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THE EFFECT OF TEACHING USING THE "PLAN STRATEGY" ON THE ACHIEVEMENT AND ATTITUDE TOWARDS PHYSICS FOR FIRST GRADE STUDENTS

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A B S T R A C T

The study aimed to find out the effect of teaching using "Plan Strategy" on the achievement and attitude towards physics among the first intermediate grade students.

The research sample consisted of 60 students from the first intermediate grade students, with 30 students for the experimental group studying according to Plan Strategy, and 30 students for the control group studying according to the usual method. After the researcher made sure of the equality of the research groups, the researcher built a test achievement and adopted a measure of attitude after making sure of its validity and reliability, the researcher used the (t-test) to find out the results, and concluded that the Plan strategy has an effective effect on achievement and attitude for the experimental group compared to the control group, and the researcher suggested a number of recommendations and proposals.

K E Y W O R D S

Introduction

First : The Problem of the Research

Physics has many abstract concepts that needs to be verified and needs lots of interpretation. It is vital that we adopt modern strategies, methods, models and teaching methods that focus on linking the scientific subject with the student's life and making him an effective participant in the educational-educational science, especially since most studies and research in this field have shown that science teachers, including physics teachers, still adopt traditional methods of teaching based on indoctrination.

Through the researcher's experience in the field of teaching physics for more than (25) years and his follow-up of the levels of achievement of students and his knowledge of the teaching methods carried out by teachers, he noticed that the achievement of most students is low, and this is explained by the results of some studies related to this field such as a study (Hassan ,2012) and a study (Al-Lami, 2018). These results stressed the need to use modern strategies in teaching in line with the development of educational programs, and confirmed many conferences and seminars that urged the need to adopt modern teaching methods, including the Fifth International Scientific Conference held at the Faculty of Basic Education, University of Babylon (2002). This conference urged the need to use modern

teaching methods that make education more effective through the transition of learners from remembering and memorizing to thinking(University of Babylon, 2002) : (181-230).
The 17th Scientific Conference held at the Faculty of Basic Education, Mustansiriya University (2016) stressed the overall quality in the field of education.
The Significance of using modern teaching methods and strategies to keep pace with the development in this field, Mustansiriya University (2016) (3-115).
Therefore, the researcher felt the need to use the strategies of his talk in teaching as a plan strategy, which the researcher believes may understand in addressing these problems , so the current research came in raising the following question: -

Did plan teaching affect the achievement and orientation towards physics among middle first graders?

Second: - Significance of the Research

Today, the world is witnessing an information and technological revolution that has included all aspects of human life. This revolution has posed a challenge to the educational system by the need to reform it and absorb the huge amount of knowledge by preparing scientific cadres who take their effective role in development in all its dimensions.

(Al-Kubaisi , 2007 : 5)

Education occupies a prominent value in the concerns of human societies, and it is at its core a humanitarian activity characterized by human goals that aim to produce a human being in which there are key facts, information, values, orientation s, habits and skills(Badr Khan , 2010 : 9).
The researcher believes that education has an important responsibility, which is to prepare human cadres capable of keeping pace with the accelerating scientific progress in various fields of life.
Physics is an experimental science that believes in natural phenomena as a subject , and experiment and measurement as a means. It is one of the most harmful natural sciences to human life, and it was not just concepts, laws and principles that should be learned, but scientific skills, social and ethical values that all lead to making sound and appropriate decisions about natural situations and phenomena.
Academic achievement is the basic criterion by which the progress of the learner in his study is measured, and it is the basis for making educational decisions (Al-Zahir , 1999: 120).
Modern teaching strategies and methods have emerged that have transferred the effectiveness of the educational process from the teacher to the student, who in this case is a center for organized events aimed at achieving the objectives of the educational process, and that education in this case is more resistant to forgetting, as well as that strategies help the student in self-learning (Melhem , 2006: 425).
One of these strategies is the plan strategy. This strategy emphasizes reading and developing the ability to summarize the reading topic, and how to apply new information and benefit from it in the face of the daily tasks that the individual may be exposed to in his life situations. Each letter of the term (**plan**) refers to a stage of applying this strategy as follows:

- The letter (P) refers to the predicted verb (Predict) by which the first phase of this strategy begins.
- The letter (L) indicates the verb (Locate) with which the second phase of this strategy begins.
- The letter(A) refers to the verb (Add) that you start with for the third stage in this strategy.
- The letter (N) refers to the verb (Not) with which the fourth phase of this strategy begins. (Attia , 2010 : 233-236)

From the above, the Significance of the research can be summarized as follows: -

1. The harmony of this research with modern educational orientation s that seek to experiment with modern methods and strategies in teaching.
2. The Significance of teaching physics in middle school, which helps students acquire physical information that explains cosmic and natural phenomena.
3. The Significance of the intermediate stage as this stage provides more opportunities to develop the capabilities and preparations of students to prepare them for educational or vocational testing in the coming stages.
4. The Significance of using modern strategies in teaching to reduce the use of traditional teaching methods that emphasize preservation and memorization. One of these strategies is the plan strategy, which may contribute to improving the level of student achievement.

Third: - Research Objective: -

The current research aims to identify the effect of plan teaching on achievement and the orientation towards physics among middle first graders.

Fourth : The Research Hypotheses:

1. The first hypothesis: There is no statistically significant difference at the level of (0.05) between the average achievement scores in physics among the experimental group students who study with the plan strategy and the average achievement scores in physics among the control group students who study using the usual method.
2. The second hypothesis: There is no statistically significant difference at the level of significance (0.05) between the average scores of the students of the experimental group studying physics in Plan strategy (plan) and the average scores of the students of the control group studying the same subject in the usual way in the scale of orientation towards physics.

Fifth: Limitation of the Research:

* Students of the first intermediate grade of Baghdad Rusafa Schools/first grade for the academic year (2021-2022).
* Chapter 5 (Power and Energy) and Chapter 6 Heat and Heat Expansion.

From the science book to be taught to first-grade students for the academic year (2021-2022).

Sixth: Identification of terms: -

* Teaching: - defined by :

(Attia , 2009): " All the conditions and possibilities provided by the teacher in a specific teaching situation, and all the measures he takes in order to help learners achieve the specific objectives of that situation (Attia , 2009 : 30).

Plan strategy: Defined by: -

(Attia , 2010): It is one of the strategies that emphasize predictive thinking in the reader, where each letter of the term (Plan) refers to a stage in the application of the strategy as follows: -

- The letter(P) refers to the predicted verb (Predict) by which the first stage of the application of this strategy begins.

- The letter(L) indicates the verb (Locate) with which the second phase of this strategy begins
- The letter (A) refers to the verb (Add) with which the third phase of this strategy begins.
- The letter (N) refers to the verb (Not) with which the fourth stage begins in this strategy (Attia , 2010 : 233-234).

(Al-Sherbini and Al-Tantawi,2006): The set of procedures carried out by the learner with the aim of achieving the requirements of the nature of learning, its processes and purposes, awareness of the procedures and activities that should be carried out to apply a certain result and self-control in the learning process and directing it (Al-Sherbini and Al-Tantawi, 2006 : 39).

Achievement defined by:

(Abu Jadu , 2011) " A systematic procedure to determine the amount of what students have learned in a subject in light of the specific objectives, and can be used to improve learning methods, and will contribute to the mastery of planning, control of implementation and evaluation of achievement (Abu Jadu , 2011: 411).

Procedural Definition: -

The amount of information gained by the students of the research sample as measured by the scores they receive in the achievement test prepared by the researcher.

*** Direction : Defined by: -**

(Al-Zaghloul and Al-Mahamid , 2007) "A simple or one-dimensional concept that refers to the emotional aspect that the individual adopts towards people, things or topics (Al-Zaghloul and Al-Mahamid, 2007: 214).

Procedural definition:

A set of positive or negative responses from members of the research sample that appear on the items of the scale towards physics as a result of their passage through the study, which is measured by the degree to which they obtain in the scale of direction adopted by the researcher.

Chapter 2

A theoretical framework and previous studies

Theoretical Framework

First : Plan Strategy

It is one of the strategies beyond knowledge, which emphasizes the predictive thinking of the reader and the development of the ability to summarize the reading topic, and how to apply new information and benefit from it in the face of daily tasks that the individual may be exposed to in his life situations. Each letter of the term (Predict) refers to a stage of applying this strategy as follows:

- The letter (P) to the verb Predict , which begins the first stage of the application of this strategy.
- The letter (L) indicates the verb (Locate) with which the second phase of this strategy begins.
- The letter (A) refers to the verb (Add) with which the third stage of this strategy begins.
- The letter (N) refers to the verb (Not) with which the fourth stage of this strategy begins.
- Plan Stages.

First : - Prediction stage (Predict Stage): At this stage, students provide their predictions of what the text may contain in terms of information and ideas in the light of the following procedures: -

1. The teacher chooses a reading text with a main concept that may be among the topics of textbooks or from outside , and if it is from outside the textbook, it should be distributed in print among students.
2. Ask students to take a quick look at the text chosen for the purpose of forming a general idea of the content of the text.
3. After taking a quick look at the topic, students are asked to predict what information the topic can contain in light of the idea they have about the topic through a quick look.
4. Asking students to draw maps that express their predictions about the general content of the chosen text after training them on how to draw maps that express the main ideas. This means that students have immersed themselves in thinking about the ideas that the text can contain and are able to express them with the drawings that summarize them.

Second: - Locate Stage: At this stage, students do the following: -

1. Identify the familiar ideas expressed by the map by placing a sign such as a star or a distinctive sign.
2. Identify the unfamiliar (new) ideas that appeared in the map by placing a distinctive mark, such as a question mark or others, so that the shape of the map is distinctive of what is familiar from what is unfamiliar.

Third: - Add Stage: The intention of the addition is to add what is new and did not exist or delete information that existed, but it was found to be inaccurate or untruthful.

At this stage, students do the following: -

1. They read the chosen text in a very attentive and focused way.
2. They identify the ideas actually included in the text in the light of the results of focused reading.
3. They evaluate their predictions, which they expressed in the prediction map they drew in the first stage and identified their ideas in the second stage.
4. They modify the maps of their predictions in the light of what they have already reached through focused reading of the reading text, if they find that there is a need for modification. The modification may take the following forms:

- Adding new information that was not in the predictive map.
- Deleting information that existed but turned out to be incorrect.

Fourth : The stage of observation and notation (Not Stage) : What is meant by observation here is to note the ways in which the information gained through studying the subject can be applied in new situations. At this stage, students do the following:

- Demonstrate how the student was able to translate it from the information in the previous steps into a tangible reality in the world in which he lives, provided that this is accompanied by evidence and clear and unambiguous evidence.
- Take note of this in the form of notes that can be referred to when needed. (Attia , 2010 : 233-236)

Second: Orientation:

Psychological and educational literature emphasizes the Significance of orientation s in the lives of individuals and groups because they have a distinctive and significant role in guiding the social behavior of the individual in many situations of social life. At the same time, their Significance increases because they help predict the behavior of the individual in those situations. They are also important outputs of the socialization process.

(al-Zghoul and almuhayada , 2007: 187)

*** Characteristics of Psychological Orientation : -**

1. The orientation has the character of relative reliability . It is not transient, but rather stabilizes and brews after it is formed .
2. The orientation consists of cognitive , emotional , and behavioral characteristics.
3. The orientation is acquired and learned from the environment in which the individual lives, that is, it is acquired during his life as a result of the experiences he is exposed to.
4. It represents a relationship between the same person and specific topics.
5. It is not directly observed, but is inferred by what appears to be external actions of the individual subject to observation and measurement.
6. Sometimes it is strong and sometimes weak.
7. The orientation is always formed around controversial and debatable topics or illustrated by disagreement.
8. It can be changed but it takes a long time .

(al-Zghoul and almuhayada , 2007 : 188)

Previous studies

First : Studies on the Plan Strategy

Study (Al-Hijami , 2015):

(The effect of the use of the two strategies (plan) and activates previous knowledge in the acquisition of physical concepts and physical enlightenment among fourth-grade students)

The study was conducted in Iraq:

The aim of the study is to identify the effect of the use of the Plan strategy and activate previous knowledge in the acquisition of physical concepts and physical enlightenment among fourth-grade students.

The research sample consisted of (100) students from the fourth scientific grade divided into three groups , the first experimental group (33) students studied according to the plan strategy, and the second experimental group (34) students studied according to (previous knowledge).

The control group reached the research sample (33) students studied according to the usual method. The researcher prepared a concept acquisition test and a physical enlightenment scale and used statistical means, including (one-way variance analysis, Schiff test, Pearson correlation coefficient). The results showed that teaching with the (Plan) strategy contributed to increasing the acquisition of physical concepts by the students of the first experimental group and raising their level of physical enlightenment compared to the students of the control group who studied according to the usual method (Al-Hijami, 2015).

Second: Studies on achievement :

Study (Hassan , 2012)

(The effect of the use of Robinson strategies and reciprocal teaching in the achievement of physics and the development of critical thinking among middle first graders)

The study was conducted in Iraq

The aim of the study was to identify the effect of Robinson strategies and reciprocal teaching in the acquisition of physics and the development of critical thinking among students of the first intermediate grade. The research sample consisted of (91) students from the average of Abu Tamam students of the Directorate General of Education in Baghdad / Rusafa I distributed to two experimental groups and a control group. The number of students of the first experimental group was (31) students studied according to Robinson's strategy and the number of students of the second experimental group was (30) students studied according to the reciprocal teaching strategy and the control group was (30) students studied according to the usual method. The researcher prepared an achievement selection and a test for critical thinking, the researcher used statistical means, including (analysis of unilateral variation (ANOVA), the Schiff test , and the Cooper's Laboratories)

The results showed that the two experimental groups outperformed the control group in the achievement test and critical thinking, and the researcher proposed a number of recommendations and suggestions (Hassan , 2012).

Third : Studies on the orientation :

(Al-Baidhani Study, 2011) The study was conducted in Iraq: -

The study aimed to identify (the effect of two strategies to solve the problems in the achievement of the students of the second intermediate grade and their tendency towards solving the physical problem). The study sample was intentionally selected and consisted of (90) students randomly selected to represent the two experimental groups and the control group by (30) students in each division , where an achievement test was prepared and a single variance analysis, Pearson correlation coefficient and Toki equation. The results resulted in the superiority of the two experimental groups over the control group in achievement and direction. The researcher proposed a number of recommendations and proposals(Al-Baydhani, 2011).

Chapter Three

- **Procedures of the Research**
- **Experimental Design**

Before conducting any study , the researcher must choose an appropriate experimental design to choose the validity of the results derived from his hypothesis (Van Dalen , 1990 : 360)

The researcher chose the partially tuned experimental design for the experimental and control groups, with post-testing to test achievement and direction.

As shown in (Figure 1) where this type of design was chosen because it is suitable for the nature and conditions of the current research as well as the availability of accuracy in the results (Al-Zobaie and Al-Ghanim, 1981 : 116).

Figure (1) The experimental design adopted in the research

Group	Valence	The independent variable	Dependent variable
Experimental group Plan Strategy	* Chronological age in months IQ Previous Achievement Attitude scale	* Plan Strategy	Achievement Orientation
Control group Traditional Method		Traditional Method	

*** The research community and its sample :**

The community from which we select the sample should be the same as the community to be researched and not be replaced by another community for the ease of collecting data and information from it (Jaber , 1989: 231).

The research community consisted of middle school students in the middle and high schools of the Directorate General of Education in Baghdad / Rusafa for the first academic year (2021-2022), the first semester, where the average of boys was selected as an intentional sample to apply the research experience for the following reasons:

- The readiness of the school administration to cooperate with the research as the researcher is a teacher on the school staff.
- The school is close to the researcher's place of work.
- Availability of the necessary means and supplies to carry out the experiment.
- Convergence of the social and economic level of students.

The researcher randomly selected two out of three divisions , as Division (C) was chosen to represent the experimental group and Division (A) to represent the control group, and the number of students in the research groups reached (68) students by (35) students in Division (C) and (33) students in Division (A), and after excluding the 5 failed students in Division (C) and (3) in Division (A), the number of members of the final sample became (60) students.

By (30) students in the experimental group and (30) students in the control group.

The reason for the exclusion of the failing students, in the belief of the researcher that they have prior knowledge of the topics studied during the experiment and therefore this knowledge will affect the accuracy of the results of the experiment and internal safety, noting that they were excluded from the results only with care to keep them in the classroom in order to preserve the school system.

* Control **Procedures**

1. Interior safety of the experimental design: -

- **Sample Equivalence:** It is clear from (Table 1) the arithmetic mean, standard deviation, calculated and tabular T-value of the variable (chronological age in months , IQ , previous academic achievement and orientation scale)

Table (1) shows the arithmetic mean, standard deviation, calculated and tabular T-value of a variable (chronological age in months , IQ , previous academic achievement and orientation scale)

Variable	Group	Number	mean	Standard Deviation	T value		Statistical significance at average (0.05)
					Calculated	tabular	
Chronological age in months	Plan Experimental Strategy (plan)	30	155,33	7,612	0.554	2,00	Not significant
	Control the usual way	30	154,26	7, 38			
IQ level	Experimental group	30	24.33	5,9	0.112	2,00	Not significant
	Control group	30	24.16	5,86			
Previous Academic Achievement	Experimental group	30	67,43	13,19	0. 407	2.00	Not significant
	Control group	30	65,96	14,167			
Attitude scale	Experimental group	30	117,6	10,844	0.373	2,00	Not significant
	Control group	30	116,56	10,697			

External safety of the experimental design: -

- **Accidents Associated with Experience**

It means natural accidents that may occur during the period of application of the experiment, such as disasters, floods, earthquakes, wars, etc. Thanks to God, nothing has happened to hinder the progress of the experiment.

- **The experimental disappearance**

It means the effect resulting from the abandonment or interruption of the members of the research sample, as the experiment was not exposed during its application to the interruption, abandonment or transfer of one of the members of the two research groups, except for some individual cases of absence, which did not affect the ease of the experiment.

- The **processes related to** maturity, as this factor had no effect on the conduct of an experiment, because the duration of the experiment was short and equal for the two research groups.

- **Sample Selection Differences**

This variable was adjusted, by performing statistical equivalence between the two research groups in the variables of the experiment.

This is to verify the equivalence of the two research groups, and to ensure the internal safety of the experiment , and thus it was concluded that the two research groups are equal in the variables of the experiment.

- History

This factor had no effect on the course of the experiment , as the experiment was conducted in a single and equal period of time.

- Effect of Experimental Procedures
- Research Confidentiality

The researcher was keen on the confidentiality of the experiment , through an agreement with the school administration not to tell the students about the nature of the experiment and its purpose in order to preserve the safety of conducting the experiment.

- Probation Period

The duration of the experiment was uniform and equal for the two research groups, as the experiment began on 1/11/2021 and ended on 2/1/2022

- Subject: - The researcher made sure that the lessons given were equal for the experimental and control groups, and it included the fifth chapter.

Power and Energy and Chapter 6 (Heat and Heat Expansion) of the Science Book for the first intermediate grade of the academic year (2021-2022).

*** Weekly schedule of lessons: -** The researcher taught physics to the two groups (4) classes per week , and by two classes for each group over two days as scheduled in the weekly schedule of classes by the school administration.

*** School structure:** The researcher applied the experiment in one school and in similar classes in terms of distance, lighting and ventilation, which indicates that there is no effect of this factor.

- Research Requirements

Determination of Scientific Material: - Determination of Scientific Material

Before starting the experiment, the researcher determined the subject to be studied by the two research groups, which included the fifth and sixth chapters of the Science Book for the first intermediate grade for the academic year (2021-2022) in the following order: -

Chapter Five : Power and Energy.

Chapter Six : Heat and Expansion of Objects.

- Formulating behavioral purposes: -

The (142) behavioral purposes were formulated, and they were classified according to Bloom's classification of the cognitive field and the levels (remembering , comprehension , application and analysis). They were presented to a group of experts and arbitrators in the field of education, psychology and methods of teaching physics to verify the accuracy of their formulation, the extent of their coverage of the educational material and their achievement of the time allocated for the lesson. In the light of the opinions of experts, some of them were reformulated and the proposed amendments were made to others.

- Preparing teaching plans: -

Planning is defined as "a scientific method used by a person to address a problem that he may face in his life , whether this problem is immediate or future, the aim of which is to ensure, especially in the face of this matter" (Salameh et al., 2009 : 91).

Teaching plans were prepared based on the academic content for the academic year (2021-2022), which are (18) study plans for the experimental group and the same for the control group, and samples of these plans were presented to a number of specialists in physics and teaching methods to ensure their validity and modify what they deem appropriate.

*** Research Tools :**

- Achievement Test: -

Achievement testing is defined as " a structured way of determining a student's level of achievement of information and skills in a subject that they have learned through their answers to a sample of questions that represent the content of the subject " (Qatami and Abu Jaber , 2008 : 744).

Achievement tests are a tool that shows the extent to which the subject has achieved its specific objectives (Webster , 1981 p: 16) and are one of the most common evaluation and methods used in evaluating learning outcomes (alhila , 2003 : 386).

There is another type of achievement tests, which are objective tests and are one of the most comprehensive and time-saving achievement tests (Aiker, 1979 p: 41).

One of the requirements of the current research is to build an achievement test, where the researcher prepared an achievement test in line with the content of the subject and the behavioral purposes prepared by the researcher based on Bloom's level of knowledge (ticketing , comprehension , application and analysis), where the researcher prepared an achievement test according to the following steps: -

- Determining the scientific subject: -

The scientific subject, which includes (Chapter Five Power and Energy and Chapter Six Heat and Expansion of Bodies), was identified from the Science Book for the first intermediate grade for the academic year (2021-2022).

- Determining the number of test items : -

The researcher used the opinions of a number of physics teachers and experts in the methods of teaching science and physics after informing them of the behavioral purposes. For the content of the physics subject of the science textbook to be taught for the first intermediate grade, it was agreed to specify (30) test items of the subject matter items .

- Select item type: -

The test items were formulated in the form of objective items (multiple choice and for levels (remembering, comprehension, application and analysis).

- Formulating instructions for answering the achievement test: -

Instructions have been drafted for the test , how to answer and distribute the response scores to all items , not to leave a item unanswered, in addition to not choosing more than one answer for one item .

*** Test Validity:**

The validity of a test is defined as “the degree to which the test measures the trait it is designed to measure” (Al-Batsh and Farid , 2007 : 127).

Validity is one of the most important factors with regard to the quality standards of tests (Brown 1981 p:107). In order for the test to be honest and achieve the purposes for which it was designed, it was confirmed that:-

- **Face validity**

The scale is considered honest if the items it contains are suitable for the purpose for which it was set, and the best way to confirm the apparent validity of the test is to present it to a group of experts and specialists to estimate the extent to which the test items achieve the attribute or attributes that it considers measured (Ebel: 1972, 566). The researcher presented the achievement test to a group of experts and specialists in teaching methods and physics to judge the validity of the test items in terms of the clarity of their items and the extent to which they measure the levels of behavioral purposes. Based on the opinions of experts and arbitrators, some items and some alternatives have been modified.

*** Content Validity:**

The validity of the test is an indicator of the extent to which the test items are related to the content of the subject and the teaching objectives to be achieved (Duran , 1985: 171).

And that the test increases the sincerity of its content, whenever it is representative of the subjects of the subject
(Stanly, 1972, p : 102)
In order to achieve the validity of the content, the researcher presented the achievement test to the experts and arbitrators, and based on their opinions and observations, it was agreed that the validity of the test by the arbitrators and specialists is more than (80%), and thus the test is ready for application in its final form.

*** Poll application of the achievement test: -**

The test was applied to a first exploratory sample of (35) students from the falcon medium for boys to ensure the clarity of the items , the clarity of the test instructions and the time taken to answer the test. The test was then modified in the light of the exploratory experiment (Ihsan and Adnan , 2008 : 38). For the purpose of statistical analysis of the test items and to determine the level of difficulty and the strength of discrimination of each item and the effectiveness of its alternatives and the reliability coefficient of the test, the researcher applied the test to a second exploratory sample of (100) students from the average of Abi Tamam after the researcher confirmed their completion of the subject and in cooperation with the school administration and the subject teacher. The students were informed of the test date a week before the date of its conduct and the average time of answering the test items was calculated after the end of the first student's time of answering the test and the time of the last student, which was (45minutes)

*** Statistical analysis of test items: -**

Analysis of test passages is a means of improving its quality by knowing the strength of the difficulty of the passages and their ability to distinguish and exclude invalid passages (Abu Zeina , 1992 : 45).
After correcting the answers, the students' scores were arranged in descending order , and the highest (27%) of the scores were selected to represent the upper group and the lowest (27%) of the scores to represent the lower group, and the answers of the upper and lower groups were analyzed statistically according to the following steps: -

- **Difficuity fator for items**

The difficulty coefficient of the objective items was calculated, as it was found that they range between (0.46- 0.70). Thus, the test items are acceptable and their difficulty coefficient is appropriate , as the test, if the difficulty coefficient of its items ranges between (20-80%), its items are acceptable (Al-Azzawi , 2008 : 81).

- Discrimination power of items:

The discriminating power of each test item was calculated using the discriminating power equation for the item , where it was found that its discriminating power ranges between (0,30-0,48), where (Brown, 1981) indicates that the achievement test items are good if their distinguishing power is more than (0.20) (Brown , 1981 , p: 104).

- Effectiveness of wrong alternatives:

The false alternative is effective when the number of students who chose it in the lower group exceeds the number of students who chose the same alternative from the upper group (Al-Baghdadi,1981: 229). A good and effective financier is one who has a negative and large coefficient of attraction. (Al-Nabhan, 2004 : 203)
After applying the equation of the effectiveness of the wrong alternatives, it appeared that all alternatives are of appropriate effectiveness, so the alternatives were kept unchanged.

- Test Reliability: Reliability means that the test gives the same results if it is repeated in measuring the same thing successive times, and under similar conditions (alhila , 1999 : 408)

The reliability of the test was extracted using the (Kuder-Richardson equation 20). This equation is used when the test items are objective , and the value of the reliability coefficient was (86%).

It is a good influence on the reliability of the test , as research in the field of measurement and evaluation indicates that the test is stable , if the value of its reliability is (0.70) and more (Allam , 2009 : 543).

- **Attitude scale**

One of the requirements of the current research is to measure the orientation towards physics , as the researcher chose the scale (Al-Baydani ,2011) for the orientation , and in order to adopt the scale, the researcher followed the following steps:

- The **validity of the scale**: Validaty is one of the basic premises that should be available in the research tool as it is the main focus of the entire subsequent measurement process. The research tool is honest when it measures what has been developed to measure (Al-Zobaie et al., 1981 : 39) In order to determine the validity of the items (apparent validity), the researcher presented the items of the scale to a number of specialists in the methods of teaching and educational and psychological sciences and to indicate their views and verify the validity of its content. It was found that all the items were accepted by specialists in terms of the validity of the items and the alternatives used.
- The **first and second survey application of the scale**: To reveal the validity of the instructions for the items of the scale and the answer time, the test was applied to a first survey sample consisting of (30) students from the middle first grade (Abdul Karim Qasim school/ Boys) . Then, the researcher applied the test to a second survey sample of middle first grade students, which reached a size of (100) students randomly selected from the middle school (falcons) for boys to find the reliability of the test.

Test Reliability

The reliability was calculated for the scale of this research by adopting the Alfa-kronbach equation, which is one of the methods that measure internal consistency, that is, homogeneity, where the girls reached 88%, which is a good and acceptable reliability coefficient, as (Duran , 1985) believes that the tests have high reliability if the reliability coefficient is between (0.80 – 0.95) (Duran , 1985 : 133)

- **Experiment application procedures: -**

The researcher followed the following steps: -

1- The researcher began conducting the experiment on the students of the two groups on 1/11/2021 by four weekly classes and at the rate of two classes for each group and the experiment continued until 2/1/2022.

- The researcher taught the students of the two groups physics based on the teaching plans he developed himself , according to the Plan strategy for the experimental group and according to the usual method for the control group.
- The post-orientation scale was applied to the students of the two research groups simultaneously on 4/1/2022.

- The achievement test was applied to the students of the experimental and control groups simultaneously on 6/1/2022.

- Statistical Means:

The researcher used the Statistical Portfolio for Social Sciences (SPSS)

Chapter Four

Results presentation and explanations

First : Presentation of the Results

- Presentation of the results of the achievement test: -

The researcher used the t-test with two independent ends to test the significance of the difference between the mean achievement scores of the experimental and control groups, where the statistical results of the test were shown as shown in Table(2).

Table (2) shows the arithmetic mean, standard deviation, variance, the calculated T-value of the scores obtained by the experimental group and the control group students in the achievement test, and the tabular value (theory)

Group	Sample size:	Arithmetic mean X	Standard Deviation	Variance S^1	T value		Statistical significance
					nepotism t.obs.	Tabular t.crt.	
Experimental group	30	76,06	16,424	269,76	4,786	2,00	(Significant at 0.05 level)
Control group	30	57,33	13,777	189,81			
Total	60						

It is clear from Table (2) that the students of the experimental group outperform the students of the control group , if the average achievement of the students of the experimental group exceeds the average achievement of the students of the control group by statistically significant teams at the level of (0.05) and in favor of the students of the experimental group. This shows that the use of the plan strategy (paln) has an effect on increasing the achievement of the students of the experimental group.

*** Presentation of the results of the orientation gauge: -**

The researcher used the t-test for two equal independent samples to identify the significance of the difference between the mean scores of the experimental and control groups in the orientation scale and as shown in Table (3) .

Table (3) shows the arithmetic mean, standard deviation, variance and calculated T-value of the scores obtained by the control group students and the students of the experimental group in the directional scale and the tabular value (theoretical)

Group	Sample size:	Arithmetic mean X	Standard Deviation	Variance S^1	T value		Statistical significance
					nepotism t.obs.	Tabular t.crt.	
Experimental group	30	117.4	11,896	141,531	3.5	2,00	(Significant at 0.05 level)
Control group	30	106.6	13,413	179,912			
Total	60						

It is clear from Table (3) that the T-value calculated with a degree of freedom (58) is equal to (3.5), which is greater than the table T-value at a level of significance (0.05). Therefore, the difference between the experimental and control groups is statistically significant and in favor of the experimental group.

The results of this research can be attributed to the following reasons: -

- Teaching with the Plan strategy helps to increase students' activity and enthusiasm and thus contributed to increasing their academic achievement and their orientation towards learning physics.
- Teaching with the (Plan) strategy encourages the experimental group students to do different activities, set their goals, organize their knowledge, and make them realize the Significance of what they learn , and how to apply what they have learned in new situations.
- The increase in student achievement in the experimental group may be attributed to the encouraging classroom environment for dialogue, interaction, discussion, questioning and exchange of views on the issues and problems of the subject matter to be learned.
- The use of modern strategies in teaching, including the Plan strategy, by the experimental group students raises their appreciation and self-confidence, develops their ability to self-learn, improves their achievement, and thus increases their positive attitude towards learning physics.
- That this strategy makes students the focus of the educational process and develops their ability to distinguish and balance and unleash their ideas of development, which contributed to increasing their mental ability.

Conclusions:

1. The advantage of using the Plan strategy in the Achievement of the experimental group compared to the control group.
2. The use of the Plan strategy led to a positive orientation towards learning physics.
3. Teaching using modern teaching strategies such as Plan requires the teacher and the student to use more skills, effort and thinking than if they used traditional methods and methods in the learning process.

Recommendations:

1. The necessary need to train teaching staff in secondary schools to use modern strategies in teaching, including the Plan strategy.
2. It is necessary to include models of modern strategies in teaching, such as Plan, in physics books for different stages of study, and to benefit from them in the learning process.

Suggestions:

1. Conducting a study on the effect of the Plan strategy on the achievement of other subjects and stages of study.
2. Conducting a study on the effect of using the Plan strategy on other variables such as critical thinking or creative thinking.

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