Impact a Module to Teaching the Skills of Mathematical Thinking on an Achievement of Mathematics for Students in the Primary Schools

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Abstract: The current research aims to design a proposed teaching Module to improve the thinking skills of the student s in the fifth grade of the primary and to know its effect on their achievement solving mathematical problem s. The proposed Module was used CASME, which means accelerating mental growith through scientific and mathematical Education. Acronym to Cognitive Acceleration Through Science and Mathematics Education. This Module combines tow Module s: the CASE Module and the CAME Module, as well as the modification of some steps and procedures that help in the process of improving thinking and be compatible at the same time to the process of accelerating thinking. The sample was selected randomly (48) student s from the university mixed primary school, and the sample was divided into tow, the first experimental group (24) student s and the second group control (24) student s, and the search tools were three, the first question naira for thinking, Second Pre- test and third Posttest, dimension It was sure to have psychometric properties, has been used Coder Richardson equation 20, (t) test for tow independent samples and (t) test for statistical samples interconnecting means, and the results showed. There were statistically significant differences between the pre and post test of the experimental group, as well as the existence of statistically significant differences between the post-test of the tow research groups, both in favor of the propsed teashing Module . In the end of the results, a set of recommend dations were written.

Keywords: Mathematics , Mathematical Thinking , CASE Module , CAME Module , model of teaching Mathematical

Research Problem :

It is no secret to many of us that the reasons for the weakness of the collection of many math has been led by the mental ability of student s associated with knowledge of the conceptual and procedural knowledge, that mean if the student uses the thinking process to solve mathematical problem s of all kinds, and even the thinking of mathematics inhurent in the student even while studying mathematical topics.

It is not enough to rely on theories that focused on infrastructure Mentality as theory Piaget, which states that there is a chonge happening in the mental capacity of an individual age between (12 years – 18 years) this stage is called the transition from thinking sensory to the abstract thinking, but looking at Variables other than genetic variables, for example the variables that accompany the student in the environment and the closest is what happens in the schol of leurn ing procise es.

(Eduard Debono) also confirms the expert in the field of reflection on the importance of student s to look at the prociss of thinking as a skill that can be improved and attention learning and training (DCTT, 2015,97), and relying on a good teacher and teaching the way we try to influence in the student 's thinking and move it wrong to solve mathematical problem s to the appropriate thinking and logical and sequential outlook for the development of correct solutions to mathematical problem s, and this type of thinking also reminded him (Alharthy, 2005, 180) leads to the positive development of the mental structure of the student .

Research Importance :

The importance of the current research lies in the following points :

1) Proposing a new trashing Module to improve mathematics thinking skills for fifth graders, which helps to learn effectively and thus increase achievement.

2) To experiment with the propsed Module on a sample of fifth grade student s and to know the effect of their solution to mathematical problem s, which gives a new perception of a teaching Module that trains student s on how to think logically while facing the mathematical problem and develp correct steps to solve them.

3) Explain the theories and Module s that have been concerned with the process of thinking, development , speed up, improve and linking those Module s with learning mathematics.

4) A new addition to the trashing Module s that may be used in other subjects that require continuous thinking skills.

5) The research contributes to the response to the demands that keep pace with the scientific development and face the digital challenge, Developing modern teasing method s that make the learner the focus of the preparation of the revolution of information. **Research Goals** :

The current research aims to:

1. Designing a proposed trashing Module to improve mathematics thinking skills for fifth graders.

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2. To know the effect of the proposed trashing Module on the achievement of the fifth grade student s in solving mathematical problem s.

Proposed Module : (C.A.S.M.E)

It means accelerating mental growth through scientific and mathematical Education, and written letters are abbreviated to Cognitive Acceleration Through Science and Mathematics Education.

This Module combines tow Module s:

1. Adey and Seyer Module (C.A.S.E)

2. Mathematics Module (C.A.M.E)

In addition to modifying some of the steps and procedures that help in the process of improving thinking and be compatible at the same time to accelerate the process of thinking .

Adey and Seyer Module (C.A.S.E):

It means accelerating mental growth through scientific Education, and the letters are shortened to: Cognitive Acceleration Through Science Education .

This Module was designed in 1989 by:

1. Philip Adey

2. Michael Seyer

The goal was to accelerate the growth of the skills of scientific thinking, has been tested in eight British school s and lasted for (10) years and proved to be effective in the materials of English language, science and mathematics (Alharthy, 2005, 177)

The project was built on the psychological Module of Piaget, which states that a qualitative change in the intellectual structure of a student of a given age, as well as the social Module of Vygotsky, which states that the environment affects the student 's learning, (Alharthy, 2005, 180). Studies have cited the name of the Module as "cognitive acceleration", "speeding up thinking " or "stimulating thinking ", and in all of these studies (Mustafa, 2012; Al-Abdullah and Rahman, 2012; Hamza and Jawad, 2016; Sahw, 2017) These studies agreed on most Educational materials (teacher's guide, laboratory materials, student 's bag).

Educational Material for Adey and Seyer Module :

1 - Introduction A - Objectives of the activity. B - Clarifying the main points to focus on. C - List of materials for the activity. D-Procedures for the implementation of the activity and an explanation of each action.

2-Student 's Bag: a - Business paper \ Multiple copies \ Take notes and results. b - Business card \ Instructions to solve the problem (do not write anything). c - Images, transparencies or slides.

3 - Method of trashing : a - Development of student s' thinking and not knowledge acquisition. b- Special training for the teacher to manage activities. c - Experienced experience in expert mentation and observation and record the results and observations . d- Make student s looking themselves to reach the end result of the activity.

4 - classroom discussions: a - before the experiment. b - during the experiment. c - after the experiment (the teacher source of information, grade manager, facilitator of learning, directed to activities and discussions).

5. Conflicts of Knowledge Exposing student s to sudden observations that do not match their expectations. Student s may be over whelmed by the fact that they rethink their cognitive structure and way of thinking to adapt to the new evidence they are seeing.

6 - Beyond Thinking : The teacher asks the student how she did it, or why she did it? Or could you Explain to your colleagues why you thought about it?

7. Bridging : It is intended to link the experiences obtained by the student s in these activities with the experiences they receive in the rest of the scientific materials. In life experience, it is necessary to extend intellectual bridges of activities to life and from life to activities, as well as to and from other scientific materials, with out these bridges, experience remains confined with in the conceptual framework of the project . (Alharthy, 2005, -186-183).

Mathematics Module (C.A.M.E):

It means speeding up thinking by trashing mathematics, and the letters are shortened to:

Cognitive Acceleration Through Mathematics Education

This Module is based in a series of events that aim at transferring the level of student thinking in mathematics from its current level to an advanced level. This Module has been used recently in many countries and was at the forefront of these countries America and Britain (Alqawas, 2013, 4) This trashing Module is concerned with the gradual progression from observation to concision, inference, and the formation of relationships in order to improve the student 's mathematical thinking and thus develop his achievement (Goulding, 2002, 104).

This Module is based on tow theories Piaget theory and Figo Testy theory. Studies on this Module include:

All agreed on most of the Educational materials for this Module, which comes from the previous Module (Adey and Seyer), in addition to how to speed up thinking about mathematics specifically by:

1 - Upgrading in solving sports problem s.

2 - Deepen the student 's understanding of mathematical concepts.

3 - Replace the steps of the routine solution with others that help in reaching a new solution.

4. Focus on how to use higher thinking skills while solving issues. (Al-Quwas, 2013)

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Improving Mathematical Thinking Skills :

(Alodwan and Dawood, 2016) Explain that improving the skills of thinking of all kinds through whish the learning of subjects effectively, whish leads to the strengthening of mental process es, and this process is done when the student finds a positive link and useful between the skills of thinking and the field of application in daily life, (Alodwan and Dawood, 2016,117). In this field, educators in general and in the trashing of mathematics in particular have provided many method s, Module s and trashing method s that stimulate and learn thinking, including SOWM strategy. This strategy is a modern strategy in trashing skills above Knowledge, whish aims to transform (Alodwan and Dawood, 2016,118), but the choice of method of trashing and effective method is related to the characteristics of the student s themselves, such as age and the school stage as well as the Educational environment and the academic content whish helps in making a decision about that choice.

Method ology and procedures:

1) Community and Sample for Research : The research community consists of all student s in the fifth grade of primary in the center of the province of terete, regular in the official hours of public school s. The sample was selected randomly (48) student s from the university mixed primary school , and the sample was divided into tow , , the first experimental group (24) student s and the second group control (24) student s.

2) <u>Equivalence of group s</u>: The equivalence of the research group s was done in the following variables:

a) Age of student . b) General rate of achievement in the fourth grade of primary. c) Test the previous information in mathematics . d) (IQ).

The statistical results indicated that there were no statistically significant differences in the above variables, which means that the experimental and control group s were equal in these variables.

3) <u>Research Design</u>: The semi-experimental design was chosen for tow group s to be suitable for the current research. Where the pre-test for both groups was applied in the first semester of the 2020-2021 academic year, The test was then applied to the tow groups.

4) <u>Research tools</u>: The search tools were made up of three tools:

A) Question naira: An open question naira addressed to both the student and the teacher with an open question about: (Ideas used during solving mathematical problem s). They were presented to teachers in writing on white paper and answered by them. The research er and the teachers were used to interview the student s and ask them about these ideas. A large number of ideas that student s have learn ed during the solving of mathematical problem s have been record ed and used in building the trashing Module .

B) Pre-test: The pre- test consists of (20) paragraphs of the article and in the form of verbal questions for the following subjects (groups, rectangles and angles, large numbers, operations on numbers, natural numbers and their characteristics). In order to find a way to think and find a solution. The validity of the virtual test was confirmed by presenting it to a group of specialists from mathematics teachers as well as supervisors and some professors of the mathematics department at the University of Kufa. Many of them expressed their approval for the test except for some modifications to the verbal and linguistic formulation. Order P View and liabilities have been introduced to those observations.

C) Post-test: The post-test shall consist of (25) twenty-five paragraphs of the type of pans in the form of verbal questions of subjects (geometric shapes, regular fractions, operations on fractions, decimals, operations on decimals, spaces). Is not routine in order to solve it using the mental abilities of the student and avoid the answer as direct as possible, and has been verified the validity of the virtual test by presenting it to a group of specialists in trashing mathematics and have made the following observations:

i. Delete tow paragraphs and replace them so that they do not affect the structure of the test by content.

ii. Modification of wording (4) four paragraphs.

iii. Modify information in (3) paragraphs.

These observations were taken and the tow paragraphs were replaced to become (25) paragraphs.

5) <u>Research procedures</u>: The research includes the following procedures:

a-See the literature and previous studies related to the subject of the research .

b- Review tests for solving mathematical problem s, whish include multiple ideas during the solution.

c - See the content of the mathematics book for the fifth grade primary, which is taught for the academic year 2020-2021 and write the annual plan of the subjects and according to time.

d- Providing the open question naira to student s and teachers before the end of the first semester, specifically in the month of (12) for the year 2020 because student s completed the first semester and conducted tow tests by their teachers. The question naira was applied to the primary school and tow school s in Najaf.

e- The construction of the test subjects which include the ideas extracted by the research er as well as see the previous measurements and then apply the test on both group s in the first month of 2021 and before the half-year exam.

f- Develop study plans for the content of the mathematics book in the second semester with review the trashing Module to improve ideas and train the teacher of mathematics on tow Module s, as well as to develop plans for the same content but in regular trashing with out reference to the Module of improving ideas.

g- Monitoring the trashing of the experimental and control groups during the trial period as a supervisor visitor and in agreement with the management of the cooperating school.

h- The construction of the post-test paragraphs with review the previous literature and standards as well as the level of mental ability of the student s as well as the ideas presented in the pre-test, and its application before the final exam.

I - Tabulation of data and statistical analysis to see the results.

The Results :

1) The first result: the effect of the proposed trashing Module on the achievement of the experimental group student s in the prepost tests. The results were shown in Table (1).

| | Results of the experimental group in the file first – tests | | | | | | | |
|-------|---|------------|-----------|---------|------------|---------|--|--|
| Test | Number of | Arithmetic | Standard | Digress | T value | T value | | |
| | student s | mean | deviation | freedom | calculated | tabular | | |
| Pre- | 24 | 61.3 | 5.5 | 23 | 9.67 | 2.042 | | |
| Post- | 24 | 71.8 | 2.3 | | | | | |

| Table (1) | | | | | | | |
|-----------------------------------|-------------------------|--|--|--|--|--|--|
| Results of the experimental groan | in the Pre-Post – tests | | | | | | |

It is clear from Table (1) that the arithmetic mean of the experimental group in the post-test is higher than the arithmetic average in the pre- test. In order to know the statistical significance, the t-test of the interrelated samples was applied. The calculated value of t (9.67) is higher than value of T (2.042). Thus, we reject the null hypothesis and accept the alternative that states the existence of the differences and for the benefit of the experimental group studied using the proposed trashing Module .

2) The second result: The erect of the proposed trashing Module on the achievement of the post-test for the tow group s of researchThe results are shown in Table (2).Table (2)

| Results of the tow group s in the post-test | | | | | | | | | |
|---|-----------|------------|-----------|---------|------------|---------|--|--|--|
| group | Number of | Arithmetic | Standard | Digress | T value | T value | | | |
| | student s | mean | deviation | freedom | calculated | tabular | | | |
| experimental | 24 | 71.8 | 2.3 | 46 | 2.54 | 2.021 | | | |
| Control | 24 | 64.1 | 2.9 | | | | | | |

It is clear from Table (2) that the arithmetic mean of the experimental group is higher than the arithmetic average of the control group. In order to know the statistical significance, the t-test of the independent samples was applied. The calculated value of t (2.54) is higher than the t (2.021). Thus, we reject the null hypothesis and accept the alternative that states the existence of the differences and for the experimental group studded using the proposed trashing Module.

3) Discussion and interpretation of the results:

In both results, the positive erect of the proposed trashing Module is shown. The research er believes that the reasons for this erect may be due to the following:

a-The trashing Module according to the const ruction of ideas is more interesting and enjoyable for the primary stage student s because it calls for the mental proprties inherent to him, and try to reach to the higher levels in the pyramid Piaget and not stand at the minimum levels based on memory, which used to over the previous years, To make a lot of effort to overcome the problem s with new ideas that led to the correct solutions.

b-The current research is consistent with all the studies and research that showed the superiority of the programs, Module s and trashing method s used to accelerate the thinking but it is unique to the Module (improve mint of ideas), the process of correcting the mascon caption of the student and the development of a correct alternative idea during the solution of sports problem s and this is what was put in the study plans of the group experimental.

c - The existence of a stimulating atmosphere to stimulate ideas with in the classroom and in the mathematics lesson specifically helps to drip different ideas among student s, and this is often in the classroom experimental group, which make s the student keen on the exact answer and chose the correct idea during the solution.

4) Recommendations:

The research er recommends:

a- Doping the proposed trashing Module in improving mathematical ideas in the trashing of mathematics in the elementary stages as well as the rest of the stages after experimentation.

b- Using the idea of tests based on different ideas and non-routine formulation of verbal questions and providing them to student s and avoid direct answer, which enhances their mathematical thinking.

c - Training primary student s to think correctly while solving mathematical problem s in terms of dealing with the data and order and use the appropriate law or the appropriate solution, which likely for the selection of short and accurate.

d- Train teachers in on the work trading institutions on advanced trashing Module s, including the proposed current Module to keep abreast of development and increase student achievement.

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