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مجلة جامعة ابن رشد في هولندا

دورية علمية محكمة تصدر فصليا

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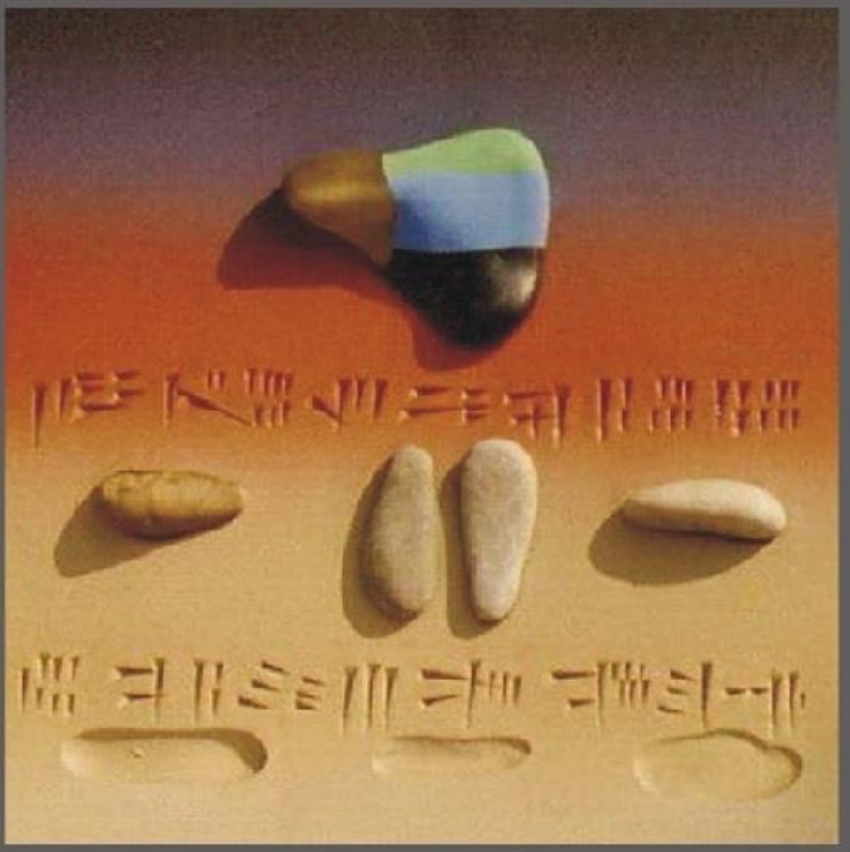

مجلة

جامعة ابن رشد في هولندا

مجلة جامعة ابن رشد في هولندا
دوريّة علمية محكَّمة تصدر فصليّا

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ثمن العدد 10 يورو أو ما يعادلها بالدولار الأمريكي

الاشتراك السنوي	الأفراد	المؤسسات
لمدة سنة	60	80
لمدة سنتين	110	150
لمدة ثلاث سنوات	160	200

رقم التسجيل في هولندا	08189752
السجل الضريبي	NL242123028B01

العدد 56 **أيلول سبتمبر 2024**

هيأة التحرير

البحوث المنشورة يُجري تقويمها أساتذة متخصصون.

الهيأة الاستشارية

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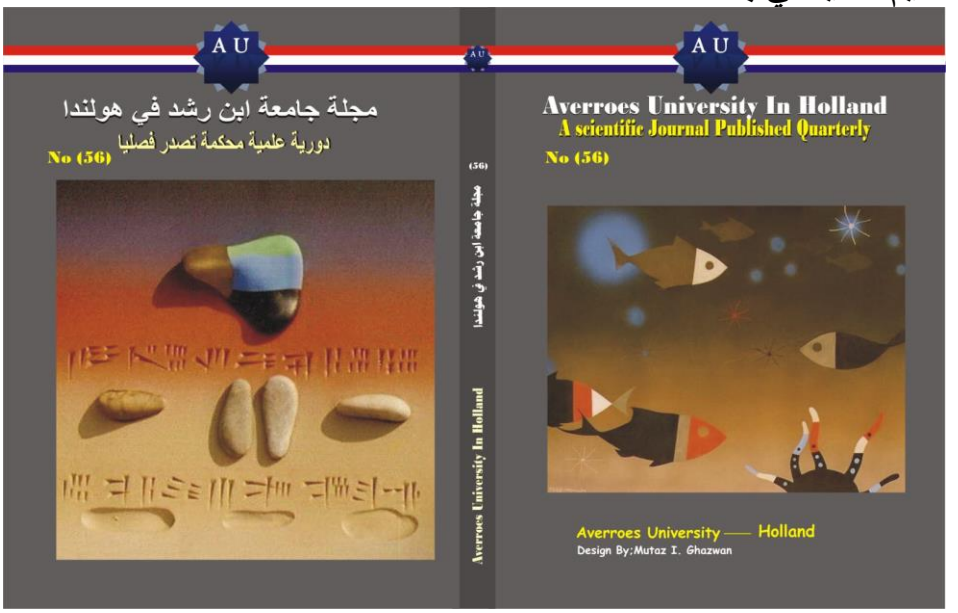
أ.م. د. علي خلف حسين عليوي العبيدي	العراق

تصميم الغلاف الدكتور معتز عناد غزوان
لوحتا الغلاف للفنان الأستاذ وليد شيت

ولد في الموصل عام ١٩٤٧
عضو نقابة الفنانين العراقيين
عضو جمعية التشكيليين العراقيين
اســـتاذ متقاعد وتدريســـي في كلية الفنون الجميلة جامعة بغداد قســـم الفنون التشكيلية
له العديد من المعارض الشخصية والجماعية
مقيم حاليا في بغداد



الفهرس 56

مفتتح

صـــدر العدد الجديد ذي الرقم 56 من مجلة ابن رشـــد وســـط ترحب واحتفال بالمنجز الجديد ومســـاهمته الأكيدة بمســـيرة التنمية والتقدم وحركة التنوير العقلي الجديدة بما يخدم مسار التغيير والبناء.
حال من الدهشة تصنع سماء البحث العلمي بتنوعات مساراته التخصصية على الرغم من العراقيل وجملة المتاعب والأوصاب التي تجابه البحث والباحث. ولكن دوريات البحث العلمي المحكمة تتابع المسيرة وبينها دوريتنا مجلة ابن رشد العلمية المحكمة التي تواصل مشوار تبني البحوث الملتزمة بالقيم العلمية الأكثر رصانة وتلك التي تخدم حاجات السوق وخطى التنمية البشرية التي تتطلع إليها مجتمعاتنا الجديدة..

لقد قدمنا في هذا العدد عددا ضافيا من تلك البحوث التي حفرت علامات نتائجها عميقا لما امتلكته من عمق البصيرة في التناول والمعالجة وأيضا بتشريح مكونات مادتها برائع التأني والتبصر ومع اختلاف أحجام تلك المواد فإن كلا منها يتناسب ومادته وأسئلته والمتاح بين الأيدي من المصادر والمراجع التي عادة ما يندر وجودها عندما تكون الاختيارات لجديد المواد وجديد المعالجة والتناول..

وبوقت وردت البحوث بميادين الفنون وجمالياتها فإن بحوثا أخرى غطت ميدان المنظومة التعليمية التربوية ومسارات البحث النفسي والاجتماعي على وفق أفضل ملامح العرض والتقديم التي استخدمت لغات عالمية ومناهجها الأحدث..

إننا نتطلع لجديد أعدادنا لمزيد من تلك البحوث النوعية الأصيلة منها والرصينة بخاصة في ميادين اللغة والأدب كون علوم الألسنية والسميولوجيا مازالت تطرح أسئلتها على الباحثات والباحثين بما يتطلب إجابات جدية منهن ومنهم بالخصوص..

ونجدد تعهدنا في مزيد دعم لتلك البحوث بما يسهل على الجميع نشر البحوث من دون كلكل العراقيل والمتاعب المادية منها وغيرها طالما توافرت شروط النشر ومحدداته القيمية الأكثر تمسكا بالروح الأكاديمي العلمي وأسسهما.

نحيي مجددا جميع من ساهم بهذا العدد مجددين عالي التقدير لكل المساهمات بأعداد ابن رشد جميعها ونرحب بجديد المنجز البحثي بتنوع مصادره وموائل إنتاجه بمختلف جامعاتنا وبلداننا بلا استثناء أو تمييز.
وإلى لقاء في الأعداد التالية

رئيس التحرير

العلوم النفسية والتربوية والاجتماعية

- أثر البرامج الارشـــادية في تنمية مهارات أطفال التوحد اللغوية دراســـة وصفية تحليلية.
- **The effect of using the Reflective Approach in Science Teaching on Developing Creative Thinking among ninth grade Students in Tulkarem District.**
- **The Relationship of emotional intelligence skills to the personal and professional competence of teachers of resource rooms for learning difficulties**
- **Advancing Multi-Group Comparisons in Educational Research: A Novel Application of Planned Contrast Analysis Using JASP in Robotics Education**
- أثر التخطيط التنفيذي على مأسسة التعليم الدامج: دراسة مسحية تحليلية للمدارس الدامجة في الأردن
- إيجابيات وسلبيات التسويق الإلكتروني من وجهة نظر عينة من الزبائن

The effect of using the Reflective Approach in Science Teaching on Developing Creative Thinking among ninth grade Students in Tulkarem District.

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Researcher: Assistant Professor Mahmoud Ahmed Al-Shamali An-Najah National University - Faculty of Educational Sciences- Department of Curriculum and Teaching methods
Researcher: Roba Faroug Dawoud Education mathematics Superviser - Minstry of Education and Higher Education

Abstract:

The aim of the research is to identify the impact of the reflective approach in science teaching on the development of creative thinking in ninth grade students. To achieve the goal of the research, the experimental method was used in its quasi-experimental design, The research sample consisted of (46) students in the academic year 2019-2018, distributed in two groups, control and experimental, the test of creative thinking was used, after the validity and reliability of the test were confirmed, using SPSS program to analyze the data, contrast analysis(ANCOVA), means, and standard deviations were used to test creative thinking. The results indicated that there were significant differences (α=0.05) between the means of the experimental group, the control group in the test and the result was in favor of the experimental group, in light of these results the researcher recommended the use of reflective approach in teaching at all grades..

Key words: Reflective approach, Creative thinking, Science teaching.

Introduction:

Science teaching particularly depends on different types of thinking, and the reflective thinking has a great importance in the subject of science and life, as the curriculum of life and science mainly depends on the reflective thinking which care about the visual vision, discovering problems, and finding a possible solutions to these problems. It also works greatly to generate many ideas away from traditional methods, emphasizing the role of different thinking skills in increasing the opportunity for mind freedom, research process, and producing ideas profusely, Reflective thinking is important for each the teacher, the learner, and the sciences; It helps the learner to generate a number of ideas about phenomena and events through the processes of description, analysis and transformation by providing different solutions to them. Mastering the reflective processes is part of the scientific culture, and reflective thinking is one of the most important modern trends that elevate science to be just an accumulation of information and knowledge (Aqeli, 2014).

The use of appropriate teaching methods allows the learner to play a constructive role in the learning process in terms of effectiveness and participation in learning (Abdullah, 2016). Thus, the reflective-based education develops the learner's ability to self-independent learning, and to find the appropriate pattern of learning (Barakat, 2005), Reflective thinking is a mental activity of the individual as a result of contemplating the events and phenomena in which he faces, analyzing them to their elements reaching results based on a predetermined plan (al-Atum et al., 2011).

The definition of reflective thinking:

Definitions of reflective thinking varied according to the diversity of philosophies, one of these definitions is Attia's (2015): it is the intentional thinking directed towards specific goals, and it is used when the individual faces a problem and the thinking addresses it to solve it as it represent a challenge to him, Abu Nahal (2010) defines it as: a mental process that includes thinking, foresight, generation of ideas and inquiry; during which the problem is analyzed, contemplated, and the generation of ideas and solutions, and verified to reach the proper solution of the problem situation(Barber, 2010).

The educational importance of reflective thinking:

Khawaldeh (2012) pointed out the importance of reflective thinking, helping students to think deeply, explore new educational mechanisms, meditate on various ideas about the situation, self-evaluation, and develop a sense of self-confidence, the ability to face and solve problems, analyze matters with extreme accuracy, and develop their psychological aspect. linking new ideas and experiences with past and current experiences and predicting them. (Choy & Oo, 2012). It helps teachers achieve a better understanding of students' learning styles, methods and patterns, and diversifies teaching methods.(Al Sharif, 2013).

Reflective thinking skills:

It includes five skills, as indicated by Aslan (2015), which are: Visual vision: It is represented in presenting the aspects of a situation or phenomenon and identifying its components, in terms of its nature, and

presenting drawings and shapes that show its components in a way that gives the learner the opportunity to discover the existing relationships visually.

Detection of fallacies: it consists in revealing weaknesses in subjects by identifying wrong and incompatible relationships with scientific truth, and thus revealing misconceptions and illogical in the achievement of educational tasks.

Reaching conclusions: reaching and building logical relationships through familiarization with the components of a situation or topic and reaching acceptable results according to scientific logic.

Providing convincing explanations: providing meanings and connotations consistent with the scientific logic of the results or correlations whether these connotations and meanings are based on tribal information, or on the characteristics of the situation .

Providing expected solutions: design and build logical procedures to solve the problematic situation, or the problem posed in light of mental perceptions about the topic, or the problematic situation.

The stages of the contemplative approach: The contemplative stages, as defined by Jones (Johns, 1994), were as follows:

Determining the contemplative situation: this stage consists in providing a detailed description of the formed position through some questions: what happened? Where did it happen? Who did it?

Reflection on the situation: this stage is to analyze the situation by answering some questions: What is important in this situation? What were you hoping for during the situation? Why did you do this?

Thinking about alternatives and options : at this stage, thinking about the alternatives and the expected options and determining the best choice by answering some questions.

Features of reflective thinking:

reflective thinking is distinguished from other types of thinking, it involves continuity and making connections between parts and the weaving of experiences in a holistic form so that each new experience is based on past experience, depends on accuracy, methodology, organization, clarity, the ability to summarize and help learners to relate the past to the present and predict the future, and It is closely related to the scientific activity of man, and it is one of the types of supra-cognitive thinking (Al Far, 2011).

The teacher must consider a set of foundations for the development of reflective thinking and its use in educational situations by students; they begin by presenting the topics in the form of problematic situations, which are clearly visible in the minds of students; in order to compose the solution of life problems and participate in intellectual processes. the teacher is considered as a guide to the students, and as an inducer to them, by directing interesting questions, in a way that leads to curiosity and depth of thinking. this requires the teacher to provide a rich environment of experience to enhance the students ' abilities to innovate, provide alternative solutions to the problematic situation and provide the necessary time for students to respond to queries(Awdat, 2006).

Kovalik & Olsen (Kovalik & Olsen ,2010,p4) emphasized the creation of an environment that develops reflective thinking, which consists in developing activities and inquiries, employing appropriate educational strategies, and providing sufficient time to reach understanding.

The creative thinking:

The ability to generate ideas and expand perceptions, enabels the learner to deal and interact positively with the changes of the era we are witnessing, and become successful in this field by teaching students creative thinking and its various skills (Al-Adwan, 2016).

The definition of creative thinking:

Mental interactions between the learner and the problematic situations he faces, to realize the elements of the problem situation to achieve a new understanding that represents an authentic solution to the problematic situation. The process of creative thinking includes each of the following skills: fluency, flexibility, authenticity, sensitivity to problems, and clarification (Saada, 2011).It is defined as the set of mental processes that take place within the human mind, with the aim of linking facts, concepts, information, principles and data, and employing them in solving problems encountered as a result of their interaction with elements of the environment in which they live(Ryan, 2011).

Factors that influence creative thinking as mentioned by Al-Huwaidi(2004):

First, subjective factors :are factors that belong to the same individual, including:

Biological composition: the biological components help the individual to be creative and the creative person is characterized by high mental potentials, creativity, and a high degree of intelligence.

Security and freedom: this is also one of the basic personal needs of man to acquire first learning and then mastering creativity.

The concept of self-actualization: individuals seek to know their abilities and evaluate them by asking themselves questions to know the extent of achieving their goals, and whether these goals have achieved a benefit to society and their satisfaction with the results indicates that their thinking is characterized by authenticity, know their abilities, and evaluate themselves in a clear and honest way, and they have a high level of self-perception.

Analyzation and installation : the ability to assemble, configure and install molecules to obtain an integrated whole of a situation. Such as: putting concepts together to form relationships, principles or laws.

Second: Environmental factors: There are many external factors that may affect the creative abilities of the individual which contribute to its development or keep them non-stimulated (Al-Suroor, 2002).

Economic level: the ability to innovate and achieve better whenever the individual is able to finance businesses and projects and allocate full-time work.

Cultural level: the individual whose family enjoys a good scientific level and is characterized by awareness and education, where they can take better care of him and provide him with assistance, showing his creativity.

Educational style: It includes individual teaching methods that help the person to learn more, in the absence of strategies and methods of self-learning when teaching and during the educational situation, this leads to a weakness in the achievement of creative students, and the emergence of difficulties in emotional expression, in

addition to the negative aspects and so on. Consequences in the classroom such as reducing the ability to express, and social isolation among creative students, but this isolation sometimes may benefit the creators, giving them the opportunity to kindle and shine their creative abilities.

Creative thinking skills:

Creative skills are represented by: fluency, originality, flexibility, problem-sensitivity, Expansion (Al-rabighi, 2014).

Fluency: means the ability to collect the greatest amount of verbal ideas and solutions when responding to a stimulus, taking into account the speed and floidity of its generation, as it focuses on quantity, not quality. Fluency Skill includes several types: verbal fluency, meaning fluency or intellectual fluency, expressive fluency, fallout fluency, shape fluency.

Flexibility: means the ability to diversify the ideas or solutions offered by the individual in the group, thus representing the qualitative aspect of creativity and innovation, it also includes: automatic flexibility, adaptive flexibility.

problems- Sensitivity : means the ability of the individual to feel and sense problems, or to find, discover and identify problems, this skill is related to the observation of unfamiliar situations and confusing things in the environment of the individual, to be re-employed in raising questions to be solved.

Originality: means the ability to regenerate in ideas and put forward new, rare and unfamiliar ideas. It is characterized by its value, quality,

and different from the ideas of others, and it is not important to be quantitative.

Expansion (extension): means the ability to give many details and provide new additions to an idea or a case, which leads to the recognition of more accurate details of the case and work to highlight it.

The teacher helps to improve the creative skills of the learners through the presentation of a large number of diverse activities that lead to creative thinking, and the use of the calendar process to reveal strengths and weaknesses; as the student can review himself, so the calendar is not to issue a final judgment and

influence the level of the good student, but, rather by providing appropriate opportunities for the learner to exploit knowledge in a creative manner in a way that enables him to reveal knowledge from its available sources. Providing the appropriate classroom atmosphere and positive communication between the teacher and his students by asking questions that stimulate thinking, develop curiosity, encourage the mind to discover and provoke new ideas in teaching students the skills of creative thinking represented in: originality, flexibility, fluency and fluency, and motivate them to ask questions, which leads them to The search for authentic self-solutions, and automatic reinforcement, which constitutes a motive to continue with stronger and more creative performance, and that is not possible without the presence of a creative teacher who is able to draw his lines of creativity on the ground (Al-Murabet, 2013).

It is noted that this topic has attracted the attention of researchers, as Al-falifli (2018) conducted a study aimed at finding out the impact of the quality of the kindergarten education in the development of creative

thinking among the students of the first grade in Sana'a, The research sample consisted of(150) first-grade students, selected deliberately from (28) private schools in the capital Sana'a, and to achieve the goal of the study, a data collection form (field survey for kindergartens) was prepared, and the Torrance test for creative thinking was used. The results of the study showed that there are statistically significant differences between the average scores of children graduating from high-level kindergartens and the average scores of children graduating from middle-level kindergartens, in creative thinking in favor of the high level.

Saideh (2016) investigated the impact of meditation and its relationship to demographic changes among students of King Abdullah II schools in Jordan. The sample of the study consisted of (131) students from the schools of the cities of salt and Zarqa were selected randomly, The results indicated that there were statistically significant differences ($\alpha = 0.05$) in the level of reflective thinking attributable to both the demographic variable, gender in favor of males, as for the school stage the results were in favor of secondary stage, the results also showed that there was no interaction between the variables of gender and school stage in the level of reflective thinking.

As for the Khader study(2015) it aimed to examine the impact of using enrichment activities in improving creative thinking skills (fluency, flexibility, and originality), and to investigate the impact of the gender variable on developing creative thinking among eighth grade students. The study sample consisted of (125) male and female students from schools in the suburbs of the capital, Amman. They were randomly assigned to the experimental and control groups. To achieve the purposes of the study, the Torrance Creative Thinking Test was used. The results indicated that there was an effect of using enrichment

activities in developing creative thinking skills in general, and sub-skills (fluency, flexibility, and originality) in particular, and that there was no effect of the gender variable on developing creative thinking skills.

The Abu Dawood Study(2013) was conducted to determine the impact of employing the 5 E's strategy on the development of certain processes of Science and creative thinking among fifth grade students in the governorates of Gaza.The study sample consisted of (60) students and they were distributed randomly , and to collect data, the science processes test was employed in science subject, and the Torrance creative test for verbal images was used, and their validity and reliability were confirmed. The results showed that there were statistically significant differences in the post-measurement of the creative thinking test in favor of the experimental group.

The (Lim& Angelique, 2011), study aimed to investigate some of the habits of reflective thinking, namely :the usual behaviors, understanding, thinking, and critical thinking in students in the light of different educational levels in the learning environment based on the problem-solving methodology, by subjecting them to a daily learning activity based on problem-solving, the size of the research sample was (1200) from freshman to senior students at the university and used the descriptive approach. The results of the analysis indicated that educational attitudes based on problem -solving developed the reflective thinking of first-level students, and for this improvement to occur, support must be provided consistently through Experience improvement.

In the study of Erdogan and Akkaya (Erdogan & Akkaya, 2009), the effect of the (Van Heel) model in developing creative thinking in

mathematics among sixth-grade students was investigated. The researchers also used the experimental method, where a sample of 55 sixth grade students were selected from the a primary school in Turkey, and the study sample was divided into two experimental and control groups, and to achieve the objectives of the study, the Torrance test for creative thinking of verbal images (A) was used.

(Mahardale et al., 2007) study, which aimed to identify the impact of traditional and problem-based environments on the level of reflective thinking among students, the reflective thinking scale was used on a sample of (110) elementary school students. They were distributed to a control group and an experimental group. The results of the analysis indicated that there was a statistically significant difference in favor of the experimental group in the levels of understanding, reflection, and critical reflection, while the differences were in favor of the control group at the level of usual work.

Extrapolating from previous studies, a clear role of reflective thinking in the development of creative thinking skills at different and diverst levels ,such as the study of (Kwon & Park, 2006), (Erdogan & Akkaya, 2009), (aboudaoud, 2013), (Khader, 2015), (AL-falifli, 2018) and (al-Saaede, 2016).

Due to the developments and modifications that occurred in the educational process in Palestine, which emerged from the meetings and conferences held by the Ministry of Education on the impact of students' outcomes in natural sciences subjects at the level of ministerial and international exams (Qubaja, 2014), which called for abandoning the traditional methods of teaching and following the methods of teaching. It provides the learner with opportunities to develop the ability to research, investigate and reflect, which makes the

learner the focus of the teaching-learning situation, contemplative, thinker and creative, able to investigate both mental and practical terms, able to face problem situations in the learning process, able to link learning to daily life, and given the importance of the contemplative approach in Giving the learner the freedom to explore, generate and build ideas was a motive for conducting this research, and based on the above, the research problem revolved around knowing the effect of using the reflective approach in science teaching in developing creative thinking among ninth grade students.

Research question: The research problem revolved around the following question:

What is the effect of using the reflective approach in science teaching on developing creative thinking skills for ninth grade students in Tulkarm District?

Research goal:

The aim of the research is to know the effect of the contemplative approach in science teaching in developing creative thinking among ninth grade students.

Research importance:

The importance of this research is that it may contribute to providing a tool for measuring creative thinking and providing an educational program on reflective thinking that benefits those in charge of preparing and developing science courses and enables interested researchers and teachers to refer to them.

Research Hypotheses: To answer the research questions, the following null hypotheses were transformed:

The first hypothesis which states: (There is no statistically significant difference ($\alpha = 0.05$) in the average responses of the students of the experimental and control groups to the post test of fluency skill according to the teaching method variable).

The second hypothesis, which states: (There is no statistically significant difference ($\alpha = 0.05$) in the average responses of the students of the experimental and control groups on the post test of flexibility skill according to the teaching method).

The third hypothesis, which states: (There is no statistically significant difference ($\alpha = 0.05$) in the average responses of the students of the experimental and control groups on the post test of sensitivity skill to solve problems according to the variable of teaching method).

The fourth hypothesis, which states: (There is no statistically significant difference ($\alpha = 0.05$) in the average responses of the students of the experimental and control groups to the post test of originality skill according to the teaching method variable).

The fifth hypothesis, which states: (There is no statistically significant difference ($\alpha = 0.05$) in the average responses of the students of the experimental and control groups to the post-test of the skill of expansion and expansion according to the variable of teaching method).

Search terms and their procedural definitions:

the reflective approach: a mental process based on four axes of analytical thinking represented in the procedures of reflection, analytical, interpretive, and evaluation to determine strengths and weaknesses, which gives the student the characteristic of objectivity,

the ability to scientific interpretation consistent with scientific truth, and to come to honest results in the light of specific plans (Abu Bashir, 2012). it can also be defined procedurally as a purposeful educational actions based on mental processes implemented by the teacher with his students, based on the investigation and insight of problem situations and their analysis into their elements to develop their creative thinking.

Creative thinking: it is a complex and purposeful mental activity driven by a strong desire to seek solutions or arrive at original results previously unknown and its results are flexible, comprehensive and complex where the individual develops the ability to think beyond the familiar and obvious things. It involves overlapping cognitive, emotional, and ethical elements that form a unique state of mind (Garwan, 2010). It is defined procedurally: the total scores obtained by the research sample members in the creative thinking skills test used to determine the effect of the reflective approach in developing creative thinking skills.

Research Methodology:

In this research, the experimental method was used, with its quasi-experimental design, based on the use of two groups: experimental and control.

Research community:

The research community consisted of all the students of the ninth grade in the schools of the Tulkarm district, whose number is (3475) male and female students, who are studying science in the first semester of the

academic year 2018/2019, according to the statistics of the Directorate of Education.

Research Sample:

The research sample consisted of (46)ninth grade students from Sami Hijazi High School in Tulkarem governorate.

Research variables:

The independent variable is represented in the method of teaching and has two levels(meditative-oriented, usual method).The dependent variable: creative thinking skills.

Research tool:

The test consists of 16 questions divided into five creative thinking skills: fluency (4 paragraphs), flexibility (3 paragraphs), problem sensitivity(3 paragraphs), originality in thinking(3 paragraphs), and expansion and Extension(3 paragraphs).

Face validity for the test:

The face validity of the test was determined by presenting it to a group of arbitrators specialized in curricula and methods of science teaching in Palestinian universities.

The validity of the internal consistency of the test: It was applied to a Pilot sample, in order to verify the validity of the internal consistency, which is intended to describe the homogeneity between the degrees of each field and the total score of the test, and the extent to which each of

the test paragraphs is related to the total degree of the field to which those paragraphs belong. Table (1).

Table (1): Pearson correlation coefficient between the skills of the creative thinking test and the total domain of the test

Skill	total field	significance level
Fluency in thinking	0.84	0.000*
Flexibility in thinking	0.93	0.000*
Sensitivity to problems in thinking	0.88	0.000*
authenticity in thinking	0.79	0.000*
Expansion in thinking	0.84	0.000*

(α=0.05)

The degree of internal validity of the different skills ranged between (0.93-0.79) and this indicates that the test has acceptable validity level for the purposes of this study.

Test reliability: Cronbach's alpha coefficient was used, and the test's overall reliability coefficient was (0.93).

the statistical procedures: The obtained data were processed statistically using the (spss) program by calculating the means and standard deviations of the pre and post achievement test. And the associated analysis of variance (ANCOVA).

Presentation and discussion of results: after analyzing data , we reached a number of results and formulated the recommendations according to these results.

Results related to research questions and hypotheses and their discussion:

First: answering the main research question, which states: (what effect does the use of the reflective approach in science teaching have on the creative thinking of ninth grade students in Tulkarem Directorate)?

To answer this question, means and standard deviations were used for the results of pre and post test for the skills of creative thinking among students of the control and experimental groups.

Table (2): means and standard deviations for pre and post tests of creative thinking skills.

the test	Pretest				post test			
	control group		experimental group		control group		experimental group	
	mean	deviation	mean	deviation	mean	deviation	mean	deviation
Fluency	20.16	8.13	22.86	7.95	18.83	5.54	28.00	3.15
Flexibility	10.68	5.75	11.23	3.98	9.26	6.94	19.05	4.72
sensitivity to problems	4.89	2.75	5.36	3.95	4.30	2.77	8.61	4.44
Authenticity	2.63	2.67	4.36	3.65	2.96	2.44	7.27	5.06
Expansion	4.89	4.29	5.41	4.25	3.17	3.90	8.45	5.12
Total marks	43.26	19.79	49.23	23.08	38.52	5.54	71.39	19.93

Table (2) shows that the total mean of the control group in the pre-test (43.26) and in the post-test (38.25), as for the total mean for experimental group in the pre-test (49.23) and in the post-test (71.39). Creative skills were higher in the control group. This is attributed to the role of the reflective approach, which has the effect of developing the ability to describe phenomena. And in linking new knowledge with previous experiences, the ability to give a set of proposed solutions and alternatives, and the analysis of phenomena; Where it develops the fluency skill based on generating the largest amount of ideas in a specific time, and contemplative thinking begins with a tendency and goal-directed attention to display aspects of the subject and this develops the skill of sensitivity to problems based on observing the problem and verifying its existence, where the observation process often begins by realizing the relationships between the elements One of the skills of reflective thinking is the development of logical steps for the subject through a set of proposed solutions that increase the discovery of the minute details of the subject and thus develop the skill of expansion and elaboration. Thinking, and among the skills of reflective thinking, is giving new alternatives after testing and experimenting with solutions, as it develops the skill of presenting rare ideas away from the usual routine and renewal of ideas.

This result is consistent with the result of Bahloul study (2003), which indicated that the metacognitive strategies that include the reflective approach develop creative thinking, achieve better learning, increase the ability to use information and employ it in learning situations, and the learner's use of metacognitive strategies is one of the basic thinking requirements. The results of the current study together with the results of the study of Khader 2015)), and the study of Abu Dawood (2013), which used metacognitive thinking strategies, including the reflective

thinking strategy in developing creative thinking; Its results indicated that there is a statistically significant difference between the average responses of the research sample for the two groups, and in favor of the experimental group.

As for the differences in the arithmetic averages of creative thinking skills, the highest arithmetic mean for fluency skill and the lowest arithmetic average for originality skill. Great, as for the decline in the skill of originality, it may be due to the students not using the skill of research and investigation and deepening the study of topics that aim to renew in presenting ideas and limiting them to superficial and in-depth learning.

Results and discussion of the first hypothesis: to test the first hypothesis, the associated analysis of variance test(ANCOVA) was used to indicate the differences between the two groups (α=0.05) depending on the variable of the teaching method, Table (3).

Table (3): The results of the associated analysis of variance (ANCOVA) test for the averages of fluency skill in creative thinking for the control and experimental groups.

Variables	Sum of Squares	degrees of freedom	Mean of Squares	F value	significance
Posttest (Fluency)	0.88	1	0.88	0.04	0.83
reflective method	989.76	1	989.76	51.09	0.00*

The error	736.06	38	19.37		
Total	24177.0	41			

(α=0.05)

Table (3) shows that there is a statistically significant difference between the average responses of the students of the experimental group and the control group in the dimensional test of fluency; the calculated value of P(51.09) is statistically significant (α=0.05), i.e., there is a statistically significant difference between the experimental group and the control group in the responses of the students to fluency due to the method of teaching (reflective , and and regular) in favor of the experimental group . This means that the method of teaching had an impact on the skill of fluency in thinking.

In order to determine the difference between the averages of the students of the experimental and control groups in the dimensional test of fluency, the means and standard fluency errors were calculated as in Table (4).

In order to determine the difference between the means of the students of the experimental and control groups in the dimensional test of fluency, the means and standard errors for fluency were calculated as in Table (4).

Table (4): the means and standard errors of fluency skill

The group	Mean	standard errors
control group	18.02	1.01
experimental group	28.02	0.94

The results shown in Table (4) indicate that there is a significant difference between the means of the students in the experimental and control groups in favor of the experimental group.

The mean of the students in the experimental group was(28.02) while the mean of the students in the control group was (18.02) and accordingly the null hypothesis was not accepted, meaning that there are statistically significant differences (α=0.05) in the responses of the students due to the reflective teaching method in favor of the experimental group.

To find out the size of variance, and the statistical significance of the practical method of teaching (reflective approach, the usual method) the "ETA square" test was used ,its considered to be small if the effect size falls between (0.01–0.06) , average if it falls between (0.07–0.14), and high if it is greater than (0.14) and Table (5) shows that.

Table (5): Results of the ETA square test for pre comparisons between the means of fluency skill according to the teaching method variable.

Source of variance	pretest	reflective method
Eta Square	0.001	0.574

It is clear from Table (5) that the impact of the reflective method was large, as its value was (0.574), which means that about 57% of the explained variance in the dependent variable (skill of fluency) is attributed to the reflective method and the rest of the variance is unexplained. The reason may be due to the effect of the reflective approach on the students' fluency in thinking which is a mental process based primarily on descriptions of events and phenomena, which facilitates access to new ideas and retrieval very quickly because it does

not require a higher intellectual process. It depends on the process of remembering and recalling previous information or experiences, so it may be most related to the behavior that is based on the stimulus and response and thus the emerging of verbal and expressive thoughts about the different stimulus. This result was consistent with the Khader study(2015), which showed that the use of enrichment activities that are considered to be sub-cognitive strategies leads to the development of the overall creative thinking process, and the skill of creative thinking fluency, compared to the usual method.

The results of the second hypothesis and its discussion: To test the second hypothesis, the associated analysis of variance (ANCOVA) test was used to indicate the differences in the means of flexibility skill between the two groups ($\alpha = 0.05$) according to the teaching method variable, Table (6).

Table (6): The results of the associated analysis of variance (ANCOVA) test for the means of the flexibility skill in creative thinking for the control and experimental groups.

Variables	Sum of Squares	degrees of freedom	Mean of Squares	F value	significance
Posttest (flexibility)	32.59	1	32.59	1.05	0.31
reflective method	1200.04	1	1200.04	38.64	0.000*
The error	1180.04	38	31.054		
Summation	10490.0	41			

(α=0.05)

Table (6) shows that there is a statistically significant difference between the means of the experimental group and the control group responses in the post test of the flexibility skill; the calculated value of P(38.644) and this value is statistically significant (α=0.05), i.e., there is a statistically significant difference between the experimental group and the control group in the responses of the students to the flexibility skill due to the method of teaching (reflective , regular) in favor of the experimental group . This means that the method of teaching had an impact on the skill of flexibility in thinking.

To determine the value of the difference between the means of the students of the experimental and control groups in the post test of flexibility skill, the means and the standard errors of flexibility skill were calculated as shown in Table (7).

Table (7): means and standard errors of flexibility skill

The group	mean	standard error
control group	8.22	1.27
experimental group	19.08	1.18

The results shown in Table (7) indicate that there is a significant difference between the means of the students in the experimental and control groups, in favor of the experimental group.

The mean of the students in the experimental group was(19.081) while the mean of the students in the control group was (8.222) and therefore the first null hypothesis was not accepted, meaning that there are statistically significant differences at the level of significance (α=0.05)

in the responses of the students due to the method of teaching in the reflective method in favor of the experimental group.

To find out the size of variance, and the practical statistical significance of the teaching method (the reflective approach, regular method), the "eta square" was used as shown in Table (8).

Table (8): Results of the ETA2 test for pre comparisons between the means of flexibility skill according to the variable of teaching method

Source of variance	pretest	reflective method
Eta square	0.027	0.504

It is clear from Table (8) that the effect of the reflective method was large, as its value was (0.504), which means that about 50% of the interpreted variance in the dependent variable (flexibility skill) is attributed to the reflective method and the rest of the variance is unexplained. The reason for the effect of the reflective approach in developing students' flexibility in creative thinking may be due to the fact that the reflective approach is represented in description, analysis and substitution.

These three procedures may make the learner able to provide various ideas, whether through the so-called Automatic flexibility associated with behavioral theory on the part of the recall based on the stimulus and its related to cognitive theory on the part of the adaptive response through the processes of adaptation and alignment and based on the structural theory on the other hand as it forces the learner to be affected by the different social contexts in which learning takes place, which leads to flexibility in presenting different ideas about an issue, event or phenomenon. This result may be due to the fact that flexibility is based

on fluency, which helps to generate unexpected ideas, explain and build on the ideas of others and the ability to resolve an issue in a variety of ways.

This finding is consistent with the result of the Kader (2015) study, which showed that the use of reflective activities that are considered to be among the above-cognitive strategies that lead to the development of the creative thinking process in general, and the skill of flexibility in creative thinking in particular.

The results of the third hypothesis and its discussion: To test the third hypothesis, the associated analysis of variance (ANCOVA) test was used to indicate the differences between the two groups ($\alpha = 0.05$) according to the teaching method variable, Table (9).

Table (9): The results of the associated analysis of variance (ANCOVA) test for the average achievement in the skill of sensitivity to problems in creative thinking for the control and experimental groups

Variables	Sum of Squares	degrees of freedom	Mean of Squares	F value	significance
Posttest (sensitivity to problems)	0.22	1	0.22	0.015	0.904
reflective method	202.36	1	202.36	13.579	0.001*
The error	566.27	38	14.90		
Summation	2527.25	41			

(α=0.05)

Table 9 shows that there is a statistically significant difference between the average responses of the students of the experimental group and the control group in the post test of the problem-sensitivity skill; the calculated value of P(13.579) and this value is statistically significant (α=0.05), i.e., there is a statistically significant difference between the experimental group and the control group in the responses of the students to the problem-sensitivity skill due to the method of teaching (reflective and regular) in favor of the experimental group . This means that the method of teaching had an impact on the problem-sensitive skill of thinking.

To determine the value of the difference between the means of the students in the experimental and control groups in the post test of fluency skill, the mean and standard errors of problem sensitivity were calculated as shown in Table (10).

Table (10): The means and standard errors of problem sensitivity skill

The group	mean	standard error
control group	4.152	0.887
experimental group	8.618	0.824

The results shown in Table (10) indicate that there is a significant difference between the means of the students in the experimental and control groups, in favor of the experimental group.

The mean of the students of the experimental group was (8.618) while the mean of the students of the control group was(4.152) and accordingly the first null hypothesis was not accepted, meaning that

there are statistically significant differences (α=0.05) in the responses of the students due to the method of teaching.

To find out the size of variance, and the practical statistical significance of the teaching method (reflective approach and regular method), the size of the effect was found using the "ETA square". Table (11)shows this.

Table (11): Results of the ETA square test for pre comparisons between the means of sensitivity of problem skill according to the teaching method

Source of variance	pretest	reflective method
Eta square	0.000	0.263

It is clear from Table (11) that the effect size of the reflective approach was large as its value was (0.263), which means that about 26% of the explained variance in the dependent variable (for the skill of sensitivity to problems) is attributed to the reflective approach and the rest of the variance is unexplained.

It is noticed from the results of the research that there is a statistically significant difference (α=0.05) in the mean responses of students to the post-test of the problem sensitivity skill and in favor of the experimental group. The reason for the effect of the reflective approach in developing students' sensitivity to problems skill in students may be that this skill is associated with observing unfamiliar or confusing objects and situations within the individual environment, to be re-employed in raising questions about problem situations ,and the research results are in line with the results of a (Choy&Oo,2012) study

which, Connect thoughts with past and current experiences and predict them. It helps teachers to better understand students ' learning patterns.

The results of the fourth hypothesis and its discussion: To test the fourth hypothesis, the associated analysis of variance (ANCOVA) test was used to indicate the differences between the two groups ($\alpha = 0.05$) according to the teaching method variable, Table (12).

Table (12): Results of the associated analysis of variance (ANCOVA) test for the means of authenticity skill in creative thinking for the control and experimental groups

Variables	Sum of Squares	degrees of freedom	Mean of Squares	F value	significance
Posttest (authenticity)	24.55	1	24.55	1.47	0.232
reflective method	233.40	1	233.40	14.04	0.001*
The error	631.49	38	16.61		
Summation	1962.0	41			

(α=0.05)

Table (12) shows that there is a statistically significant difference between the responses mean of the students in the experimental group and the control group in the post test of the authenticity skill in thinking; the calculated P(14.045) value is considered to be statistically significant (α=0.05), meaning that there is a statistically

significant difference between the experimental and control group in the students' responses to the skill of sensitivity to problems due to the teaching method (reflective and regular) in favor of the experimental group. This means that the teaching method had an impact on the skill of authenticity in thinking.

In order to determine the value of the difference between the means of the students in the experimental and control groups in the post test of authenticity skill, the mean and standard errors of authenticity thinking skill were calculated as shown in Table (13).

Table (13): the means and standard errors of authenticity skill in creative thinking

The group	mean	standard error
control group	2.50	0.95
experimental group	7.47	0.88

The results shown in Table (13) indicate that there is a significant difference between the means of the students in the experimental and control groups, which was significant in favor of the experimental group.

The mean of the students in the experimental group was (7.47), while the mean of the students in the control group was (2.509). Accordingly, the first null hypothesis was not accepted, meaning that there are statistically significant differences ($\alpha = 0.05$) in the students' responses that are attributed for the method of teaching in the reflective approach, in favor of the experimental group.

To find out the size of the variance, and the practical statistical significance of the teaching method (the reflective approach, the regular method), the effect size was found using the "eta square". Table (14) illustrated this.

Table (14): Results of the (ETA square) test for pre comparisons between the means of authenticity skill according to the teaching method variable

Source of variance	pretest	reflective method
Eta square	0.037	0.270

It is clear from table (14) that the effect size of the reflective approach method was large, as its value was (0.270), which means that about 27% of the explained variance in the dependent variable (skill of authenticity) is attributed to the reflective approach and the rest of the variance is unexplained. The reason for the effect of the reflective approach in developing the skill of originality in thinking among students may be the renewal of ideas and the introduction of new, rare and unfamiliar ideas that are different from the ideas of others in terms of type. This may also be due to the role of the mind-set, which makes the learner able to find innovative and unique solutions to problems and situations encountered in the class room through contemplative activities that help the learner to identify problems encountered in life; thus helping to achieve the functionality of knowledge, the transmission of the impact of learning, brainstorming of ideas which are not based on the ideas of others.

This result is consistent with the study of Abu Dawood (2013): it showed that there were statistically significant differences ($\alpha = 0.05$) in the post-measurement of the creative thinking test between the mean scores of the students of the experimental and control groups in favor of the experimental group, as it agrees with the study of Khader (2015) ; Its results showed that employing reflective activities leads to the development of the creative thinking process in general, and the skill of authenticity in creative thinking in particular.

The results of the fifth hypothesis and its discussion: To test the fifth hypothesis, the associated analysis of variance (ANCOVA) test was used to indicate the differences between the two groups ($\alpha = 0.05$) according to the teaching method variable, Table (15).

Table (15): Results of the associated analysis of variance (ANCOVA) test for the averages of the skill expansion and overflow of the control and experimental groups

Variables	Squares sum	Freedom degrees	Squares mean	F value	significance
Posttest (expansion)	9.562	1	9.562	0.421	0.521
reflective method	274.465	1	274.465	12.071	0.001*
The error	863.998	38	22.737		
Summation	2655.0	41			

($\alpha = 0.05$)

Table (15) shows that there is a statistically significant difference between the mean responses of the students in the experimental group and the control group in the post test of the skill of expansion and extension in thinking; the P(12.071) value is statistically significant (α=0.05) that is, meaning that there is a statistically significant difference between the experimental and control group in the students' responses in the skill of expansion and elaboration due to the teaching method (reflective , and regular) in favor of the experimental group. This means that the method of teaching had an impact on the skill of expansion and expansion in thinking.

In order to determine the value of the difference between the means of the students in the experimental and control groups in the post test of the skill of expansion and overflow, the mean and standard errors of the skill of expansion and overflow were calculated as shown in Table (16).

Table (16): the mean and standard errors for the skill of expansion and overflow

The group	mean	standard error
control group	3.28	1.09
experimental group	8.48	1.01

The results shown in Table (16) indicate that there is a significant difference between the means of the students of the experimental and control groups, in favor of the experimental group.

The mean of the students in the experimental group was (8.482) while the mean of the students in the control group was(3.28) and,

accordingly, the first null hypothesis was not accepted, meaning that there are statistically significant differences (α=0.05) in the responses of the students due to the method of teaching.

To find out the size of the variance, and the practical statistical significance of the teaching method (the reflective approach, the regular method), the effect size was found using the "eta square". Table (17) illustrates this.

Table (17): Results of the (ETA square) test for dimensional comparisons between the means of the skill of expansion and fluctuation according to the variable of teaching method

Source of variance	pretest (companion tribal)	reflective method
Eta square	0.01	0.24

Table (17) shows that the effect of the reflective method was large, with a value of (0.241) this means that about 24% of the explained variance in the dependent variable (skill of expansion and extension) is attributed to the reflective method and the rest of the variation is unexplained . The reason for the influence of the meditative orientation in the skill of expansion and extension in the creative thinking of students may be that it is a mental process through which the use of educational activities and attitudes based on reflective three levels of description, analysis, and switching, which helps the learner in giving many details and introducing new additions to the idea, In addition to the role of the reflective approach in giving students the opportunity to present their answers freely, which provides them with a comfortable learning

environment that leads to adding new and diverse details to a particular idea, as reflective thinking is part of the scientific culture and one of the most important modern trends that transcend science to be just an accumulation of information. The results of the research agreed with what Al-Aqili indicated that reflective thinking is important for the teacher, the learner and the sciences; It helps the learner to generate a number of ideas about phenomena and events through the processes of description, analysis and transformation by providing different solutions to them. Al-Aqili (2014). The results of the analysis also agreed with the results of the study of Erdogan and Akkaya (Erdogan & Akkaya, 2009), which indicated that there was a statistically significant difference between the average responses of the students of the control and experimental groups, in the creative thinking test in favor of the experimental group.

Recommendations: Based on the results, it is recommended to use the reflective approach in science teaching because of its impact on developing creative thinking among students. Taking into account all creative thinking skills while using the reflective approach strategy in science teaching.

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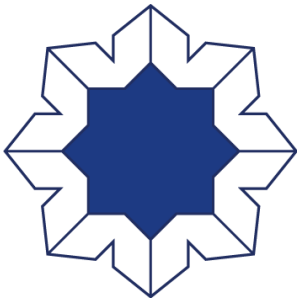

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