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Training the Students of the Department of Mathematics to Use Thinking Acceleration Paradigm (CAME) to Acquire Skills of Mathematical Communication

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Abstrac

The aim of the research is to train the students of the mathematics department on the CAME model in the practical education program to enable them acquire the skills of mathematical communication.

The study sample consisted of students of the fourth grade of the mathematics department at the College of Education for Pure Sciences / University of Mosul for the academic year 2018-2019. The number of students was (62) students who were divided into two groups: the first was trained according to the CAME model, (32, 30) male and female students, respectively.

In order to achieve the objective of the research and test hypotheses, this requires the filling of a form of the skills of mathematical communication .The form was of (24) items that covered five area (mathematical reading, writing, representation, listening, and discussion). The test was steadfast and honest

After randomly dividing the sample of the research students into two research groups, a proposed training program was developed to train the experimental groups on the acceleration of thinking model, as well as developing the objects schedule for the groups. The researcher applied his own experience to the groups on 15/10/2018, and the first course lased up to 10/1/2019, and then the sample students were sent to the secondary and high schools in the city of Mosul and its environs. There, the training tool was implemented through cooperation with the department teaching staff. After statistical data collection and analysis using T –Test for two independent

samples, the results showed the following:
- There is a statistically significant difference at (0.05) between the two averages of mathematical communication achievement skills (mathematical reading, writing, representation, listening, discussion, and total) in the two experimental and control groups and in favor of the experimental group.

Capacitación de los estudiantes del Departamento de Matemáticas para usar el paradigma de aceleración del pensamiento (CAME) para adquirir habilidades de comunicación matemática

Resumen

El objetivo de la investigación es capacitar a los estudiantes del departamento de matemáticas en el modelo CAME en el programa de educación práctica para que puedan adquirir las habilidades de comunicación matemática.

La muestra de estudio consistió en estudiantes del cuarto grado del departamento de matemáticas de la Facultad de Educación de Ciencias Puras / Universidad de Mosul para el año académico 2018-2019. El número de estudiantes fue (62) estudiantes que se dividieron en dos grupos: el primero fue entrenado según el modelo CAME, (32, 30) estudiantes masculinos y femeninos, respectivamente.

Para lograr el objetivo de las hipótesis de investigación y prueba, esto requiere el llenado de una forma de las habilidades de comunicación matemática. La forma era de (24) ítems que cubrían cinco áreas (lectura matemática, escritura, representación, escucha y discusión). La prueba fue firme y honesta.

Después de dividir aleatoriamente la muestra de los estudiantes de investigación en dos grupos de investigación, se desarrolló un programa de capacitación propuesto para capacitar a los grupos experimentales sobre la aceleración del modelo de pensamiento, así como para desarrollar el cronograma de objetos para los grupos. El investigador aplicó su propia experiencia a los grupos el 15/10/2018, y el primer curso duró hasta el 10/1/2019, y luego los estudiantes de muestra fueron enviados a las escuelas secundarias y prepara

torias de la ciudad de Mosul y sus alrededores. . Allí, la herramienta de capacitación se implementó a través de la cooperación con el personal docente del departamento. Después de la recopilación y análisis de datos estadísticos utilizando T –Test para dos muestras independientes, los resultados mostraron lo siguiente:

- Existe una diferencia estadísticamente significativa en (0.05) entre los dos promedios de las habilidades de logro de la comunicación matemática (lectura matemática, escritura, representación, comprensión auditiva, discusión y total) en los dos grupos experimentales y de control y a favor del grupo experimental

Introduction

The teaching of mathematics is one of the basic components of the curriculum as the educational objectives and the content chosen by the curriculum specialists can only be evaluated by the teacher and the methods he uses in teaching. Therefore, teaching can be considered as the link between the students and the components of the curriculum and the method which includes the educational situations that are developed in the class which are organized by the teacher and the method he follows so as to make these situations effective and interesting at the same time (Da'mas and Alnatour, 2010: 77)

The improvement of the educational process in terms of curricula and teaching methods that lead to the improving of the students ' achievement and enable them to keep up with the scientific progress that is observed in the current era. keeping abreast of the rapid scientific and technological progress that affects the curricula in general and mathematics curricula in particular, and learning mathematics in terms of the use of teaching methods appropriate and new are considered the foundations on which the mathematics curriculum depends on the different stages of education. (Abu Obaid and Jaradat, 2009: 2)

On its part, the Supreme Education Council in Qatar adopted a set of standards for the mathematics curriculum. Among the objectives of these standards is the delivery of mathematical ideas accurately through natural and mathematical language such as numbers, figures , relationships, symbols, shapes, drawings and graphs, as well as mathematical terms that contribute to accelerating the student thinking (Education Authority, 2004: 12)

Moreover, the attention of the advanced educational systems in the process of thinking and the principles associated with other cognitive processes, especially in the areas of science and the transition to mathematics represented by Thinking Acceleration Paradigms of Science (CASE) and Mathematics (CAME), which emphasize the process of thinking acceleration as well as seeking to generate an encouraging learning environment among teachers and

their students in various subjects and in an objective view of the researcher to the reality of teaching mathematics at the university level, especially students of the Department of Mathematics in the college of Education for Pure Sciences, generate a feeling and sense of the researcher about the problem through his experience in the field of methods of teaching mathematics and his teaching the practical part and supervision of the students when they teach at different schools at the practical teaching stage in the college of Education. He noted that there are significant shortcomings in the performance of students and teachers in the skills of communication of mathematics. The students only performance us limited to the explanation of the subject and giving a number of examples and then move to solve some mathematical problems .All these things happen in a routine manner , and thus mathematics loses its logic and beauty, and this is reflected in a state of dissatisfaction of the students which leads to their refusal to participate in any type of collective participation, because the focus of the teacher is on certain mathematical terms and symbols without exchanging ideas, dialogue, discussion and thinking motivation in the students .

In this aspect and in line with the recent orientations in the field of teaching mathematics, the researcher chose the thinking acceleration (CAME) model that is based on the thinking acceleration through mathematics and the training of mathematics students in order to achieve the process of mathematical communication and seek to stimulate their thinking and participation in the classroom, and thus the Search problem can be stated by the following question:

What is the effect of the CAME model in training the students of mathematics department in the practical education program to impart them the skills of mathematical communication?

Mathematics is a significant science that is indispensable to any individual, whatever his culture is, as it occupies a distinguished space in life, whatever its degree of advancement is . Mathematics is indispensable in many fields such as measurement, quantities, sizes, times, distances, and weights. The understanding of mathematics within the enormous technological development has not been limited to a specific number of elite people, and its learning has become an urgent need for every member of society. (Afaneh, 2012: 2)

The importance of mathematical communication lies in helping the students to gain and enhance the understanding of mathematics, and to create an appropriate learning environment, as well as its contribution to learning the vocabulary of the language of mathematics such as symbols, forms and word. As for the teacher, the mathematical communication helps him to discover the insights of the students' thinking and form a comprehensive view of their different aspects. (Cotton, 1995: 39).

Mathematical communication within the classroom is recognized as one of the significant standards at the present time for learning mathematics. This is confirmed in the educational literature that is written about teaching mathematics. The NCTM report on school mathematics standards (1989) indicates that students are to learn mathematical communication skills at all the learning levels. Such standards were developed in 2000 and focused on the need to include mathematics curricula at all education levels and that stands as opportunities for developing communication skills among learners. It was considered one of the basic components of mathematical ability which is (self-confidence towards mathematics, the ability to solve the problems, the capability to infer, and communicate with others about ideas and solutions (Cantlon, 1998: 109).

For her part, Alanzi ,et al. (2009) pointed out that the mathematical communication works to get the learners out of the traditional atmosphere within the classroom and turn mathematics into an interesting subject, and to highlight the practical aspect of it, as well as taking into account individual differences between learners and improve and accelerate their thinking at different levels and stages of study. (AlAnzi et al., 2009: 3)

This shows the significance of thinking acceleration through the educational programs and models that focused on the issue of thinking acceleration, so that much efforts have been exerted on the issue of accelerating the mental growth or the so called" thinking acceleration " by speeding up thinking. Through such programs and models , new employing strategies and approaches that raise the levels of thinking for students are applied ; That is to say, they , in a way , accelerate the transfer of students to the stages of higher thinking, including formal thinking, and then they will have many skills and mental processes at an early age, which facilitates their understanding of this new scientific Thinking acceleration Program. (Alqawas, 2013: 4)

The significance of this research lies in the significance of its variables in the following aspects:

1 - This research is in line with the recent trends in the training of students on the thinking accelerating model

2 – It is considered a breakthrough for researchers and graduate students in completing it, and applying its variables in other areas of mathematics.

3. It is a modest effort to be added to the previous scientific efforts in the field of teaching methods ,in general , and mathematics, in particular.

Third: Objective of the Research

It is to understand the effect of the CAME model in training the students of mathematics department in the practical education program to enable them gain the skills of mathematical communication.

Fourth : Hypotheses of the Research:

To achieve the research objective, the following zero hypotheses were formulated:

- There is no statistically significant difference at (0.05) level between the two averages of the skill of mathematical reading of mathematical communication in the members of the experimental and control groups

- There is no statistically significant difference at (0.05) level between the two averages of the mathematical skill of writing mathematical communication between members of the experimental and control groups

- There is no statistically significant difference at (0.05) level between the two averages of the skill of mathematical representation of mathematical communication in the members of the experimental and control groups

- There is no statistically significant difference at (0.05) level between the two averages of the sports listening skill of mathematical communication in the members of the experimental and control groups

- There is no statistically significant difference at (0.05) level between the two averages of the skill of mathematical discussion of mathematical communication in the members of the experimental and control groups

- There is no statistically significant difference at (0.05) between the two modes of communication skills as a whole in the experimental and control groups.

Fifth: Research limits

The current search is limited to :

- Fourth grade students in mathematics Department / College of Education for

Pure Sciences / University of Mosul for the academic year (2018 - 2019).
- The practical education program for students of the College of Education for Pure Sciences

Sixth: Definition of terms

Second: the model
is defined by :

Aldridg (2004): - as "analytical tool or method of analysis as much as it contributes to the technical development in general, it also contributes to the foundation of teaching science." (Aldridg , 2004: 32)

Qatami (2016): - as a "practical framework that contains a set of steps and systematic and logical actions that are followed in the implementation of an act, it serves as a guide and guide for implementation."
(Qatami, 2016: 255)

First: Thinking Acceleration (CAME)
It is defined by :

Adam (2006): - as a "model of mathematics teaching aims to accelerate the students' cognitive development and accelerate their access to the stage of formal thinking which consists of four stages: preparation, cognitive conflict, thinking of thinking, and bridging. (Adam, 2006: 15)

Monifieth (2007): - as a model to accelerate the thinking from the level of sensory thinking to higher levels of formal thinking. (Net: 2007, Monifieth

Second :Procedural definition:

It is a series of steps organized, planned and serialized by the researcher when he teaches the fourth grade students in the Department of Mathematics on the basis of the
acceleration model, starting with their sensory preparation of the subject of the lesson through putting them face to face with a mathematical problem, and then their transition to cognitive conflict through a strange and puzzling position and raises their surprise, and then directs them to think about thinking ,organizes their ideas , and to bridge and build relationships and intellectual and objective links between the subject of the lesson and the rest of the other sciences and everyday applications. .

Third: Mathematical communication
It is defined by :

• Al Amer (2009): as "The ability of the individual to use the symbols of the structure of mathematics in the expression of ideas and the use of the language of mathematics when explaining to others." (Al-Amer, 2009: 90)

• Abu Zina (2010): as " a way to exchange ideas and clarify understanding, and helps to give the meaning and sustainability of mathematical ideas and their dissemination and thus their mathematical thinking is organized and strengthened through the communication , analysis, and evaluation of the thinking of others." (Abu Zina, 2010: 101)

The Procedural Definition: is The ability of a fourth year student to use the language of mathematics, including symbols and structure of knowledge, and to express the relations between its contents and concepts when confronted with a written , drawn or read position and interpreting it through reading, writing and mathematical representation, and then graded according to the mark that is scored from the prepared test.

Theory Background: This background includes two fields:

First Field: Thinking Acceleration (CAME)

This model began in the mid-eighties by Adey , Shayer & Carolen Yats .It is a model that is based on Piaget's ideas for cognitive and cognitive development levels and Vygotsky cognitive structures. In fact, Piaget's theory emphasizes on the idea that learning is an active and continuous construction process, with orientation purpose and that the process of learning includes the individual's reconstruction of his knowledge through social negotiation with others .It prepares the best conditions for the learner when faces real problem or task. It insists on consideration of the pre knowledge to be a prerequisite for the construction of meaningful learning, and that the purpose of the process of learning is making certain adaptations to go with the cognitive pressures that are practiced with an individual's experience. (Olive and Olive, 1992: 87)

As a result, researchers began to explore how language, social interactions, culture and history contribute to the development of knowledge among indivi

duals within the possible growth. This approach was guided by Vygotsky's theory, which emphasizes the social relations that develop all higher mental functions, and on the internal psychological level, as the meaning cannot be understood unless it is linked to the socio-cultural dimension. (Jones, 2007: 312)

The impact of this development in the educational / learning process is to make modern educational models more suitable for the learner and the requirements of the age and their being able to cope with the successive changes of knowledge in the framework of social constructivism , as well as to seek to design advanced curricula that help the learner to acquire functional knowledge and make the teacher directs the education process in the classroom , and in this case, the teacher becomes active with his student and is not the only source of knowledge that has begun to require more advanced forms and teaching designs, away from the traditional tendency that supposes teaching to be a situation that requires the performance of One party - the active teacher- on whom the whole process of teaching depends . In addition , the insistence of the latest studies and research on the participation of the teacher, learner and the curriculum in one package to increase the level of the educational process , which is the educational aim of each education staff to find the appropriate solutions to reach the highest levels of education. (Zayer et al., 2014: 43)

Steps to Thinking Acceleration (CAME)

This model includes four basic steps:

First: Sensory Setup: Concrete Preparation

The teacher divides the students into cooperative groups ,and then begins to present the lesson by posing a problem or issue for the students and makes them in a confusing situation as well as giving them ample opportunity to think and answer.

Second: Cognitive Conflict

The teacher places the students in a confusing situation that contradicts their existing information, so the students have a state of cognitive instability that encourages them to find a suitable solution.

Third: Thinking in Thinking

In this step, the student will be aware of the cognitive processes he performs through explaining the steps he has taken in solving the problem or issue.

mathematical
In this step, the student will employ what he has learned and relate it to practical life, reinforced by examples of reality (Alkubaisy, 2008: 217-219)

Second Field : mathematical communication

Mathematical communication is a way of exchanging ideas and clarifying the understanding of mathematics through talking and questioning. It is reflected through analysis and discussion. It promotes and develops the knowledge of learners in a more logical and profound way. The use of the mathematical language contributes greatly to raising their level of achievement, especially when they can express their ideas. and their views through mathematical representation, writing and reading. (Lim & Chew, 2007: 23)

These activities must be done in the classroom , giving value to the mathematical methods used by students to solve the problems and to confront the situations that stand in front of them, as this helps them to deepen their understanding of basic principles and laws ,and develop their abilities to do all kinds and forms of thinking. (Khaing et al., 2007: 13)

Areas of mathematical Communication:

Most of the literature on mathematical communication has agreed on the following five areas:

1) Mathematical reading:

One of the important elements of distinguished mathematics education is the ability to read a sound and correct reading and understanding the meaning of symbols, terms and shapes, and understanding the meaning of mathematical formulas. This requires the teacher's effort skill and the students' skills. The language of mathematics has its own specificity, and special reading increases the motivation of students to learn. (Balas, 1997: 1)

2) Mathematical Writing:

Mathematical writing is a significant tool in the process of education, in general and mathematics, in particular, as it forces students to wait, which improves the process of thinking and understanding, and also grants them the ability to express ideas and relationships and then communicate it to others. Miller, 1991: 516)

3) Mathematical Representation:

Mathematical representation is one of the important areas of student communication as it helps developing and deepening their understanding of ideas and concepts when they create, compare, and use a variety of mathematical representations such as images, shapes, graphs, tables, translation, and symbol processing. Such representations assist them to continue their thinking .It is considered a significant factor in the information delivery process. (Watson, 2000: 54)

4) Mathematical listening:

The mathematical listening is represented by the mutual listening between the teacher and the students .When listening to a students', the teacher will help them to correct their mistakes, which result from their misunderstanding of concepts, generalizations, principles, algorithms and mathematical problem solving. This is the main motivation for the teacher to develop the appropriate treatment programs for his students and help them solve the problems. (Brenner et al., 1997: 664)

5) Mathematical discussion:

Mathematical discussion is one of the areas of mathematical communication through which other forms of communication are activated .It plays a significant role in effective learning in situations where the teacher and his students

communicate with each other, share ideas and opinions. It is closely associated with the skill of listening in an attempt to stimulate thinking and talents related to students. It is worth mentioning that the questions put for the students must be at a high cognitive level. (Kinoski, 2010: 36)

Evaluation of Mathematical Communication

Among the Evaluation of mathematical communication are the ones mentioned by Als'aeed and Abdulhameed (2010) ,which are as follows :

1) Open and extended tasks. 2) Evaluation of Performance
3) Work records. 4) Remark.
5) Interview. 6) Students' writings.
7) Working in collaborative groups. (Saeed and Abdulhameed, 2010: 215)

The researcher prefers using the remark form to comment on the skills of mathematical communication in the students.

Previous studies:

The researcher examined a number of previous studies that dealt with the model of thinking acceleration as an independent variable ,and the studies that dealt with the skills of mathematical communication as a dependent variable:

First: studies about thinking acceleration:

No.	Title of the study	Purpose	The sample				Group	Results
			type	Number	Class stage	Specialty		
1	Khafaji)2016(University of Mosul-Iraq	Ady and Shaer's structural model is to provide second-graders with the skills to solve the problem and develop their mathematical thinking	students	92	Second	mathematics	Experimental – control	- There is a statistically significant difference between the Mediterranean Skills of solving the problem and developing the thinking of the members of both groups and for the benefit of the pilot,.
2	Sumaidaie)2017(University of Tikrit, Iraq	Adey & shayer model in the acquisition of fifth-grade scientific concepts and the development of the skills of intellectual thinking	Students	69	Fifth Scientific Biology	Biology	Control	- The existence of a statistically significant difference between the average acquisition of biological concepts and the development of contemplative thinking

								among the two groups and for the benefit of the experimental.

Second : studies about Mathematical communication skills :

No.	Title of the study	Purpose	The sample				Group	Results
			type	Number	Class stage	Specialty		
1	Lexi & Kearney)2009(USA	Effectiveness of mathematical communication skills in mathematics education	students	30	Seventh grade and their teachers	mathematics	Experimental – control	Teachers are able to communicate skills. A better teacher is the product of his students on a better communication test
2	Alhadidy)2017(University of Al Mosul Iraq	Designing a teaching strategy based on the integration of content thinking skills and their impact on the development of pivotal thinking skills and mathematical	Students	68	Fifth	mathematics	Experimental – control	- There was a statistically significant difference at the level of significance (0.05) between the two groups of research in the development of sports communication as a whole and

		communicati on among fifth graders						for the benefit of the experimental group.

Usefulness of previous studies

After reviewing the previous studies in the two areas, the researcher finds out a number of aspects that can be used in his research:

1. Identifying the search problem.
2. Defining the research objectives and hypotheses.
3. Choosing the appropriate experimental design for the search.
4. Preparing the research tools and procedures and analyzing them statistically.
5. Benefiting from the statistical methods that are similar to the design of the current study.

Research methodology and procedures:

In light of the objective of the research, the researcher adopts the experimental method by defining the research community, and then choosing the sample as well as the adoption of its tools and application, and adopting the appropriate statistical means, as follows:

First: Experimental Design:

Based on the objective and hypotheses of the research, the researcher adopts the experimental design called the two experimental groups with the post-test. As shown in the following diagram:

Group	Independent variable : a training program based on	Dependent variable
Experimental	)CAME(paradigm	Mathematical communication

Second: Research community:

The research community is the fourth grade students in the Department of Mathematics / College of Education for Pure Sciences for the academic year 2018-2019, (182) students who are divided into six divisions (A, B, C, D, E, and F).

Third: Selection of the research sample:

After determining the research society, the researcher chose the simple random method of the research sample, which is represented by the two sections (A and B). The number of the members of these sections is 62 students. Section B, whose members are 30 students stand for the experimental group , who studied according to the (CAME) educational training , and section (A), whose members are (32) represent the control group who are trained according to the practical education program.

In terms of parity of the experimental and control groups, the researcher has only chosen random distribution, and the concerned department annually divides the fourth grade students according to the students' gender variable and the general grades, and this way grants the researcher a suitable level of parity between the two groups in addition to their ages that are close to each other.

Fourth: Research requirements:

The implementation of the research experience requires some of the most significant requirements, including the preparation of the program of scientific education based on thinking acceleration (CAME) ,as well as the preparation of teaching plans for the training program . The presented them before a refereed committee of specialists and experts in the teaching methods of science and mathematics, who approved them.

Fifth: Research tool:

In order to measure the mathematical communication of the sample of the research, the researcher examines many tests and remark forms of the previous studies about the skills of mathematical communication. The researcher does not find any tool that achieved the current research objectives and matches the nature and specificity of the students and the material. Therefore, he decided to create his own tool of the Mathematical communication that is compatible with the levels of the fourth stage students of the Mathematics Department and their level of mental aptitude and ability. It is supposed to be able to reflect the extent to which the students acquire the skills of mathematical communication. Four basic communication skills are identified namely (reading, writing, acting, and listening) .It is made of (24) items that fall into five fields and each one of them contains three alternatives (good, medium, weak). The researcher made sure of the logical credibility of the form by presenting it to a number of experienced and specialized staff in the field of mathematics and methods of teaching science and Mathematics. He also extracted the consistency of conformity by the researcher monitoring , with another researcher of the same specialization , a number of teachers of mathematics in the field and then apply the equation Cooper to extract the consistency of conformity .The average of conformity reached (0.83) which is a good and acceptable rate , and therefore the tool is ready to be applied to the basic sample in its final form.

Sixth: Implementation of the research experience:

After the researcher realizes the division of the sample of the research members through a simple random division between the two research groups that will be trained during the experiment, developing the teaching plans according to the thinking acceleration model (CAME), creating a note form for mathematical communication skills, and developing the courses table for the groups . The researcher applied his experience on 16/10/2018 by himself as he taught the subject in the department and continued doing for the whole first semester up to 9/1/2019 before the students went to the period of individual application in the secondary and high schools, as follows:

- The experimental group

Trained by the researcher in the following fields:

1. Theoretical Part: Providing students with the ethics of the teaching profes

sion as well as modern strategies in the teaching of mathematics, the best teaching principles, classroom management and control, active learning, and mathematical problem solving skills.

2. Application Part (micro-learning)

Students have been trained through micro-learning method to use the CAME model by putting students in a mathematical formed or mathematical position that requires their cooperation to reach a solution such as a presentation of a diagram or experience, and then moving to a strange position that contradicts with their previous information that they already have , and that will urge them to search and ask just to solve these contradictions .They need to be aware of their answers and the steps they take to reach a solution, as well as the employment of their learning and transfer their mathematical experience to new life situations to consolidate their mathematical information. They are also trained to verify their behavioral purposes by directing a set of behavioral-related questions to measure their comprehension of the material.

3 - Field visits: Field visits were limited to schools that are close to the university because of the security conditions that hit the city.

- Control group

Trained by the researcher also according to the scheduled regular program:

1- Theoretical part: Providing students with the ethics of the teaching profession and modern strategies in teaching, good teaching principles, management and control of the class.

2. Application part (micro-learning)

Students are trained through mini-instruction on the usual teaching methods and strategies for mathematics.

3 - Field visits: Field visits were limited to schools that are close to the university because of the security conditions that hit the city.

Seventh: Application of the search tool:

After the completion of the training in the research experience, the students

are directed to the field practice of the application. The researcher applied the form of mathematical communication skills through sending them on field visits and taking notes on their performance in the classrooms. The researcher applied the repetitions on the form according to the standard of (good, medium, weak) By giving the grades (3,2,1) and the grades ranged (24-72).

Eighth: Statistical Means

The researcher used the following statistical means:

1. Cooper's equation in extracting constancy.

2. Tentative testing of two independent samples to test the hypothesis.
The researcher used the statistical program (SPSS) to analyze his statistical data, as well as the use of Microsoft Excel to analyze data for measurement and evaluation of the laws of distinction and ease.

Presentation and interpret of the results:

This part of the research includes a presentation of the results reached by the researcher in a collective manner in the light of the hypotheses that were developed, interpreted and compared with the results of the previous studies of this research:

"There is no statistically significant difference at (0,05) between the average of gaining the skills of mathematical communication (reading, writing, acting, listening, and discussion) and the total in the experimental and control groups

To investigate these hypotheses, the researcher extracted the arithmetic average and the standard deviation of each skill of mathematical communication (reading, writing, acting, listening, discussion, as a whole). The t-test was then used for two independent samples to test the statistical significance of the difference between the arithmetic averages Each skill and skills as a whole for the grades of the two groups
of research (experimental and control) as well as the extraction of the index of the effect size (square ETA, d) and the results are included in the following table:

The mean and standard Deviation of students' marks of both groups in the mathematical communication test

Hypothesis	group	Number of students	mean scores	standard Deviation	Value T		SquarEATA	D
					calculated	tabulated		
First reading skill	Experimental	32	10.8750	2.21068	4.95	1.998	0.28	0.4
	Control	30	8.2667	1.91065				
Second Skill Writing	Experimental	32	11.5625	2.62663	4.46		0.24	0.33
	Control	30	9.0667	1.61743				
The third skill to represent	Experimental	32	15.2813	2.06717	6.05		0.37	0.61
	Control	30	11.6000	2.69866				
Fourth Listening skill	Experimental	32	10.7188	1.27594	7.72		0.49	0.99
	Control	30	7.4000	2.04434				
Fifth Skill Discussion	Experimental	32	12.5000	2.12512	6.70		0.42	0.74
	Control	30	7.7000	3.40537				
All skills	Experimental	32	60.9375	6.12208	10.53		0.64	1.84
	Control	30	44.0333	6.50985				

From the previous table, it is shown that the calculated T value of each skill in mathematical communication (reading, writing, acting, listening, and discussion, as a whole) is greater than the value of the score at 0.05 and thus the zero hypotheses is rejected. This indicates the existence of a statistically significant difference in mathematical communication skills (reading, writing, acting, listening, discussion, as a whole) between the experimental and control groups and for the experimental group.

The researcher attributes these results to the fact that the training of students on the CAME model is reflected on the students through a problem or given to them , which contributed to reading and extracting the basic ideas and proper understanding of symbols, terminology and mathematical relations, as well as presenting strange or puzzling situations that enabled the students to express their ideas and a proper understanding of the basic concepts and principles to reach broader and more general concepts and principles. Then bit gives them the ability to express and represent ideas, concepts, and mathematical relationships. as well as the creation, comparison and use of various forms of mathematical representations such as symbolic or verbal translation and the charts and drawings that require the students to use them to arrive at the appropriate solution. The active atmosphere provided by the model CAME allowed the students to talk and respond to the questions of teachers and others using the symbols and vocabulary of the language of mathematics to express the ideas and mathematical relationships and give them a clear picture of their understanding and employ what they have learned in new life situations.
Conclusions:

1- The effectiveness of the CAME program in teaching practical education
2 - the effectiveness the thinking acceleration (CAME) program in the achievement of the skill of mathematical communication

3 - Giving a large role to the students in the classroom and in an organized manner developed the practicing of the skills of mathematical communication (reading, writing, acting, listening, and discussion).

Recommendations:

- The Center for Teaching Methods at the University of Mosul needs to provide special courses in teaching the university teaching staff members on the use of modern models in teaching.

- Emphasis is to be focused on the teaching of practical education through the application of modern models in teaching, including the (CAME) model

- Emphasizing is to be focused on the teaching of mathematics department teaching staff members to pay more attention to the mathematical communication skills.

Suggestions:

In order to complete the current research, the researcher suggests doing the following future studies:

- Comparing the CAME model with the strategy of activities in the form of providing students with the fifth grade of mathematical concepts and developing their critical thinking.

- Studying the effect of the CAME model on the achievement of students of applied mathematics fifth Grade.

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