skill of the high jump were accounted through the double application of the test on the 12 students

reflects that the tests are of high degree of validity and are able to show the differences and therefore are appropriate for use.

exploratory sample on a week interval and in the same conditions of the first application, during the period from 30/1/2014 to 6/2/2014, as shown in table 14.

Variables	Measurement unit	First application		Second application		Correlation coefficient	
		mean	St.dev.	mean	St.dev.		
Legs muscles strength	Kilogram	115.750	1.288	116.000	1.414	*0.898	
Back muscles strength	Kilogram	77.117	2.760	77.833	2.657	*0.918	
Vertical jump from the constancy	Cm	30.417	1.165	30.667	0.985	*0.925	
Forward-below flexion of trunk from standing	Cm	6.333	0.651	6.500	0.674	*0.828	
The two shoulders joints flexibility	Cm	15.833	0.718	16.083	0.900	*0.868	
Heels flexibility	Cm	10.250	0.622	10.333	0.651	*0.898	
Flexibility of the dorsum of foot	Cm	4.558	1.016	4.833	1.008	*0.903	
The cognitive test	degree	6.333	1.073	6.500	1.168	*0.943	
Skill Level	The level of the performance of arms movements	degree	0.458	0.294	0.517	0.244	*0.948
	The level of the performance of legs strokes	degree	0.618	0.160	0.651	0.135	*0.916
	The level of performing breathing	degree	1.250	0.375	1.300	0.319	*0.979
	The level of the whole performance of swimming	degree	0.377	0.254	0.418	0.232	*0.920

The tabular value of (r) at the level of 0.05= 0.576

Table (14) shows that there is a statistically significant correlation at the level (0.05) between the first and the second applications of all the tests. This reflects the reliability of tests.

The proposed learning program: (Appendix 5)

The brainstorming method was used on some physical variables and knowledge acquisition and its relationship to the students' quick learning of the butterfly style. This was through designing a (6) weeks educational program with three sessions per week, 90 minutes for each.

Determining the content of the learning units:

While determining and composing the content, the researcher has turned to many of references, researches and studies that focused on brainstorming, in addition to the references and researches and academic studies of swimming and butterfly swimming in particular.

- Relevant to the aims of the educational units. Valid and significance.
- Appropriate to the experiences of the students, their needs and abilities; has the characteristics of constancy, continuity and integration.
- Providing the students an opportunity for thinking.
- Taking into account the scientific accuracy.

Design of the educational units:

The Brainstorming session:

The researcher has reviewed references and studies that focused on brainstorming in order to design the procedural steps of the brainstorming session on an accurate scientific basis. The steps were as follows:

\* Identification and discussion of the problem (the subject):

The teacher takes this step, as he does suggest the problem which is the learning of butterfly swimming. In order to ensure the success of the meeting the students should be provided with the minimum information subject. This is because providing the students with more would reduce the space of thinking available before the and confine them to tight areas.

\* Reviewing of the principles of the brainstorming:

The best in this case is to write the four principles on a large board and hang it on a place that is clear for all students, so that they can bear it in mind throughout the brainstorming session.

\* Reformulation of the problem (the subject):

The teacher is to reformulate the subject in the form of questions to the students, in order for them to be aware of

the subjects. This would help promoting and provoking their thinking skills. Planning for the questions is a real criterion for the success of the teaching process using the brainstorming method. Questions must be a variety of questions ranging from those raising the students' knowledge, understanding and extent of absorption to questions about learning butterfly swimming:

- Find an easy way to learn butterfly swimming?
- Analyze the causes of over-playing in the undulation of the body?
- Propose a solution for the possibility of performing Butterfly pool without stopping when the arms enter the water?
- What do you think about Butterfly swimming?

**\* Brainstorming:**

In this section students are asked to display all their ideas about the performance of swimming as an answer to the questions which were presented in the reformulation of the problem. The writer has then to register all the ideas submitted by the students on the blackboard to be clear for everyone. This is because any student may build his own idea on the ideas of his colleague.

**\* Evaluation of ideas:**

The aim of this step is to evaluate ideas and determine what can be taken of them. It can also include two ideas in order to generate one good idea that is applicable. In this meeting the students who will carry out the process of assessment with the help of the teacher. In each lesson the teacher would present a part of the Butterfly learning. After the completion of the brainstorming session and deduction of a number of ideas, the students would go to the physical warm-up and the application of their ideas in the pool dedicated to learning the butterfly swimming. The

teacher is to arrange ideas in accordance with the proper scientific basis of gradation in learning Butterfly swimming. The assistants are to provide the tools proposed by the students, which help them to learn the skill.

**Application of the basic study**

**Pre measurement**

The pre measurement was conducted on the experimental and control groups in terms of some physical variables, the level of knowledge acquisition and the quick learning of butterfly swimming on Saturday, 2/8/2014 AD.

**Application of the educational program:**

The experiment of basic research was applied on the experimental group, which used the brainstorming for 6 weeks by three units per week and 90 minutes duration of each. The traditional program was applied on the control by using the command method including explanation and providing a model of the skill and application on it, in the period from 9 / 2 to 03/20/2014.

**Post measurement**

The researcher conducted the post measurement on the experimental and control groups in the period from 22/3 to 24/3/2014. The same conditions followed in the pre measurement have been taken into account here.

**Statistical processing**

The researcher used the statistical program for Social Sciences (SPSS), which includes the following processors: - the arithmetic mean - Standard deviation - Median - Torsion coefficient. - The correlation coefficient. - Test "T".

**The presentation and discussion of the results**

**First: Results**

Table (15)

Significance of the differences between the pre and post measurements of the experimental group in terms of the physical variables, knowledge acquisition and the level of performance of Butterfly swimming under discussion.

Variables	Measure ment unit	Pre measurement		Post measurement		Average of differences	T	Ratios of improvement
		115.800	1.240	121.950	1.191			
Legs muscles strength	Kilogram	76.975	1.720	84.675	1.340	6.150-	33.841	%5.04
Back muscles strength	Kilogram	29.750	1.446	33.250	1.020	7.700-	42.974	%9.09
Vertical jump from the constancy	Cm	6.400	0.503	8.200	0.410	3.500-	9.037	%10.53
Forward-below flexion of trunk from standing	Cm	15.850	0.813	20.275	0.966	1.800-	19.615	%21.95
The two shoulders joints flexibility	Cm	10.200	0.616	14.650	0.745	4.425-	26.448	%21.82
Heels flexibility	Cm	4.735	0.874	9.565	0.682	4.450-	19.927	%30.38
Flexibility of the dorsum of foot	Cm	6.375	0.783	13.665	1.061	4.830-	66.544	%50.50
						7.290-	26.077	%5.35

Variables		Measure ment unit	Pre measurement		Post measurement		Average of differences	T	Ratios of improvement
			115.800	1.240	121.950	1.191			
The cognitive test		Degree	115.800	1.240	121.950	1.191	6.150-	33.841	%5.04
Skill Level	The level of the performance of arms movements	Degree	0.477	0.266	7.725	0.850	7.248-	33.870	%93.83
	The level of the performance of legs strokes	Degree	0.636	0.174	8.125	0.944	7.489-	33.625	%92.17
	The level of performing breathing	Degree	1.178	0.350	8.175	0.847	6.997-	44.700	%85.59
	The level of the whole performance of swimming	Degree	0.384	0.205	7.850	0.875	7.466-	35.716	%95.11

The tabular value of "T" at the 0.05 level = 2.093

Table (15) shows that there are statistically significant differences at the 0.05 level between the pre and the post measurements of the experimental group which used the brain storming method in in terms of the physical variables, knowledge acquisition and the level of performance of Butterfly swimming under discussion.

Table (16)

Significance of the differences between the pre and post measurements of the control group in terms of the physical variables, knowledge acquisition and the level of performance of Butterfly swimming under discussion.

Variables		Measurement unit	Pre measurement		Post measurement		Average of differences	t	Ratios of improvement
Legs muscles strength		Kilogram	115.950	1.234	119.350	1.040	3.400-	15.286	%2.85
Back muscles strength		Kilogram	76.795	2.095	82.475	1.682	5.680-	22.932	%6.89
Vertical jump from the constancy		Cm	29.950	1.356	32.025	1.323	2.075-	7.765	%6.48
Forward-below flexion of trunk from standing		Cm	6.450	0.510	7.050	0.686	0.600-	3.559	%8.51
The two shoulders joints flexibility		Cm	15.700	0.733	18.850	0.933	3.150-	28.787	%16.71
Heels flexibility		Cm	10.350	0.671	11.950	0.945	1.600-	7.610	%13.39
Flexibility of the dorsum of foot		Cm	4.525	0.752	7.075	0.977	2.550-	11.419	%36.04
The cognitive test		degree	6.550	0.759	9.300	0.865	2.750-	12.724	%29.57
Skill Level	The level of the performance of arms movements	degree	0.420	0.174	6.060	0.888	5.640-	25.556	%93.07
	The level of the performance of legs strokes	degree	0.695	0.143	6.625	0.705	5.930-	35.537	%89.51
	The level of performing breathing	degree	1.322	0.221	6.785	0.579	5.463-	44.123	%80.52
	The level of the whole performance of swimming	degree	0.305	0.181	6.135	0.805	5.830-	29.740	%95.03

The tabular value of "t" at the 0.05 level = 2.093

Table (16) shows that there are statistically significant differences at the 0.05 level between the pre and the post measurements of the control in terms of the physical variables, knowledge acquisition and the level of performance of Butterfly swimming under discussion, in favor of the post measurement.

Table (17)

Significance of the differences between the pre and post measurements of the control and the experimental groups in terms of the physical variables, knowledge acquisition and the level of performance of Butterfly swimming under discussion.

Variables		Measurement unit	The control group		The experimental group		Average of differences	T value	Ratios of improvement
Legs muscles strength		Kilogram	121.950	1.191	119.350	1.040	2.600	10.137*	121.950
Back muscles strength		Kilogram	84.675	1.340	82.475	1.682	2.200	*6.306	84.675
Vertical jump from the constancy		Cm	33.250	1.020	32.025	1.323	1.225	*4.520	33.250
Forward-below flexion of trunk from standing		Cm	8.200	0.410	7.050	0.686	1.150	*8.870	8.200
The two shoulders joints flexibility		Cm	20.275	0.966	18.850	0.933	1.425	*6.541	20.275
Heels flexibility		Cm	14.650	0.745	11.950	0.945	2.700	13.831*	14.650
Flexibility of the dorsum of foot		Cm	9.565	0.682	7.075	0.977	2.490	12.882*	9.565
The cognitive test		Degree	13.665	1.061	9.300	0.865	4.365	19.656*	13.665
Skill Level	The level of the performance of arms movements	Degree	7.725	0.850	6.060	0.888	1.665	*8.350	7.725
	The level of the performance of legs strokes	Degree	8.125	0.944	6.625	0.705	1.500	*7.848	8.125
	The level of performing breathing	Degree	8.175	0.847	6.785	0.579	1.390	*8.352	8.175
	The level of the whole performance of swimming	Degree	7.850	0.875	6.135	0.805	1.715	*8.892	7.850

The tabular value of "T" at the 0.05 level = 2.0921

Table (17) shows that there are statistically significant differences in the two post measurements of the control and the experimental groups in terms of the physical variables, knowledge acquisition and the level of performance of Butterfly swimming under discussion, in favor of the experimental group.

### Second: discussion of the results

Results of table (15) show that there are statistically significant differences at the 0.05 level between the pre and post measurements of the experimental group which followed the brainstorming method regarding the physical variables under discussion, in favor of the post one. Ratios of improvement were between (5.04%, 50.50 %). According to the researcher, this improvement is due to conducting the proposed program using the brain storming method. This method included connecting the physical training to the skill training of butterfly swimming, for the training to be in the same direction of the muscular work of the butterfly swimming. The improvement in performance was then due for raising the level of the muscular ability, as well as the effectiveness of the

trainings impacts of using this method, the good selection of the exercises and the used training tools (the divided boxes- the Swedish chair) and the performance of the different jumps, partridge over and between the divided boxes and chairs in addition to the use of the exercises of jumping and partridge which result in developing the muscular ability of the two legs which is represented in the distance of the vertical jumping.

this result agrees with the results of the study Stemm (2005) <sup>(25)</sup>, Douglas & Kleiner (2008) <sup>(20)</sup>, as these studies agreed on the importance of using the exercises with their different forms to achieve a significant increase in muscle ability. This is because they lead to the development of the level of skill performance.

This is in line with what Rashid bin Hussein Abdul Karim (2008) stated of that the teacher needs to use brainstorming in many situations, and that he will find that this method is useful for generating ideas and solutions to problems as well as increasing academic achievement of students, expelling boredom and motivating the mind. (7:32)

This is confirmed by Nasser Abdel Razek Mohamed (1999) who have stressed that brainstorming is an effective way to produce many distinctive ideas and determine which of them may be a solution to the problem. Brainstorming is more effective when it is conducted in a group of no more than twenty people. It should be performed in a comfortable environment. If participants feel of the freedom and convenience they will then brainstorming their minds and producing innovative ideas and the possibility of building their own ideas on the ideas of others. (16:16)

The results of table (15) has shown that there are significant differences between the pre and post measurements of the experimental group in terms of knowledge acquisition at a rate of improvement of (5.35%) and the level of performance of Butterfly swimming under consideration and in favor of the post measurement. Improvement ratios ranged from (85.59% to 95.11%). The researcher thinks that this due to the response of each variable to the use of brainstorming in learning butterfly style, which helped students to increase their knowledge acquisition. This is because the greater the available adequate information about swimming would led to the performance of technical stages at the best level as well as reducing errors during the performance. Students innovation of new ideas and tools helped them to grade in learning the technical stages, which helped to the quick learning of Butterfly swimming under discussion.

This is consistent with what referred to by both Wafika Mustafa Salem (2001) (17) and Mahdi Mahmoud Salem (2002) (15), that modifying the behavior of the learner is related to practice and training until adaptation in new situation. Richard Schmidt also states the (2001), the continuous training and experience lead to a permanent change in the ability of skill performance. (24: 153)

This is consistent with what indicated by Akram Kamal safe (2008) (3) that the rate of improvement in the level of skill performance of the experimental group which followed the brainstorming method was better than the rate of improvement in the same variables among the control group which followed the method of displaying and explanation.

Thus, the first hypothesis which states that "**there are statistically significant differences between the pre and post measurements of the experimental group in some physical variables, the level of knowledge acquisition and quick learning of butterfly swimming of the students the Northern Borders University and in favor of post measurement**" is verified.

The results of table (16) shows the presence of statistically significant differences between the pre and post measurements of the control group in physical variables,

knowledge acquisition and level of performance of Butterfly swimming under consideration, in favor of post measurement. The researcher attributes this result to that the traditional method which depends on the verbal explanation and performance of the practical model of butterfly swimming to be learned can't be ignored. A range of progressive exercises from easy to difficult and from the simple to the complex were provided as well as the students' repetitive performance of the skill, mistakes correcting and teacher's guiding of the students during performance. This leads to the proper learning in a way that matches the technical performance. This is of a positive impact on the efficiency of skill performance of butterfly swimming under discussion.

Thus, the second hypothesis, which states that "**There are statistically significant differences between the pre and post measurements for the control group in terms of some physical variables, the level of knowledge acquisition and the quick learning of butterfly swimming of the students of the Northern Borders university and in favor of the post measurement**" is proved.

It is clear from the results of table (17) that there are statistically significant differences in the two post measurements for the experimental and the control group in terms of the physical variables under consideration, in favor of the experimental one. The researcher thinks that this result is due that the brainstorming helps visualizing the form of performance and makes students activate their minds to perform the skills. It also helps understanding the technical stages and makes the learning process easy and interesting. It also gives students freedom to express their ideas. On the contrary to that is the way used with the control group as it has relied on verbal explanation and the practical performance of the example only. This is in line with the results of each of Nasser Abdel-Razeq Mohammed Studies (1999) (16), Ahmed Abdul Latif Ebada (2001) (2), Nonis (2005) (23) that the use of brainstorming is of a positive impact on improving physical performance and skill.

Table (17) shows the presence of statistically significant differences in the two post measurements for the two experimental and control group in knowledge acquisition and level of performance for swimming the butterfly under discussion and in favor of the experimental group. The researcher believes that the regularity of the experimental group in the application of units of proposed program using brainstorming compared to the traditional method had a clear impact on developing knowledge acquisition Butterfly swimming of the students. This result is consistent with the results of the study of Factors (2005) (22) who pointed to the existence of differences between

the pre and post measurements in favor of post on in terms of physical variables and skill performance as a result of the use of rated training method.

Thus the third hypothesis, which states that "there are statistically significant differences between the two post measurements for the experimental and control groups in some physical variables, the level of knowledge acquisition and quick learning of butterfly swimming and in favor of the experimental group" is proved.

### Conclusions and recommendations

#### First conclusions:

1. The proposed program using brainstorming affects the improvement of the physical variables, and the quick learning as well as promoting butterfly swimming for the experimental group.
2. The traditional method (verbal explanation and the performance of the practical model) is of a slight positive impact on the improvement of the physical variables, the level of knowledge acquisition under discussion and the quick learning as well as promoting butterfly swimming for the control group.
3. The brainstorming method is better than the traditional method in terms of improving the physical variables, the level of knowledge acquisition under discussion and the quick learning as well as promoting butterfly swimming. This reflects the effectiveness of the brainstorming method.
4. The experimental group was superior to the control group in some physical variables, the level of knowledge acquisition, quick learning and improving butterfly swimming.

#### Second: Recommendations:

1. The use of brainstorming is of effective impact on raising the level of performance of butterfly swimming.
2. Students must be given the opportunity to express their ideas in learning skill performance which providing them with the strong motive to learn, and increases their confidence when entering to the practical domain outside the scope of the university.
3. Conducting further empirical researches on the use of brainstorming and comparing it to other methods of teaching to achieve and proving the extent of its effectiveness in other areas rather than butterfly swimming.

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