

# "The Effect of Innovative Matrix Strategy on Achievement of Second Grade Intermediate Students in Science"

<sup>1</sup>Najam eamir najam, <sup>2</sup>Ibtisam Jafar Jawad, <sup>3</sup>Abdulameer Khalaf Aret

## **Abstract**

*The research aims to identify the impact of the strategy of the innovative matrix in the achievement of second grade students of the average subject of science, and to verify the goal of the researcher developed a zero hypothesis which states: The average grades of the control group students who will study according to the usual method in the test of achievement of science, and in order to verify them applied his experience in the second half of the academic year (2019-2020). The research sample consisted of (70) second grade students in middle school, and were randomly distributed to two groups (35) students in each group, and the two groups were rewarded in the following variables: chronological age, IQ test scores, half year In the light of the relative importance of the content and behavioral purposes, an achievement test was constructed of (40) multiple-choice items. The researcher has verified the characteristics of psychometric testing. The experiment lasted (8) weeks. The two groups then analyzed the results and showed the superiority of students The experimental group who studied according to the strategy of the innovative matrix on the control group who studied in the usual way in the academic achievement variable.*

**keywords:** Innovative Matrix Strategy, Intermediate Second Grade, Science, Achievement

## **I. Introduction**

Science is a science that aims to help human beings understand the natural phenomena surrounding them, and increase their ability to subject them to measurement and appreciation, and thus the ability to use them, which is an essential part of our general culture and will continue to inspire people and will continue to promote science and technology as a whole.

(Hake, 1998; Sidin, 2003) pointed out that with the scientific breakthrough in science that began at the dawn of the twentieth century, it was necessary for those interested in science to pause to consider the teaching of this science at various stages of study, and allow the learner to understand and understand the concepts Science in general and physics in particular, It has evolved from being a branch of (natural sciences) to being the origin of other sciences. In other words, increase the physical culture of the learner and indicate the role of physics in the growth of civilization in general, as physics has its applications and effects in society Almost all specialists agree that physics is one of the pillars of the natural sciences and is the basis of

many other sciences that are interested in studying, analyzing, interpreting and investing natural phenomena. This has made it difficult for students to learn and understand this subject, which is reflected negatively on their academic achievement and motivation to learn it (Caine & Caine, 1994).

This makes teachers look for the best modern methods and strategies that are most useful in teaching science in general, and physics in particular. It has been found that methods that may contribute to a broader understanding of physics and achieve many of its teaching objectives in the intermediate stage, It is the use of modern strategies, including the strategy of innovative matrix because it is a modern strategies that may help overcome problems that impede students' understanding of physics and raise the level of achievement, as well as this strategy was not put into practice in the teaching of physics for middle school (De Bono, Therefore, this study was conducted to find out whether there was a difference between the students of the experimental group studying according to the innovative matrix strategy and the students of the control group studying according to the usual method.

## **II. Theoretical framework and previous studies**

The innovative matrix strategy is based on the active learning that emerged from the constructivist theory. The goal of this strategy is to work with the group. It helps develop creative thinking, problem solving and decision-making skills of students. Toat matrix implementation strategy is innovative in the classroom (The teacher determines in advance where the matrix will be presented to the students. The teacher presents to the students the form of the matrix shown below, in which the teacher asks the students to formulate possible and other unlikely scenarios from the matrix alternatives.

### **previous studies**

#### **(Majd momtaz, 2018) 's Education**

##### **"The Impact of the Harvest Strategy on the Achievement of Second Grade Students in Science"**

This study was conducted in Iraq, and aimed at: To know the impact of the harvest strategy on the achievement of second-grade students in science, the researcher prepared an achievement test for science subject as the test consisted of 40 paragraphs of multiple choice, as the test was applied to a sample of 100 students and confirmed Of the psychometric characteristics of (difficulty factor - discrimination coefficient - the effectiveness of the wrong alternatives, the stability of the test half - way), and after the analysis of the results of the research shows the superiority of the experimental group students according to the strategy of harvest over the students of the control group studied in the usual way.

### III. Research Methodology and Procedures:

It includes a review of the actions taken to achieve the objectives of the research starting from the research methodology and experimental design and determine the research community and sample, the equivalence of the two research groups (experimental and control), the preparation of research supplies and tools, procedures for the application of the experiment and the presentation of statistical methods used, and will be presented as follows:

Experimental design of the research: includes the independent variable (strategy of the innovative matrix) and (regular method), and a dependent variable (academic achievement), so the researcher used experimental design partial control of two equal groups, one experimental and the other control.

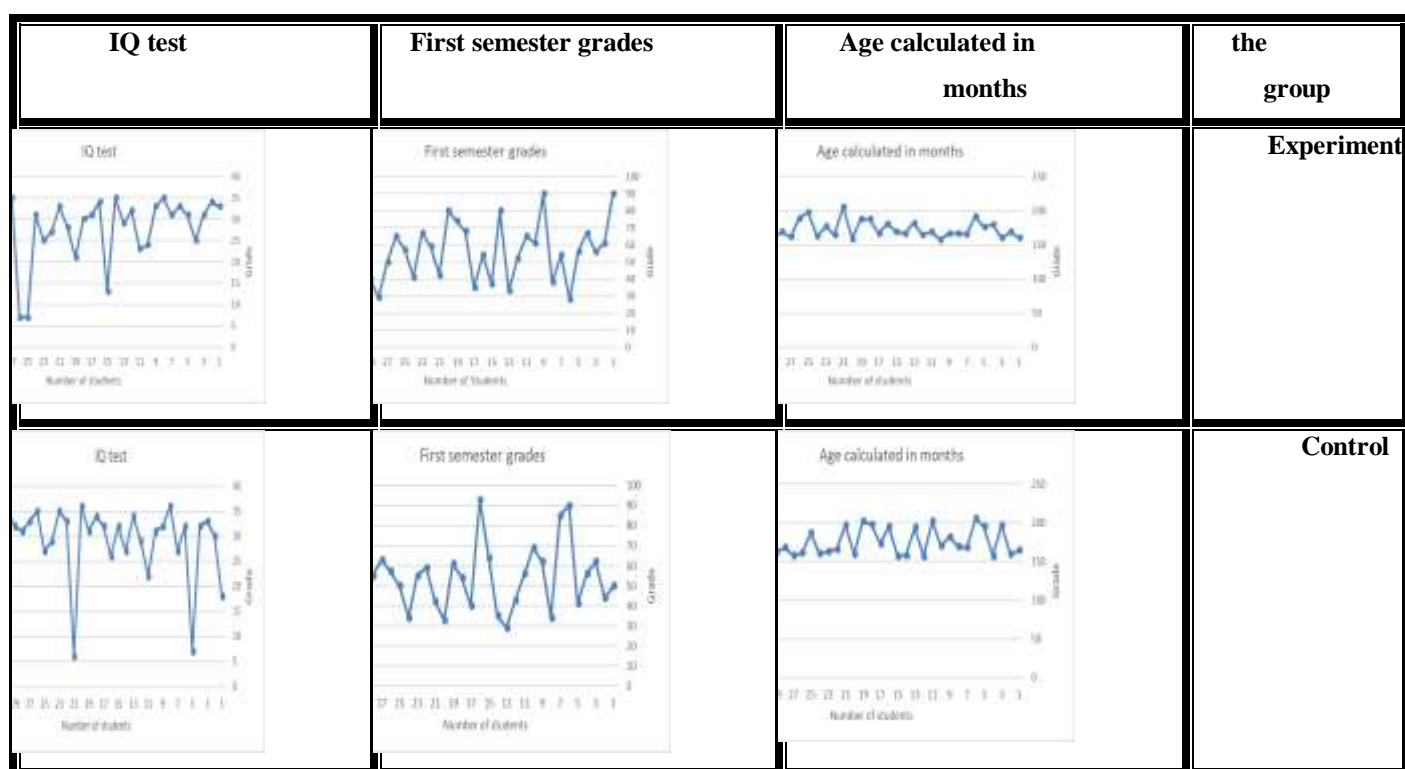
Research community and its sample: The current research community represents all second grade students in the public (secondary and intermediate) day schools of the Directorate General of Education in Babil Governorate (Al-Musayyib) for the academic year (2019-2020), in which the number of second-grade middle classes is not less than two divisions As for the sample, the researcher chose (Moderate Moderate) in the province of Babylon / Musayyib intentionally to conduct his research, and found that it includes four divisions of the second intermediate grade (A, B, C, D), the researcher chose Division (A) random method (method Lottery) to represent the experimental group and the number of students (35) students whose students will study according to (Innovative matrix strategy), and in the same way the researcher randomly selected Division (C) to represent the control group and the number of students (35) students whose students will study according to (the usual method).

Parity of the two research groups: The researcher conducted a statistical parity between the experimental and control groups in some variables that affect the results of the experiment. However, he was keen to conduct parity with the following variables: chronological age calculated in months, first grade scores, IQ test.

Significance level	T value		Degree of freedom	Standard deviation	SMA	Sample volume	The group	Variable
	Tabular	Calculated						
Not statistically significant	2	0.997	68	12.28	171.81	3	Experimental	Age calculated in months
		0.198		16.14	174.81		Control	
				16.91	54.87		Experimental	First semester grade
		0.758		15.81	53.45		Control	

				7.814	27.77		Experim ntal	IQ test
				7.277	29.87		Contro	

The following figure shows the equivalence of the two research groups with the above variables:



Control of extraneous variables: Although the researcher to verify the equivalence of the two research groups in some of the variables that are believed to affect the conduct of the experiment, but tried to avoid the impact of some extraneous variables in the conduct of the experiment and here are some of these variables and how to adjust: (Accidents associated with the experiment: The experiment in the research did not experience any emergency or accident that impedes its progress, Experimental extinction: There was no interruption or transfer to any student throughout the experiment, sample selection: The two research groups were chosen intentionally and the two groups were equal, Maturity: Because the duration of the experiment is uniform between the two research groups as well as the approximation of the age of the students in both groups, therefore, the growth will return to the members of the two groups at the same level, so this factor did not affect the research, the impact of experimental procedures: The researcher worked to reduce the impact of experimental procedures That can affect me During the course of the experiment variable).

Preparation of research requirements: The research requirements are fundamental to the research and according to which the search procedures are implemented and these requirements are as follows: (scientific

material (content): The scientific material that the researcher taught to students of the research groups during the duration of the experiment) The second subject of the academic year (2019-2020), and the scientific article included the study of the electrical properties of DC nanocomposites (PMMA - Ti), where the researcher prepared 16 plans for the experimental group studying according to (Innovative Matrix Strategy) and similar to the control group that is studying According to (the usual way Yeh).

Tools and methods used in the study of DC electrical properties of nanocomposites (PMMA - Ti) according to the innovative matrix strategy

Research Tool: Steps have been prepared for the research tool (achievement test) are as follows:

Determine the purpose of the achievement test: The purpose of the achievement test is to measure the achievement of second grade intermediate students (information, skills and experience) in physics in the study of DC electrical properties of nanocomposites (PMMA - Ti).

Determining the objectives of the test: After the purpose of the achievement test is determined, the objectives of the test are determined to determine the extent of achievement and the researcher formulated a number of behavioral goals. Determine the test paragraphs: The researcher has determined the number of paragraphs that make up the achievement test as the number of test paragraphs (40 paragraphs). The test paragraphs were formulated in their initial form in the light of what was included in the test map. The researcher chose the type of test (multiple choice) which is considered one of the best objective tests. The test consisted of (40) test items, which were distributed at the levels of cognitive Bloom. , Understanding, application, analysis), and on the three topics of the book of science.

Test Instructions: Specific instructions and instructions on how to answer are formulated (choose one correct alternative to the paragraph, answer all paragraphs, the duration of the answer, write the last name, grade and division in the space provided). Correcting test answers: After the test paragraphs were formulated and the type of test selected, a criterion was set for correcting the answers. The highest final score for the achievement test is (40) and the lowest (0).

Validity of the test: It was confirmed the apparent validity of the test and the validity of the content, as the results showed that the virtual sincerity obtained an agreement rate (80%) by the arbitrators and specialists, while the truthfulness of the content has shown that all paragraphs of achievement test statistically significant, so the achievement test is honest In measuring the understanding and understanding of second grade students in science in general and physics in particular.

Scouting App for Achievement Test: Includes what comes

First exploratory application: Achievement test was applied in its first exploratory stage to a group of second grade students from the non-research sample and the number of students (40) students, the purpose is to know the clarity of the instructions and instructions of the test and the extent to understand the clarity of the test paragraphs for students and calculate the time required for the test where he scored The researcher

examined the exit time for each student, and calculated the average time found that the time required to answer the test paragraphs every (43) minutes.

The second exploratory application: The test was applied to a sample of (100) students in the second intermediate grade other than the research sample.

#### Statistical Analysis of Achievement Test Clauses:

– Difficulty of the paragraph: By conducting statistical analysis of the items of achievement test, it was found that the difficulty factor of its paragraphs ranges from (0.36 - 0.69).

– Paragraph recognition: an important characteristic that must be available in the test paragraphs is the characteristic of discrimination and means the possibility of items or paragraphs to detect individual differences for students and test items are valid as the coefficient of distinguishing items is (20.0) and above, and the value of the coefficient of distinguishing the achievement test items Between (0.37 - 0.70), and thus the items of achievement test have a good and suitable distinction coefficient.

– Effectiveness of the wrong alternatives: The researcher conducted a statistical analysis (the highest 27% and the lowest 27%) to find the effectiveness of the wrong alternatives ranging between (-0.11 - 0.33-) and it became clear that the alternatives of the paragraphs of the achievement test are all effective and thus are all appropriate.

The stability of the test: the stability of the test depends on the relationship between each paragraph and the other or between the test paragraphs all, and this is evidenced by the stability of the degrees and consistency of paragraphs, and can be calculated the stability of the test using the legal relationship between the test units, and a good test specifications to be consistent and honest and so to be The test items have a clear meaning that they must be truthful and consistent at the same time.

#### Methods of finding test stability:

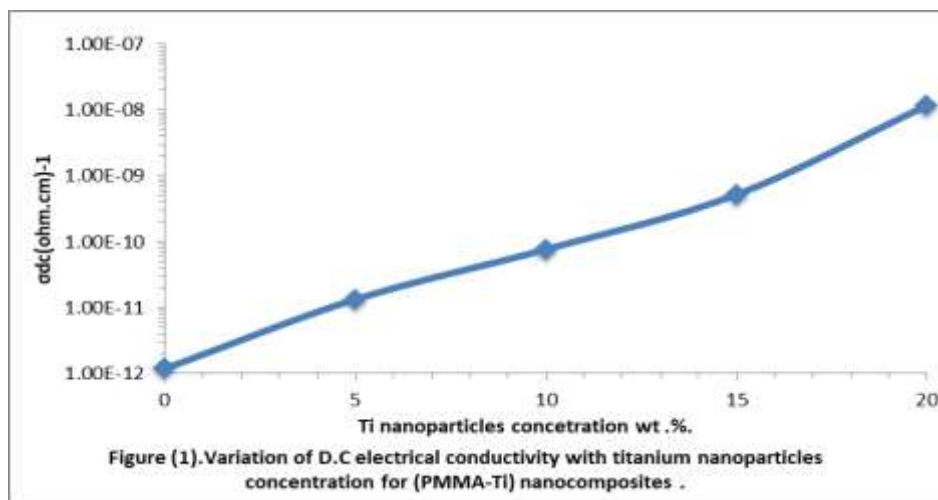
Fragmentation Medium fragmentation method: This method is one of the most commonly used methods, because it avoids the disadvantages of some other methods. Pearson correlation coefficient was obtained between the odd and even grades with the coefficient of stability (0.86). (0.92) It is a good stability factor from the perspective of specialists

Application of the research tool: The experimental and control groups were informed of the date of application of the achievement test one week before it was conducted. Statistical Methods: The researcher used the t-test equation for two independent samples to perform the equivalence between the experimental and control groups, and the Pearson correlation equation. Statistical spss, Excel

#### Results

The experimental group students using the Excel program reached the appearance of variation of the electrical conductivity of DC with titanium nanoparticles. The concentration of% of the compound, as shown in the following figure:

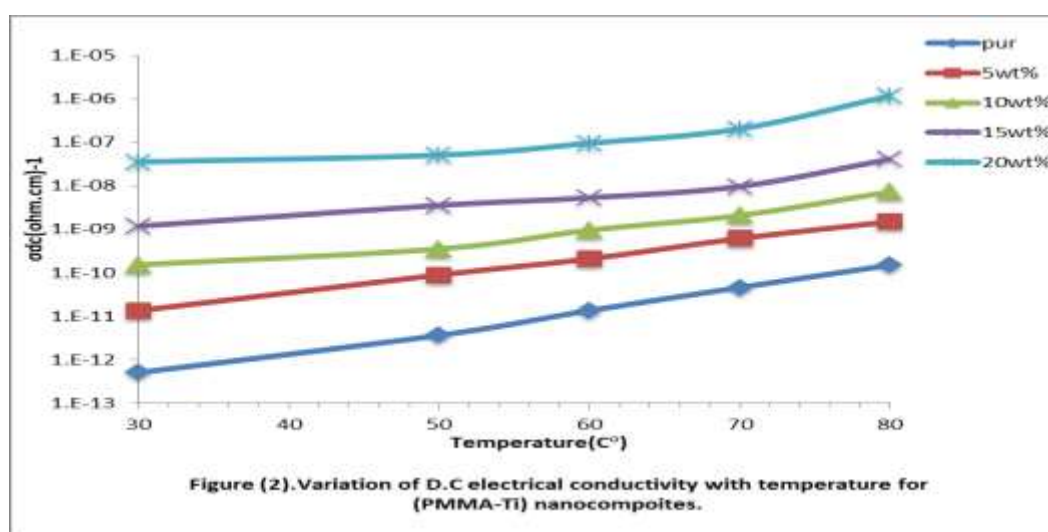
**Figure 1:** Variation of D.C. electrical conductivity with Titanium nanoparticles wt. % concentration of composite



Through the above figure, the effect of titanium nanoparticles on electrical conductivity is shown at C0 (30). Conductivity remains almost constant at low titanium nanoparticles concentration, and then begins to increase when the concentration of titanium nanoparticles is equal to or greater than 15% by weight. The DC electrical conductivity of a sample of a high concentration of titanium nanoparticles is about two for a volume compared to the DC electrical conductivity of a neat PMMA sample. While in low filler content, both polymer controls the electrical properties of the composite material, electrical conductivity can also be increased due to increased charge carriers that can be increased due to increased filler content.

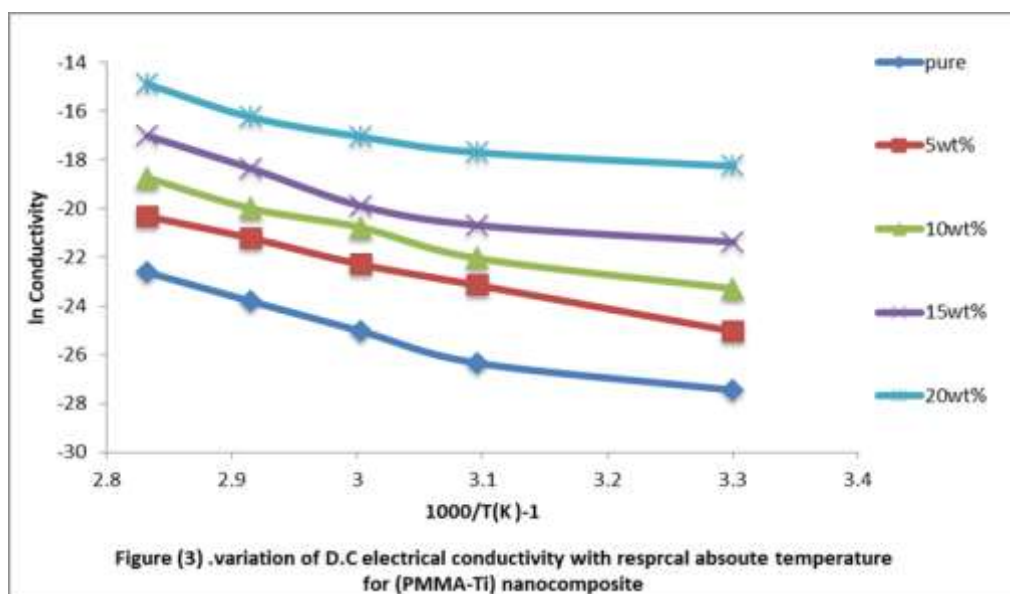
They also found the appearance of variation of electrical conductivity of temperature with the temperature of (PMMA-Ti) nanocomposite and the following figure shows:

**Figure 2:** Variation of D.C. electrical conductivity with temperature for (PMMA-Ti) nanocomposite



The above diagram shows the temperature variation of the bulk electrical conductivity of a complex nanocomposite (PMMA-Ti). Figure shows that larger electrical conductivity increases with increasing temperature of nanomaterials (PMMA-Ti). This means that these materials have resistance to the negative thermal coefficient, that is, the resistance decreases with increasing temperature, due to the fact that polymer chains and titanium ions of nanostructures can act as traps for moving carriers by jumping process, as the temperature increases, the movement of polymer chains increases; As a result of titanium nanoparticle ions. Consequently, trapped carriers are released and compound connectivity increases as a result of the increase and movement of cargo carriers.

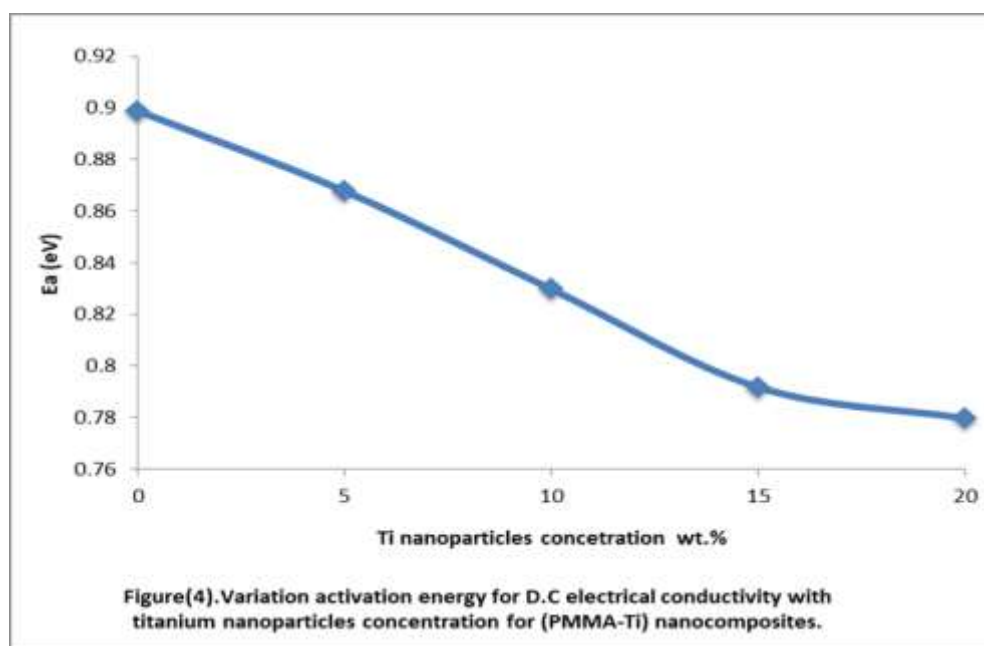
They also found a change in electrical conductivity D.C. With an absolute reciprocal temperature for (PMMA-Ti) nanocomposite as in the following figure:



The figure above shows the relationship between conductivity and the inverted absolute temperature of the PMMA-Ti nanocomposite, using the equation  $\sigma = \exp \exp (-E_a / kBT)$ . The thermal movement of ions and molecules, while the low activation energy values of the higher nanoparticle content samples in titanium can be attributed to the electronic conduction mechanism that is associated with decreasing distance between titanium nanoparticles.

They also found, according to the innovative matrix strategy, the energy of contrast activation of the electrical connections D.C with the concentration of titanium nanocomposites.





The figure above shows that the addition of low concentrations creates local energy levels in the forbidden energy gap that acts as traps for shippers, which move by moving between these levels. By increasing the concentrations of titanium nanoparticles, the activation energy decreases as a result of the increase of local centers.

Then, a test was prepared for both groups after the end of the teaching material that the researcher taught, as the results showed the superiority of the experimental group over the control group according to the following table:

Significance level	T - values		Degree of freedom	Standard deviation	SMA	Number	Statistical
	Tabular	Calculated					
D . Statistically	2	2.15	68	6.29	26.0	3	Experimental
				6.77	22.6	3	Control

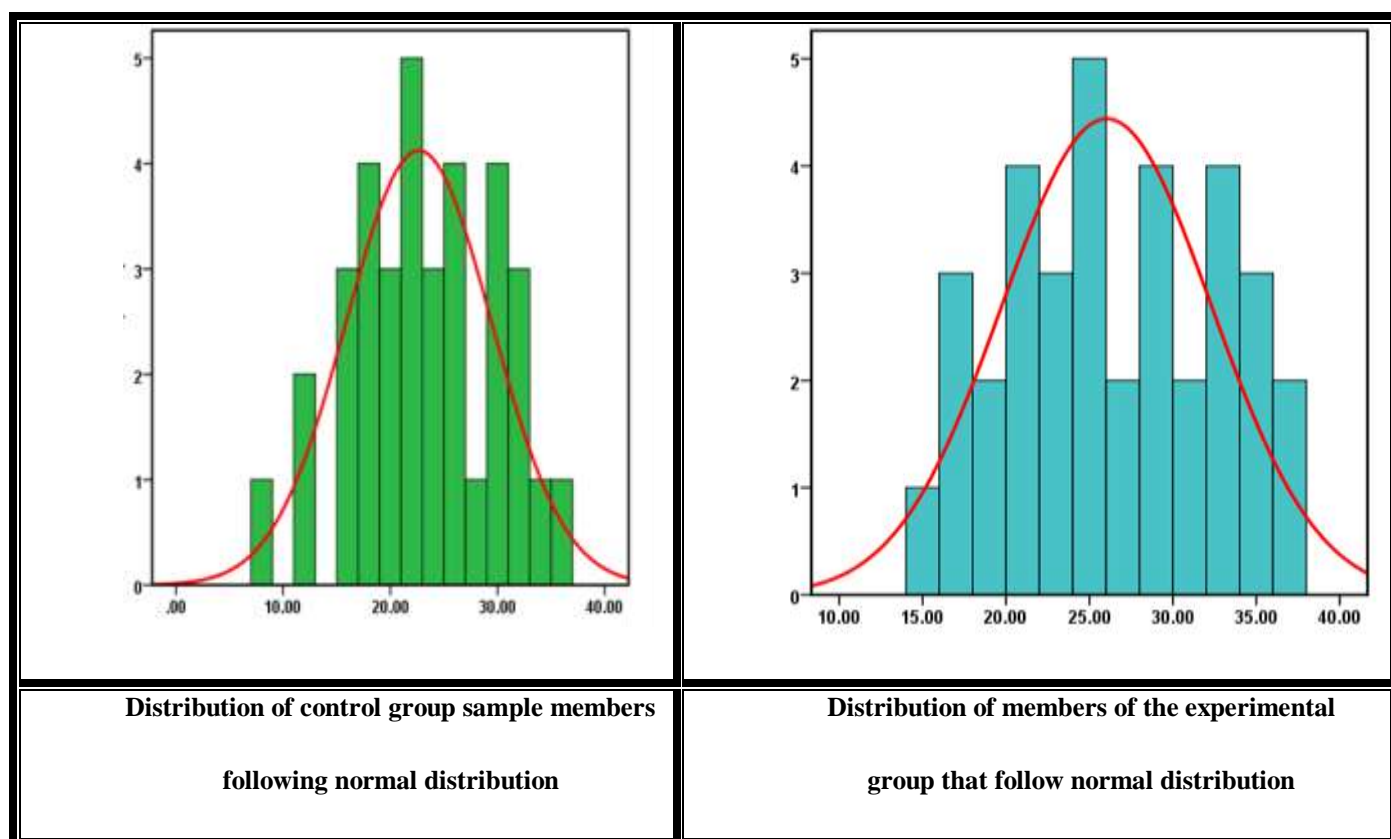
The above table shows that the experimental group is superior to the control group in the achievement test. Collection for the experimental group.

This is consistent with the previous study, which confirmed the superiority of the experimental group over the control group. There is a difference between the function of the sample distribution and the theoretical distribution function of the equilibrium distribution, which means acceptance of the null hypothesis, ie, the distribution is moderate, we notice the probability p values are greater than the significance level adopted by the researcher (0.05) in the study achievement variable Thus, all members of the two groups

follow the normal distribution in the two research variables and this achieves the requirement to use the non-parametric statistics of t-test to analyze the variance and the following table shows that:

Shapiro-Wilk			Kolmogorov-Smirnov			the test	the group
Significance	p	Statistics	Significance	p	Statistics	variable	
Is D.	0.319	0.965	Is D.	0.200	0.08	Collection	Experimental
Is D.	0.735	0.980	Is D.	0.200	0.08	Collection	Control

The following figure shows how the individuals of the two research samples follow the normal distribution of the above test:



The above shows that the experimental group students studied according to the strategy of the innovative matrix than the control group students who studied according to the usual method, and this shows us that teaching according to the strategy of the innovative matrix had a positive impact in understanding the information and scientific facts and the interpretation of mathematical laws through cooperative groups and Discussed by students and this leads to raise their scientific level and raise their level of achievement, in the light of the experience of the researcher and the results obtained and the reasons for the research, the researcher reached the following conclusions:

1. The strategy of the innovative matrix has a positive impact in increasing the achievement of second grade students in science in general and physics in particular and increase their abilities to understand information and facts and knowledge and raise their academic level.

2. The innovative matrix strategy has a role in making students the focus of the educational process through their active participation in the educational situation, which will increase their self-confidence and encourage them to persevere to raise their scientific level.

In view of the presentation of the results the researcher recommends the following:

1. The researcher recommends the need to adopt the strategy of innovative matrix in the teaching of physics for the intermediate stage.

2. Provide teachers of science in general and physics in particular with the procedural steps of the innovative matrix strategy in which subjects are taught, as well as give a video of how to teach according to the strategy of the innovative matrix. The researcher provided the physics teacher with the procedural steps through which the teaching is done.

## References:

1. Al-Khafaf, Ali Abdoun, 2011: Multiple Intelligences and Ways to Develop Them, 1, Dar Al-Masirah for Publishing and Distribution, Amman, Jordan.
2. Waqfy, Matar, 2015: Multiple Intelligences, I3, Dar Al Radwan Publishing and Distribution, Amman, Jordan.
3. Amboosaidi, Abdullah bin Khamis and Huda bint Ali Husaniyya, 2016: Active Learning Strategies 180 Strategy with Applied Examples, 1, Dar Al Masirah Publishing and Distribution, Amman, Jordan.
4. Kim Wiseman., (1977): Educational Psychology Measurement and Evaluation, New Jersey: Prentice – Hill.
5. Gebhard , J . G. (1992 ). “ Awareness of teaching : Approaches14- benefits, tasks”. Forum, 40 (4),p2-18
6. Kagan , J . M .( 1988 ). “Teaching as clinical problem solving :A critical examination of the analogy and its implications”. Teaching & Teacher Education ,6( 4),p337 – 354.
7. Keeley (2009). E- Learning and Constructivism: From Theory to Application. Interdisciplinary, Journal of E-Learning & Learning Objects' Vol. 5' N. I
8. Kish, C. K.; Sheehan, J.K. ; Cole, K. B. ; Struyk, L. R. & Kinder, D. (1997) : Portfolios in the Classroom: A vehicle for Developing reflective thinking , the university of north Carolina press.
9. Nsf funding (2006).INVESTigations in environmental systems,new york, Herrf-jones Education Devision.
10. Philips, D(1997) : Coming to grips with readical social constructivism, science educations, vol (81) no (1)
11. Philips,D.C(1995) . "the good ,the bad ,the ugly : the many faces ofconstructivism ". Eductional researcher ,vol (24) No(7) .

- 12.Schon, D.A (1987) : Educating the Reflective Practitioner: Toward a new Design For Teaching Learning in the Professions, Jossey Bass , San Francisco.
- 13.Solomon , L( 1994 ) : " Analogical Transfer and Functional Fixedness In the science classroom " , Journal of Educational Research,Vol(87) , No(6) , pp ( 371 -377).