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The effect of (5555) strategy in associative thinking among fourth-grade scientific level students in the subject of biology

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Abstract

The current research objectives to identify the effect of the strategy (5555) on the associative thinking of fourth-grade students in biology, as the research sample included two groups, one of them was the experimental group and the number of its students was (25) students, and the other was the control group and the number of students was (25) students, the researchers selected (Al-Thaqalayn Preparatory School for Boys) affiliated to the General Directorate of Education in Al-Qadisiyah Governorate / the Center was randomly assigned to the research community. Research variables, and before starting the application of the experiment, the researchers rewarded the two research groups to obtain accurate results with the following variables: (the chronological age of the students calculated in months, the academic achievement of the fathers, the academic achievement of the mothers, the previous biological information test, the Daniels test of intelligence). When making parity between the two research groups, the researchers prepared the research requirements of the plans, objectives and tests for the two research groups, and upon completion of the application of the experiment, the researchers applied their research tool to the two research groups, and after analyzing the results statistically, the researchers obtained data for the two research groups, and these data were performed statistically by A t-test for two independent samples, and the results showed that the students of the experimental group outperformed the students of the control group according to the strategy (5555) in associative thinking.

key words: Strategy (5555),The associative thinking, fourth grade scientificlevel students , biology.

be described as the skill in extracting the common element between ideas, events and concepts (Hussein and Abdel Nasser, 2002 : 299), as most of the methods used in teaching do not encourage associative thinking and to ensure the existence of the problem, the researchers presented a questionnaire to biology teachers in twenty schools, who teach biology to fourth grade scientific students in the Directorate of Education of Qadissiya Governorate, the city center, as the questionnaire included a set of questionssupposed Researchers influence it, including do you have prior knowledge of associative thinking? And does your teaching style encourage associative thinking? Teachers confirmed the validity of what the researchers said, as the results of the questionnaire showed that a large percentage of teachers reach (90%) who do not have prior knowledge and do not encourage students to think associatively, so the researchers felt that experimenting with a modern teaching strategy is (5555) strategy

Article One
Definition of research
First : The research problem:

The subject of biology is still a prisoner to the usual methods that focus on theoretical aspects, memorization and indoctrination instead of thinking, as associative thinking is important for learners, because it helps them to explain the causes of the problems they face with the possibility of finding a solution to them, as well as it accustoms the teacher and the learner to link the reasons to the results to reach the final solution to the problem, so that it is possible to know the reasons for the academic delay of some learners and helps the teacher to determine the method or method that drives interaction with the studied material. It provides good stimuli that result in good responses from learners. The importance of associative thinking lies in finding a link between two things or two ideas, in the form of the occurrence of one before or after the other in a direct or sequential manner, that is, it can

strategy, as these strategies differ according to the goals to be achieved and the objectives for which they were set, as they varied to suit the education of individuals and groups to match the conditions and possibilities of the educational process, as well as with the ages of learners and their mental and physical abilities and in the conditions and possibilities prevailing in the school community De Bono, 1997:372))

There was also a need to emphasize more relevant strategies related to the learner's life, interests and abilities to reduce the gap between what the learner gets within the classroom walls and the experiences gained from their surroundings. The learner today needs strategies that enable him to transfer scientific information, experiences and skills outside the classroom and the school environment (Al-Kaabi, 2018: 19). It is worth noting that the strategy (5555) has great importance as it moves the student from the state of listening and indoctrination and negativity in learning to thinking and meditation and positivity in learning and helps to raise students' tendencies towards educational material, as a result of the active role played by each student in individual thinking to ask many ideas to the question posed, and the discussion in order to organize these ideas. It is important in learning the skill of communication, and students' acquisition of many desirable qualities such as working in groups, avoiding selfishness, creating a spirit of cooperation with others and respecting them, renouncing fear and shame, avoiding isolation, playing multiple discussion roles and positive listening, active interaction, and freely expressing opinions and defending views, and requires mental activity and deep individual thinking to produce the most ideas about a specific problem or question and discuss it. It works to increase the motivation of students to think with their maximum energies as they are exposed to the question by the teacher, especially students with low achievement and isolated in each of the class groups. All of this has a positive effect on the development of thinking of various kinds (Ambo Saidi and Huda, 2016: 408). In the sense that it has become one of the main objectives of the educational process is to increase the thinking of learners, and as long as the goal is of this importance, the concerned and the teaching process teachers and teachers must pay attention and focus on teaching thinking and its skills to create intellectual and creative learners that may help students increase their associative thinking in biology, and educational studies and research have indicated that the lack of development of associative thinking in students may generate a state of decline in their academic achievement and cognitive comprehension, including the study of (Zidane and Anwar, 2016) and the study of Amin (2016) and the study of Ghadib (2019). She recommended that associative thinking should be given an important role in the educational implications of the curricula, and that students face difficulties in analyzing, distinguishing, and understanding associative relationships and inferring meaning from them, and that students stand unable to link what they see during educational situations with their information, and this is an indication of the weakness of associative thinking, so associative thinking has become an imperative necessity to be able to overcome the problems facing them, as there has become an urgent need to educate an educated generation that relies fully on thinking skills through the development of students' minds and associative thinking, and thus the problem of research was the answer to the following question: What is the effect of (5555) strategy in associative thinking among fourth graders in biology?

Second: The significance of research:

Many modern teaching strategies called for the attention of the learner as the focus of the educational process, and thus moved the educational process from dependence on the teacher to the learner's self-reliance in the educational process and the participation of the teacher as a guide and mentor in the educational process (Melhem, 2006: 435), so it is necessary to review and view the strategies and methods of teaching this subject and choose what suits them and what suits students to be actively involved in the educational process (Kovach, 2000 :P, 2, Therefore, emphasis should be placed on the strategies and teaching methods that are emphasized by educational theories, which make learners a center of the educational process, which works to show their creative abilities in discovering knowledge and translating the objectives of the curriculum into the ideas that the educational institution aspires to, so when choosing teaching methods must be consistent with the nature of science and the acquisition of experiences (Ibrahim and Nelli, 2008: 96). Although there are many modern teaching strategies, but there is not always an ideal

Hussein Abdel Moneim Dawood and others.

Fifth : Definition of terms:

Strategy (5555): Define it :

Abdelsalam (2021) said : "It is one of the strategies that emanate from the new active learning strategies, which make the student's role positive, as it includes the step of meditation and thinking about the problem, the subject or the question posed by the teacher individually, and the discussion between the members of the group in everything that each member has reached in order to filter the ideas reached by the whole group, to come up with five ideas for the question posed or the problem, it aims to train students to put forward various ideas, and the manifold thinking about any problem they face." (Abdelsalam, 129:2021)

Procedurally, the **researcher defines** it as a set of steps that the researcher undertakes in teaching the students of the experimental group for the topics of the first five chapters (classification of living organisms, ecology and ecology, food chain and cycle of elements in nature, factors affecting the environment, suitability of the animal with the environment) from the biology subject to be taught for the fourth scientific grade in Iraq, which is (dividing the students of the class into five groups each group consisting of five students, then asking the question or problem, with a time of five minutes for individual thinking and discussion among the members of each group, and coming up with five ideas for one group about the question or problem posed).

Associative thinking defines it:

Al-Mihana**and others (2021) that :** "is the thinking that results from the relationship that the student forms between the exciters he faces and the responses that appear, and this type of thinking comes as a result of repetition, trying and learning."**(**Al-Mihana et al., 2021, 42)

The researcher operationally defines it as: A set of skills and mental treatments that are employed by fourth grade scientific learners (the research sample), which includes three skills, namely (identifying ideas or things to be linked, finding the relationship between these ideas and things, and determining the result to be reached) in a set of specific situations and activities included in the associative thinking test, which are measured by the degrees they obtain when answering the paragraphs of the associative thinking test prepared for this purpose.

who are the best nucleus for building the nation (Barqawi, 2014 :13), that thinking develops better by integrating his skills into the curriculum of the learners, and teaching thinking in this way enhances the learning of mental processes, and thus enables the learner to apply thinking skills in an easy and clear way whenever he needs it. (Nofal and Mohammed ,2011: 50), associative thinking is the thinking that results from the relationship that the student forms between the stimuli he faces and the responses he shows, and this type of thinking comes as a result of repetition, trying and learning" (Al-Mihana, et al., 2021, 42).

Third: The goal of the research and its hypothesis: The current research aims to identify the effect of the 5555 strategy in the associative thinking of fourth grade students in the scientific subject of biology and to achieve the goal of the research, the two researchers formulated the following zero hypothesis:

There is no statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students who will study biology according to the strategy (5555) and the average scores of the control group students who will study the same subject according to the usual method in the correlational thinking test prepared for the purposes of this research.

Fourth: The limits of the research: Identifies the current research as:

1. **Spatial boundaries:** Government preparatory and secondary schools affiliated with the General Directorate of Qadisiyah Education/Governorate Center Thaqalayn Preparatory School for Boys).
2. **Temporal Limits:** The first semester of the academic year (2021-2022).
3. **Human boundaries:** fourth grade scientific students.
4. **Cognitive limits**: (The first five chapters)* from the book of Biology for the fourth scientific grade, 11th edition, 2021, by

*(Chapter 1: Classification of Living Organisms, Chapter 2: Ecology and Ecosystems, Chapter 3: Food Chain and the Elements Cycle in Nature, Chapter 5: Factors Affecting the Environment, Chapter 6: Animal Adaptation to the Environment).Note that the fourth chapter was deleted by the Ministry of Education.

life, as educators emphasize that the teaching of different curricula is no longer traditionally transferring knowledge to the learner, preserving and retrieving it with a process that is concerned with thinking, and activating the learner's previous knowledge, and building, acquiring, understanding, preserving and using knowledge, from the perspective of the learner's mental, emotional and skill development, and the integration of his personality in various aspects, and in the context of social narrative (Zaytoun, 2007 :42), despite the agreement of educators on the importance of educators That is, but there is no agreement among them on how to develop these skills, so a lot of strategies have emerged to develop skills, and among these strategies is (5555), which is defined as "one of the strategies emanating from the new active learning strategies, which makes the student's role positive, and includes the step of meditation and thinking about the topic, problem, or question posed by the teacher individually, and discussing all the members of the group among themselves in everything that each member has reached in order to filter out the ideas reached by the whole group, and thus come up with five ideas for the question or problem," it aims to train students to put forward various ideas, think about any problem they face, and focus on the learner and make him The focus of the educational process is by activating its role, giving or providing the opportunity for each learner to think about the largest possible number of solutions or answers to a single problem or question, and providing the learner with a kind of interaction and participation in the group, through the discussion and dialogue between them to reach the best solutions. (Abdelsalam, 2021 : 171)

Correlational thinking: Correlational thinking can be defined as the thinking that results from the relationship that the student has between the stimuli and the responses that appear. This type of thinking comes as a result of repetition, trying and learning (ordeal and others, 2021, 42), and is of great importance in our lives, as it helps the learner to make the decision in a timely manner, and find appropriate solutions to the problems presented to the learner easily, and it also helps the learner to use his mental potential to solve problemsandraise the level of motivation and excitement and attract attention to the topics presented to the learner, which leads him to participate effectively. It enables the learner to

Chapter 2

The first topic : Theoretical background

Active learning: Active learning derives its philosophy from contemporary global and local variables. Active learning is a response to these variables, which require a reconsideration of the roles of both the learner and the teacher, and calls for shifting the focus of attention from the teacher to the learner, and making the latter the focus of the educational process (ordeal et al., 2021, 171-172). Many educators have worked hard to define the concept of active learning, and some have defined it as: a teaching method based on the participation of learners in the work of things that forces them to think about what they learn, where learners carry out dynamic mental activities such as reading, writing, discussion or solving the problem and experience . (Abdel-Amir and Atif, 2020: 35-36), that the normal way that the teacher does and the learner listens to what the teacher says is prevalent among the teachers in the various schools of general education or even university education, and it has been found that this method does not contribute to finding real learning, and the call to change teaching methods in line with the active learning method began (Ibrahim,2018: 25), and many studies have confirmed the importance of active learning and proved its effectiveness and positive role in the development of many different aspects of learning, including the study of Abu six, (2017), and the study of Saadi, (2016). (Khairy, 2018: 34-35-36)

Active Learning Strategies:

It includes a wide range of activities that participate in the basic elements, which encourage learners to apply the things they learn, and these strategies can be used to urge learners to be busy thinking with their colleagues or small groups, and also make them busy expressing their opinions and ideas, discovering personal values and attitudes, and providing them with feedback (Abu Jibbin, 2021 : 149), and that active learning strategies are many and varied, and the researchers will mention the strategy 5555)) As it relates to the research topic.

Strategy (5555): The policy of indoctrination followed by many teachers is a barrier between the learner and his creativity, and those in charge of the educational process must free the learner from these restrictions, and this in turn leads to the creation of a generation capable of facing the problems that he faces in his daily

suit the procedures and methodology of this study, and these studies are as follows:

- **Alaidi Study (2016**): The Effect of 5555 Strategy on the Achievement and Divergent Thinking of Fourth Grade Literary Students in Sociology.
- **Hammadi and Walid Study (2017)**: The effect of 5555 strategy on reading comprehension among fourth graders.

Chapter Three
Research Methodology and Procedures

First: Experimental design: The selection of experimental design is one of the important things that the researcher does, because it helps the researcher in determining the factors surrounding the experiment, as the researcher can know what is happening and what he is doing, and since the current research includes two variables: the independent variable represented by the strategy (5555), and the dependent variable (relational thinking), so the experimental design was chosen with partial adjustment, and as shown in Figure (1).

link the cause to the result and know the reason for the result (Amin, 2016 :22). Correlational thinking also helps the teacher in determining the method or method that motivates the learner to interact with the studied material or skill, and introduces new stimuli that result in new responses from learners (Amin, 2016 :48). Correlational thinking is a very useful skill for its ease, as it can lead to the production of some ideas that are very useful to learners. One of the most important skills is to identify ideas or things to be linked and find the relationship between these ideas and things, provided that this link is a logical link and from Then select the result to be reached.
(Hussein and Abdel Nasser, 2002 : 299).

The second topic : Previous studies:

After exposing the researcher to the educational literature, and by conducting a survey of scientific databases and research engines specialized in Arab and foreign studies, and corresponding with many Iraqi and Arab universities, he found that there is a lack of previous studies that dealt with the strategy (5555) in the subject of biology, so the researcher used studies in different subjects to

Group	The independent variable	Dependent variable	Search Equipment
Experimental group	Strategy (5555)	Non associative thinking	Associative reasoning test
Control group	The usual way.		

Figure (1) : Experimental Design

visited the General Directorate of Education of Qadisiyah, in order to identify the preparatory and secondary schools for boys that contain two or more divisions, which are located in the governorate center, as they numbered (15) schools, and Table (1) shows this.

Second: The research community and its sample:

أ- The **research community:** The current research community represents the government preparatory and secondary schools for boys only, which are affiliated with the Directorate of Education of Qadisiyah /Governorate Center. The researchers

Table (1) Preparatory and secondary schools for boys that have two or more divisions for the fourth grade in the center of Qadisiyah Governorate for the academic year (2021-2022)

Location	**Number of fourth grade scientific level students**	**Number of classroom**	**Gender**	**School Name**	**No.**
Algiers District	166	3	Males	Republic Middle School for Boys	1
Rifat District	111	4	Males	Karama Middle School for Boys	2
Al Orouba II	400	8	Males	Qutaiba Preparatory Boys	3
Al Asri	361	6	Males	Ibn Al-Nafis	4

neighborhood				Preparatory School for Boys	
Officers Neighborhood	363	6	Males	Central Middle School for Boys	5
Sadr neighborhood	244	6	Males	Diwaniyah Preparatory School for Boys	6
Al-Karama neighborhood	152	4	Males	Abi Trapp Preparatory School for Boys	7
Om al-Khayal	250	5	Males	Jawahari Boys' Preparatory School	8
Al-Askari neighborhood	420	9	Males	Al sadreen boys middle school	9
Al Saray District	169	5	Males	Al-Thuqain Preparatory for Boys	10
Al-Askan District	142	4	Males	Al Zaiton Prep for Boys	11
Al Orouba 1st District	270	6	Males	Al Tafawq Middle School of for Boys	12
Al ta ameem Neighborhood	320	8	Males	Al-Ghadeer Preparatory School for Boys	13
Om al-Khayal	55	2	Males	Mumtazeen Boys' High School	14
ALNAHDA DISTRICT	118	3	Males	Boys' science high school	15

will study the subject of biology according to a strategy (5555), and in the same way he chose a division (e) to represent the control group that will study the same subject in the usual way, and (14) students were excluded to match the strategic steps (5555), thus the final number of the research sample became (50) students, with (25) students for the experimental group and (25) students for the control group as shown in Table(2).

The **research sample:** The research sample is divided into:

A- Sample schools: The two researchers (Al-ThaqalaynPreparatory School for Boys) in the center of Qadisiyah Governorate (in a random way)* chose to conduct his research.

B - Sample of students: After the two researchers (middle school for boys) chose to apply the experiment, the researchers visited the selected school, and found it contains five study divisions for the fourth scientific grade, as the number of students reached (169) students distributed among five study divisions, and the number of students in one division reached respectively (34, 36, 31, 35, 33), as the research sample consisted of two divisions (**c, e**) of (64) students, and the researcher chose a division (c) (in a random way)* to represent the experimental group that

withdrawal of the second paper, so it was a division (E) to represent the control group.

*The researcher used the method of simple random withdrawal, where the researcher wrote the names of the schools on small papers and put them in a bag, and one of them was withdrawn and it bore the name of the boys' middle school.

* *The researcher wrote the names of the two divisions (Cand E) on a small paper and put them in a bag and pulled the first paper, so it was a division (C) to represent the experimental group and the

Table (2) Distribution of the research sample to the experimental and control group before and after exclusion

No.	group	Section	Number of students before exclusion	Number of students excluded	Number of students after exclusion
1	Experimental Strategy(5555)	C	31	6	25
2	Adjuster (Normal Method)	AH	33	8	25
	Total	2	64	14	50

chronological age of students calculated in months, Daniels' test of intelligence, and the correlational thinking test), and as shown in Table (3).

Third: Equivalence of the two research groups:

The researchers were keen to conduct equivalence with the following variables: (the

Table (3) arithmetic mean and standard deviation and the calculated and tabular values of the variable (chronological age, Daniels IQ test, relational reasoning test) for the two research groups

Variable	group	Number	arithmetic mean	standard deviation	Variance	Freedom degree	Lost Values		sig
							Calculated	tabular	
Chronological age	**Experimental group**	**25**	**200.20**	**6.40**	**40.92**	**48**	**1.167**	**2**	**Statistically nonfunctional**
	Control group	**25**	**198.64**	**1.93**	**3.74**				
IQ test (Daniels)	**Experimental group**	**25**	**17.20**	**2.99**	**8.92**		**0.480**		
	Control group	**25**	**16.68**	**4.52**	**20.39**				
Associative reasoning test	**Experimental group**	**25**	**18.80**	**3.08**	**9.50**		**1.850**		
	Control group	**25**	**17.16**	**3.18**	**10.14**				

specifically affecting the dependent variable may be in its favor or against it, and in order to obtain good results, and to know the effect of the independent factor, the external variables must be controlled before conducting the experiment, in the sense of limiting all variables except the independent variable in order to isolate them and prevent their effect on the result, and the two researchers have controlled all the external variables that affect the conduct of the experiment, including (sample members, physical factors, duration of the experiment, scientific material, research requirements, classrooms), as the two research groups studied according to the prescribed quotas for biology by three quotas per division per week, and according to the distribution of the school administration of quotas as shown in the following table:

The above table shows that the calculated value for (chronological age, intelligence test (Danley's) and relational reasoning test) reached (1.167, 0.480, 1.850) in the order of (1.167, 0.480, 1.850), which is less than the tabular T-value (2), so the above variables for the two research groups (control and experimental) were equalized.

Fourth: Control of extraneous variables:

The extraneous variable is not included in the study design and is not subject to the control of the researcher, but it affects the results of the study or the dependent variable undesirable and the researcher cannot observe or measure it (Hamza et al.,2016 :62). It is a fixation of the factors and variables related to the phenomenon under research with the exception of the independent factor, and during the experiment, a set of factors and variables affecting the research experiment appear,

experimental group and the control group

Table (5) Distribution of lessons between the

AlYaum	group	Section	Lesson	Time
Saturday	Control group	AH	The first	(8,00- 8,45)
	Experimental group	C	Second	(8,50 - 9,35)
Sunday	Control group	AH	Second	(8,50 - 9,35)
	Experimental group	C	The third	(9,40 - 10,25)
Monday	Control group	AH	The third	(9,40 - 10,25)
	Experimental group	C	Four	(10,30 - 11,15)

course in a coherent and integrated manner, the objectives for each of those five chapters are unified with what the curriculum aims in general, as they were defined as follows: (Chapter 1: Classification of living organisms, Chapter 2: Ecology and the ecosystem, Chapter 3: Food chain and the cycle of elements in nature, Chapter 5: Factors affecting the environment, Chapter 6 : Adaptation of animals to the environment).Note that Chapter Four was deleted by the Ministry of Education, and Table (6) shows this:

Fifth: Research requirements: Before applying the experiment, it is necessary to prepare the basic requirements of the experiment, which are :

Determining the scientific material: The researchers identified the scientific material that will be taught to the students of the two research groups during the duration of the experiment, so it included the chapters that are taught within the annual plan for the content of the biology material for the fourth scientific grade, I 11, 2021, written by Hussein Abdel Moneim Dawood and others, During the first

Table (6) Topics to be taught during the trial period

No.	Terminations	Class Title
1	The first	Classification of living things
2	Second	Ecology and Ecology
3	The third	Food Chain and Element Cycle in Nature
4	Five	Factors affecting the environment
5	Six	Adaptation of the animal to the environment

goals and compared with the tabular value of (3.84) with a degree of freedom (1) and at the level of significance (0.05), and the results showed the validity of all behavioral purposes according to the opinions of experts and specialists, and all the purposes were adopted and kept in final form (212) behavioral purposes, with the level of recall, and(60) goals for the level of comprehension, (27, 25 goals for the level of application, 19 goals for the level of synthesis), and the level of composition.

Preparing **teaching plans: Teaching plans** were prepared by the two researchers for the topics of biology to be studied during the experiment, according to the content of the textbook and the behavioral goals formulated,

Formulation of behavioral goals: (212) behavioral goals were formulated by the researchers based on the general goals, and the content of the material to be studied in the experiment, distributed among the levels of classification of Bloom (remembering, comprehension, application, analysis, composition, evaluation), and to ensure its validity and fulfillment of the content of the study material, the researchers presented it to a group of specialists in the educational field and teaching methods, and as a result of the analysis of the responses of the arbitrators, the number of (40) arbitrators, some of the goals were modified according to their opinions and observations, as the values of a square (K2) were calculated for each of the behavioral

of identifying ideas or things to be linked and the skill of finding the relationship between these ideas and things, provided that this link is a logical link and the skill of determining the result to be reached). (Hussein and Abdel Nasser, 2002 : 299)

c. test paragraphs formulation

A correlational thinking test was prepared consisting of(25) test items of the type of multiple choice consisting of the origin of the paragraph and four alternatives, one of which is correct and three of which are wrong to measure the levels of associative thinking among fourth grade scientific students, as the test was presented to a number of experts and arbitrators in the field of education and methods of teaching them, and through their directives, some paragraphs were modified to be ready for implementation .

B. Test Correction

Before piloting the test, the researcher prepared special instructions to correct it as follows:

- One grade is given to the student when he answers a correct answer to each paragraph.
- A score of zero is given to the student when he or she answers a wrong answer to each paragraph.
- The answer is incorrect if the paragraph is left unanswered or when more than one alternative is chosen.

Thus, the test score ranged between (zero) as the lowest score and (25) as the highest score.

B. Test validity: The validity of the test is one of the basic characteristics necessary and required in the preparation of the scales, and the truthful test is the measure that measures the attribute that was established in order to measure it (Alam, 2019 : 139), and the apparent validity of the correlational thinking test has been extracted, and it is as follows:

1- Apparent validity: The test requires a group of experts and specialists related to the subject of the test, and based on the approval of the experts, the validity of the test can be reached, and thus the test appears to measure what was set to measure it (Melhem, 2017: 126), and to verify the apparent validity of the test was presented to a group of experts and arbitrators specialized in the field of education and teaching methods, to express their opinions, and the square of Kay was used to analyze the opinions of the experts and adopted an agreement ratio (80%) and more as a criterion and according to the strategy (5555) For the students of the experimental group, and according to the normal method for the students of the control group, and then the researchers presented two model plans to a group of specialists in the educational field and teaching methods, to explore their opinions, observations and proposals in order to improve the formulation of these plans, in line with ensuring the success of the experiment, and according to what the arbitrators showed, the two researchers made some necessary adjustments to them, and they became ready for implementation.

Sixth : The research tool:

One of the important and basic things that the researchers identify and build is the preparation of research tools, and the research includes a dependent variable, which is (associative thinking). Therefore, the research tool is the test of associative thinking. The following is a breakdown of the preparation of the tool:

Preparation of the associative reasoning test:

Relational thinking is a variable subject of the research, and therefore it required the construction of a test for relational thinking for students of the fourth scientific grade, and because of the lack of an appropriate and appropriate test in the field of biology, so the researchers built a test to measure the level of relational thinking in the subject of biology for the fourth scientific grade after reviewing a group of studies that dealt with relational thinking such as the study of (Zayer and Ahud, 2015) and the study of (Zidane and Anwar, 2016) and the study of (Amin, 2016) and the study of (Ghadib, 2019). From these studies, there were some points of convergence between them and the current research, so the researchers prepared a test for relational thinking according to the following steps:

A- Determining the goal of the test: The test aims to know the associative thinking of the research sample, which are fourth grade scientific students.

B- Determining associative thinking skills:

After reviewing the educational literature and a group of previous studies, and after consulting the supervisor and a group of specialists, it was agreed to classify (Hussein and Abdel Nasser, 2002) for the skills of associative thinking, and identified the skills dealt with by the associative thinking test that are suitable for fourth grade scientific students, so all the skills included in the test were appropriate: (the skill

supervision of the application, he noticed that the instructions of the answer and the test paragraphs were clear through the lack of inquiry of students about how to answer, and the test time was calculated by finding the average time taken by the students of the first survey sample, which was almost (43) minutes, as the times taken by all students were collected after recording the response time of each student on his answer sheet, and by adopting the following equation:

Average Time =

First student answer +second student answer.. +etc ÷ total number of students

(Al-Najjar, 2010 : 36)

Average time = $\frac{1286}{30}$ =42.8 minutes ≅ 43 minutes

➢Second Reconnaissance Sample (Statistical Analysis Sample):

The associative reasoning test was applied to a sample of (100) students from Ibn Al Nafis Boys' Middle School, and he personally supervised the application of the test in cooperation with the subject teacher. After correcting the students' answers, the grades were arranged downward from the highest grade and were (25) to the lowest grade and were (3). The discriminatory force and the stability coefficient were extracted, and the upper and lower extremist samples were chosen by (27%) as the best two groups to represent the entire sample. The following is an explanation of the procedures for the statistical analysis of the test items:

1- The difficulty coefficient using the difficulty coefficient for the objective paragraphs was found that the level of difficulty ranges between (0.30 – 0.50), which is an acceptable difficulty coefficient according to the standard set, as the paragraphs are good if their level of difficulty ranges between (0.20 - 0.80) and thus the paragraphs of the associative thinking test are good and appropriate (Al-Ataya,2011: 67).

2- The paragraph discrimination coefficient: The calculation of the paragraph discrimination coefficient was performed using its mathematical equation, and it was found that its ratio ranges between (0.44 – 0.78), and thus the test paragraphs are distinctive relational thinking, **as it indicates** (Al-Khatib, 2014). **Test paragraphs are good if their recognition strength is (0.20) or more**(Al-Khatib, 2014 : 235). **The paragraphs of the** for the validity of the test paragraphs and its suitability to measure the quality for which it was set, and the percentage and the square of Kay was used at the level of significance (0.05) to analyze the responses of the arbitrators to the test paragraphs, and the most of the test paragraphs obtained the approval of the experts and the specialized arbitrators and their suitability for the purpose for which it was set, and some paragraphs were modified until the test was ready in its final form, and the percentage of the test ranged between(90%) and Ka (^{2}) between (19.230) and therefore (25).

B- construction validity (internal consistency): that each of the test paragraphs must follow the same path as the total test, which represents the coherent overall concept of the property to be measured for each of the test paragraphs and that its inconsistency means that it must be deleted or replaced and can be verified in the light of ascertaining the correlation between the performance of students on this paragraph and their performance on the whole of the test is the test that leads to the validity of the test construction(Al-Zamli et al.,2013: 258)**,** and the researcher has verified The validity of the construction of the correlational thinking test despite its verification of the validity of the test on the surface, and for this reason the researcher used the scores of the exploratory sample used in the statistical analysis to find out the extent of the correlation of the degree of each paragraph with the total score of the test, the researcher subjected the scores of the second exploratory sample (100), to the analysis of the paragraphs, which is the same sample on which the discriminatory strength of the test paragraphs was calculated and according to the coefficient of correlation of the degree of each paragraph with the total degree of the test using the Pearson correlation coefficient, and the correlation coefficients ranged between (0.285-0.728), and thus all the paragraphs were statistically significant, and thus all the (25) paragraphs of the test were retained.

Applying the correlational reasoning test to the exploratory sample:

- The first exploratory sample: To ensure the clarity of the paragraphs and determine the time taken to answer all the test paragraphs, the test was applied to a survey sample of (30) students from the (Olive Prep School for Boys), and through the researcher's

found its stability coefficient equal to (0.94), which is a good stability coefficient, if the value of the stability coefficient from (0.67) and above is good. This is an acceptable stability coefficient, as indicated by researchers and workers in the field of psychological and educational measurement. Thus, all test items were retained and the test was ready for application in its final form for the research sample.

Seventh : Statistical means:

The researchers used the SPSS statistical analysis software.

Chapter Four

Presentation and interpretation of results

First : Presentation of the results: The results of the null hypothesis: The researchers prepared the correlational thinking test for biology, and it was applied to the two research groups. After applying the test, the researchers corrected the papers of the two groups and recorded the grades of the students of the two groups. The mean of the grades of the students of the two research groups and the standard deviation was calculated, and then the t-test was applied to two independent samples as shown in Table (7).

scale are therefore valid for their ability to distinguish between students.

3- Effectiveness of the wrong alternatives: The effectiveness of the wrong alternatives to the relational reasoning test paragraphs was calculated and the results of applying the equation of alternatives to all paragraphs were negative, and I found them to range between ({-0.07}, {-0.41}). This means that the wrong alternatives were distorted to weak students, which indicates the effectiveness of the wrong alternatives to the relational reasoning test, and thus it was decided to keep the incorrect alternatives as they are.

4. **test stability:** means that the results shown by the test should be consistent in the sense that if the test was reapplied to the same sample and in the same circumstances after an appropriate period, the results would be the same. (Allam,543:2009),

The stability of the relational reasoning test was verified, as the stability of the achievement test was calculated using the equation (Kyoder Richardson – 20) because all its paragraphs are objective of the type (multiple selection), so the researcher used this method also to calculate the stability coefficient of the relational reasoning test and

Table (7) arithmetic mean, variance, calculated T-value, tabular and degree of freedom for the students' scores of the research sample in the final associative thinking test

No.	group	Number of students	Arithmetic mean	standard deviation	Variance	Freedom degree	T value		Statistical significance at the level of 0.05
							Calculated	tabular	
1	Experimental group	25	18.36	3.41	11.66	48	2.983	2	Function
2	Control group	25	15.32	3.78	14.31				

the zero hypothesis and accepting the alternative hypothesis, i.e. there is a statistically significant difference between the average scores of the experimental group and the average scores of the control group and in favor of the experimental group.

Second : Interpreting the results :

1- Teaching according to the strategy (5555) helped students to exchange ideas using evidence and proofs by reorganizing and expanding the knowledge structure and increasing their horizon about information and acquired facts.

2- The 5555 strategy contributed to creating a classroom environment through freedom

The above table shows that the average scores of the students of the experimental group in the correlational thinking test (18.36) and the standard deviation(3.41), while the average scores of the students of the control group (15.32) and the standard deviation amounted to (3.78). Using the equation of the t-test for two independent samples, the calculated T-value is (2.983), which is greater than the tabular value at the level of significance (0.05) and a degree of freedom (48), which is equal to (2). This means that the students of the experimental group are superior to the students of the control group in the posterial associative thinking test, rejecting

of expression, asking questions, encouraging student participation, and eliminating shame and introversion to enhance their behavior to participate.

Third: Conclusions : Based on the results that emerged, the two researchers concluded the following:

Teaching according to the strategy (5555) is positively effective in raising the level of biology achievement for fourth grade scientific students compared to the usual method.

Fourth : Recommendations: In light of the conclusions reached by the research, the following recommendations can be formulated: -

1- Conducting in-service training courses for teachers of biology to train them in the use of modern strategies, including (5555).
2- The need for the Ministry of Education to issue a guide for neighborhood teachers that includes modern strategies with an indication of the steps and mechanism that it carries out, and varied to keep abreast of developments in the educational process.
3- Include modern strategies, including (5555) in the vocabulary of methods of teaching biology in faculties of education and basic education in order to improve and develop the level of biology teacher.

Fifth: Proposals: Complementing this study, the two researchers propose to benefit from the strategy (5555) in conducting a number of studies and scientific research as follows :

1- Conducting a similar study using a strategy (5555) in other variables: (gender, divergent thinking, sound thinking, reflective thinking).

2- Conducting studies similar to the current study in the subjects of (Physics – Chemistry) and at other stages of study (primary and intermediate stages).

References

- Ibrahim, Khaled Kazem and Nelly Awaid Alkanani, (2008): **Educational Studies**, Center for Research and Studies, Ministry of Education, Volume (1), Issue (4) Baghdad, Iraq.
- Ibrahim, Haitham Saleh (2018): **Modern Teaching Methods and Methods**, 1st Edition, Radwan Publishing and Distribution House, Amman, Jordan.
- Abu Jibbin, Atta and Ali Mahdi Kazem (2021): **Active Learning and** Strategies, 1st Edition, Dibono Thinking Education Center, Amman, Jordan.
- Abu Sitta, Amal Muhammad Salem (2017): **A program based on active learning to develop the achievement motivation and self-efficacy of female teachers**, unpublished doctoral thesis, Girls College, Ain Shams University.
- Ambo Saidi, Abdullah bin Khamis (2016) : **180 strategies in active learning with applied examples**, Dar al-Masirah for Publishing and Distribution , Amman, Jordan.
- Amin, Doaa Mohebuddin Ahmed (2016) : The **effect of the teaching strategy in the seven steps in associative thinking and learning the skills of conversation and correction in basketball**, (unpublished Master Thesis), Faculty of Physical Education and Sports Sciences for Girls, University of Baghdad .
- Barqawi, Jalal Aziz, (2014) : **Creative Thinking, Science and Art**, 1st Edition, Dar Al-Radwan for Publishing and Distribution, Amman, Jordan.
- Hussein, Thaer, Abdul Nasser Fakhro, (2002): **A Guide to Thinking Skills 100 Thinking** Skills,1st Edition,Dar Juhayna, Amman .
- Hamadi, Hassan Khalbas, and Walid Khalid Talib (2017): The **effect of 5555 strategy on reading comprehension among fourth grade preparatory students,** published research**,** Journal of Educational and Psychological Research**,** Volume(15), Issue (56), Iraq.
- Hamza,Hamid Mohammed , Nisreen Hamza Al-Sultani , Ibtisam Jaafar Jawad Al-Khafaji , (2016): **Research Methods in Education and Psychology**. Amman: Radwan Publishing and Distribution House.
- Al-Khatib, Ma 'an Murad (2014) : **Principles of Measurement and Evaluation in Education**, 1st Edition, Dar Al-Thaqafa Library, Amman.
- Khairy, Lamia Mohamed Ayman, (2018) : **Active Learning**, 1st Edition, Bastaroun Foundation for Printing, Publishing and Distribution, Giza , Egypt .
- Daoud, Hussein Abdel Moneim et al. (2021) : **Book of Biology** for the Fourth Grade of Science, 11th Edition, Ministry of Education, General Directorate of Curricula, Baghdad – Iraq.
- Al-Zamli, Ali Abdul Jassim et al. (2013) : **Concepts and Applications in Educational Evaluation and Measurement**, 2nd Edition, Al-Falah Office, Kuwait.

- Al-Enazi, Fatima Qassem (2019): **Modern educational means and their effect on academic achievement**, 1st Edition, Al-Raya Publishing and Distribution House, Amman, Jordan.
- Ghadib, Baha Shubram, (2019) : The **effectiveness of a program based on cognitive sensory learning patterns in correcting spelling error and developing associative thinking among second-grade students**, unpublished doctoral thesis, Faculty of Education for Humanities , University of Basra.
- Al Kaabi, Karar Abdul Zahra (2018): **Modern Strategies in Teaching and Learning**, 1st Edition, Safa Publishing and Distribution House, Amman, Jordan.
- Al-Mihana , Ali Kazem Yassin and Sarhan , Muhammad Hamid and Al-Saadi, Hassan Ali Muhaisen and Abbas , Kazem Katie (2021): **Understanding the Reader and Active Thinking Applied Strategies**, 1st Edition, Safaa Publishing and Distribution House, Amman.
- Melhem , Sami Mohammed, (2006) : **Research Methods in Education and Psychology**, 1st Edition , Dar al-Masirah for Publishing and Distribution , Amman , Jordan.
- Al-Najjar, Nabil Juma Saleh (2010**): Measurement and Evaluation (Applied Perspective with Spss Software Applications)**, Dar Al-Hamed Publishing and Distribution, Amman, Jordan.
- Nofal , Muhammad Bakr and Muhammad Qasim Saifan, (2011) : **Integrating Thinking Skills in Academic Content**, 1st Edition , Dar Al-Masirah for Publishing and Distribution , Amman , Jordan.
- De Bono, Edward (1997): **Lateral thinking: A text book of creativity**, New York, pelican.
- Kovach, J. C. (2000): **Self regeulatory strategies in an accounting principles course, Effects on student Achievement**, paper presented October 28-2000 at thellinois. www.creative process.nen/Book shef/irt book2.html/35k/mcGrw-Hill Book company,new yourk
- Zayer, Saad Ali and the reigns of Sami Hashim, (2015)**: The level of associative thinking among university students**, Nasat Magazine, No. 7, Baghdad.
- Zaytoun, Ayesh Mahmoud , (2007) : **The Constructivist Theory and Strategies of Teaching Science**,1st Edition, Dar Al-Shorouk Publishing and Distribution, Amman, Jordan .
- Zaidan, Abdul Razzaq Abdullah and Anwar Farouk Shakir, (2016) : The **level of associative thinking among students of Diyala University**, published research, Enlightenment Journal of Humanitarian and Social Research, Issue 1 November, Algeria.
- Saadi, Saad Youssef Mahmoud(2016): The **effectiveness of using some types of active learning in teaching history to develop achievement and orientation towards the subject among middle school students in the Republic of Iraq**, PhD thesis, Faculty of Education, Mansoura University.
- Alaidi, Zahraa Ali Karim (2016): The **effect of 5555 strategy in the achievement and divergent thinking of fourth grade female students in the literary subject of sociology**, (unpublished master's thesis), Faculty of Education, Wasit University.
- Abdul Amir, Abbas Naji and Atef Abd Ali Durai , (2020) : The Constructive **Theory (Active Learning and Creativity)**, 1st Edition , Dar Al-Ayyam Publishing and Distribution , Amman , Jordan .
- Abdelsalam , Muhammad (2021) : **Active Learning Strategies**, Noor Library, Cairo.
- Al-Ataya, Sana Farouk (2011) : The **Concepts of Measurement and Calendar**, 1st Edition, Dar Al-Hadi, Beirut .
- Alam, Salah Al-Din Mahmoud (2009) : **Measurement and Educational Evaluation in the Teaching Process**, 2nd Edition, Dar Al-Masirah for Publishing, Distribution and Printing, Amman, Jordan.