

# The Effect of Generative Teaching Strategy In Academic Achievement And Retention In Science For the Eighth Grade Male Students At Al Mazarsouthern District Schools

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**Abstract-** The study aimed at investigating the effect of generative teaching strategy in academic achievement and retention in science for the eighth grade male students at Al-Mazar southern district schools. The study sample consisted of (62) students divided into (30) students for the experimental group who learned through generative learning methodology and (32) students for the control group who learned through traditional method. The study used Quasi - experimental approach and a guide was prepared for both the student and the teacher regarding how to use generative learning strategy as well as an achievement test in the unit consisting of (20) multiple choice items whose validity and reliability were verified. The study concluded that: there were statistically significant differences among post- achievement scale in science in favor of the experimental group. The effect size was (68%). it was also concluded that there were statistically significant differences among the averages of both groups' scales regarding achievement test and retention in favor of the experimental group. The effect size was (70%). In the light of this study results, the generative learning strategy for teaching science was suggested.

**Index Terms-** Generative Teaching, Achievement in Science, Retention in Science.

## I. INTRODUCTION

Science has an essential role in the current society progress by tackling all aspects of life as well as achieving cultural development that is regarded a result of rapid progress of science. It follows that the people interested in science consider the real value if it lies in its ability in interpretation of phenomena and events. This can be attained through fact interaction and correlation in terms of concepts and theories rather than through facts by themselves; the facts without concepts are opaque and the concepts without facts are speculative. (Tamam 1995).

The science teachers are essentially concerned with teaching concepts and scientific principles that represent mental images for the perceptive. These concepts and principles vary due to their different sources as well as the way they are formed. A lot of teachers nowadays are mere exact copies of those who had taught the mand follow the same methodology. They also carry the

same thoughts in spite of the training they received to teach more effectively instead the traditional methods they were accustomed to. (Windschitl, 1999).

Various changes took place in science teaching programmers in the second half of the 20<sup>th</sup> century. These changes were reflection to economic, scientific and technological shifts and there was need to cope with these changes and adopt new approach in science depending on scientific strategies in research and thinking. (Al Hilah, 2002).

It is worth mentioning that the effective instruction is not confined to introduce concepts, facts skills and activities but rather to perform scientific operations on the part of the learner. In that vein, the education specialists have emphasized that one of the most important aims of teaching science is thinking skills development among students by teachers' using of teaching strategies through which students practice activities that trigger thinking and encourage them to ask questions. (Zaitoon, 2004).

On the other hand, science instruction requires adoption new approaches and contemporary theories as well as new methodology to activate teaching and learning science at different education stages. (Al Baz, 2001).

As long as grasping students' teaching is primary focus of the process of instruction strategies, there emerge need for identifying the impact of use of teaching strategies on student's learning and their acquisition of scientific concepts as well as their attitudes and beliefs toward science in the light if increasing call to activate group learning. This matter obliges teachers to be aware that the change in the education outcomes requires equal change in curricula and methodology and that student's motivation plays essential role in conceptual change. Instruction strategies also help students and increase their scientific achievement. (Salmi. 2003). When using generative teaching strategy, it is necessary to provide for teaching situation that enable students to relate the previous learning to the later and allowed him to ask questions, exchange views and criticize thoughts (Abdulsalam, 2006).

**Statement of the problem is to answer the following main QUESTION:**

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depending on scientific strategies in research and thinking. (Abdulsalam, 2001).

The researcher, through his practical experience, noticed student's failure and weakness in achievement and retention with regard to scientific concepts. This was due to not relating their new experiences to the previous ones and not implementing what they learn in real life. Generative teaching strategy was an attempt to solve this problem. Generative teaching strategy include two stages: the primary stage which is concerned with relation new experiences to the previous ones, and application stage which has to do with the student's implementation of everyday skills and experiences them learn. This, in turn, extends the effect of learning for a long time and increase the academic attainment.

This study- generative teaching strategy for retention and attainment among students—is an addition to the studies and researches based on constructive learning. It aims to answer the following main question:

### **What is the effect of generative teaching strategy in academic achievement and retention in science for the eighth grade male students at Al Mazar southern district schools?**

#### **The main question had the following sub- questions:**

1. Were there statistically significant differences at the level ( $0.05 = \alpha$ ) between the control group and experimental group in post- test application in science achievement test?
2. Were there statistically significant differences at the level ( $0.05 \geq \alpha$ ) in retention for the eighth grade students in science that could be attributed to teaching strategy (generative or traditional teaching)?

## II. STUDY SIGNIFICANCE

The study is significant in that it is regarded a step toward new strategy improvement and implementation where it is in line with new instruction approaches that require a student to be the engine of the teaching- learning process. The significance of the study is as follows:

1. Its response to the improvement of science teaching process to achieve the targeted aims [in the framework of education development](#) adopted by the Ministry of Education in Jordan.
2. [Opening the door to](#) conduct studies dealing with educational materials and variables not adopted in this study.
3. [Enrichment](#) science teachers with [constructivism](#)- based strategies, thereby they will be helped with well- per petrated instruction. It shows model classes using generative teaching strategy.

### **Previous studies 2.2**

The study of (Al Jaman 2013) aimed to investigate "the effectiveness of generative teaching in retention in chemistry and the scientific deduction for ninth grade students" compared to the traditional method before and after conducting the experiment research. The study sample consisted of (61) ninth grade female students from two sections in Al Khaledia secondary school for girls in Western Northern Badia, directorate, Mafraq. (31) female students for the experimental group and (30) students for the control group. The experimental group was taught through generative teaching strategy while the control group was taught through traditional method. The study was conducted in the

second semester 2012/ 2013. To achieve the aims of the study. An achievement test in the unit and scientific deduction had been prepared. The results showed that there were statistically significant differences at the level ( $0.05 = \alpha$ ) in the average on ninth grade female students in chemistry retention in favour of the experimental group taught through generative teaching strategy.

The study of (Al Saadeen 2011) aimed to investigate "the effect of the strategy of generative teaching and learning course in tenth grade students' acquisition of the basic concepts of physics and establishing their beliefs toward physics and learning. The study sample consisted of all tenth grade sections in the governments in Al Ram tha directorate. The study sample was (154) male and female students divided into three groups: the first experimental group was taught through generative learning, the second experimental group was taught through learning course, and the third control group studied through traditional method. To achieve the aims of the study, a test for physical concepts acquisition was administered to the tenth grade students. The results showed that there were statistically significant differences among the averages of physical concepts acquisition for the students in favour of generative learning strategy compared to the learning course and traditional method and this was attributed to the teaching strategy.

## III. METHODOLOGY

The study used [quasi-experimental](#) approach to cover the application aspect, answer its questions and to elicit results depending on measurement tools designed for the purposes of this study according to commonly accepted procedures.

### **Study in strument**

An achievement- test in material unit in eighth grade science book was developed. It consisted of (20) multiple- choice items and every student had to choose one correct answer out of four choices.

### **Study variables**

The present study included the following variables:

**The dependent variable:** it represented in teaching strategy and it had two types (traditional teaching method and generative teaching strategy)

**The independent variable:** it represented in students' achievement- test and retention. It was measured through study sample's answers to the achievement- test.

The study sample consisted of eighth grade students from Al Mazar Al-Janoub is chools in the academic year 2015/ 2016. The study sample was chosen in purposive method from Mu'tah secondary school for boys, Mazar Al-Janoubi, two eighth grade sections out of four sections were chosen. The [number](#) of the two section sbranches [reached](#) eight (62) students, (30) students group learned through generative teaching methodology and (32) students learned through traditional method.

### **Statistical treatment**

Statistical processing had been carried out using SPSS (Statistical Package for the Social Sciences) [to assess](#) the study results as follows:

1. The arithmetic means and standard deviations for responses of the study sample individuals to the achievement- test of each group.

2. ANCOVA (Analysis of Covariance) to examine the differences among the groups in post application of the achievement- test.

3. Eta squared to measure the size effect.

4. Kuder - Richardson 20to verify the reliability of the achievement- test.

5. Difficulty and discrimination coefficients

6. Coefficient of skew ness: Kolmogorov-Smirnov test to exam in enormality tests.

**1. Were there statistically significant differences at the level (0.05 = a) between the control group and experimental group in post- test application in science achievement test?**

To answer the question, the researcher used (ANCOVA) between the control group and experimental group to compare the performance level in post-measurement of achievement – taking into consideration that the achievement level of post-measurement was the covariate variable ( control variable) as shown in the tables (1) and (2).

**Table 1: Arithmetic MEANS FOR eighth grade students' achievement in science**

Group	Arithmetic-mean		Post-measurement		Adjusted Mean
	Arithmetic Mean	Standard Deviation	Arithmetic Mean	Standard Deviation	
Control	4.30	1.79	10.88	2.49	11.26
Experimental	5.30	1.37	16.47	1.91	16.06

**Table 2: ANCOVA to examine the differences between achievement groups in science in post-measurement**

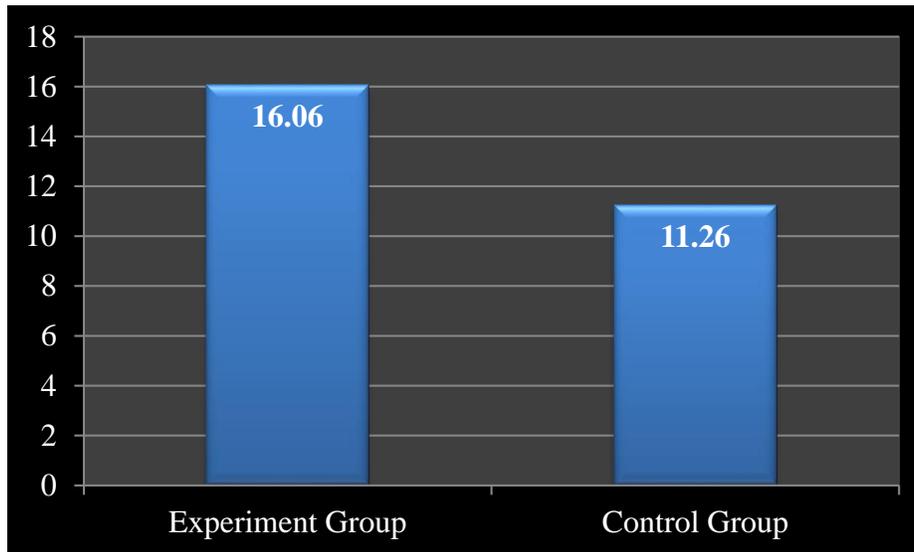
Source of variance	Sum of squares	D. f	Mean squares (MS)	F Value	Level of significance	Size effect ETA squared
Between groups	332.809	1	332.809	122.427*	0.00	
Error	160.387	59	2.718			68%
Total	12216.000	62				
Adjusted	781.097	61				

Statistically significant at the level ( $0.05 \geq \alpha$ )

Data in table (1) indicated that there were statistically significant differences at the level ( $0.05 = \alpha$ ) between the means of achievement post-measurement in science according to the group variable (control, experimental) after controlling the post-performance, by reference to the adjusted arithmetic means, it appeared that the mean of control group members' performance was (11.26) and the mean of experimental group members' performance was (16.06). This indicated that the differences were in favor of the experimental group and the results promoted the fact that generative teaching strategy had effect on eighth grade students' achievement in science.

According to Cohehen's classification, the calculated size effect which was (68%) assured that there was great effect of generative teaching strategy on eighth grade students' achievement in science.

**Figure (1) shows the variation between the control and experimental group in the post-application of the science test after controlling of the post-measurement.**



**Figure 1: Variation between the control and experimental group in the post-application of the science test after controlling of the post-measurement.**

**2. The results related to second question of the study stating that:**

**were there statistically significant differences at the level ( $0.05 \geq \alpha$ ) in delayed achievement (retention) for the eighth grade students in science that could be attributed to teaching strategy (generative or traditional teaching) ?**

To answer the question, the researcher used (ANCOVA) between the control group and experimental group to compare the performance in delayed – measurement

taking into consideration that the achievement of post-measurement was the pre- variable (control variable) as shown in the tables (3) and (4).

**Table 3: The Arithmetic means for eighth grade students' post and delayed achievement in science**

Group	Post-measurement		Delayed-measurement		Adjusted arithmetic Mean
	Arithmetic Mean	Standard Deviation	Arithmetic Mean	Standard Deviation	
Control	10.88	2.49	7.13	1.60	8.81
Experimental	16.47	1.91	16.10	1.97	14.30

**Table 4: ANCOVA to examine the differences between achievement groups in science in delayed measurement**

Source of variance	Sum squares	df	Mean squares (MS)	F Value	Level significance	Size effect of ETA squared
Between groups	177.411	1	177.411	136.245	0.00*	
Error	76.827	59	1.302			
Total	9593.000	62				0.70
Adjusted	1439.435	61				

\*Statistically significant at the level (0.05 ≥ a)

Data in table (3) indicated that there were statistically significant differences at the level (0.05 ≥ a) between the means of the delayed achievement in science according to the group variable (control, experimental) after controlling the performance in post-measurement, by reference to the adjusted arithmetic means, it appeared that the mean of control group members' performance was (8.81) and the mean of and the mean of experimental group members' performance was (14.30). This indicated that the differences were in favor of the experimental group and such result promoted the fact that generative teaching strategy had effect on eighth grade students' retention in science. According to Coheen's classification, the calculated size effect which was (70 %) assured that there was great effect of generative teaching strategy on eighth grade students' achievement and retention in science.

#### IV. DISCUSSION

##### 1. Discussion of the results related to the first question which stated that: Were there statistically significant differences at the level (0.05 = a) between the control group and experimental group in post- test application in science achievement test?

[1] The results showed that there were statistically significant differences between the means of the two groups (experimental and control) regarding the post-measurement of achievement in science and in favour of the experimental group. This indicated that there was an impact of the generative teaching strategy in the eighth grade students' achievement in science. The size effect (68%) emphasized the great impact of this strategy. The researcher explained this result according to the fact that the mental correlations of chemistry concepts established by the students who learned through this strategy had effect on their scores. He also added that teaching through this strategy helped students relate what

they hear, see and read by constructing relationship among these senses as well as coordination of sight, hearing and articulation, which facilitated establishing relation which in turn facilitated students' realization and acquisition of concept. As a consequence, it had been reflected on their achievement in sciences characterized by difficult concepts. Generative instruction strategy – according to the researcher -make it easy for eighth grade students to acquire the rigid of science concepts due to its multiple strategies combined together and achieved the expected result which was formation of conceptions of science concepts by acquiring new concepts and relating them to their previous outcome of these concepts. This result is also explained based on the fact that the learner is the focus of this strategy, so it is consistent with the results of the study of (Al Jaman 2013) in which there were statistically significant differences in the average of the ninth grade students' achievement in chemistry. This was due to the teaching model and in favour of the experimental group which studied through generative teaching strategy and the study of (Al Saedeen 2011) whose results referred to statistically significant differences between the means of physical concept- acquisition attributed to the strategy of teaching, and in favor of the strategy of generative learning. The study of (Daheer 2009) which came with the results: the effectiveness of generative learning among the eighth grade students and the existence of statistically significant differences between the average scores of the students in the two post-test groups in favour of the experimental group due to the generative learning strategy. The study of (Kourilsky 2004) whose results indicated that the use of the generative teaching strategy in instruction was effective and positive. The study of (Muhammad, 2003) showed that the generative model in teaching has a great influence and effect in modifying the alternative perceptions about frightening natural phenomena and it also had great influence and

effectiveness in students' acquisition of the scientific deduction skills, thus this result contradicted the study of (Saleh, 2009) whose results showed that there were differences in the post-application between the two groups in favour of the experimental group that studied the same units (heat and the expansion of objects by heat) in the traditional method.

- [2] **2. Were there statistically significant differences at the level ( $0.05 \geq \alpha$ ) in delayed achievement (retention) for the eighth grade students in science that could be attributed to teaching strategy (generative or traditional teaching)?**
- [3] The results showed that there is a statistically significant difference between the means of both groups (control and experimental) on the delayed achievement test (retention) in science in favour of the experimental group. This demonstrated the effectiveness of the generative teaching strategy in the eighth grade students' retention of learning material that was implemented in accordance with the generative teaching strategy. The researcher attributed this result to the fact that education in this strategy has developed the skill of thinking, recalling and retention of students. The researcher also attributed this result to the fact that teaching in this strategy developed students' thinking skills, recall and retention.
- [4] The researcher also ascribed this result to the fact that teaching through this strategy facilitated students' acquisition of science concepts and helped them establish relations among these concepts compared the control group learning through traditional method and who performance didn't develop regarding delayed achievement test where their achievement test results didn't improve. This is evidence that traditional method was not effective as far as thinking development and retention was concerned, and the student was not able to establish relations among concepts so that he could keep and recall the learned material.
- [5] This result might be attributed to the impact of the generative teaching strategy in facilitating the transfer of learning effect. This result may be attributed to the social and dynamic atmosphere and interaction between the chemistry teacher and the students, being of things this strategy depend on. This facilitated the acquisition, retention and recall of the concepts when needed (delayed test). the researcher also accounted for this result in that students' retention and easy recall of concepts – compared to the control group's lack of exposure to such experiences -were enhanced by discussing lesson concepts, allowing them reintroduce their notes,

expressing what they understand, discussing lesson activities, using appropriate teaching aids, recycling concepts, relating the stages of this strategy.

This result might be attributed to the fact that teaching by this strategy had helped students to retrieve the concepts of science. It is as well due to the effectiveness of this strategy in helping students to remember previous concepts and relate them to current knowledge. This enabled students to retain concepts and call them during the delayed test. It may be attributed to the repetition of concepts during the application of generative teaching stages that enabled students to understand and retain concepts as well as their ease of retrieval.

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