

The impact of the guided discovery method on the development of creative thinking among high school students

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Abstract: The study aims to identify the impact of the guided discovery method on the development of creative thinking among high school students, and to achieve this, the researcher used the experimental approach for its suitability to the nature of the study through proposed educational units using the directed discovery method, as well as the creative thinking scale. 120 students, and to achieve the aim of the study, the researcher used several statistical methods, including the arithmetic mean, standard deviation, and student t. Many recommendations have been made, the most important of which is the use of the method of guided discovery more in secondary education.

KEY WORDS: directed discovery style; creative thinking; High school students.

المخلص: تهدف الدراسة التي بين أيدينا إلى تحديد تأثير طريقة الاكتشاف الموجه على تنمية التفكير الابداعي لدى تلاميذ التعليم الثانوي بمدينة تلمسان، ولتحقيق ذلك استخدم الباحثان المنهج التجريبي لملائمته لطبيعة الدراسة من خلال وحدات تعليمية مقترحة باستخدام أسلوب الاكتشاف الموجه وكذا مقياس التفكير الإبداعي، اعتمد الباحثان على عينة قصدية بلغت 120 تلميذاً، ولتحقيق هدف الدراسة استخدم الباحثان عدة طرق احصائية منها المتوسط الحسابي، الانحراف المعياري، ت ستودنت، وأظهرت النتائج ان لاستخدام أسلوب الاكتشاف الموجه أثر إيجابي على تنمية التفكير الابداعي لدى التلاميذ، وقد تم تقديم العديد من التوصيات، وأهمها استخدام طريقة الاكتشاف الموجه بشكل أكبر في التعليم الثانوي.

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The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

الكلمات المفتاحية: أسلوب الاكتشاف الموجه؛ التفكير الابداعي؛ تلاميذ
الطور الثانوي.

1-Introduction:

Many teaching methods and approaches have emerged at this time to keep pace with the development taking place in educational processes. The most prominent of these are the competency-based approach, which is divided into direct and indirect methods. Each of these methods plays an important role in the teaching process. No single method can achieve all the objectives of a physical education and sports lesson. Each method has the potential to achieve a certain degree of educational objectives if used for a specific period of time, consistent with the teaching situations it requires. Furthermore, each method plays a specific role in the student's skill, social, emotional, and cognitive development.

Methods are one of the fundamental pillars of the teaching process in the field of physical education and sports. Effective teaching is not simply a job or a job, but rather the design of a large, complex project with clear foundations that directly connect to the future of those being taught. Teaching methods are the relationships that arise between teacher and student, which positively or negatively impact the achievement of the objectives set for the lesson (Bouaruri, 2020). The guided discovery method is considered an indirect method of education. It takes into account cognitive aspects and influences students' growth channels. Cognitive growth is at its highest levels due to students' engagement in specific intellectual processes in order to cross the threshold of discovery. Hence, we see that the guided discovery method motivates the learner and pushes them toward discovery, whether in terms of motor skills and how they are performed, or psychological aspects, indirectly on the part of the learner. Afaf 1990 referred to this method through its outcomes that appear to the student through their growth channels. Independence is the criterion for determining growth in the cognitive and emotional domains, where a clear change in cognitive growth occurs through engagement in a specific intellectual process. Crossing the threshold of discovery places the student toward the ultimate, which is the same level of growth as in the emotional domain. This is because when

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

students are successful in every step of discovery, they experience a positive sense of accomplishment (Rana, 2012)

Creative thinking among students is important for raising student performance, developing their thinking, and enhancing their skills (Hoda, 2022)

In this context, recent studies have focused on developing creative thinking through various methods to achieve advanced thinking among learners, enhance their ability to analyze and interpret, and overcome problems and difficulties encountered within the educational situations presented by the teacher during the educational class.

2. Subject Scope:

2.1. Research Theme:

Learning based on experimentation and application is easier and faster to transfer its effect than traditional learning, which is taught only to the learner. New teaching methods have emerged that help shift the educational process from the subject to the learner, thus making the subject a means rather than an end.

The appropriate selection of a teaching method is a complementary factor. Taylor and Holland point out that creativity in sports can be achieved by relying on appropriate methods that allow athletes to see their performance and the results of that performance, enabling them to find useful and authentic ways to develop their creative abilities (Jamal, 2018)

The guided discovery method is one of the most powerful pedagogical methods of the competency-based approach, as it awakens the learner's ability to explore and create. Currently, the learning process is no longer solely dependent on providing students with a wealth of information and experiences, but rather has expanded beyond that, with the teacher's role now directed toward motivating, motivating, and encouraging students to access information and experiences and acquire the desired facts on their own. This leads to increased student positivity and an expansion of their role to include planning and participation in assessment and activities, thus becoming an important focus of the educational process. So that students can achieve better learning more than their concern with how the teacher can deliver a better lesson, and to change teaching methods that center around the student, such as the guided discovery method, and in order to achieve the educational goals of discovering a specific thing, it is necessary to focus on guided discovery strategies that aim to create an

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

educational environment that has the greatest role in the learning process, as the problem is presented to students before learning knowledge, so they discover their need to learn so that they are able to reach the solution. This strategy also aims to allow students to think freely, and give them the initiative to make decisions related to resolving educational situations, and students' possession of this skill in school makes it easier for them to be able to make decisions in their practical life (Al-Din, 2021)

Hence, the necessity of reviewing prevailing thinking methods to determine whether they are capable of achieving the goal of comprehensive servitude, or whether they require restructuring and rebuilding. This is achieved after undertaking a process of demolishing erroneous methods, breaking down mental constraints, and breaking down mental barriers that may hinder sound thinking and creative production (Qashmar, 2019)

Creative thinking helps provide individuals with many new approaches to practical experience. Therefore, it is the responsibility of creative people in our world today to develop and advance society and free it from the many intractable problems that stand in the way of its growth (Mohamed, 2011)

This is especially true for secondary school students, who undergo a variety of psychological and physical changes. This requires teachers to pay attention to them and guide them toward controlling their emotions and thoughts, building a strong foundation of knowledge and skills upon which to build their self-esteem and fortify themselves against various life situations.

2- General objective of the study:

Among the main objectives of the study are determining the impact of the guided discovery method on the development of creative thinking among high school students, designing appropriate instructional units for high school students, and assessing the effectiveness of the proposed instructional units in fostering creative thinking among high school students, and to promote the concept of the guided discovery method and its use as a technique for fostering better thinking.

In addition, to enrich studies and research that prioritize this method in developing creative thinking and improving performance.

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

Theoretical and Practical Significance : Highlighting the importance of instructional units using the guided discovery method, as well as the Creative Thinking Scale, and reinforcing psychological and cognitive development through a new topic, given the significance of this aspect in improving and developing the psychological skills and cognitive abilities of secondary school students.

This topic may also contribute to resolving certain psychological crises and issues that affect and hinder thinking in general, and creative thinking in particular, among adolescents in secondary school.

3- Procedural definition of the concepts mentioned in the research:

3.1 The Guided Discovery Method:

-Terminal Definition:

It is a teaching method based on learning activity and teacher guidance to achieve the educational objectives required to be achieved through the educational situation (Khader, 2016)

-Procedural Definition:

It is a method for motivating students by encouraging the teacher to formulate their ideas and apply them in the field during educational situations.

3.2 .Creative Thinking:

-The technical definition:

It is defined as "a complex, purposeful mental activity driven by a strong desire to search for solutions or arrive at original, previously unknown nuclei. Creative thinking is characterized by its comprehensiveness and complexity because it involves intertwined cognitive, emotional, and ethical elements that form a unique mental state." (Rahman, 1998)

-Operational definition:

It is the student's ability to solve problems they face in an innovative and creative manner by thinking differently.

3.3 .Adolescence:

-Technical Definition:

"Zidane" defines it as a transitional stage between childhood and adulthood. It is a sensitive stage in every individual's life, due to the sudden physiological and physical changes that occur during it, resulting in emotional tensions and a proliferation of psychological

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

and social problems that often disrupt the adolescent's life and require intervention from those around them (Zidane, 1996)

-Procedural Definition:

It is a period of human growth characterized by greater physical and emotional changes than any other stage. Therefore, psychologists attach great importance to it and require close monitoring.

4. Previous Studies:

4.1. study by “Lamia Hassan Al-Diwan” (1999):

entitled "The Effect of Using Two Teaching Methods to Develop General and Motor Creative Abilities in Physical Education and Sports Lessons for Fifth-Grade Primary School Girls."

The study aimed to compare the teaching of physical education—the imperative method, the diversified method, and the traditional method—in developing general and motor creative abilities. The researcher conducted her experiment on a sample she deliberately selected: 66 fifth-grade students at Rabaa Al-Adawiya Girls' School, distributed equally among three classes. 20 students from class (A) became the first experimental group, taught using the imperative method; 20 students from class (B) were taught using the branched method; and 20 students from class (C) were a control group taught using the traditional method. The remaining 6 students from the total group were subjected to a pilot experiment. **The researcher found** significant differences between the pre- and post-tests of the imperative method group, the branched method group, and the control group, in favor of the post-test, in general and motor creative abilities. She also found significant differences between the use of the branched and imperative method and the traditional method in developing general and motor creative abilities, in favor of the branched method group.

4.2. study by “Saadi Hussein” (2012):

Which came Entitled "The Effect of Problem Solving and Self-Review Strategy on Teaching the Effectiveness of Throwing Weight and the Ability to Develop Creative Thinking."

The study aimed to identify the impact of the problem-solving and self-reflection strategy on teaching weight-throwing and developing creative thinking. The sample consisted of 60 first-year students from the College of Physical Education at the University of Erbil, with 20 students per group. The Princeton 1989 scale, adapted from the Arabic version of Al-Surur, was used to measure creative thinking. **The study concluded** that the problem-solving strategy had an impact on

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

learning technical performance and developing creative thinking compared to the other two approaches. This was followed by the self-reflection strategy.

4.3. study by “Abu Al-Tayeb and Hussein” (2013):

This study aimed to identify the impact of guided discovery instruction on creative thinking and some basic swimming skills among children aged 5-6 years. This was done using the experimental method. **The results of the study** showed statistically significant differences at a significance level of 0.05 between the pre- and post-tests of the experimental group in creative thinking and some swimming skills, in favor of the post-test. There were also statistically significant differences between the experimental and control groups in creative thinking and some swimming skills, in favor of the experimental group.

4.4. Study by “Belkacem Mouhoubi” (2016):

Titled "The Effect of the Guided Discovery Method on Developing Reflective Thinking and Learning Motivation for Physical Education and Sports Lessons among Secondary School Students."

The study aimed to determine the effect of the guided discovery method on developing reflective thinking and learning motivation for physical education and sports lessons among secondary school students. The study sample included an experimental group of 36 students and a control group of 35 students. The researcher used an experimental method with a quasi-experimental design. Study data were collected using two tools: a learning motivation scale and a reflective thinking scale. **The study results** showed that the guided discovery teaching method led to the development of reflective thinking and learning motivation for physical education and sports lessons among the study sample.

5. The Applied Framework of the Study

5.1. Study Methodology:

The researcher used the experimental method because it was appropriate for this study and its objectives. This was to determine whether the proposed educational units, using the guided discovery method, contributed to the development of creative thinking among secondary school students at several secondary schools in Tlemcen.

5.2. Study community:

The research community comprised high school students in Tlemcen. As for the original research community, we were unable to determine the total number of students.

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

5.3. Study Sample:

The study was conducted on a sample of 120 students, selected purposively (80 females and 40 males), from several high schools in Tlemcen province.

The sample was divided into a exploratory study and a baseline study. The scale was distributed by the work team, then collected and the following was taken into account:

5.4. Exploratory Study Sample: The study was conducted on a sample of 30 high school students. The purpose was to measure the psychological and emotional state of the practicing student and their learning outcomes from this sporting activity. The study utilized a guided discovery method, which involved completing a questionnaire and creative thinking.

5.5. Primary Study Sample: The sample consisted of 90 students, divided equally between the control and experimental samples, with 45 students per sample.

Table 1: Shows the distribution of sample members and the number of males and females selected in each secondary school.

Number	Name of secondary school	Number of males	Number of females
01	Tha*awjlida	5	12
02	Th*shtwan al-Jadida	8	13
03	Th*Ben Zarjab	7	15
04	Th*Mahi Abdelkader	5	11
05	Th*Ben Sakran	11	15
06	Th*Ahmed Marbouh	4	14
Total		40	80

5.6. Methods and Tools

- Sources, references, and similar studies related to the topic.
- The "Sayyid Muhammad Hasan Khairallah" Creativity Scale.
- SPSS was used to process the data obtained by the students to obtain the results.

6. Methods for collecting study information:

6.1. Instructional units using the guided discovery method:

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

A set of proposed instructional units was presented using the guided discovery method, targeting the following activities:

Table 2: Represents the selected sports activities.

Individual activity	long jump
Group activity	handball

After consulting with the arbitrators and experienced professors from the Institute of Physical Education and Sports, Oran-Mostaganem-Chlef, the proposed units were approved, including the aforementioned activities, as follows:

- Number of units per week: 3, 120 minutes.
- Program duration: 2 months.

6.2. Creative Thinking Questionnaire:

The study instrument was embodied in the Creative Trait Scale developed by researcher Sayed Mohamed Hassan Khairallah (1981). The scale consists of 37 statements, all of which are positive. Responses are divided into five points, with the highest score on the scale being 185, the average score being 111, and the lowest score being 37. The scores are shown in the following table:

Table 3: Represents the scores on the Creative Trait Scale.

Type of answer to the statement	always	often	sometimes	rarely	never	Number of statements
Degrees	5	4	3	2	1	37

7. Statistical Processing Methods:

To achieve the scientific and academic objectives of the study, we relied on several statistical methods, as explained below:

- Arithmetic means.
- Standard deviation.
- Student's t-test for studying statistical differences.

8. Presentation and Analysis and interpretation of Results:

8.1.Presentation and Analysis and interpretation of the Results of the First Hypothesis:

“There are no statistically significant differences between the experimental group and the control group in the pre-test on the creative thinking scale”.

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

**Table 4 shows the comparison between the experimental group
and the control group in the pre-test on the creative thinking
scale.**

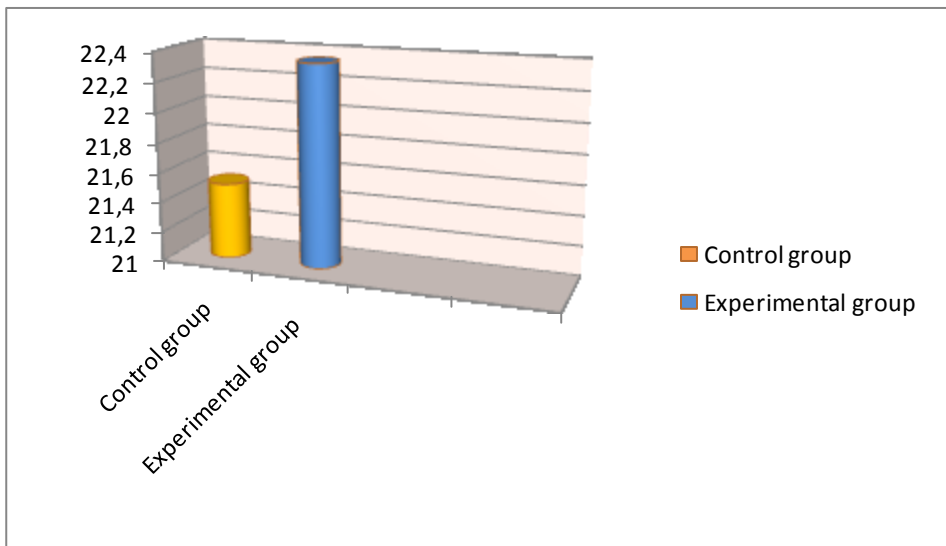
Axis	Sample	Arithm etic mean	Stand ard Deviat ion	Calcula ted T	Degrees of Freedo m	Table d T	Signific ance Level α	Statistical Decision
creati ve think ing	Control	21.51	1.28	0.42	88	1.63	0.05	Not significant
	Experim ental	22.35	1.49					

Table 4, which shows the comparison between the experimental and control samples in the pre-test of creative thinking, shows the following:

The arithmetic mean for the control sample was (21.51) with a standard deviation of (1.28), while the arithmetic mean for the experimental sample was (22.35) with a standard deviation of (1.49). The standard deviation for the two samples is not significant, indicating that the values centered around the arithmetic mean are close. To determine the significance of the difference between the means of the two samples, the Student test was used, with a value of (0.42). This value is smaller than the tabular t value, which was estimated at (1.63) at a significance level of 0.05 and a degree of freedom of 88. Therefore, we conclude that there is no statistically significant difference between the two samples in creative thinking.

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

Graph(N°1): Comparison between the experimental group and the control group in the pre-test of the creative thinking scale



8.2. Presentation and analysis and interpretation of the results of the second hypothesis:

"There are statistically significant differences between the pre- and post-tests of the experimental sample for the creative thinking scale."

Table 5: Shows the comparison between the pre-test and post-test in creative thinking for the experimental sample.

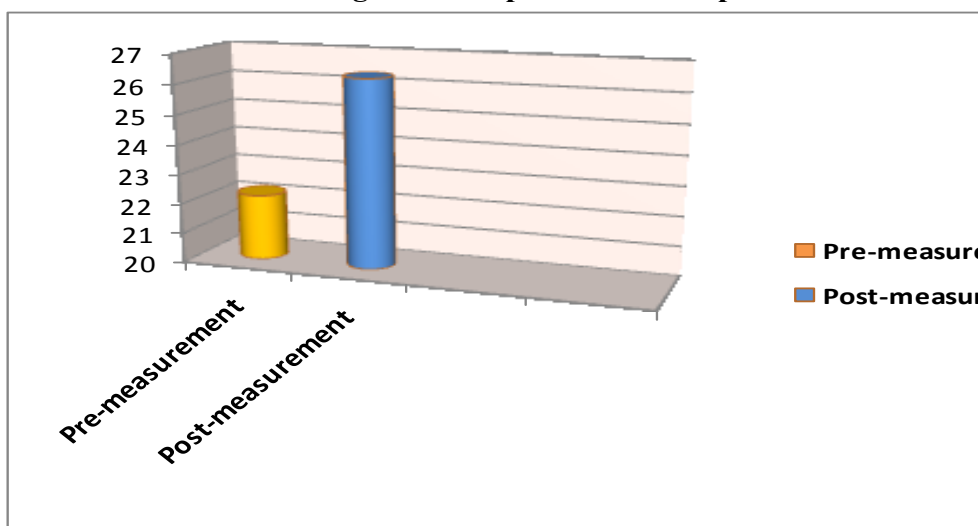
Axis	Measur ement	Arithm etic mean	Standar d Deviati on	Calcul ated T	Degree s of Freedo m	Tabl ed T	Signifi cance Level α	Statisti cal Decisio n
creati ve thinki ng	Before	22.24	1.37	7.66	44	1.83	0.05	signific ant
	After	25.99	1.07					

Table 5, which compares the pre-test and post-test for the experimental sample on creative thinking, shows the following:

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

The arithmetic mean for the experimental sample in the pre-test was (22.24) with a standard deviation of (1.37), while the arithmetic mean for the same sample in the post-test was (25.99) with a standard deviation of (71.0). The standard deviation for the two samples was not significant, indicating that the values centered around the arithmetic mean were close. To determine the significance of the difference between the means for the two measurements, the Student test was used, with a value of (7.66). This value was larger than the tabular t-value, which was estimated at (1.83) at a significance level of 0.05 and a degree of freedom of 44. Therefore, we conclude that there is a statistically significant difference between the pre-test and post-test in creative thinking, in favor of the post-test. The researchers attribute this difference to the educational units proposed using the guided discovery method. This is the conclusion reached by **Saadi Hussein's study (2012)**, which found that the problem-solving strategy had an impact on technical performance in learning and the development of creative thinking compared to other approaches.

Graph(N°2): Represents the comparison between the pre-test and post-test in creative thinking for the experimental sample.



8.3. Presentation and analysis and interpretation of the results of the third hypothesis:

"There are statistically significant differences between the experimental sample and the control sample in the post-test measurement of creative thinking."

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

Table 6: Shows the comparison between the experimental sample and the control sample in the post-measurement of creative thinking.

Axis	Sam ple	Arith metic mean	Standard Deviation	Calculated T	Degree s of Freedom	Table d T	Significance Level α	Statistical Decision
creative thinki ng	Control	22.21	1.80	3.62	88	1.73	0.05	significant
	Experimental	26.33	1.05					

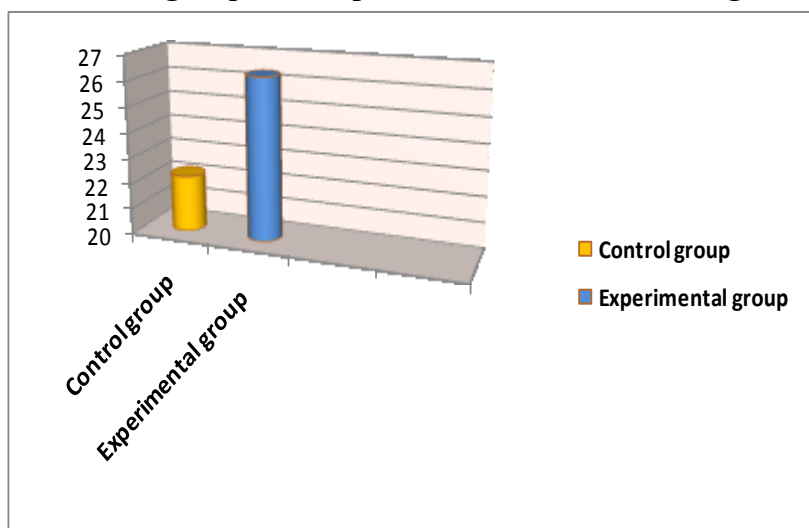
Table 6, which shows the comparison between the experimental and control samples in the post-test of creative thinking, shows the following:

The arithmetic mean for the control sample was (22.21) with a standard deviation of (1.80), while the arithmetic mean for the experimental sample was (26.33) with a standard deviation of (1.07). The standard deviation for the two samples is not significant, indicating the convergence of values centered around the arithmetic mean. To determine the significance of the difference between the averages for the two samples, the Student test was used, which reached a value of (3.62). This value is greater than the tabular t-value, which was estimated at (1.73) at a significance level of 0.05 and a degree of freedom of 88. Therefore, we conclude that there is a statistically significant difference between the control and experimental samples in the post-test of creative thinking, in favor of the experimental sample. The researchers attribute this difference to the proposed educational units using the guided discovery method. **This was confirmed by Lamia Hassan Al-Diwan's study**, which concluded that there were significant differences between the two tests. The pre- and post-test results for the imperative style group, the branched style group and the control group were in favor of the post-test in general and motor creative abilities. It also found that there were significant statistical differences between the use of the branched

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

and imperative style and the traditional method in developing general and motor creative abilities, in favor of the branched style group. The findings of both **Belkacem Mahoubi's study (2016)** and **Abu al-Tayyib and Hussein's study (2013)** confirmed that the guided discovery teaching method led to the development of reflective thinking and motivation to learn in physical education and sports classes, and that there were statistically significant differences between the experimental and control groups in the areas of creative thinking and certain swimming skills, in favor of the experimental group. Hence, we say that the hypothesis that states: "There are statistically significant differences between the experimental sample and the control sample in the post-test measurement of creative thinking, in favor of the experimental group, is attributed to the proposed educational units."

Graph(N°3): Represents the difference between the experimental and control groups in the post-test of creative thinking.



9. Conclusions:

- There is a noticeable interest among the study sample of high school students in practicing mathematics using the guided discovery method.
- The experimental sample responded positively to the proposed educational units.

The Impact Of The Guided Discovery Method On The Development Of Creative Thinking Among High School Students

- The proposed educational units that the experimental group underwent had a positive impact on the creative thinking of high school students.
- The use of the guided discovery method had a positive impact and contributed to enhancing creative thinking among high school students.

10. Conclusion:

Teaching methods are one of the most important basic requirements of the teaching process, as they provide a new vision for the relationship between teacher, learner, and goal. The method determines the teacher's behavior with students, which in turn impacts the student's personality and contributes significantly to building it, preparing them to face the challenges of the times and interact successfully in life.

The guided discovery method has been one of the most observed and studied methods in recent years, as it is a method within the modern pedagogical approach, the competency-based approach. It is one of its indirect methods and the most effective in conveying information and consolidating it in the learner's mind.

We should not forget that thinking is the basis of every process, regardless of its field or specialization, and it branches into many types, the most important of which is creative thinking, which motivates the individual to reach new and highly effective solutions, unlike ordinary thinking, which gives...

Most of the time, it's a temporary solution. The study demonstrated that using guided discovery methods has a positive impact on developing creative thinking among secondary school students.

Therefore, **we recommend** that researchers continue their research into how to develop creative thinking and employ various teaching methods, particularly guided discovery methods, to improve the thinking level of secondary school students.