

The Effectiveness of Two Strategies R.A.A.F And Immediate Feedback in Achievement of Physics of Second Year Intermediate Students

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Abstract

The research aimed to identify the effectiveness of teaching by using R.A.A.F and immediate feedback strategies in the achievement of the second intermediate grade students in physics. The study sampled (88) students, (29) students in the first experimental group , (30) students in the second experimental group and (29) students in the control group of the students of the second intermediate grade in Al-Israa Intermediate School. Students of the first experimental group studied with R.A.A.F strategy, studied students of the second experimental group by the immediate feedback strategy, and the students of the control group studied in the traditional method. The researcher prepared an achievement test for physics consisting of 40 multiple-choice items and achieved its validity and stability. The results indicated that the two experimental groups outperformed the control groups in achievement. There were no statistical differences between the students of the two experimental groups. In light of the results, the researcher confirmed the effectiveness of R.A.A.F strategies and immediate feedback and made several recommendations and proposals.

Keywords: teaching, achievement, immediate feedback, strategy.

Introduction

The term feedback came as an alternative to knowing the results, which is more comprehensive, as it means, in addition to knowing the results, other basic matters, the most important of which is the use of this knowledge in making the required improvements in the educational process. This feedback represents the spirit of systems with partial control and the basis for the continuous development of the educational system is defined as described by Rowntree in the field of education as "the sensory blood of the learner. The importance of feedback in the learning process can be summarized as follows: A – the person who give feedback informs the learner of the result of his learning, whether it is correct or incorrect, which reduces anxiety and

tension between the learner's achievement in case of poor knowledge of the results of his learning. B - it enhances the activity of the learner and encourages him to continue in the learning process for a longer period than it is, and thus helps to support the learning and teaching process. C- knowing the learner's answer and the reason for his error convince him that he is responsible for this error, which leads to doubling his efforts to overcome the error. D- Correcting the incorrect answer of the learner leads to getting rid of it, and replacing it with the correct answer. E - the use of feedback will activate the learning process, increase the level of motivation for learning, and make both teachers and learners in a continuous movement to achieve the desired goals. Also, the learner finds his place among the behavioral goals achieved by other peers in his class, which they have not achieved yet. G - feedbacks provide the learner with additional information and various references, which lead to strengthening, supporting and enriching the learning process(Al-Hila, 2000).

The importance of feedback is emphasized because it permeates the educational process through three basic axes: the curriculum, the teacher, and the student, and they are interconnected in order to achieve the goals of the learning process. Curricula and knowledge of strengths and weaknesses work to address them. This applies to the axes of the teacher and the student. Feedback has a great impact in helping the teacher to adapt to the needs of the students. At the same time, the students are able to know their academic level and it can be either deferred or immediate. As for the delayed feedback, it provides the learners with information about their performance in the test after answering it for a period of time not less than one day. The researcher focused on this aspect in her research, as these two types of feedback received controversy and many points of view from researchers. In this regard, the owners of behavioral theories (Holl / 1952), (Skiener, 1954), (Spenser, 1956) judge that "learning is better when the correct response is followed by reinforcement, or immediate feedback". Most educators accept the principle of using immediate feedback for information, and knowledge of results is a key factor in obtaining information. Also, the method of feedback is similar to the method of review that the teacher uses at the end of the material to know the extent of students' understanding of the material and remove the error, if any. The teaching process refers to all the conditions and capabilities that the teacher provides to his students during the lessons, as well as the procedures that taken to help them achieve the specific goals (purposes), and this is only done by adopting an appropriate teaching strategy with this purpose. Students deal with physics and its objectives as well about its methods to develop students' abilities and tendencies. The studies of Piaget, Deniz, and others indicate that dealing with tangible things is an important

activity in learning physics, so reading, questioning, and feedback make them more understanding and aware of the student (Frederick, 1986, 185). So recognizing common errors of concepts among students is not enough without addressing them, it was therefore necessary to use modern models and methods aimed at forming a sound knowledge structure far from the traditional methods that focus on memorization and indoctrination. One of the strategies that the researcher decided to experiment with is R.A.A.F, which is one of the modern trends in teaching mathematics because it provides positive interaction between teachers and learners in the classroom, where the student is active, effective, and involved in the education process. Perceptible and practical activities to represent abstract mathematical knowledge bring it closer to the learner's mind, thus helping to understand it. This is confirmed by the educational applications of Piaget's theory in teaching physics, which focused on learning through action, discovery and experimentation.

Background of the study

It is known that academic achievement is related to school learning and is considered a measure for evaluating the level of the learner and his academic achievement. This is achieved to a large extent thanks to the teachers' use of methods, means and activities that help students to do so. Among the reasons attributed to poor achievement is the teachers' continuation in using the traditional methods of teaching, despite its effectiveness in certain situations and circumstances, but with the scientific development and increase in number of students in classrooms and the development of curricula, it is no longer sufficient to achieve the aims of learning, which led to poor achievement. The learners consider physics a difficult subject for several reasons, including the methods of presenting the content and the lack of acceptance of the learners. It has, including what is related to the external environment of the student, represented by teaching methods that are dominated by stereotypes, routine, diction, and indoctrination. This has also led to an increase in students' aversion to studying physics, and their poor achievement of it, in addition to the fact that traditional methods make the learner a secondary element during learning or not taking over it. Any role other than the recipient does not provide nor support the students. It does not take into account the individual differences between the learners and give them the same level and rank, and from here the researcher sees that there is a need to use advanced teaching methods and strategies that will raise the level of learning and the students' outcome of the subject. Thus, the use of R.A.A.F strategies and immediate feedback may be among these methods, which may contribute to achieving more

effective teaching and raising the level of students' achievement in physics. Therefore, the research problem can be summarized as follows: What is the effectiveness of teaching with R.A.A.F strategies and immediate feedback on achievement of second intermediate students in physics?

The Research Importance

The importance of this research is evident in the following:

- The use of modern strategies such as R.A.A.F and immediate feedback in teaching physics may positively affect learners' achievement in the subject.
- The need of teachers and learners to use proven modern strategies can contribute to achieving the desired educational goals, which are consistent with the educational philosophy of the state and its future.
- It is possible to benefit from the results of the current research in developing methods of teaching physics and in preparing teachers and training them on modern methods and strategies such as R.A.A.F and immediate feedback.
- It is the first study (as far as the researcher knows) that combined R.A.A.F and immediate feedback strategies together in one study.
- The research dealt with the intermediate stage, which is considered a link between the primary and preparatory stages, as the learner begins with the study of physics.
- It adds an educational scientific study in this field to the educational library.
- It is possible to benefit from the results of the research in developing the educational process in Iraq and keeping pace with global development and drawing attention to the importance of using R.A.A.F strategies and immediate feedback in raising the level of knowledge, emotional and skillful learners.

The research Objective

The research aims to verify the effectiveness of R.A.A.F strategies and immediate feedback in the achievement of second-grade intermediate students in physics.

The Hypothesis of the Research

For the purpose of verifying the aim of the research, the following hypothesis was formulated:

There is no statistical significant difference at the level (0.05) between the scores mean of the students of the three research groups in the achievement test.

The Limitation

The limits of the research were the second intermediate students in Directorate of Education in Diwanayah Governorate (the center) for the academic year 2021 - 2022, second semester. Chapters (the first - motion and force, the second - the laws of motion, the third - work, power and energy, the fourth - work and machines) from the physics book were taught.

Define terms

First: R.A.A.F. strategy

It as an educational strategy based on reading the topic of the lesson (Read), extracting questions (Ask) and answering them (Answer), and then providing feedback(Dansereau, 2014).

Second: immediate feedback strategy

It is “immediate feedback as relating to the behavior observed and follows it immediately and provides the other party with information or directions and instructions to enhance behavior”(Biehler & Snowman, 1986, p. 10).

Achievement

It is the outcome of what the learner learns after a specified period of time has passed(Bolndis, 2010).

The researcher defines it procedurally as: the grades that the students of the research sample will obtain in the achievement test prepared by the researcher.

Literature Review

This section includes the concept of R.A.A.F strategies and immediate feedback as follows:

First: R.A.A.F. Strategy

R.A.A.F. Strategy is a teaching strategy based on information processing and based on constructivist theory, through which the learner can carry out processes of processing and processing a large

amount of information. It is based on linking the educational material or the new part of it with old or familiar information(Dean, 2012).

R.A.A.F. Strategy Steps

R = Read: Giving the student an opportunity to read the topic of the lesson quickly to form an initial idea.

A =(Ask) Formulate the material in the form of questions

A =(Answer) Answer the questions that were asked by the learners

F = Feedback and Correction

R.A.A.F encourages learners to interact in educational-learning situations, as it provides educational activities and materials according to the capabilities, preparations of the learners and their previous knowledge backgrounds. R.A.A.F aims to satisfy the learners' needs and increases their motivation towards education, thus increases their experiences and develops their skills and abilities (Dansereau, 2014: 177). The concept of R.A.A.F is based on simplifying the scientific material and formulating it in the form of questions while providing assistance to them in the form of hints or guiding information with the intention of providing them with some skills and abilities that enable him to continue their learning. Then, students are left to complete learning alone, relying on their own abilities in discovering new concepts and knowledge(Morgan, 2014).

Immediate feedback

The concept of feedback was derived from one of the applied and engineering sciences concerned with "mechanism of control". Then its use moved in the fields of education and psychology. It was derived from the term cybernetics. The term was first coined by (Norber Wiener). The owners of the cyberlogical theory, or the theory of self-regulation of behavior, have drawn attention to the fact that some scientists confuse the concept of feedback with the concept of knowing the results, which psychology books used to use to mean reinforcement or reward. This indicated ((Thorndik, 1937) that knowledge of the results works as a reward, and acts as an incentive to exert more effort and activity(Goodwin, 2017). As the term knowledge of the results did not necessarily mean that the individual benefited from this knowledge in modifying behavior and directing it in the right direction, it was a convention somewhat limited in meaning and content.

From this point of view, the term feedback came as an alternative to knowing the results, which is considered more comprehensive, as it means, in addition to knowing the results, other basic matters, the

most important of which is the use of this knowledge in making the required improvements in the educational process(Abonto, 2012).

This feedback represents the spirit of systems with partial control. Also, the basis for the continuous development of the educational system is defined as described by Rowntree in the field of education as "the sensory blood of the learner."(Clariana, Ross, & Morrison, 1991, p. 140).

Immediate Feedback requirements:

In order for the feedback to be of maximum value, the teacher must take a set of actions, as indicated by (Tuckman, 2015), including:

1- Giving quick and short tests at the end of each lesson for the purpose of knowing the extent to which the objectives of that subject are achieved, and the extent to which students understand the concepts in it.

2 Returning the corrected tests themselves to the students, and not limiting themselves to giving grades only because obtaining a grade does not give real feedback.

3- Pointing out the mistakes and the basis for correcting each test clearly, because the feedback is based on the gap between what should be and what actually is(Huang, 2005).

Characteristics of Immediate feedback

Psychologists have assumed that feedback has three characteristics, or functions that it performs, they are as follows:

Reinforcing feature:

This feature constitutes an essential axis in the functional role of feedback, as it constitutes encouragement, reward, and confirmation of the correct response. correct response later(Peeck & Tillema, 2016).

Motivational feature:

This feature constitutes an important axis, as the feedback contributes to stimulating the learner's motivation for learning, achievement, and perfect performance, which means making the learner enjoy the learning process, eagerly accept it. It contributes to the class discussion, and this leads to modifying the learner's behavior and voting, and helping him to adopt an orientation towards learning instead of focusing on performance and getting grades(Joseph & Maguire, 1982).

Positive characteristic:

It works to direct the individual towards performance, so it shows them the perfect performance, so they confirm it, the incomplete

performance and delete it, so that it increases the level of the learner's attention to the important aspects of the skill to be learned, so it fixes the desired meanings and associations in it, corrects mistakes and corrects misunderstandings. The learner is encouraged to repeat the behavior that leads to desired results, and this increases the learner's self-confidence and his educational outputs and pushes him to focus the efforts and attention on the educational task that needs modification, which increases his retention of the educational material for a long time (Store, 2019).

Immediate Feedback patterns:

Feedback has multiple patterns and images; it can be as easy as “yes” or “no” or more complex as providing corrective information for the responses. It may be a pattern through which you develop new information for the responses. Also, the process can expand further to approach the process. The educational itself, and among the common patterns of feedback based on its source are the following:

- 1 - According to the source of the feedback (internal - external).
- 2 - In conjunction with a response (syndrome - final).
- 3 - According to the time of submission (immediate - deferred).
- 4 - According to the form of information (verbal - written).
- 5 - According to its dimension (positive - negative corrective).
- 6 - According to the amount of information (relative frequency - absolute frequency).
- 7 - According to their nature (individual - collective).
- 8 - According to their distribution (separate, continuous, cumulative) (Abonto, 2012).

The feedback within the time frame in which it was submitted will be the main focus of the research.

Material and Methodology

First: Research Methodology

The researcher used the experimental approach, which includes the use of experimental design.

The researcher used the design of equal groups, which includes, the first experimental group exposed to the effect of the independent variable (R.A.A.F strategy). The second experimental group was exposed to the effect of the independent variable (immediate feedback strategy), the third group (control) is taught in the traditional method.

Second: The Research Community and Its Sample:

The current research community consisted of students of the second intermediate grade in government day intermediate schools in the center of Al-Qadisiyah Governorate for the academic year (2021-2022), which numbered (31) schools. The researcher randomly chose (by lot) Al-Israa middle school, which contains three classes for the second grade. The average, and randomly chosen (by lot) were Class (B) for a first experimental group (29) students, Class (C), a second experimental group (29) students, and Class (A) to represent the control group (30) students.

Equivalence of the Three Research Groups

The researcher chose the research groups randomly, and decided to ensure that they were statistically equal through the following variables:

1- Past Information of Physics Test Scores

The researcher applied the past information test that he prepared, consisting of (20) multiple-choice items on the research sample. The results were as shown in Table (1), which shows that the three groups are equivalent in this variable.

Table (1) ANOVA for the scores of the three groups in the previous information test

Source of Variation	df	SS	MS	F	Critical f	P.	Sig.
Between Groups	2	8.715	4.357	0.33	3.1	0.72	None
Within Groups	85	1120.001	13.17				
Total	87	1128.716					

The Age of the Students in Months

Ages in months were calculated, entered and processed by the statistical program, the results indicated the equality of the research groups in age, as in Table (2).

Table (2) ANOVA results for the ages of the students of the research groups.

Source of Variation	df	SS	MS	f	Critical f	P.	Sig.
Between Groups	2	44.723	22.362	0.71	3.1	0.49	None
Within Groups	85	2661.266	31.309				
Total	87	2705.989					

3- IQ test

The researcher applied IQ test suitable for age groups consisting of 40 items that include verbal, logical, mathematical and visual intelligence. It is codified on the learners' environment and suitable for second

grade students (Al-Nabhan, 2019) and the results indicated that the groups are equal in the intelligence test, and Table (3) explains it.

Table (3) ANOVA results for the students of the research groups in the intelligence test

Source of Variation	df	SS	MS	f	Critical f	P.	Sig.
Between Groups	2	350.891	116.964	0.36	3.1	0.26	None
Within Groups	85	7195.188	85.657				
Total	87	7546.08					

Fourth: Controlling non-experimental variables (extraneous)

The researcher tried to adjust some non-experimental variables, as follows:

1. Selection of the sample
2. Conditions of the experiment and associated incidents
3. Experimental extinction
4. Maturity factor
5. Measuring instrument
6. Impact of experimental procedures

Fifth / Research Requirements

- (1) Determine the subjects of Physics

Before starting the application of the experiment, the scientific material to be taught in the second course of the academic year (2015-2016) was determined, and the curriculum's items was distributed to the weekly classes decided by the Ministry, as shown in Table (4).

Table (4) Distribution of curriculum items among classes

Chapter	Subject	Lessons
1	light and reflection of light	6
2	Refraction of Light	3
3	thin lenses	3
4	Color and the electromagnetic spectrum	4

(2) The Formulation of Behavioral Objectives

The researcher formulated (99) behavioral goals according to (Bloom's) cognitive classification with its first three levels, which are (remembering, understanding, and applying). Its apparent validity was confirmed by presenting it to a number of arbitrators.

Daily lesson plans

The researcher prepared (16) teaching plans for each of the three groups.

Sixth / Research Tool

Achievement Test

The researcher determined the type of test (objective), then prepared the specification table in light of the weight of the content and objectives for each of the four chapters. He formulated 40 multiple-choice items with four alternatives, only one of which was correct. A number of specialists in physics and teaching methods, and in the light of their opinions and observations, modified some paragraphs and prepared the test instructions, and gave one point for the correct paragraph, and zero for the wrong or left out.

F- Exploratory application of the test

The researcher applied the test to (100) students in Al-Miraj Intermediate School for Boys. It was found through the application that the instructions are clear, the paragraphs are understandable, and the answer time is (40) minutes.

G- Analyze The Test Items Statistically

The students' scores were arranged in descending order, and (27%) of the highest scores were taken to represent the upper group, and (27%) from the lowest scores to represent the lower group. The number of students in each group was (27) students from the upper and lower groups. The difficulty coefficient was calculated with the discrimination coefficient for each item of the test, and the difficulty coefficient values were (0.52-0.69). The discrimination coefficient values were between (0.48-0.78). The effectiveness of camouflages was calculated and found to be between (-0.148 and -0.296), which means that they are effective.

H - Reliability of The Test

According to Cronbach's alpha coefficient, the reliability of the achievement test was (0.89).

Seventh: Applying The Experiment

The experiment was applied to the students of the three groups, before that, equivalence was conducted by IQ, the previous information, and the arrangement of the schedule with the school administration.

Eighth: Applying the achievement test

Before the end of the experiment, the students were informed of the date of the test in the subjects of the four taught chapters, and the test was applied in agreement with the physics teacher for the second intermediate grade and another teacher.

Tenth: Statistical Treatment

The researcher used the SPSS statistical program to calculate:

1. Percentage
2. Mean
3. Standard deviation
4. One-way analysis of variance (ANOVA)
6. Difficulty for the test items
7. Discrimination of the test items
8. The effectiveness of wrong alternatives for the test items
9. Cronbach's alpha coefficient to find the reliability of the achievement test.
10. Scheffe test.

Results and Discussion

To verify the null hypothesis of the research, there are no statistically significant differences at the level (0.05) between the mean scores of the students of the three research groups in the achievement test). The arithmetic mean and standard deviation of the scores of the students of each of the first experimental group, the second experimental group, and the control group were extracted, as in the table (5).

Table 5 Mean and Std. deviation for the students of the three groups in achievement

Group	Mean	Std. deviation
Experimental 1	26.28	8.33
Experimental 2	27.9	8.1
Control	19.55	9.48

To identify the differences in the averages of the three research groups, one-way analysis was used, the p-value (0.001) was calculated, which is less than the level of significance (0.05), and f-value (7.666) was greater than the critical value (3.1). This indicates that there were significant differences between the means. Thus, the null hypothesis is rejected and the alternative hypothesis is accepted (there are statistically significant differences at the level of (0.05) between the mean scores of the students of the three research groups in the total achievement test) as in Table (6).

Table 6 ANOVA results for the scores of the students of the three research groups in the achievement test

Source of Variation	SS	df	MS	f		P.	SIG.
				Value	Critical		
Between Groups	1147.198	2	573.599	7.666	3.1	0.001	Yes
Within Groups	6359.666	85	74.82				

In order to identify the direction of the differences in the mean scores of the three groups, a post-comparison was made between them, as shown in Table (7).

Table 7 Pairwise comparisons between the means of achievement test scores for students of the three groups

Groups	Scheffe	Critical Value	P value	Sig.
Exp1 , Exp2	1.624	5.61	0.772	None
, Cont. Exp2	8.348	5.61	0.002	Yes
Exp1 , Cont.	6.724	5.656	0.015	Yes

It is clear from Table (7) that:

1. There is no difference between the mean scores of the first and second experimental groups, as its value was (1.624), which is less than the critical value (5.61).
2. There is a difference between the mean scores of the second experimental and control groups, as its value amounted to (8.348), which is greater than the critical value of (5.61), in favor of the second experimental group.
3. There is a difference between the mean scores of the first experimental and control groups, as its value amounted to (6.724), which is greater than the critical value (5.656), and in favor of the first experimental group.

Interpreting and discussing the results

The results are the following:

* The first experimentalist taught with R.A.A.F strategy was preferred over their peers in the control group who were taught in the usual way in achievement.

The researcher attributes this to the following reasons:

- R.A.A.F increases the ability of students to learn and interact with educational situations and retrieve what they have learned by

providing the necessary feedback to the student by his peers, the teacher, or any person with experience in the subject of the lesson.

- R.A.A.F puts the learners in a real confrontation with problems and questions to know whether they can pass it on their own or if they need the support and help of others, and in both cases the learners come out of the situation with a collection of organized information fixed in the memory.

- Teaching using R.A.A.F leads to more continuous and effective communication between the student and the teacher and increases educational attainment. Also, the teacher can, through communication and interaction, identify the different needs of students and transfer his knowledge, skill and emotional experiences to them.

- Teaching using R.A.A.F provides information to students in a rich and diverse learning environment that encourages taking responsibility for self-learning and pushing them to achieve goals.

- Teaching using R.A.A.F works to improve the cognitive abilities of the student and gives him a sense of acceptance from others and self-confidence and prepares him for self-learning.

- Teaching using R.A.A.F and immediate feedback provides the opportunity for the student to present the concepts of the subject in a way that differs from the traditional style of teaching, which depends entirely on the teacher.

- Teaching using R.A.A.F and immediate feedback helps the teacher to overcome the problem of the number of students in one class, and the individual differences between them.

Teaching using R.A.A.F and immediate feedback adds excitement and freedom to the student and reduces boredom and routine.

- Teaching using R.A.A.F and immediate feedback helps the teacher to provide immediate feedback to students, which leads to immediate correction of the learning path.

- Teaching using R.A.A.F and immediate feedback is based on a basic principle in learning, which is to identify the student's previous experiences in order to start from them and work on reorganizing and providing assistance to the student in order to make them overcome the difficulties that may accompany the learning process.

R.A.A.F and immediate feedback give the student the opportunity to interact continuously and increase their ability to describe, clarify, mention details, interpret physical phenomena. They make them understand the material easier, and the role of gradual assistance

during the learning process in understanding topics, and thus ease of application in other situations.

- The general summary strategy provides an opportunity for students to review the lesson during the summary, which increases the possibility of learning and acquiring information.
- The strategies provide a comfortable atmosphere for learning and freedom for students to sit and move feature not available in traditional teaching.
- The strategies deal with the learners effectively beyond being passive recipients, and the focus is increased on developing their basic skills, and encouraging them to use primary and multiple sources, through which their role in the learning process is activated.

Conclusions

The following conclusions are drawn:

- The effectiveness of teaching using R.A.A.F strategies and immediate feedback in physics achievement.

It has not been proven that one of the two strategies is superior to the other in increasing physics achievement.

Recommendations

The researcher recommends the following:

- Adopting R.A.A.F strategies and immediate feedback in teaching physics for the second intermediate grade, due to their effectiveness in improving academic achievement.
- Including R.A.A.F strategies and immediate feedback in the primary school and higher study materials of the colleges of education.
- Including R.A.A.F strategies and immediate feedback in the physics teacher's guide for all grades.
- Training teachers on planning and implementation steps for R.A.A.F strategies and immediate feedback.

Propositions

The researcher suggests the following:

Conducting other studies using R.A.A.F strategies and immediate feedback on other academic stages.

Studying one of the two strategies (R.A.A.F or immediate feedback) with other teaching strategies in the same dependent variable.

Studying the effectiveness of R.A.A.F strategies and immediate feedback on other dependent variables and different subjects.

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