The Effect of the Alternative Evaluation Strategy on the Divergent Thinking of the Fourth Scientific Class Female Students in a Subject of Biology

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Abstract

The research aims to identify the impact of the alternative evaluation strategy on the divergent thinking of fourth-grade students in biology by making sure of the following null hypothesis: There are no statistically significant differences at the level (0.05) between the average scores of the experimental group who study according to the alternative evaluation strategy,and the average scores of the experimental group who study according to the normal method in the divergent thinking test. The two researchers chose the experimental design with partial control for the two experimental and control groups with a post-test, and the two researchers deliberately chose (Al-Fidaapreparatory school for girls) to represent the research community that was identified with fourth scientific class students in government day schools of the Directorate of Education of Baghdad Governorate / Resafa2 for the academic year 2021 / 2022. The number of sample members (99) female students within two divisions, Division (A) an experimental group and Division (B) the control group. Valence was made between the two research groups in the following variables: the chronological age of the female students calculated in months, the prior knowledge test and the intelligence test, and the study tool represented by thedivergent thinking consists of (14) paragraphs, and the validity of the research tool was confirmed, after the experiment ended and the students' answers were corrected and treated statistically using the SPSS statistical bag. The following results showed: There are statistically significant differences at the level (0.05) between the mean scores of the students of the two research groups in favor of the experimental group In the divergent thinking test, it reached (50.82)

First: Problem of the Research .

The educational system in our country suffers from a number of problems and gaps, including the evaluation system used in our schools, which may neglect the right of many students and does not care about the development of thinking skills and mental and creative abilities of students that are developed by following modern methods and trends in education. The adoption of the traditional calendar in most of our schools established a culture of memorization and indoctrination and contributed to destroying the abilities and talents of students and not investing ,

developing and benefiting from them in building a creative, innovative generation capable of solving its problems and finding multiple and different solutions, especially in the age of technique and technology. Many students may miss higher mental processes that help them change the direction of their ideas and think fluently and freely or produce new unfamiliar solutions,because of the lack of attitudes, activities or educational strategies that motivate them, this led to the formation of a generation, most of which possess a culture of imitation, follow a routine approach to life, follow the trail of the past, depend on others, lack creativity and self-expression, and move away from finding new and original solutions in which our beloved country develops. Accordingly, the researchers identified the research problem by answering the following question;

What is the effect of the alternative assessment strategy on the divergent thinking of fourth scientific class students biology?

Second: Importance Of The Research

The evaluation process is of great importance as it determines what has been achieved from the planned goals and determines the level reached by students,evaluation is an essential element in the curriculum and permeates all stages of the educational process. It is a basic starting point for curriculum development and modification. It is an organized process based on measurement that aims to collect information and evidence that helps guide the educational process and take appropriate action. (Al-Absi, 2010, 14, 15). We find that one of the most important goals of education is to raise the level of thinking among students to reach mastery of abstract thinking processes,thinking is using our prior knowledge to solve problems we encounter,but many students are not good at thinking despite their knowledge. The reason for this is that they do not know how to use their cognitive store appropriately. Hence the need to teach the student how to deal with the information stored in his brain and how to learn from his previous experiences. One of the most important duties of the school is to prepare educational situations for students to learn from their experiences and use their minds to interact with activities and experiences. (Al-Harthy, 2009, 17). Divergent thinking is characterized by moving to broad directions and horizons that are not bound by a specific solution or idea, but rather the trend towards all possible ideas and solutions that are original,the basis of divergent thinking depends on authorship, installation, reclassification and awareness of new relationships, the development of divergent thinking helps in developing the capabilities of the human mind. The concepts of creativity and innovation overlap with the concept of divergent thinking in all areas of life. (Razooqi and Latif, 2019, 32_29). The study (Al-Mutairi, 2021: 15) confirmed that divergent thinking helps in planning and evaluating the method in the processes and steps to take the appropriate decision.The student who has reflective thinking has the ability to understand relationships and make use of information to support his point of view, make summaries, analyze introductions, review and search for alternatives.The skill components of divergent thinking such as fluency, flexibility and originality in ideas are required in the information age and the availability and plurality of alternatives, as these skills contribute to the students' launch towards divergent and creative ideas in order to activate their skill side. The importance of the research can be summarized as follows:

1-Knowing the effect of the alternative assessment strategy in the divergent thinking of the fourth scientific class students .

2-Providing a test to measure the divergent thinking skills of the fourth scientific class students.

Third: Aim Of The Research

The current research aims to identify the impact of the alternative assessment strategy on the divergent thinking of the fourth scientific class students in biology

Fourth: The hypothesis of the research

There are no statistically significant differences at the level (0.05) between the average scores of the experimental group students who studyaccording to the alternative evaluation strategy and the average scores of the control group students who study according to the normal method in the divergent thinking test..

Fifth: Limitation Of The Research

1-**Human limits**: fourth scientific class students in the government preparatory day schools of the Directorate of Education, Baghdad / Al-Resafa II

2-Spatial boundaries: the General Directorate of Education in Baghdad / Al-Resafa II.

3-**Objective limits**: fourth scientific class biology, first, second, third, fifth and sixth semester

-**Time limits**: the first semester of the 2021/2022 school year4

Sixth: Defining Terms

1-Effect (Shehata and Al-Najjar, 2003) defined it as the outcome of the desired or undesirable change that occurs in the student as a result of the education process. (Shehata and Al-Najjar, 2003: 22)

2-**Teaching Strategy**, defined by (Phila, Al-Zaki, 2004) as: It is a long-term plan that aims to reach a set of options and alternatives to achieve a set of specific goals and reach effective and rapid results. It also includes evaluation methods through which to identify the success of the strategy. and achieving goals. (Phila, Zaki, 2004, 51)

3-**Alternative Evaluatio**n (Mahidat and Mahasneh, 2009) defines it as: am image of the evaluation in which the student accomplishes or performs realistic life tasks that clearly show the extent to which he applies the basic skills and knowledge he has learned and acquired with the aim of evaluating the student's ability in a realistic path closer to his daily life. (Mahidat, Mahasneh, 2009, 18)

The two researchers define it procedurally as: One of the modern trends in the field of learning and education based on assigning students with realistic duties and tasks that may take a period of time and using a number of strategies,the evaluation is characterized by being real, comprehensive and objective.

4-**Divergent Thinking** (Al-Atoum, 2009) defined it as: thinking that is used to produce, generate and inspire divergent ideas and new information from previous or given information, that is, to produce novel things from previous cognitive experiences. (Al-Atoum et al., 2009, 140)

The two researchers define it procedurally: it is the degree obtained by the students in the divergent thinking test prepared for this research, which measures the skill of associative, verbal, expressive and intellectual fluency, fluency of forms, and the skill of automatic and adaptive flexibility of meanings.

Seventh: Theoretical framework.

Constructivism Theory: The educational field at the end of the last century underwent a fundamental transformation in the field of education, as the focus shifted from external factors that affect learning, such as the personality of the teacher, his reinforcement of enthusiasm, the curriculum, the school, to the internal factors represented by what happens inside the minds of students such as prior concepts, prior knowledge, mental capacity, thinking patterns i.e. moving from superficiallearning to meaningful learning.

This transformation was accompanied by the emergence of the so-called Theory of Constructivism, and it was a new symphony, but its clips are not alien to the ears. (Zaytoun, Zaytoun, 2003, 17, 27, 28). Although the philosophy of Theory of Constructivism is attributed to Jean Piaget (1896 - 1980), Pestalozzi (1746 - 1827) had come up with similar results more than a century before that,thus,he focused on the importance of adopting educational methods on the development of the natural growth of the student and on his emotions and feelings, and thus clarified the necessity of the senses as tools for learning, and urged linking educational curricula with the experiences of children that fit and harmonize with their lives and family environments. (Al-Dulaimi, 2014, 14).

Theory of Constructivism concept: Educators mention the saying that we hear, we forget, we see, we remember and we act, and we understand. Understanding is the heart of Theory of Constructivism,Theory of Constructivism includes the principle that knowledge comes and is built from experience and learning is a subjective and personal interpretation of the world, and knowledge is an active process of meaning-making based on experience and must occur in real situations,the tests must be integrated and consistent with the task, and this requires finding and innovating curricula and strategies that are compatible with the learning process to activate and activate knowledge, understanding, acquiring and adopting it in the personal and social perspective of the student. (Zaytoun, 2 19, 2007). Joseph Novak (Joseph Novak 1986) defines Theory of Constructivismas the idea that people build, or is the process of building meaning within their thoughts as a result of doing an action and that this construction sometimes includes the discovery of new systems in things or events and the creation of new concepts or the development of old concepts and the building of new relationships of a higher level. (Al-Huwaidi, 2010, 46). The learning process is seen through the philosophy of Theory of Constructivism as a subjective process, as students, through mental processes, enter knowledge to become a part of them, and students build knowledge and rebuild it through active interaction with educational experience, as explained (Cook 2001) that when he said,Learners are seen as having an effective influence in building their own meanings to some extent, as long as individuals do so based on their beliefs and past experiences as human knowledge is temporary, indefinite, subjective and subjective(Al-Samarrai and Al-Khafaji, 2014, 51). From the mentioned , the researchers see that Theory of Constructivism includes 4 basic elements;

1 -Prior knowledge is essential in the learning process

.2-Building knowledge is subjective and personal and depends on students' abilities.

3-Interact with educational and life situations and its essential role in building knowledge.

4-Concepts and knowledge are constantly built and modified in order to reach the correct construction.

Principles of Theory of Constructivism

The first principle: the students' previous knowledge is the focus of the learning process because the student builds his knowledge through his previous experiences.

The second principle: Learning occurs in the event of a change in the students' cognitive structure, as a reorganization of experiences and ideas occurs when students learn about new experiences and information.

The third principle: Building students' knowledge is a self-construction that depends on the students themselves through the interaction of their senses with the external environment by providing them with information and experiences that link with their previous information to reach the meaning.

Fourth principle: Students build their knowledge in cooperation with others through social interaction with them.

Fifth principle: The best learning occurs when students are confronted with a real task, situation, or problem. (Zaytoun, 2007, 44)

Constructivism is based on four theories

Piaget's theory of learning and cognitive development-

-Cognitive theory and focus on the internal factors affecting learning

-Social theory in social interaction in the classroom, laboratory or field.

-The humanistic theory in highlighting the importance of the student and the active role in discovering and building knowledge

)Al-Adwan, 2016, 39(

Alternative assessment: The traditional assessment has prevailed for many years and focused on highlighting the individual differences among students and encouraging them to compete and win the first ranks among their peers without knowing what they possess or what they can do because the traditional assessment gives an idea of what these students possess of information, these characteristics are no longer parallel and compatible with future aspirations and ambitions. (Mahaidat, Al-Mahasna, 2009, 9).

Alternative evaluation emerged as a result of the criticisms leveled at traditional evaluation methods. Alternative evaluation or authentic evaluation is based on the principle of making evaluation a part of the learning process. It requires students to perform tasks that stimulate their thinking based on previous knowledge and dependence on current education by practicing appropriate skills to solve realistic and real problems,this makes the evaluation process consists of constructivist educational experiences that require students to adopt thinking skills to achieve the best levels of quality in performance. (Uwdha, 2015, 16). Several concepts or terms were synonymous with the concept of alternative evaluation, including: performance-based evaluation, qualitative evaluation, formative evaluation, and direct evaluation. It is also called the comprehensive evaluation, and the alternative evaluation is an alternative to the existing evaluation in our schools for the purpose of addressing the negative aspects of the existing evaluation, which is a continuous structural evaluation aimed at modification, improvement and development.

(Sulaiman, Abu Allam, 2010, 482). Alternative assessment is seen as that type of assessment that places students with tasks that are meaningful and worthwhile that the student can feel and that differ from traditional tests, and require and include high-level thinking skills and coherence and consistency of a wide range of knowledge. (Ali, 2011, 374)

Alternative Calendar Strategies

First: Performance evaluation with Writing Tests Assessment: The specialist differed in the nature of this strategy and how to apply it within the alternative assessment strategies. (Zaytoon, 2007) sees it as a strategy that is adopted in order to measure language skills, scientific language and scientific and cognitive content, in which students are assigned to write a scientific task or a topic, project, research or article, provided that the task has a natural, realistic context and not artificial like traditional tests. (Zaytoun, 2007, 659). As for (Dams, 2008), it is prepared by the same as the traditional assessment tests of all kinds, articles, objective and others. It is mentioned that it is a strategy that depends on collecting evidence about the student's learning,remembering facts and skills is evaluated by adopting paper and pen and adopting carefully prepared tools. Students can show their skills by completing a table or drawing. This strategy is important because it is one of the most important means used in measuring school achievement based on tests. (Damas, 2008, 64)

Second: Observation: It is defined as monitoring the performance of students in educational situations by the teacher with the aim of collecting information and data, analyzing them and issuing a judgment. It is characterized by providing qualitative and quantitative information about students' achievement of the learning competencies achieved in reality,observation provides information that tests cannot provide, as the teacher can adapting observation to the educational situation. Observation can assess or measure learning behaviors such as classroom behavior, home and class homework solving, participation and cooperation, and the level of abilities and skills that students possess. (Mahidat and Mahasna, 2009, 112)

Third: Concepts Mapping Strategy: It is based on Ausubel's meaningful verbal learning theory (1918-2008), which looks at the student's cognitive structure as a hierarchical shape in which the most comprehensive, general and abstract principles and concepts are organized, followed by the least comprehensive and most specific. Joseph Novak J. Novak (1932) is credited with creating and designing concept maps and developing them in the seventies of the last century based on the ideas and principles of Osbel's theory. (Zaytoun, 2007, 521). The conceptual map depends on analyzing concepts and clarifying the hierarchical relationships between concepts. It was mentioned (Novak and Gwen 1986) when designing a concept map for a topic, the teacher must show the idea of the concept, for example, giving a definition of the concept to help students identify the concepts and the common relationships between them as they exist in nature. The concept map is adopted because it helps the teacher in planning and implementing the lesson and facilitates the process of reviewing concepts and evaluating the student. (Al-Huwaidi, 2008, 333)

Fourth: Portfolio: The achievement file or the student's work file is one of the recently used methods in educational institutions as it is suitable for the purposes of alternative evaluation, as it focuses on developing learning processes in and outside the school and enables students to monitor and follow up their performance bytheir selves and gives the opportunity to employ their skills and knowledge by undertaking individual projects and tasks or collective. (Al-Absi, 2010, 91). Khalil (2011) mentions that the achievement file is a documentation of the best work and achievements of

the students, and that their efforts tell the story of their progress during a specified period of time. (Khalil, 2011, 313). The two researchers thinkThe achievement file is one of the good means

of learning and evaluating students. The file gives image of students' activity and achievement. It is one of the motivating means to achieve the best results, because every student aspires to have the best file, especially with the possibility of seeing and evaluating the achievement file by parents.

Divergent thinking

Thinking is a refined mental activity in which a person reflects reality on objective bases and in a way that is different from what happens with regard to perceptions and sensations, which only reflect external phenomena. (Ibrahim, 2007, 29). Divergent thinking differs from other types of thinking as it is used in creative problem solving.It is sometimes called the starting thinking and is characterized by originality with an emphasis on the plurality and diversity of products and their quality. It includes divergent thinking, as Guilford sees it, the generation and production of new information from available or given information, and there are fewer restrictions in this type of thinking.is not straightforward conventional thinking but rather reasonable speculative reasoning that requires higher levels of Bloom's classification. (Khalil, 2007, 22, 23). Bloom classification. (Khalil, 2007, 22, 23). Meader (1998) believes that "creative thinking is a thinking pattern consisting of two components: convergent thinking, which includes the production of correct and predetermined or agreed information, and the percentage of freedom in this mental activity is low, while divergent thinking, It is used to generate, produce and inspire different ideas and new information from given information or observations, i.e. produce new things based on their cognitive experiences." Beyer (1987) sees as stated in Al-Atoum (2009) "Creative thinking is divergent thinking that is characterized by originality and usually violates existing and accepted principles and is not determined by intuitive rules and its results cannot be expected." (Al-Atoum et al., 2009, 139, 140). (Spearman, 1931) is the first to present an explanation of divergent thinking, in which he focused on the mental aspect and adopted three foundations: awareness of experience, awareness of relationships, and then deduction of related matters. (William, I986) defined divergent thinking as thinking that consists of talents, abilities and skills, and these abilities are possessed by most individuals, but they vary in type and degree, as everyone has creative abilities and skills. such as fluency, originality, and flexibility, but some of them possess them to a greater or lesser degree than other .

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individuals, but they vary in type and degree, as everyone has creative abilities and skills. such as fluency, originality, and flexibility, but some of them possess them to a greater or lesser degree than others, just as the creator

is creative in a specific field or areas and not in other areas. (Al-Rubaie, 2018, 42, 43)

Guilford's theory of mental formation: It is one of the most prominent theories on which divergent thinking was based. This theory assumed that the human mental formation consists of a three-dimensional system, which is the content dimension, the operations dimension, and the products dimension. (Khalil, 2007, 47). Guilford has adopted the term divergent thinking within his theory in the second dimension after operations and confirmed that divergent thinking is creative thinking.The Guilford (1959) model is one of the important models that have been of interest to researchers for a long time. This model consists of 120 mental abilities or factors. (Razzooqi et al., 2019, 69)

Fig. 1 shows Guilford's theory of mental construction

Divergent Thinking Skills

1-**Fluency**: It is the ability to produce the largest number of ideas, alternatives, or synonyms, and it is basically a process of recalling and remembering previous experiences, information or concepts. (Hussain, 2009, 154)

A. **Association Fluenc**y: Students' ability to produce the largest possible number of utterances or words associated with a specific tone, beginnings, endings, or number of letters.

B.**Verbal Fluency**: It is the ability of students to form the largest possible number of words, words or meanings within certain conditions.

C.Expressional Fluency: It is the ability to formulate sound ideas or to issue coherent ideas in a particular situation. These ideas are characterized by abundance and diversity.

D.**Ideational Fluency**: It means producing as many ideas as possible related to a specific situation that students are able to perceive it.

E. Figural Fluency: Students are able to quickly draw examples, modifications, and details in response to a visual or descriptive stimulus

(Al-Afoun and Abdel-Saheb, 2012, 130,131)

2.Flexibility: It is the ability to see things through different angles or areas. This skill is represented by the students' ability to change the direction of their thinking from one angle to another, which is the opposite of thinking in one direction and mental inertia. (Abu Jadu, Nofal, 2007, 161). They include two types of flexibility;

1.Spontaneous Flexibility: It means the ability to issue the largest number of different types of ideas and trends related to an exciting situation or problem that requires initiative and spontaneity.

2.Adaptive Flexibility: It refers to the ability to change the mental direction to face or address a problem, which is adapting to the situation of the situation or problem. (Qatami et al., 2008, 19, 20)

Through what was mentioned about divergent thinking, the two researchers believe that it is one of the distinctive creative thinking patterns because it provides a great space for freedom of thinking

and that it raises restrictions and barriers as it pushes students to think of unfamiliar and strange solutions and ideas that may be basic and important ideas and solutions in the future. It also provides students with a new environment. Far from boredom and routine, it motivates them and pushes them towards innovation and progress, and motivates them to research and study.

AXIS TWO

PreviousStudies

1-**Study (Al-Rabi'i 2018**): The study aimed to identify the effect of an educational design according to active learning models in the achievement of chemistry and divergent thinking for fifth grade scientific students. The researcher adopted the experimental method, and the number of the sample was 58 students. As a result, the experimental group outperformed the control group in achievement and thinking;

2-Study (Younis 2019): This study aims at the effect of the Flanders model in expressive performance and the development of divergent thinking among the students of the fifthliterary, and the number of the sample was (60) and the researcher used the experimental method. The experimental group over the control group in expressive performance and divergent thinking test.

Research Methodology and Procedures

1-**Experimental design**: It means a plan developed for the purpose of answering a research problem and ensuring the accuracy of the results reached by the research (Al-Tayeb et al., 95: 2005)

The group	The equivalence of the two groups	independent variable	dependent variable	measure of the dependent variable
Experimental	Previous knowledge- -Chronological age in months	Alternative assessment strategy	Divergent thinking	Divergent thinking test
Control	Intelligence test-	Normal way		

Scheme (1) Experimental design of the research

2-The research community and its sample: The research community was determined by all female students of the fourth scientific grade in the middle and secondary day schools of the General Directorate of Education in Baghdad / Al-Rusafa II for the academic year 2022-2021. The two researchers chose (Al-Fidaa Preparatory School for Girls), because of the facilities and cooperation by the administration and teachers, as well as the presence of (4) study divisions for the fourth scientific grade in the school, which provides a greater opportunity. Division (A) was chosen to represent the experimental group that will be studied (by the alternative evaluation strategy), as it was the number of its students is (50) and class (B) to represent the control group that will study in the normal way, and the number of female students in it is (49) students.

: -Adjustment procedure3

A. The internal safety of the experimental design: The two researchers conducted an equivalence between the two research groups (experimental and control) in the following variables: the chronological age of the students calculated in months, the test of prior knowledge and the test of intelligence. Table (1) shows the results of equivalence with a degree of freedom of 97.

Table (1)

Arithmetic means and standard deviations of the experimental and control groups in the equivalence variables.

Equivalence variables	Arithmetic mean		Standard deviation		t-test		Significance at level 0.05
	experimental group	control group	experimental group	control group	calculated	tabular	
Previous knowledge	9.400	9.142	2.356	2.121	0.570	2.00	Statistically significant
The age with Months	187.200	187.020	4.045	3.350	0.240	2.00	Statistically significant
IQ test	20.340	19.714	5.895	5.605	0.541	2.00	Statistically significant

B. Adjusting for extraneous variables (external safety of experimental design

After confirming the internal safety of the research variables through the equivalence procedure for the sample, the two researchers sought to control the extraneous variables and ensure the external safety of the design, so they took measures, including controlling the conditions of the experiment and the associated accidents, experimental extinction (leaving in the experiment), processes related to the maturity of the sample members and the impact of experimental procedures, including confidentiality of the experiment, the study material, the teaching means , the duration of the experiment, the place of the experiment, and the distribution of lessons.

Fourth: Research Requirements;

1-Defining the scientific material: Before starting the application of the experiment, the scientific content that will be taught during the application of the experiment was determined for the two research groups, according to the vocabulary of the biology book for fourth-grade students of science for the academic year 2022-2021, first edition, and represented by chapters: first, second, third, fifth and sixth.

2-Formulation of behavioral goals and preparation of studyplans: (157) behavioral goals were formulated based on Bloom's classification, and (25) teaching plans were prepared for both research groups, and a model of these teaching plans was presented to a number of arbitrators and specialists in methods of teaching science and some teachers biology subject, to express their opinions and observations, and some amendments were made to it to take the final form.

Fifth. Research Tool: Building a Divergent Thinking Test

1-**Determining the objective of the test:** The idea of determining the test objective is to measure the divergent thinking of fourth-grade students through the paragraphs designed for this purpose.

2-**Reviewing the literature and previous studies**: Previous studies were reviewed that dealt with the areas of divergent thinking, including the study of Al-Tamimi (2016) and the study (Al-Rubaie, 2018) and the study (Younis, 2019). These studies benefited the two researchers in dividing skills and formulating test items.

3-Determining divergent thinking skills: By referring to the literature for this variable, and after consulting a number of specialists in the field of teaching methods of biology and psychology, seven divergent thinking skills were identified, measured by the test among students of the fourth scientific class, to suit their mental abilities and abilities and table (2) demonstrates these skills.

4-**Formulation of the test items in light of the specific field**s: A number of test items were formulated for each of them, and these items were formulated to match the levels of the fourth grade students in science and their mental abilities. The test consisted of (14) items of the type of essay.

5-**Presenting the fields with paragraphs to the arbitrators**: The seven skills were presented with the paragraphs consisting of (14) paragraphs to a number of arbitrators, for the purpose of knowing their opinions and observations and in light of the arbitrators' directives and observations, some paragraphs were modified, so the test consisted of (14) paragraphs.

Table (2)Distribution of the paragraphs of the final divergent thinking test between skills

S/N	The name of the skill	The number of paragraphs	The sequence of the skill	The degree for each skill
1	**associative fluency**	2	1(A,B)	10
2	**Verbal fluency**	2	2(A,B)	10
3	**Expressive fluency**	2	3(A,B)	10
4	**Intellectual Fluency**	2	4(A,B)	10
5	**Fluency in shapes**	2	5(A,B)	12
6	**Automatic flexibility**	2	6(A,B)	10
7	**Adaptive flexibility**	2	7(A,B)	10

.-Preparation of test instructions6

A. Answer instructions: A page has been prepared in the introduction to the test that includes the instructions for the test directed to the students. These instructions showed the nature of the test, its purpose and the way to answer it, as well as writing down the total score for the test.

B. **Correction instructions:** Answers were proposed for the test, and the test consisted of (14) paragraphs of the type of essay, where each paragraph contained (5-6) answers, so the degree of each paragraph ranged between (5-6), and the total score of the test was (72) degrees.

7-**The validity of the test**: The validity of the divergent thinking test was verified using two types of validity;

A. Virtual validity: The Virtual validity was confirmed by presenting the test to a number of specialists in psychology, biology and teaching methods.

B. Construction validity: The internal consistency of the divergent thinking test was verified by finding the correlation (Pearson correlation coefficient) between each of;

1-**The scores of each item and its domain scores**: The results showed that all items of the test were statistically significant, as the values of the correlation coefficient ranged between (0.44-0.74), which is a good sign of the construct validity of the divergent thinking test.

2-**Scores of the domain and total test scores**: The results showed that all test items were statistically significant, as the values of the correlation coefficients were between (0.65-0.74), which is a good sign of the construction validity of the divergent thinking test.

3-The scores of each item and the scores of the overall test: The results showed that all items were statistically significant, as the values of the correlation coefficient were between (0.40.-0.57), which is a good sign of the construct validity of the divergent thinking test.

8-The exploratory application of the test: The test was applied to a first exploratory sample of (35) female students on Sunday, 9/1/ 2021 AD, at Umm Al-Qura Preparatory School for Girls to show the extent of the clarity of the test paragraphs and its instructions and to determine the necessary time that would suffice for female students to answer, and after making sure of that the test was applied to a second exploratory sample of (100) on Monday, 17/1/2022 AD, at Al-Somoud Preparatory School for Girls, for the purpose of statistical analysis of the test items.

9-Statistical analysis of the test items: After applying the test to the statistical analysis sample, the following was carried out;

-Correcting the students' answer sheets, and finding the final grade for each student.

-Arrange the answer sheets in descending order from the highest overall score to the lowest overall score.

-Determining and sorting the scores of the group with the highest (highest) scores and the scores of the group with the lowest (lowest) scores, by using the highest (27%) and lowest (27%) percentage of the two groups for statistical analysis.

A. Difficulty coefficient for divergent thinking test items: The difficulty coefficient was found for all test items, which were (14) items according to the difficulty coefficient equation for the essay items, and it was found that it ranges between (0.41-0.67)

B. **Discriminatory strength of divergent thinking test items**: The discriminatory power was calculated for all test items according to their discrimination coefficient equation, and it was found that it ranges between (0.75 -0.30)

10-**The reliability of the divergent thinking test:** The value of the reliability coefficient of the divergent thinking test that was applied to the sample of statistical analysis was calculated according to the (Alpha Cronbach) equation, and the value of the test reliability coefficient was (0.88), which is a good value according to what most of the literature and sources indicate.

Reliabilityof correction for article paragraphs: For the purpose of verifying the reliability of correction for article paragraphs, (30) sheets were randomly withdrawn from the answer sheets (the second survey) and then they were corrected again after (14 days) after the first correction, using the Cooper equation. The percentage of agreement between the two corrections was (0.98), and by adopting the same equation and after re-correcting all the answer sheets for the same sample again by biology teacher in the school in which the experiment was applied, the percentage of agreement between the two corrections was calculated and reached (0.91), which is an acceptable value as indicated (Majid and Yassin, 2012), the reliability of the correction for article paragraphs is good and acceptable if its coefficient is (75%) and above (Majid and Yassin, 2012: 93)

.-The final divergent thinking test and its application11

The divergent thinking test was applied in its final form, at the same time to the two research groups on Monday 24/1/2022 AD, after it was agreed with the students on the test date a week ago.

Sixth: Procedures for applying the experiment

`1-The experiment began on Sunday, 14/11/2021, at Al-Fida Preparatory School for Girls, with 3 lessons per week for Division (A) and Division B)

2-The two research groups were rewarded during the first week of the experiment.
3-After completing the scientific material for the first semester and after agreeing with the students a week ago, the divergent thinking test was applied to the two research groups on Monday, 24/1/2022, and the experiment ended on this date.

Seventh: Statistical means: The following statistical methods were adopted: Cooper's equation, Alpha Cronbach's equation, Pearson's equation, t-test for two independent samples, Paragraph difficulty equation, discriminatory power equation for items,and the equation for the effectiveness of the wrong alternatives and the equation for the size of the effect, and the statistical program SPSS was used, version 23.

Presentation and interpretation of results

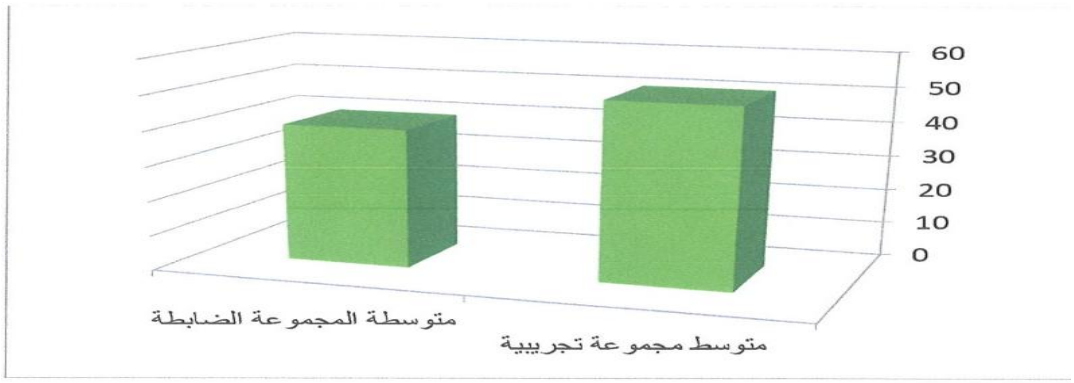
Presentation of the results for the purpose of validating the null hypothesis which states that;

There is no statistically significant difference at the level (0.05) between the average scores of the experimental group students who study according to the alternative assessment strategy and the average scores of the control group students who study according to the normal method in the divergent thinking test, and after applying the divergent thinking test and correcting the students' answers The results shown in Table (3) were obtained

Table (3)The results of the t-test for the difference between the average scores of the two groups in the divergent thinking test

Group	Number	Arithmetic mean	Standard deviation	Value T		Significance level 0.05
				Calculated	Tabular	
Experimental	50	50.820	10.746	4.516	2.00	Statistically significant
Control	49	39,938	13.129			

We note from Table (3) that the calculated T value (t) reached (4.516), which is greater than the tabular value whose value is (2.00) at the significance level (0.05) and the degree of freedom (97), and this indicates the superiority of the experimental group students who studied by adopting the alternative evaluation strategy on the students of the control group who studied according to the normal method in the divergent thinking test, thus rejecting the null hypothesis and accepting the alternative hypothesis, and Fig. (1) shows the means for the two groups.



Plan (2) the averages of the two groups in the dimensional divergent thinking test

Second: Interpretation of the results

The alternative evaluation strategy stimulated the female students to use their mental abilities and creative and divergent thinking through the realistic and real tasks that they were assigned, especially since the alternative evaluation allows the students to use their abilities and skills in thinking and gives enough time to find multiple, different and strange answers and solutions through its strategies and activities. Asking uncommon and unfamiliar questions stimulated the students and raised their creativity and made them think more flexibly. This is consistent with what was mentioned (Zaytoon, 2007) when he confirmed that the use of traditional assessment represented by exams and tests encourages convergent thinking, in contrast to the use of alternative assessment strategies. (Zaytoun, 2007, 606)

Third: Conclusions

1-Teaching using the alternative assessment strategy had an impact on pushing the experimental group female students to use divergent thinking.

2-Adopting modern strategies and unconventional teaching methods when teaching students contributes to developing their thinking and mental abilities.

Fourth: Recommendations

1-Urging biology teachers and female teachers to adopt the alternative assessment strategy in the different academic levels.

2-Encouraging and urging biology teachersfemale teachers to use modern teaching approaches and strategies that make the learner the focus of the educational process and a positive participant in it.

Fifth: Suggestions

1-Conducting a research on the effect of the alternative evaluation strategy in lateral thinking among female students of the fifth scientific class.

2-Conducting research to determine the extent to which middle school students acquire divergent thinking skills.

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