

“Creative Thinking and its Relationship to Mathematical Intuition of the Fourth Class Students are Scientific”

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Abstrac

The aim of the study was to find out the relationship between the skills of creative thinking and mathematical intuition among students in the fourth grade. To achieve this goal, the following hypotheses were developed:

1. There were no statistically significant differences at the level of significance (0.05) between the theoretical average (mean) and the arithmetical average of the grades of the fourth grade students in the creative thinking test.
2. There were no statistically significant differences at the level of significance (0.05) between the theoretical average (mean) and the arithmetic average of the students of the fourth grade in the mathematical intuition test.
3. There is no statistically significant correlation between (0.05) among the students in the fourth grade in the two tests creative thinking and mathematical intuition.

The research community consisted of 243 students in the fourth grade in the preparatory schools of the General Directorate for the Second Karkh Education in Baghdad for the year 2018-2019. The research sample was chosen in a simple random way and consisted of (61) students of the fourth grade scientific school And 25% of the members of the total society. The statistical bag for the educational and psychological sciences (SPSS) was used in interpreting the results of the research, which reached:

1. Ownership of the fourth grade students of creative thinking skills.
 2. Ownership of students of the fourth grade of scientific mathematical intuition.
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"El pensamiento creativo y su relación con la intuición matemática de los estudiantes de cuarta clase son científicos"

3. There is a positive and statistically significant relationship at the level of significance (0.05) between the rate of creative test scores and the degree of mathematical intuition test scores.

In the light of the findings, a number of appropriate conclusions, recommendations and proposals were developed.

Resumen

El objetivo del estudio fue descubrir la relación entre las habilidades del pensamiento creativo y la intuición matemática entre los estudiantes de cuarto grado. Para lograr este objetivo, se desarrollaron las siguientes hipótesis:

1. No hubo diferencias estadísticamente significativas en el nivel de significancia (0.05) entre el promedio teórico (promedio) y el promedio aritmético de las calificaciones de los estudiantes de cuarto grado en la prueba de pensamiento creativo.

2. No hubo diferencias estadísticamente significativas en el nivel de significancia (0.05) entre el promedio teórico (promedio) y el promedio aritmético de los estudiantes de cuarto grado en la prueba de intuición matemática.

3. No existe una correlación estadísticamente significativa entre (0.05) entre los estudiantes de cuarto grado en las dos pruebas de pensamiento creativo e intuición matemática.

La comunidad investigadora consistió en 243 estudiantes de cuarto grado en las escuelas preparatorias de la Dirección General para la Segunda Educación Karkh en Bagdad para el año 2018-2019. La muestra de investigación fue elegida de manera aleatoria simple y consistió en (61) estudiantes de la escuela científica de cuarto grado y el 25% de los miembros de la sociedad total. La bolsa estadística para las ciencias educativas y psicológicas (SPSS) se utilizó para interpretar los resultados de la investigación, que alcanzó:

1. Propiedad de los estudiantes de cuarto grado de habilidades de pensamiento creativo.

2. Propiedad de los estudiantes del cuarto grado de intuición matemática científica.

3. Existe una relación positiva y estadísticamente significativa en el nivel de significancia (0.05) entre la tasa de puntajes de las pruebas creativas y el grado de puntajes de las pruebas de intuición matemática.

A la luz de los hallazgos, se desarrollaron una serie de conclusiones, recomendaciones y propuestas apropiadas.

The problem of research: Despite the importance of mathematics and the emergence of modern methods and trends in teaching, we find many students find it difficult to understand this article may be due to the lack of use of different types of thinking that may play a role in the curriculum not to understand or not allow learners This is what led the researcher to provide a questionnaire for teachers of mathematics consisting of a question related to mathematical intuition and types of teachers and teachers of mathematics for the fourth grade scientific number (30) teachers and schools and have an experience of not less than five years, the question is: R Some scientific idea of intuition and mathematical types (sensory - inductive - pure numerical)? .

All the answers confirmed that they have no idea or knowledge or information about mathematical intuition and types. Thus, the need arose to research these two variables together for scarcity or perhaps the absence of local and Arabic research (as per the researcher's knowledge) as an attempt to identify and investigate the extent to which the fourth grade students possess the skills of creative thinking and mathematical intuition.

The problem of research is determined by answering the following question: What is the relationship between creative thinking skills and mathematical intuition among the fourth grade students?

Second: The importance of research: Mathematics is characterized by its fertile nature, which makes it an area to train the minds of learners on the types of sound thinking and the realization of quantitative and logical relations, the recent trends in the teaching of mathematics emphasizes the need for the teacher to allow students to use and develop thinking types, creative thinking skills being unique to several characteristics This is because the learner requires him to interact with the problem he faces immediately after his sense of the problem and uses all his mental abilities to face and solve the problem and these characteristics exist in all learners but in varying degrees (Thunder and Suha, 2015: 126 - 127) It is worth mentioning that intuition is the fourth mental function and has contributed to the results of the modern scientific fields (education science, psychology, neuroscience and other sciences), all of which emphasize the optimal use and integrated For brain functions based on the principle of each function depends on the other to achieve balance and interdependence.

The importance of intuition in the use of mental functions in different ways,

which occur when a person is in the process of identifying something did not expect how it will happen, and it is worth noting that the intuition falls at three levels (cognitive, predictive, transformational). (Mawla, 2009: 227-231).

Kutbi (1997) argues that mathematical intuition is not very different from intuition in its general sense, but is prepared by mental mathematical processes used by learners in solving mathematical problems without having to pass the steps of solving the specific problem and identifying it with three types: sensory, inductive, numerical.

(Kutbi, 1997: 115-114)

The importance of the study as follows:

- 1) the importance of mathematics in the preparatory stage in general and the fourth grade in particular.
- 2) The importance of distinguishing between creative thinking skills and mathematical intuition types.
- 3) Provide the field of education by creating a relationship between creative thinking and mathematical intuition.
- 4) The study confirms the mental functions and solving the problems and difficulties faced by learners in mathematics.
- 5) To develop the methods and methods of teaching by introducing them to the skills of creative thinking and mathematical intuition, as it may help learners to avoid their weaknesses and shortcomings.

Third: Research Objective: The aim of the research is to identify the relationship between creative thinking skills and mathematical intuition

In the fourth grade students?

Fourth: The hypotheses of research: To achieve the goal, the following hypotheses were developed:

1. There were no statistically significant differences at the level of significance (0.05) between the theoretical average (mean) and the arithmetical average of the grades of the fourth grade students in the creative thinking test.
2. There were no statistically significant differences at the level of significance (0.05) between the theoretical average (mean) and the arithmetic average of the students of the fourth grade in the mathematical intuition test.
3. There is no statistically significant correlation between (0.05) among the students in the fourth grade in the two tests creative thinking and mathematical intuition.

Fifth: The limits of research: The current research was limited to the following:

1. Secondary and secondary schools for boys (day) affiliated to the Directorate of Education Karkh second in the city of Baghdad.

2. The fourth grade students for the academic year (2018 - 2019).
3. Creative thinking skills (fluency, flexibility, originality, details)
4. Mathematical intuition (sensory, inductive, purely numerical).

VI: Definition of terms:

Creative thinking: Qatami (2007) defined it as "a multi-faceted phenomenon that involves the production of something new or the creation of something unusual, and therefore creative individuals will not be looking for new, unusual things"

(Qatami, 2007: 125)

Theoretical Definition: An intellectual activity used by the individual when he feels the existence of a problem, he tries to collect all his experiences to develop appropriate solutions after re-organization in proportion to the situation and the search for the most successful and best solutions.

Procedural Definition: The degree to which students in the fourth grade of science will be able to respond to the skills of the skills test (fluency, flexibility, originality, details)

Mathematical intuition: Kutbi (1997) defines it as: the direct cognition of the subjects of thinking and the outcomes of the mental processes. If the outputs are the basis of the proof and the reasoning, it is known as the mental intuition, which is on two types (inductive intuition and purely numerical intuition) It is known (sensory intuition). (Kutbi, 1997: 114-115)

Theoretical definition: The researcher adopted the definition of the research objective (Kutbi, 1997).

Procedural definition: The degree to which students in the fourth grade of science will receive through their response to the mathematical intuition test paragraphs according to their types (sensory, inductive, purely numerical).

Chapter Two (Theoretical Background):

First: Creative Thinking Creative thinking is one of the most important types of thinking in which an individual must have features such as control, self-sufficiency, self-confidence, ability to innovate (Abu Laila, 1984: 58).

General components of creative thinking

1. Creative process: how it produces creativity and includes four stages are:
 - a. Preparation: Any creative action must be preceded by public and private preparation.
 - B. Nursery: This stage needs time may be long or short, the solution may suddenly appear at a time when the problem has been forgotten.
 - T. Brightness: The peak of reaching the peak of creativity.
 - W. Verification: The last stage in the creative process, it includes the raw material generated from previous searches and from the foresight that is in its final stage.

2. Creative production: It is the process of meeting three basic requirements (novelty, appropriateness, development potential), which helps to uncover the important foundations by which the creative product can be accepted or rejected.

3. Personality traits: They are enjoyed by creative individuals of human characteristics including: cognitive memory, methods and previous experiences.

(Abu Jado and Muhammad, 2015, 141-143)

Creative Thinking Skills:

1. Fluency: Creative thinking requires multiple ideas that learners provide at a specific time to be fundamental ideas beyond the general average of their peers after being exposed to certain mathematical or engineering problems. The student presents his / her multiple ideas and then the most convincing ideas are chosen.

2. Flexibility: It is the intellectual diversity of the learners by modifying or changing his idea of a subject in proportion to the type of problem that he faces as finding solutions to the geological or engineering issue.

3. Originality: It is all new characterized by the creative learner through the provision of non-repeated answers and spoke for the first time as solutions to a mathematical problem did not know the level of peers of learners.

4. Details: The ability of the learner to provide appropriate explanations to the basic idea, which makes it easier for mental processes to understand what is happening to the subject to be studied.

(Thunder and Soha, 2015: 158 - 176)

Creativity Levels (Innovation):

1. Expressionist creativity: It is spontaneous creativity, which works to develop ideas, regardless of their quality, for example: children's drawings that are spontaneous.

1. Product Creativity: It is the second level that is interested in finding a product that has the benefit or value or design of a painting

2. Creative innovation is the level that shows the ingenuity of the individual or that the individual makes a new contribution to the knowledge or principles and theories or philosophical schools, such as the inventions of Edison and Marconi.

3. Creative innovation: means the ability of the individual to generate new functional uses of objects or tools known and present.

4. Creativity (the breakthrough): It is the highest degree of creativity and is

rarely accessible to individuals, and is the arrival of the invention of a theory or a new principle such as the theory of Aninstein.

(Abu Jado and Muhammad, 2015,

139-140).

Mathematical intuition: intuition The fourth mental function used by learners in different ways is that the learner reaches to know the information without knowing how it was done. Many people remember their vision of the situation before it happens and do not know how it happened. The intuition has three levels (cognitive, predictive, transformational). (Mawla, 2009: 227-232).

In the opinion of the researcher that those interested in education have shown a clear and increasing interest in mathematical intuition as it is the way that shows us things we can not understand only by it. It helps us to understand the issues of mathematics with justifications and convictions to enable us to prove and find solutions in the future, all the axioms and axioms are sensational claims may agree with Our senses or not agree, but mental work needs them.

I am a mathematical intuition:

1. Sensory intuition: It is built on the senses of learners through forms or drawings, which is very important, but the defects of non-believer has been determined that the person fixed body moving and vice versa, and yet it is a must when teaching our students.
2. Intuitive intuition: It is one type of mental intuition helps learners to add new experiences from the results of the experiences conducted on special experiences to access to general experiences, the process of conducting a number of times the same experience helps the learner intuition to know the final results.
3. Pure numerical intuition: It is one of the types of mental intuition that helps learners to create a cumulative mental knowledge, for example, number 9 is a component of $1 + 8$, $4 + 5$, $3 + 6$.. This type is based on the acceptance of the principle of mathematical induction as one Methods of mathematical proof.

(Kutbi, 1997: 114).

Chapter Three: Previous Studies

First - Previous studies on creative thinking:

The study (Al-Faris, 2011) was conducted in Iraq and aimed to know the effectiveness of a training program according to the habits of the mind in achievement and the development of mathematical logical intelligence and creative thinking. The sample consisted of (41) students of the fourth grade scientific chosen by the method of intent, (20) students were trained in the training program according to the habits of the mind, and a group of 21 female students studied in the usual way in teaching. The equivalence between the two groups of research in a number of variables. The researcher built the tools of research and verify the validity of the building and display On a group of arbitrators,

specialists and bin (45), the detection of the coefficient of difficulty and discrimination, and the coefficient of the effectiveness of the wrong alternatives, and the stability of the test was calculated using the Alpha-Kronbach equation (0.87). The researcher also constructed the test of logical mathematical intelligence consisting of (35) paragraphs. The researcher then constructed the creative thinking test which consisted of (20) paragraphs constructed in light of the structural components of the test. The validity of the test was verified. - Kronbach and worth (0.92). The experiment was applied in the first semester of the year 2010-2011. To test hypothesis validity, the data were collected and statistically analyzed using statistical means: (TEST for two independent samples, TNA for two linked samples, alpha-Cronbach equation, Pearson coefficient, and percentage coefficient). The results were as follows:

1- There is a statistically significant difference at (0.05) between the mean scores of the experimental group and the control group in the achievement test in favor of the scores of the students of the experimental group.

2 - There is a significant difference at the level (0.05) between the average scores of the experimental group and the control group in the post-application to test logical mathematical intelligence in favor of the grades of students in the experimental group.

3 - There is a difference of statistical significance at (0.05) between the average scores of the experimental group in the tribal application and post-application to test logical mathematical intelligence for the benefit of the post-application.

4- There is a statistically significant difference at (0.05) between the average of the experimental group and the control group in the post-application to test the creative thinking in favor of the grades of the students of the experimental group.

5 - There is a significant difference at the level (0.05) between the average scores of the experimental group in the tribal application and post-application to test creative thinking for the benefit of the post-application.

The researcher presented a number of conclusions, recommendations and appropriate proposals.

II - Previous studies dealing with mathematical intuition: There is no previous study of this variable (to the knowledge of the researcher).

III. Indicators and indications of previous studies:

1. The current study agreed with the study (Al-Faris, 2011) in the place of its conduct inside Iraq.

The study aims to identify the relationship between the skills of creative thinking and the mathematical intuition of the fourth grade students.

3. In terms of size of the sample, in the study (Al-Faris, 2011), 41 students were

enrolled (20) for the experimental group and 21 for the control group. This study will comprise 61 students.

4. The methodology of the research differed. In the study (Al-Faris, 2011), the experimental method was used and the current research will use the descriptive approach.

5. Al-Faris (2011) studied the use of statistical methods in the processing of data, including (independent testing of two independent samples, the tectological test of two connected samples, the alpha-kronbach equation, Pearson coefficient, and the coefficient of the percentage agreement).

Chapter Four: Research Procedures

First: Research Methodology The researcher adopted the descriptive approach to correlative studies to suit the nature of the research objective in revealing the relation between the two variables (creative thinking and mathematical intuition) for the fourth grade students.

Second: Society of Research: The society is determined by students of the fourth grade in the preparatory schools of the Directorate of Karkh / 2 for the city of Baghdad for the academic year (2018 - 2019) and amounted to (243).

Third: Sample of the research: A random sample was selected. 61 students were withdrawn, representing 25% of the research community, with two schools for each school having two divisions, namely, the Junior Scientific Knowledge Center for Boys and the Nebuchadnezzar Preparatory School for Boys.

IV - Research Tools: The research was based on two tools to measure (creative thinking and mathematical intuition):

Creative Thinking Test: The first tool in research, the test was adopted by (Al-Faris, 2011), found its relevance to the measurement of creative thinking skills among students in the fourth grade scientific. And the mathematics and the Iraqi environment as well as it has a good and good steadfastness and includes the test (20) test paragraph and the researcher the following procedures:

1. The test was presented to a group of experts and arbitrators specialized in mathematics and teaching methods and supported the validity of its use.
2. The test of creative thinking was applied to a sample of 40 students in Ibn Sina secondary school for boys to ascertain the clarity of the paragraphs and the instructions of the answer and the time it took. (50) minutes sufficient to answer the test paragraphs.

3. Validation of the test: The validity of the test was verified on the face of it, as it was presented to a group of specialists in educational and psychological sciences who supported the validity of its use to measure the creative thinking of the fourth grade students in mathematics.

4. Stability of the test: Stability was calculated by using the Qyoder-Richardson equation (20) by the scores obtained by the survey sample. The stability coefficient was 0.88 and this ratio is good and acceptable. (Al-Sharqawi, 1996: 55).

Thus, the test of creative thinking is ready to be used in the measurement of students in the fourth grade scientific.

The mathematical intuition test is the second research tool. The researcher built the test according to the following:

1 - Determination of the objective of the test: aims to measure the mathematical intuition of students of the fourth grade scientific.

2 - Preparing the initial paragraphs of the test, questions were presented to the learners in the form of (test booklet) contains the question (problem) and then provide a number of positions is (solving problems), which are unfamiliar positions of the student requires him to respond immediately (surprise) Presence depends primarily on the student's importance and intelligent guess which is supposed to be the correct answer.

3 - The validity of the test used by the researcher (honesty virtual) was extracted after the presentation to a group of experts and specialists in the science of mathematics and teaching methods and psychology to determine the extent of achievement of the paragraphs of the measured as in Appendix (2), and after taking into account according to the views of the arbitrators were deleted two paragraphs (15) items distributed evenly over the three species.

(2) If the answer is wrong or abandoned, (1) one degree if the answer is partially correct, and (2) if the answer Exactly correct. Thus the test became between 0 - 30 degrees and the theoretical average of the whole test was adopted at 15 degrees.

5 - Formulation of the test instructions: the need to choose the answer even if it is characterized by difficulty within the specified time.

6- The first experimental application: The mathematical intuition test subjects were applied to a first sample of 50 students at Ibn Sina secondary school on Thursday 21/2/2019 to confirm the clarity of the paragraphs and the instructions of the answer and the time taken.) Is sufficient to answer the test paragraphs. Calculated by taking the average time for the first (5) students and the average time to another (5) students.

7 - The second pilot application: The test was applied to the second survey sample composed of (50) students at Ibn Sina secondary school for boys on Sunday 24/2/2019. For the purpose of extracting the statistical analysis of the

paragraphs, namely:

a. Difficulty factor for paragraphs: Individuals were divided into two extreme groups (high and low), each with a percentage of (50%), which included 25 students per group. Their difficulty ranged from 0.20 to 0.80, which is acceptable as confirmed by Zubai and others (1981: 77). Annex (3)

B. The strength of the distinction of the paragraph: The answers of the students of the fourth grade were arranged in descending order and the upper and lower grades were determined by 50%. The coefficient of discrimination for all paragraphs ranged from 0.22 to 0.81 and Eble, 1972 () states that the coefficient of discrimination is acceptable if it ranges from 0.20 to 0.80 (Eble, 1972: 269)

8. The stability of the test: The equation (Kjoder Richardson - 20) was used to calculate the stability of the mathematical intuition test paragraphs to extract the internal consistency of the paragraphs, giving one degree for the correct answer and zero for the wrong answer. (0.86) which is an acceptable stability coefficient. Allam (2000) confirms that the coefficient of stability is acceptable between 0.80 and more. (Allam, 2000: 534)

9 - The final test: Integrating the mathematical intuition test with the final version of (15) test paragraphs distributed on three types equally, namely (sensory intuition, inductive intuition, purely numerical intuition).

Fifth: The final application of the two tests: The researcher applied the tests during the second half of the academic year (2018 - 2019) on the sample in the two schools of scientific knowledge of boys and junior high school Nebuchadnezzar for boys and took the period between 24-27 / 2/2019.

VI - Statistical Means: The researcher adopted the statistical bag for educational and psychological sciences (SPSS):

1 - Equation coefficient of difficulty (to calculate the difficulty of the paragraphs of the tests of creative thinking and mathematical intuition)

2 - The coefficient of discrimination (to extract the discriminatory power of the paragraphs of the tests of creative thinking and mathematical intuition)

3 - the effectiveness of the wrong alternatives (to calculate the moles for the paragraphs of the test of creative thinking)

4) The one-way meta-test (to find the difference between the arithmetic mean and the mean mean for the sample)

5 - the test of the two independent interrelated (to test the significance of the differences between the tests creative thinking and mathematical intuition)

6 - Keoder - Richardson equation 20: (to extract the value of the stability of the

tests of creative thinking and mathematical intuition).

Pearson correlation coefficient to find the correlation between (creative thinking and mathematical intuition)

(Allam, 2000: 534)

Chapter Five: Results of the Research First - Presentation of the results and interpretation:

1 - For the purpose of verifying the first zero hypothesis, which stated that: (There are no statistically significant differences at the level of significance (0.05) between the theoretical average (satisfaction) and the mean of the scores of students in the fourth grade in the test of creative thinking). The results showed that there was a statistically significant difference with the calculated T value (11.34), which is greater than the numerical value of (1), which is greater than the numerical value of (10) and the arithmetic mean (11.4) 2) at the level of (0.05) and the degree of freedom (60), Table (1) which indicates that the respondents possess the skills of creative thinking acceptable. Thus, the null hypothesis is rejected, and the alternative hypothesis is accepted, which states that there are statistically significant differences at the level of significance (0.05) between the theoretical average and the arithmetic mean and for the fourth grade students in the creative thinking test. Theoretically, it may be due to the following reasons:

- a. The methods and methods of teaching used to possess students of the fourth grade of scientific skills of creative thinking.
- B. The experiences of fourth-grade students of creative thinking played a key role in acquiring creative thinking skills.
- T. The presence of some topics of mathematics and focus on examples that develop the skills of creative thinking for students of the fourth grade scientific.

Table (1) The final test of the difference between the average grade of students and the theoretical average for the test of creative thinking

At a level of significance (0.05)	T value		Free of degree	Average Average	standard deviation	SMA	sample
	table	calculate					
function	2	11.34	60	10	5.4	11.4	61

2. For the purpose of verifying the second null hypothesis, which states that: (There were no statistically significant differences at the level of significance (0.05) between the theoretical average (mean) and the arithmetic mean of the grades of the fourth grade students in the mathematical intuition test). The test was used for one sample to compare the theoretical mean (15) and the arithmetic average (16.4). The results showed that there was a statistically significant difference with a calculated value of (9.53) 2) at the level of (0.05) and the degree of freedom (60), Table (2), indicating that the respondents possess the skills of creative thinking acceptable. Thus, the null hypothesis is rejected, and the alternative hypothesis is accepted, which states that there are statistically significant differences at the level of significance (0.05) between the theoretical average and the arithmetic mean and for the fourth grade students in the creative thinking test. Theoretically, it may be due to the following reasons:

- a. Mathematics classes help fourth-graders reach results and understand math solutions before starting to solve.
- B. Experiences of the accumulated fourth grade students found through previous observations and experimentation.
- T. Stay away from stress and anxiety during the course of the lesson among the students of the fourth grade scientific and their teachers contributes to their possession of mathematical intuition.

Table (2): The final test of the difference between the average grade of students and the theoretical average of the mathematical intuition test.

At a level of significance (0.05)	t value		Free of degree	Average Average	standard deviation	SMA	sample
	table	calculate					
function	2	9.53	60	15	4.6	16.4	61

3. For the purpose of verifying the third null hypothesis, which states that: (There is no relationship of statistical significance at the level of (0.05) between the grades of students in the fourth grade scientific tests creative thinking and mathematical intuition.) Pearson correlation coefficient was used between the average test scores for students In order to determine the significance of the relationship, the calculated value (2.4) was compared with the table value of (2) and the degree of freedom (59) at the level of significance (0.05). Alternative. It can be attributed to the following reasons:

- a. The clear interest in the subjects of mathematics and the solution of exercises and exercises for their subjects helped to gain students of the fourth grade of scientific skills of creative thinking and mathematical intuition.

B. This is due to the nature of the school examinations and the pre-examination of the forms of exam questions, whether paper or available on websites on the Internet, allowing the acquisition of different thinking patterns, including creative thinking skills and mathematical intuition through predicting the solutions for the large number of training.

CONCLUSIONS:

1. Creative thinking skills can be acquired by training students in the fourth grade of science within and outside the lesson.
2. Students possess the fourth grade of mathematical intuition at an acceptable level.
3. The skills of creative thinking related to the statistical significance of mathematical intuition at the level of significance (0.05).

RECOMMENDATIONS:

1. Preparation of training and rehabilitation courses for teachers of mathematics, including the definition of the importance of creative thinking and mathematical intuition and the need to acquire them by their students.
2. Develop the mathematics curriculum in middle schools intensively to help students acquire the skills of creative thinking and mathematical intuition.
3. The need for the teachers of mathematics to return their students using creative thinking skills before the direct answer of them as well as training on the use of types of intuition (sensory, inductive, purely numerical).

IV. PROPOSALS:

1. Conduct similar research to find the relationship between one of the variables in the current research with other variables such as problem solving, information processing skills, and mathematical strength.
2. Conduct research similar to the current research for other stages of study.
3. Conduct research similar to the current research according to the gender variable (male and female) to find out the impact of the relationship between them.

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