

The effect of the triple dialogue strategy on the mathematical communication skills among fifth grade primary school students

Prof. Dr. Taghreed Abdul-Kadhim Jawad Amna Ibrahim Ahmed Shihab

Al-Mustansiriya University / College of Basic Education

amnaibrahim9000@gmail.com

ABSTRACT

The current research aims to know the effectiveness of the three-way dialogue strategy in the mathematical communication skills of fifth-grade pupils. To achieve the objectives of the research, the following null hypothesis was established: (There is no statistically significant difference at the significance level (0.05) between the average grades of the experimental group students who will study the subject Mathematics according to the tripartite dialogue strategy and the control group students who will study the same subject according to the usual method of testing mathematical communication skills, The research sample consisted of (35) pupils of the fifth grade of elementary school in (Al-Mansouriya Primary School for Girls) for the academic year (2020-2021), and it was distributed into two groups, the experimental studies, which were studied according to the tripartite dialogue strategy by (19) students, the control was studied according to the usual method by (16) female students. The two research groups were rewarded with variables (chronological age calculated in months, previous knowledge in mathematics, and mathematical communication skills with previous information, intelligence, and the educational level of the parents), The research tool of examining mathematical communication skills was built, and it consisted of (25) essay paragraph ,for each skill of sports communication skills (5) paragraphs, i.e. mathematical listening (5) paragraphs, mathematical writing (5 paragraphs), and mathematical reading (5 paragraphs), mathematical discussion (5 paragraphs), and the mathematical representation (5) paragraphs, and the validity of the test was verified and the calculation of the difficulty factor and the discriminatory strength of its paragraphs was acceptable, and the alpha-Cronbach equation was used to find the stability, so its value was (0.88). After completing the experiment, a test of sports communication skills was applied to each of the two groups (experimental and control), and by using appropriate statistical means, the results showed: a statistically significant difference between the mean scores of the experimental and control groups in the test of sports communication skills, in favor of the experimental group and in light of the results of the research A number of conclusions were reached, including teaching according to the tripartite dialogue strategy that has the effect of increasing the mathematical communication skills of fifth grade primary students. A number of recommendations and proposals have been developed, the most important of which is encouraging mathematics teachers to use the three-way dialogue strategy at all school levels, in addition to that, training courses to train mathematics teachers on how to apply the three-way dialogue strategy that helps them in managing educational situations. The proposals: Conduct a study similar to this research in other study topics and different study stages, and conduct a study of the effect of using the three-way dialogue strategy on other variables such as mathematical prowess, mathematical culture and information retention, and conduct a study to find out the extent to which mathematics teachers possess mathematical communication skills.

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RESEARCH PROBLEM:

Mathematics is an advanced science with the passage of time and the technological and scientific development, because ancient mathematics differs greatly from contemporary mathematics, not only in terms of the difference of subjects, but also in terms of the difference in the method of teaching and the method of research in it (Abu Aqil 2013: 19), and that the content of the mathematics curriculum is represented in that educational material and activities presented in textbooks, and the type of content, the degree of depth and the method of exposure differs according to the different learners for whom this

content was developed in terms of capabilities, content and goals that they seek to achieve (Al-Sharif, 1996: 34).

In addition to that change in mathematics textbooks towards modernization and development as stated in the mathematics book of the fifth grade (in Iraq and some Arab countries) and the next upwards, as it was applied for the first time in the academic year (2018-2019) so that every year a mathematics book changes in A study stage, in which there is a paradigm shift in terms of organizing lessons into six paragraphs, namely: learning, making sure of your understanding, training and solving exercises, training and solving

life problems, thinking, writing, and presenting the material in modern ways that may have the elements of attraction and excitement, which it is hoped Helping the student to interact with her, through the exercises, exercises and life issues she provides.

(Al-Kubaisi et al. 2018: 21-22)

This made the students, in turn, receive and preserve information, and this in turn leads to weakness in the level of mathematical communication skills, and this is what the study (Doaa, 2019) indicates, the weakness is due to several reasons, including the teacher's dependence in teaching on traditional teaching strategies and methods that are not in line with the development and modernization of mathematics in the fifth grade of primary school, explaining the lesson in a spontaneous manner, without using educational aids, and not linking mathematics with daily life **(Al-Kubaisi et al. 2018:25)**. The researcher also provided a questionnaire for mathematics teachers in the fifth grade of primary school in various primary schools and their number reached (10) teachers and a teacher, appendix (4) to explore the extent of their possession of mathematical communication skills, so after analyzing the questionnaire, the researcher found that:

(80%) of the teachers do not have knowledge of mathematical communication skills, nor do they have such knowledge among their students.

Accordingly, the research problem was identified to answer the following question: **What is the effect of the tripartite dialogue strategy on the mathematical communication skills of fifth grade primary students?**

Research Importance:

Mathematics is considered an important and necessary science for any individual, regardless of his culture, because it takes an important space in life and the individual needs it in making decisions related to his daily life matters, and it also has an important role in the progress of many societies, because it works to solve many of the problems facing a society that seeks to be a scientific, technical society, Mathematics is one of the distinct fields of knowledge because it contributes to other areas of knowledge. **(Hamdan, 2005: 47)**.

Therefore, modern teaching methods should vary according to the change in the perception of the nature of the education process. After it was based on memorization and recitation, it expanded to include cognitive perceptual levels, which requires the learner's positivity in education in order to show

students' latent abilities and upgrade them, the traditional methods of teaching are no longer suitable for contemporary life, the mission of the modern teacher, according to current teaching methods, is to provide learners with the opportunity to acquire knowledge on their own, and to participate effectively in all educational activities. **(Zayed et al., 2014: 34-35)**, Therefore, the need today for methods and strategies that do not depend on the effort of the teacher only, as these strategies focused on the fact that the teacher is the basis of the teaching process and the student is the recipient of information only, without having a role in that process, but rather to the teaching-learning strategies and the triple dialogue strategy Of these strategies in which the learner's role is active and active in processing information to access new knowledge. Depending on his personal effort, the teacher's role is to guide and direct, and accordingly, these strategies are based on a joint effort between the teacher and the student with the activation of the student's role clearly. **(Abbas et al. 2007: 153)**, And this strategy takes place in three phases, namely: the first phase "the initiative" here the teacher begins to ask questions to the students, and the second phase "responds" to the teacher's question with the information known to them. As for the third phase "evaluation," here in this stage the teacher performs the students' answers and learns The extent to which the students' response is close to the expected answers, and the third stage appears in the form of feedback **(Mercer, 1995: 88)**.

Accordingly, this strategy (the tripartite dialogue) begins with the teacher several questions that she asks the students and then responds to the answers to these questions, and then these answers are made **(Lemke, 1990: p 187)**.

Moreover, this strategy provides an effective explanation in the lesson, as it represents a change in the teacher's style from individual speech to interactive dialogue, and that the aim of using triple dialogue in classroom discourse came to achieve special educational goals, and to encourage pupils to practice their roles in the classroom **(haned, 2005: p. 45)**, Mathematical communication is an essential part of mathematics and its teaching, and it is a way to exchange ideas and clarify understanding, and through communication, ideas become a topic for development, discussion and amendment **(NCTM, 2000: 12)**, In mathematical communication, counting skills are employed, including language skill (reading, writing, speaking and listening), as well as the skill of mathematical translation using the language of read and written mathematics, and this helps students to understand mathematics and employ it in life situations **(Al-Rifai, 2001: 65)**, Some

educators assert that teaching skills, including clear writing of symbols, terminology and mathematical representations, clarity of discussions, questioning and listening to their answers, differ in their communication with students according to different educational situations, but they are consistent in that they are communication skills that follow the student's understanding and questions, or the understanding is dependent on their use by the teacher. (William, 2004: 111).

The importance of the current research can be illustrated by:

- 1) Helping mathematics teachers make use of the triple dialogue strategy in teaching mathematics at any school level.
- 2) Providing indications on how to use the tripartite dialogue strategy, which sports teachers may benefit from in improving the level of sports communication skills among students.
- 3) Presenting a daily teaching plan according to the tripartite dialogue strategy, which officials may benefit from in writing textbooks as well as preparing a teacher's guide.
- 4) Researchers can conduct other studies in this field, as there is no (to the researcher's knowledge) a study that deals with the impact of the tripartite dialogue strategy on mathematical communication skills in Iraq and the Arab countries.
- 5) Providing primary school teachers with a test for mathematical communication skills that enable them to know the level of mathematical communication skills of fifth grade primary students.

Research objective: The current research aims to identify: The effect of triple dialogue strategy, triple dialogue, on mathematical communication skills of fifth grade primary students.

Research hypothesis: For the purpose of verifying the objective of the research, the following null hypothesis was formulated:

(There is no statistically significant difference at the significance level (0.05) between the average grades of the experimental group students who will study mathematics according to the triple dialogue strategy and the control group students who will study the same subject according to the usual method of testing mathematical communication skills).

Research limits: The current search was limited to the following limits: -

1- Fifth grade primary students in elementary schools affiliated to the General Directorate of Diyala Education.

2- The content of the chapters: the first (large numbers), the second (the addition and subtraction of large numbers), and the third (multiplication of numbers) from the mathematics book scheduled for the fifth grade of primary school, for the year 2019 by his author (Amir Abdul Majid Jassim and others)

3- The stages of the tripartite dialogue strategy, which are (initiative, response, and evaluation).

4- Mathematical communication skills (reading, writing, discussion, listening, and acting)

5- The first semester of the academic year (2020-2021).

Define terminology

Triadic Dialogue Strategy:

- (Harb and others, 2010): "It is one of the strategies that depends on asking different level questions to groups of students, and as a result, discussion, dialogue and negotiation occurs between the teacher and the students." (Harb and others, 2010: 202)

Sports communication:

- (Al-Saeed and Al-Baz, 2010): "The student's ability to understand mathematical expressions and the ideas contained within them and the ability to analyze, guess and dialogue with others through sentences written in a sound mathematical language." (Al-Saeed and Al-Baz, 2010: 139)

- **Procedural definition:** It is the learner's ability to use the language of mathematics, including its symbols, words, and forms in expressing and understanding mathematical ideas or relationships. By answering the items of the mathematical communication skills test prepared for the purpose of this research.

Theoretical background:

The first chapter / the tripartite dialogue strategy:

The origin of this strategy goes back to the world (Mahan, 1987) was the first to support this strategy, and it was known as the tripartite dialogue strategy (initiative - response - evaluation) due to its reliance on social dialogue participation between the teacher and the learners and between the learners themselves. (Polman & Pea, 2001: 224)

This strategy is based on constructivism theory, and is concerned with the social interaction between the

teacher and the learners and between the learners with each other, as learning depends primarily on a social process (Terwell, 1999: 197)

Advantages of the tripartite dialogue strategy:

- 1- Help to develop interaction and communication between teacher and learner.
- 2- It helps to develop higher levels of thinking if the questions asked by the teacher include higher levels.
- 3- It helps the teacher and the learner to build activities in mathematics lessons (Sigman, 1994: 58)

The stages of the tripartite dialogue strategy

First / Initiation: It is symbolized by the letter (I), and it includes a set of questions that the teacher directs to the learners to cover the whole topic of the lesson, here the role of the teacher (reminding learners of questions, directing and managing the group discussion in the classroom, and the teacher reminds learners about the topic of Time to time or the problem presented for discussion, and the teacher asks the learners to do some activities.) (Hussam El-Din, 2008: 11)

These questions are represented by the following types:

A) Clarification questions: The articulation of these questions is (What does this mean? Can an example be given?) These questions include defining terms and giving examples of concepts, and this type of questions is consistent with explanatory questions, such as: What do you mean by fractions with different denominators?

B) Questions for deepening and examining axioms: The articulation of these questions is (What is the idea? What do you suppose?) And it is concerned with ideas and axioms that refer to concepts.

C) Research questions for reasons or providing evidence: The questions raised by the teacher are represented by the statement (How did you know that?) Where the causes and results are linked to their causes.

D) Questions related to a point of view or expectation of a specific opinion: This type of question is represented in (What are the alternatives to this opinion or idea?), As it is concerned with the learner's point of view and his ability to evaluate the situation, and here it agrees with the relational probing questions (which is a question that the teacher presents to the student. In the event that his

answer is correct, he is asked to link his answer to a specific topic).

E) Questions of implications and guesses (implications): This type of question is (What do you expect to happen? What does it mean?)

It includes the questions that the teacher poses to know the learners' ability to anticipate and predict what will happen in the future, as it helps the learners in the learning process. (Alsop & Hicks, 2001: 88)

Second / Response phase: This stage is symbolized by the letter (R), and it includes the learner's presentation of an answer that may be verbal or written, in the event that the learner does not reach the required (correct) answer, the teacher's role is to help the learner reach a solution. Correct and that by using one of the following methods: -

- 1- Provide hints that are keywords for the answer.
- 2- Directing and assigning the learners to carry out some additional activities that are related to the topic of the lesson, such as reading some booklets, summarizing the topic, or collecting pictures and drawings related to the topic (Hussam El-Din, 2008: 11)

At this stage, discussion is considered one of the best ways to help learning and to remember information for a long time, and to encourage learners to continue the learning process, and also develop their thinking skills. (Budair, 2008: 89)

Third / Evaluation stage: This stage is symbolized by the letter (E), and it includes the teacher evaluating the learners' answers and providing them with feedback, and it is intended to provide learners with information or data on the progress of his performance in order to help him in modifying performance, if it needs to be modified. (Al-Hiela, 1999: 257)

Sports communication skills

1) Mathematical reading skill:

Reading is one of the graces of God that He gave to creation, from which the individual acquires ideas and experiences, and the ability to read is one of the most important skills that a learner can possess in society, and it is one of the most means of understanding and communication, when the learner reads, he transforms words or symbols into meanings that the mind understands and perceives, and the mind moves, and thinks at a speed that exceeds the speed of the eye through the process of the mind, and this process is useful that should be combined with the understanding of the reciter and various skills in

order to be able to learn to read. (Zaeer and Dakhil, 2016: 143-145)

Therefore, reading is considered one of the prominent means that convey to us the fruits of the human mind, and it is much deeper than joining another letter to be a syllable or a word, as it is a very complex process and is based on the interpretation of written symbols, that is, the link between language and facts. The reader contemplates the symbols and connects them with meanings, then interprets those meanings according to his experiences, so he reads symbols and does not read meanings, which is a process in which the reader builds the facts that lie behind the symbols, and this construct must relate to the experience to explain those symbols for him (Shehata, 1993: 101)

(Al-Jundi, 2018) believes that it is "a process by which the link between verbal speech and written symbols, whereby the language of speech consists of meanings and a word that leads to this meaning." (Al-Jundi, 2018: 58-59)

Teaching reading for learners aims to achieve a set of goals, including:

- 1- Forming basic reading habits, such as: recognition, pronunciation, and comprehension.
- 2- Training in the use of punctuation and its functions in reading.
- 3- Expanding learners' perceptions, increasing their experiences and developing them through adding new knowledge. (Wali, 1998: 216-215)

Mathematical writing skill: is the process by which language is used to bring meaning and add it to our experiences. Writing includes authoring, testing, and arranging ideas, and the expression of the written is transmitted through several forms such as short stories, speeches, reports, poetry.

The importance of writing skill: The importance of writing stems from the fact that it is the means by which the learner transmits his ideas to the reader, and error in it may lead to changing the scientific fact, and in this way it is considered a means of communication through which we find out the ideas of others and express what we have of meanings and concepts. (Yunus, 1999: 28), Therefore, writing is a necessary process for life, whether for the learner or society, and then correct writing is an important process in language teaching to convey ideas and express them, in addition to what the modern trends suggest in terms of trends in this field (Al-Naqa et al., 1980: 84). Writing is a process that goes through several stages in which learners gather the necessary information for the writing topic through several activities, write the first version on the topic and

review the written topic in terms of content and general organization (Abu Zahra, 2005: 248).

The skill of mathematical listening (listening): Listening is a process of concern for the comments and opinions of others for both the teacher and the learner, and the learner with his colleagues (Morgan, 1999: 143), and it is one of the most common methods of communication. It is one of the main factors required to understand others, because understanding others is a necessity, it is imperative to communicate and deal with them. (Al-Kubaisi and Abdullah, 2015: 47) The teacher's listening to the learners helps in their evaluation and knowledge of their mistakes and misunderstanding of some mathematical concepts and ideas. (Brenner, 1997: 663-689)

(Adas 1996) believes that "the best way to help every learner who searches for himself and focuses on his identity is to listen to him by the teacher, and pay attention to him, with what he says or does in order to avoid his embarrassment." (Adas, 1996: 132)

The importance of listening:

- 1- It is considered one of the old habits in which the speaker sees an active element during his speech, so he feels pleasure and relief if he feels that his listeners listen to him with interest and may feel offended if he feels that the listeners are distracted from him.
- 2- It helps to enrich the listener's vocabulary.
- 3- It appears in the unimportant lectures and seminars (which are not available in the book), which leads the listener to rely on himself in sharp points (Al-Hadi et al., 2003: 165)

Mathematical discussion (speaking) skill: It is one of the important communication skills, as it is spoken with clarity, beauty and strength of phrases, and it is a process that requires the learner to perform several complex mental operations in terms of: recalling ideas and meanings and selecting what suits them from words, structures, and methods, and linking each other with Observing the speech pattern and arrangement, and these processes make it imperative for the teacher to give them great care to prepare the minds of the pupils for them, and to derive them, with keen interest in continuing their training in this type of expression, and to encourage learners to oral expression and a lot of speech so that the desired goals in developing learners' abilities are achieved for them good speaking and discussion (Al-Beja, 2005, 467)

The importance of discussion (speaking): There is no doubt that discussion is one of the most important

aspects of linguistic activity, as learners use speech more than writing, so we shed light on the importance of discussion (speaking) with the following:

- 1- Contemporary life, including its cultural freedom, needs discussion, opinion, and persuasion.
- 2- Speaking is a truthful indicator to some extent for judging the speaker and knowing his cultural level.
- 3-It is considered a main tool in the educational learning process in all its stages, and the teacher or the learner cannot be indispensable for explaining and clarifying, to activate the interaction process in educational situations (Al-Hadi and others, 2003: 171)

Mathematical representation skill: learners in elementary schools represent mathematical ideas, relationships and situations using sensory materials, pictures, illustrations, charts, tables, numbers, words and symbols. Learning different forms of representation helps to understand mathematical concepts and relationships, and learners must be able to Moving from one representation to another, and using different representations appropriately and according to the need to solve problems, and when learners are able to represent concepts in different ways, they develop flexibility in thinking for those concepts and will not tend to perceive a single representation in mathematics (Badawi, 2007: 59-60)

(Barood, 1999) believes that representation is the reintroduction of the mathematical idea in another form in a way that helps to understand the idea and reach an appropriate solution, and this requires a logical analysis, so it is important for learners to

participate in this process, which helps in understanding the concepts (Barood, 1999: 232)

The importance of the skill of mathematical representation:

- 1) Its relevance to all areas of mathematics, since school mathematics is not dealt with in an abstract way, and no concept or relationship is presented in any of its fields, unless it is related to a mathematical representation.
- 2) The representation is made by lines, shapes and images of a concept, rule, or mathematical process aimed at converting verbal content into symbolic content, in order to improve the mental perception process and the visual representation of learners.
- 3) It works to distinguish between mathematical concepts (perimeter, area, congruence, and similarity) and between arithmetic operations, and representations are used in learning different topics, as it works to develop the language of mathematics for learners.
- 4) It is a fundamental pillar in the development of mathematical communication skills, on the one hand it works to communicate abstract concepts and relationships in the form of symbols and shapes, and on the other hand it facilitates communication between learners with each other, and between the teacher and the learners.
- 5) Representation is related to the criterion of reasoning and proof, so it is necessary for learners to make sure of the correctness of their guesses and expectations using the models, and the necessity to use these representations across the classroom (Naif, 2013)

Previous studies:

First: Previous studies dealing with the tripartite dialogue strategy

The researcher's name, year and place of study	Goal studying	Study Approach	Educational level	The size and sex of the sample	Research tools	Statistical means	Results
Hussein, 2006 Iraq	Knowing the effectiveness of the strategy (start-response-evaluation) and strategy (think-pair-share) in the achievement and retention of second-stage students and	experimental	Second stage students in the College of Education	(48) male and female students, distributed equally among the three groups, of (16) male and	Achievement Test - Curiosity Scale	- T-test - mono-analysis of variance - Schiff test	The use of the strategy (beginning - response - evaluation) and the strategy of (think - match - share) had a positive effect in improving the achievement,

	curiosity in the practical physical optics course.			female students for each group			retention, and curiosity of the students of the two experimental groups, compared to the control group that studied the same subject in the usual way.
Hussam El Din, 2008 Egypt	Identify the effect of the "start-response-evaluation" strategy on developing achievement and the trend towards practicing habits of mind in the subject of social sciences.	experimental	Fourth grade of middle school	(61) students divided into two experimental groups of (31) students and a control group of (30) students	Achievement test - a measure of the attitude towards practicing habits of mind	A t-test of two independent samples	There was a statistically significant difference in the achievement test and the measure of attitude towards habits of mind between the experimental and control groups in favor of the experimental group.

Second: Previous studies dealing with sports communication skills:

Researcher's name, year and place of study	Purpose of the study	Study Approach	Educational level	The size and sex of the sample	search tools	Statistical means	Results
Hussain, 2012 Saudi Arabia	Identify the effectiveness of a proposed program to develop mathematical communication skills among primary school students.	experimental	Sixth grade of primary school	(50) students divided into (25) students for the experimental group and (25) students for the control group	An oral test for reading and listening skills, a written test for acting and writing skills, a note card	A t-test for two correlated groups, Anova.	There is a statistically significant difference between the mean of the post application of the experimental group and the control group in the level of mathematical communication in favor of the experimental group in the three axes of the evaluation, which are the oral test, the written test, the note card) - There is a statistically significant difference between the mean of the two applications, pre and post, of the experimental group and the control group at the level of Sports communication for the benefit of the

							group
Ghafour, 2016 Iraq	Identify the effect of using the generative learning model on the mathematical communication skills of fifth grade primary students	experimental	First grade is average	(46) female pupils divided into two experimental groups of (23) pupils and a control group of (23) pupils	Mathematical communication skills test	T-test of two independent samples	There is a statistically significant difference between the mean achievement of the two groups in the test of mathematical communication skills in favor of the experimental group

Research methodology: An experimental method was used; because this approach is appropriate to achieve the two research objectives,

First: Experimental design:

Table (1) the experimental design adopted in the research

the group	Parity variables	Independent variable	Dependent variable	Research tool
Experimental	-Chronological age calculated in months - IQ test -Previous collection in -Mathematics -Examining previous knowledge of mathematics	Triple Dialogue Strategy	Sports communication skills	Mathematical communication skills test
Control	-A test of sports communication skills with previous information	The usual way		

Second: The research community: The research community consists of fifth grade primary school students in the morning primary schools for girls affiliated to the General Directorate of Diyala Education, for the academic year (2020-2021) AD, as the total number of primary morning schools for girls reached (9) schools distributed in the private sector. The Directorate has education in Diyala, while the total number of female students in the fifth grade of primary school is (522) female students.

Third: The research sample: After the researcher identified the research community, the (Al-Mansouriya Primary School for Girls) affiliated to the General Directorate of Diyala Education was chosen, which was agreed with the school administration regarding the experiment, as the sample was chosen randomly and there were seven divisions for the fifth grade of primary school, the experimental group represented Division (B), and the

number of its female students reached (19), and the Control Group represented Division (D), and the number of its students reached (16) female students, none of the female students was excluded.

Fourth: Control procedures:

- The chronological age of the students, calculated in months: the student’s age is calculated in months up to (1/10/2020), as the required information about the individuals of the research sample pertaining to the age of each student was obtained from the school cards, as shown in Table (2)

- Intelligence test: The test was applied to the two research groups (experimental and control) on Tuesday (11/3/2020), and the test was corrected by giving one score for the correct answer and zero for the wrong answer, so that the final score of the test becomes (45) degrees, as shown in the table (2).

- Previous achievement in mathematics: It is the average final grade for mathematics obtained from the school records of fourth-grade students for the primary school year (2019-2020). The test was applied on Sunday 11/11/2020. As shown in Table (2).
- Examining previous knowledge in mathematics: for the purpose of identifying what students of the two research groups (experimental and control) possess of previous information in mathematics related to

mathematical subjects covered by the experiment, from a multiple-choice type, the test was applied by the students of the two research groups on Monday, November 2, 2020, as shown in Table (2).

- Mathematical communication skills test with previous information: The test was applied to the students of the two research groups (experimental and control) on Monday (4/11/2020), as shown in Table (2).

Variables	The group	Number of students	Total ranks	Average ranks	The Mann Whitney Value		Indication level	Statistical significance at (0.05) level
					Calculated	Tabular		
Chronological age	Experimental	19	325.00	17.11	135.00	92	0.572	Not a function
	Control	16	305.00	19.06				
IQ test	Experimental	19	354.50	18.66	139.50	92	0.678	Not a function
	Control	16	275.50	17.22				
Previous achievement	Experimental	19	365.00	19.21	129.00	92	0.438	Not a function
	Control	16	265.00	16.56				
Previous knowledge	Experimental	19	346.50	18.24	147.50	92	0.881	Not a function
	Control	16	283.50	17.72				
Sports communication skills with previous information	Experimental	19	357.50	18.82	126.00	92	0.606	Not a function
	Control	16	272.50	17.03				

Table (2) the statistical results of the two research groups (experimental and control) regarding parity variables

Fifthly / Research requirements:

1) Determining the scientific subject: The researcher has determined the scientific material that will be taught to the students of the two groups of research, represented by the three chapters of the mathematics book scheduled for the fifth grade of primary school, which is (the first chapter: the large numbers, the second chapter: the addition and subtraction of large numbers, the third chapter: the multiplication of numbers) which is taught In the first semester of the academic year (2020-2021).

2) Preparing teaching plans: The researcher prepared teaching plans for each of the two research groups (experimental and control), as the total number of plans reached (28) daily plans, and a model of these study plans was presented to a number of referees and specialists in the field of mathematics and methods of teaching it.

Sixth / Research tool

Sports Communication Skills Test:

- Determining the goal test: It is to identify the level of mathematical communication skills of fifth grade primary students.

Determining sports communication skills: The researcher reviewed literature from books that dealt with sports communication skills such as (**Badawi, 2019**) and previous studies such as the study of (**Salman and Faris, 2006**), (**Saadi, 2009**), (**Al-Nahhal, 2016**).

- Determining the scientific material: The scientific material of the two research groups (experimental and control) was determined by the content of three chapters, namely (the first: the large numbers, the second: the addition and subtraction of large numbers, the third: the multiplication of numbers)

from the mathematics textbook for the fifth grade of primary school.

- Drafting test paragraphs: Test items were prepared according to mathematical communication skills, as the test consisted of (25) paragraphs of essays with short and specific answers with (5) essay paragraphs for each skill of mathematical communication skills, i.e. listening skill consisting of (5) paragraphs, and the skill of reading It consisted of (5) paragraphs, the writing skill consisted of (5) paragraphs, and the discussion skill consisted of (5) paragraphs, and the acting skill consisted of (5) paragraphs.

- The first exploratory application (information sample): To identify the extent of clarity of the instructions of the test items, and to determine the time that students take to answer the test items, it was applied on Wednesday (10/2/2021) on an exploratory sample consisting of (25) students from Female students of the fifth grade of primary school for the academic year (2020-2019), in (Sur Al-Watan Primary School), and the sample was randomly selected from six classes in the school. It was found that all the test items and the answer instructions were clear, and to control the time it took to answer all the students of the test items, the arithmetic average of the students' answers was calculated and the average time was (56) minutes.

- The second exploratory application (statistical analysis sample): The test was applied to a second survey sample to conduct statistical analyzes. On Thursday 14/2/2021, the sample was randomly selected from one of the schools affiliated with the General Directorate of Diyala Education, which is the (Al-Shahhab Boys School). It contained (100) male students distributed among nine section.

- Statistical analysis of items to test mathematical communication skills.

After applying the test to the exploratory sample of fifth grade primary students who studied according to the prescribed book, the researcher did the following procedures:

- 1) Correcting the students' answers.
- 2) Arrange the answers papers in descending order from the highest to the lowest.
- 3) Determining the top group of students who got the highest scores in the test by (27%), and determining the lowest group of students who got the lowest scores in the test by (27%).

- Difficulty of the test items: The difficulty factor was calculated for each paragraph of the test using the special equation for each paragraph of the essay, as

the value of the difficulty factor for the essay items ranged between (0.28 - 0.63), so the test items are acceptable and the difficulty factor is acceptable because it ranged from (0.20 - 0.80). (**Plum et al. 1983: 607**)

- ❖ Discriminatory strength of the test items: The discriminatory strength of the essay test paragraphs was calculated using its own formula, as the researcher found that the strength of discrimination for each paragraph of the mathematical communication skills test, ranged between (0.33 - 0.74), as the paragraph is considered good if the discriminatory power is greater From (0.20), and thus the test items are acceptable in their distinction, thus they were retained without deletion or modification (**Al-Dulaimi and Adnan, 2005: 90**)

- ❖ Validity of the test: honesty should measure what was set for it and give a detailed picture of the note to be measured. (**Al-Abisi, 2010, 210**)

Two types of validity were chosen to verify the validity of the mathematical communication skills test:

- 1) Virtual validity: It is veracity that does not refer to what the scale actually measures, but rather to what appears to be measured outwardly. (Omar, 2010: 196). The Virtual validity of the test was confirmed by examining a group of arbitrators in mathematics, methods of teaching it, educational and psychological sciences, the paragraphs that had an agreement of more than (85%) of the opinions of the arbitrators were accepted, and thus the test would be Virtual validity.

- 2) Validity of internal consistency to test mathematical communication skills (construct validity): This type of honesty can be achieved through the correlational relationship between each of the following:

- The score of the paragraph with the total score of the test: The researcher calculated the relationship of each paragraph's score to the total score of the test, using the Pearson correlation coefficient, and the value of the correlation coefficient ranged between (0.27 - 0.58), which is a statistically significant function.
- The degree of each paragraph with the degree of skill to which it belongs: since the researcher calculated the relationship of each paragraph to the degree of skill using the Pearson correlation coefficient, and the value of the correlation coefficient ranged between (0.29 - 0.54), which is a statistical function.

- The degree of each skill by the total score of the test: The researcher calculated the relationship of each skill to the total score of the test using the Pearson correlation coefficient, and the value of the correlation coefficient ranged between (0.56 - 0.69), which is a statistically significant function.

Persistence

- ❖ The stability of the test of sports communication skills: The stability of the test of sports communication skills was calculated using the (Alpha-Kronbach) equation, as the value of the stability factor was (0.88), which is a high value, and it is a good indicator of the test's stability, and thus the test became its final form.
- ❖ Stability of correction for essay questions: to ensure the stability of the correction by calculating it over time, and by means of another corrector, as she corrected a sample of the answers of (30) students and another corrector corrected the same answers, after using the Cooper equation, the researcher's scores and the second corrected scores It was found that the coefficient of the stability of the correction is equal to (0.94), and the researcher also re-corrected the same answers after a period of (15)

days, to reveal the stability of the correction over time, and after using the Cooper equation between the degrees of the first application and the degrees of the second application, it was found that the value of the agreement It reaches (0.97), and this indicates that the test is characterized by high correction stability.

- ❖ Seventh / statistical means: The statistical program (spss) for social sciences, version (25) was used to statistically process data.
- ❖ Presentation of the results of: a test of sports communication skills

The null hypothesis: which states that: (There is no statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who studied mathematics according to the triple dialogue strategy and the scores of the control group students who studied the same subject according to the usual method in the test For the purpose of verifying the validity of this hypothesis, the total of the test ranks of the research sample's scores in the Mathematical Communication Skills Test was extracted, and the Mann Whitney test was applied to two independent samples, and the result was as in Table (3).

Table (3) the statistical results of the Mann Whitney test for the two research groups (experimental and control) in the test of mathematical communication skills in Mathematics.

The group	Number of students	Total ranks	Average ranks	The Mann Whitney Value		Indication level	Statistical significance at (0.05) level
				Calculated	Tabular		
Experimental	19	441.00	23.21	53.00	92	0.001	a function
Control	16	189.00	11.81				

It is noticed from Table (3), that the calculated Man-Whitney value reached (53.00) at the level of significance (0.001), which is smaller than the adopted level of significance (0.05), and this shows the existence of a statistically significant difference between the mean scores of the experimental group and the scores of the control group in the skill test Sports communication and for the benefit of the experimental group, that is, the students of the experimental group who studied according to the three-way dialogue strategy excelled over the pupils of the control group who studied according to the usual method of testing sports communication skills, Thus, it rejects the null hypothesis and accepts the alternative hypothesis, which states that (there is a statistically significant difference at the level of significance (0.05) between the mean scores of the experimental group students who studied mathematics according to the triple dialogue strategy,

and the degrees of the control group students who studied the same subject according to The usual method of testing mathematical communication skills), for the benefit of the experimental group.

To know the effect of the independent variable (the three-way dialogue strategy) on the dependent variable (mathematical communication skills), Cohen's equation was used, and for the purpose of making sure that the size of the resulting differences using Mann's test is due to the independent variable and not to other variables. The size of the effectiveness of the triple dialogue strategy was calculated by Cohen's equation and it was equal to (1.12), and when comparing this value with the standard values of Cohen's values as in Table (4). It showed that the size of the effectiveness of the triple dialogue strategy on mathematical communication skills is large because the value of Cohen's equation

(1.12) Greater than (0.8). This indicates that the effect of the tripartite dialogue strategy on mathematical communication skills among fifth

grade primary students is large, and in favor of the experimental group.

Table (4) Standard Values for Cohen's Values

Standard Cohen Value	0.2	0.5	0.8
Impact size	Little	Average	Big

(Labad, 2005: 40)

Interpretation of the results: The results of the research presented in Tables (4) and (5) have proven the superiority of the pupils of the experimental group who studied according to the three-way dialogue strategy over the pupils of the control group who studied according to the usual method of testing mathematical communication skills. This superiority to:

- 1) That teaching with the tripartite dialogue strategy according to its stages has led to a focus on mathematical communication skills, including (listening, reading, writing, discussion and acting) and this is consistent with the teaching position in order to deliver the educational material.
- 2) The tripartite dialogue strategy provides the opportunity for students to search for facts and correct solutions, so learners are faced with multi-action situations, and this in turn leads to improving their mathematical communication skills.
- 3) The strategy contributed to learning mathematics subjects through cooperation between the pupils of the experimental group among themselves, and this contributed to improving mathematical communication skills.
- 4) The strategy encourages students to have the freedom to think and express what is going on in their minds in terms of questions and answers, correct mistakes, and thus improve their mathematical communication skills.
- 5) The tripartite dialogue strategy contributes to increasing social interaction and encourages pupils to cooperate with each other, to discuss and listen, and this increases mathematical communication skills, which leads to an increase in their desire to learn, as all these characteristics led to improvement of fifth grade primary students in the post-mathematical communication test.

Conclusions: According to the research results obtained by the researcher, the following is concluded:

- 1) Teaching according to the tripartite dialogue strategy is effective in improving the mathematical communication skills of fifth grade primary students.
- 2) The size of the impact of the tripartite dialogue strategy was large on sports communication skills.

Recommendations: In light of the research results reached by the researcher, she recommends the following

- 1) To recommend officials in the General Directorates of Education that mathematics teachers rely on modern teaching strategies that help teachers increase their awareness and awareness of the mental processes that occur during learning, such as the tripartite dialogue strategy because of its impact on achievement and mathematical communication skills.
- 2) Encouraging mathematics teachers to use the triple dialogue strategy at all school levels.
- 3) Conducting training courses to train mathematics teachers on how to apply the three-way dialogue strategy that helps them manage educational situations.
- 4) Paying attention to employing the three-way dialogue strategy in teaching mathematics in order to improve mathematical communication skills.

Proposals: Completion of the current research the researcher proposes to conduct the following studies:

- Conducting a similar study for this research in other subjects and at different levels of study.
- 2) Conducting a study of the impact of the tripartite dialogue strategy on other variables such as sporting prowess, sports culture and information retention.
- 3) Conducting a study to know the effectiveness of the tripartite dialogue strategy in developing mathematical thinking among elementary school students
- 4) Conducting a study that includes analyzing mathematics books at the elementary level according to mathematical communication skills
- 5) Conducting a study to find out the extent to which mathematics teachers possess the skills of mathematical communication.

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