South Valley University

Hurghada Faculty of Education
Curriculum & Instruction Dept.

Methods of Teaching English

4rd year – Math Dept.

رؤية الكلية

كلية التربية بالغردقة مؤسسة رائدة محليًا ودوليًا فى مجالات التعليم ، والبحث العلمى ،وخدمة المجتمع ؛ بما يؤهلها للمنافسة على المستوى : المحلى ، والإقليمى ، والعالمى.

رسالة الكلية

تلتزم كلية التربية بالغردقة بإعداد المعلم أكاديميًا ومهنيًا وثقافيًا ، من خلال برامجها المتميزة ، بما يؤهله للمنافسة والتميز فى مجتمع المعرفة والتكنولوجيا ، ومواجهة متطلبات سوق العمل محليًا وإقليميًا ، وتهتم بتطوير مهارات الباحثين ؛ بما يحقق التمية المهنية المستدامة ، وتوفير خدمات تربوية لتحقيق الشراكة بين الكلية والمجتمع .

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Chapter 1: The method of teaching

After you study this semester is expected to be able to:

1- Know the concept of the teaching method.

2- Know the specifications of the good teaching method

3- Determine the objectives of good teaching methods.

4- Determine the basis for choosing the method of teaching.

5- You know the types of teaching methods.

One of the most important functions that help the teacher to succeed in doing his role is to enable him to have a range of

different teaching methods that make it easier for him to play his role in communicating information to students, so we will address the teaching methods in terms of their concept and how to choose teaching methods and the foundations of their selection, we will also address a range of different teaching methods.

The concept of teaching method:

Teaching method can be defined as a series of organized events run by the teacher within the classroom to achieve his goals, how the teacher organizes educational positions and uses different means and activities according to structured steps, to give learners the desired knowledge, skills and trends or is the approach taken by the teacher in communicating the information, knowledge and activities of the learner easily and easily.

It can also be defined as all the procedures, steps and movements followed by the teacher with the learners, successive and interrelated procedures and movements to organize educational information, attitudes and experiences, to achieve a set of pre-defined educational objectives.

Ensuring the quality of teaching depends on the teacher himself and not just on the set of steps :

1- The teacher should choose the appropriate method for the objectives of the subject he wants to teach.

2- The teacher must have the necessary teaching skills to implement the method of teaching chosen.

3- The teacher should have the appropriate personal characteristics that enable him to successfully implement the teaching method, and personal characteristics mean the natural features that God has given him in his personality and in his physical qualities that help him to perform his work.

The specifications of the good teaching method:

General specifications:

1 - To be clear target.

2- To deal with specific educational content.

3- To vary educational activities.

4- To include a clear and specific calendar tool.

5- To provide the learner with feedback.

Special specifications:

1- Have a clear and specific goal for learners.

2- It deals with specific educational content.

3- Various educational tools and means are used.

4- It provokes the motives of the students and urges them to learn.

5- They are gained by cognitive mental skills as well as practical mobility skills.

6- Prepare them for constructive thinking, dialogue and discussion, in an objective and quiet way.

7- Provide them with the necessary skills necessary for them in their future lives.

8- Help them to engage in the educational process and contribute to various educational activities.

9- Facilitates a process between the teacher and the student, the student and the subject, and between the students together.

10- The learners reach the desired results with the least time, effort and cost.

11- Fit the abilities of learners and their preparations and inclinations and desires and take into account the individual differences between them.

12- The information is presented to them in a logical sequence .that is easy to difficult and unusual

The objectives of a good teaching method :

There are a set of teaching objectives that any teaching method seeks to achieve in order to perform its purpose, including:

1- The acquisition of educational experiences planned by learners.

2- Training learners in scientific thinking through problem solving method.

3- Training learners in group work.

4-Training learners in creativity and innovation.

5- Taking into account the individual differences between learners.

6- Learners acquire the desired values, customs and trends for the benefit of the learner and society.

The basis for choosing the appropriate teaching method: choosing the appropriate teaching method to teach content, depends on a set of foundations such as:

1- Educational objectives.

2- The study stage.

3- The possibilities and preparations of both the teacher and the learner.

4- The nature and type of scientific material.

5- The availability of educational means.

6- The nature of the curriculum.

7- The learner's inclinations and trends.

8- The number of learners.

9- The time limit for teaching content.

Types of teaching methods:

1- Teaching methods based on the teacher.

2- Teaching methods that depend on the learner.

3- Teaching methods based on the teacher and the learner.

We will address each of them in detail as follows:

First: teaching methods based on the teacher:

These methods depend on the teacher mainly, he provides science and knowledge to students through lectures and

lessons and then evaluates the performance of students and measures their results through tests and evaluations, including:

1- The method of lecture:

The method of lecture is one of the oldest teaching methods, and was linked to the lack of educational books, and adults are the ones who teach to young people and it is still one of the most common ways to date. The method of the lecturer is for the teacher to deliver information and knowledge to students in all aspects and to provide facts and information that may otherwise be difficult to obtain.

Steps of the lecture method:

1- Introduction: its purpose is to prepare the minds of students for modern information and prepare them for the new topic by reminding them of the previous lesson.

2- Presentation: The whole theme of the lesson includes facts and experiences to devise general rules and correct

governance, so they include the bulk of the time allocated to the lesson.

3- Linkage: The purpose of which is for the teacher to look for the link between the molecules (information) and balance each other so that the pupils are aware of these facts, and this step may usually enter with the introduction and presentation.

4- Inference: A step that can be easily accessed if the teacher goes through the previous steps in a natural way, since after the students understand the molecules they can access general laws and generalizations and devise macro issues.

5- Application: In which the teacher uses the circulars and laws he has reached and applies them to new parts, so as to make sure that the information is confirmed to the minds of the students, and this application is in the form of questions. This method is generally based on explanation, teacher-giving, listening and listening by pupils and showing up in preparation for the exam.

Advantages of the lecture method:

1- The automatic method in general is characterized by the ease of application, and its approval of various stages of education except the method of urbanization that specifically corresponds to university students or the elderly in general.

2- The method of the lecturer is characterized by the breadth of knowledge, and the provision of new information from here and there, which helps to enrich the information of the attendees.

3- The method of explanation serves to clarify the vague points and the description also helps to serve this purpose, and the insights are proven in the mind.

4- The description method is suitable for application in various fields of knowledge, and the way stories are told attracts the attention of pupils and increases their focus and interest in the subject of the lesson.

Defects of the lecture method:

1- This method causes stress and fatigue of the teacher as he is burdened throughout the lecture.

2- The learner's position in this way is negative in the learning process, and this method develops in the learner the characteristics of dependency and reliance on the teacher who is considered with the textbook and its summaries as a source of knowledge and knowledge.

3- This method leads to a spirit of boredom among pupils as it tends to listen throughout the lecture and deprives the student

of active participation in setting the goals of the lesson and drawing.

There are some points that should be taken into account - when applying the method of lecture:

1- The teacher should provoke the love of reconnaissance among his students, and give the students an idea of the elements of the topic.

2- Adapt the speed of presentation to the ability of pupils to follow up and record observations.

3- Ask students questions from time to time to ascertain their understanding and follow-up to the lesson.

4- The teacher's voice should be normal and normal and try to look at all pupils during the delivery.

5- Attention to the use of specific means to clarify and break boredom among pupils.

6- Install the basic elements of the lesson on the blackboard so that pupils can follow what is said.

7- Not to get too far off the subject because it distracts pupils.

8- Unaffected and emotional in the event that pupils leave and are distracted because this sometimes seems normal.

9- Try to do short tests for pupils at the end of the conversation or at the beginning of the second session in order to motivate pupils to follow what is thrown at them seriously.

2- The method of practical and illustrative presentations:

The practical presentation is defined as: an explanatory presentation by the teacher in front of his students, with the aim of clarifying, proving an idea or fact, or a specific scientific principle, such as presenting an experiment to prove a scientific law, for example, or presenting a stereoscopic model of eye composition, any part of the body, plants, fish or others. Although practical and illustrative presentations are originally activities carried out by the teacher during the teaching process in order to support his teaching of specific subjects, some see it as an independent method of teaching methods and methods, perhaps because the teacher can carry out full teaching positions using practical presentations, especially in lessons and topics whose activities include a variety of processes, the subject of the lesson may be, for example: The internal organs of the human body, or the respiratory system in the human being, the teacher spends one or more in a practical presentation on his living eye, or a stereoscopic model that shows these topics to the learners. Or the subject of the lesson is about how to acquire the skills of talking, or listening, for

example, the teacher spends one or more lessons in an demonstration by showing tapes or audio discs showing how to pronounce correctly, the exits of words, or skills.

Advantages of the practical presentation method:

1- It gives pleasure and excitement to the teaching process.

2. It gives realism and meaning to teaching experiences.

3. Increase the learner's positivity and desire for more learning.

4. Allows the learner to acquire observational skills and to conclude.

5. Allows the learner to train in scientific thinking skills.

6. Provide the learner with practical experience that benefits him in his daily life.

7. It is an important step in giving the learner useful practical and manual skills.

8. Links theoretical and practical teaching and learning experiences.

9. Integrated with other teaching methods and methods in achieving teaching objectives.

10. Allows the learner to modify his alternative ideas and misconceptions about specific topics, in accordance with his previous experience on those topics.

11. The disadvantages of the method of practical presentations:
12- The teacher takes its focus.

13. The role and responsibility of the learner during teaching are limited to viewing and observation

14. The learner does not have the opportunity to engage in practical activities himself and his hands.

15. It may not be suitable for teaching certain subjects, especially theoretical subjects that lack practical activities.

16. The learner's desire for adventure and experimentation is not satisfied.

17. Development.

The disadvantages of the method of practical presentations:
the disadvantages of the method of practical presentations is that they do not allow the learner to participate and practice the implementation of practical activities himself, so that method can be developed by overcoming its disadvantages referred to, which increases its effectiveness in teaching, where the teacher must:

1- Encourages learners to participate in the implementation of his practical offers.

2- Gives learners the opportunity to engage in practical activities with their own hands.

3- This method is used in appropriate lessons and topics.

4- This method is supported by other teaching methods that integrate with it, such as dialogue and discussion, to increase its effectiveness in teaching.

How does the teacher successfully apply the method of practical presentations?

He must follow the following stages and steps:

1- Planning practical offers.

2- Carrying out practical offers.

3- Evaluating scientific presentations.

Second: Teaching methods depend on the learner:

where the learner is required to access knowledge based on his own effort with guidance from the teacher, these methods can be divided into:

1- Methods of education and self-learning such as (programmed education).

2- Methods of distance learning and learning such as (university education, in-service training).

3- Teaching and learning methods in small groups

(focus groups).

1- Methods of self-education and learning:

One of the most important methods of self-teaching and self-learning is programmed education:

programmed education is defined as one of the methods of individual education through which the learner can teach himself in a subjective way, through a specially designed programed that allows information to be divided into small parts, arranged logically and behaviorally so that the learner responds gradually and ensures the validity of his or her response until he or she reaches the desired final behavior. It is therefore a specific technique aimed at providing education to the learner according to his or her needs and abilities. It can be said that this method is one of individual teaching and learning methods, on which a teacher can rely on teaching the learner a specific subject, through which the learner can teach himself.

The advantages of programmatic education:

1- Extreme accuracy in setting goals, description of the ultimate behavior of the learner.

2- Dividing the work into small steps leads to reduced chances of error and increased success.

3. Getting the learner internal reinforcement confirms the right response and increases his motivation to learn.

4. Allows each learner to learn according to his or her own abilities and self-potential.

5- Allows the learner to reach the level of mastery whatever his abilities and potential.

6. Suitable for all categories of learners who are highly educated and with special needs.

7. Gives the learner more pleasure in learning than the usual traditional methods.

The disadvantages of programmatic education:

1- Not suitable for all educational subjects.

2. It is not effective in achieving emotional goals, often focusing on cognitive goals.

3- Financially expensive, especially if accompanied by reliance on educational machines and projectors.

4- The information is fragmented in such a way that the learner does not link the parts of the same subject, i.e. to confuse the overall picture of the subject in the learner.

5. Requires high efficiency from software developers, and it may be difficult to have good-level programmers.

2- Distance learning methods:

Distance learning is one of the teaching and self-learning methods produced by modern education technology and is originally a method of individual education and learning, but has strengthened the open education system and the continuing education system. Distance education is defined as an educational situation in which the means of communication and communication available play a key role in overcoming the problem of long distances between the teacher and the learner, allowing for the opportunity for joint interaction.

Areas of distance learning :

1- Literacy and adult education programs

2- University education.

3. In-service training.

Teaching and distance learning channels:

1- Correspondence education.

2- Education by telephone.

3-Education through educational satellite channels.

4- Online education (e-mail- contact another computer - file sharing - archive - talk station - web link).

3- Teaching and learning methods in small groups:

These learners are focus of these methods, such as:

Focus groups: learners are divided into small groups of five to seven learners, preferably not to confuse educated boys and girls in one group, and then the teacher sits down to each group and asks them a set of questions about a specific educational topic, receives the answers of the learners' group separately, and directs dialogue and discussion. Between learners and some of them on the one hand, and between them and him on the other, dialogue and discussion should not be just a question and answer. - The original is to reveal misconceptions and perceptions about any subject among learners and it needs more time and effort.

Third: Teaching methods based on the teacher and the learner:

The method of cooperative learning:

The concept of cooperative learning:

collaborative learning is a free content of ways to organize social interaction within or outside the class so that the educational process is fully achieved, and cooperative learning takes the form of a circular session for students and the method of dialogue and discussion to achieve learning/educational outcomes so that they learn together without absolute dependency on the teacher or some individuals of them.

The practical justification for using this method:

students, especially young people, have enormous potential, the teacher must make a great effort to control it and make students quiet listeners, instead it is possible to move the energies of students actively in the learning process, and the communication of students among them would make an impact on each other and this effect can be exploited well, in addition to the fact that collaborative learning is more consistent with human nature than others has enabled patterns.

Conditions for applying collaborative learning:

Some believe that simply dividing students into homogeneous groups within the class and assigning them to certain tasks or sitting next to each other at the same table to talk to each other while completing their individual appointments is collaborative learning, but this process is governed by basic conditions that need to be met: -

students learn in small groups of 2-6 students per group, and some believe that number 4 is the optimal number of students in the group, It should be noted here that it is initially preferable that the number group should initially be as low as possible, and then it can increase.

The educational tasks assigned to students must be designed on the basis that students depend on each other and the group in general. The educational environment provides group members with equal opportunities to interact with each other according to tasks, and encourages them to communicate and exchange views in different ways. Each member of the group has a responsibility to contribute to the work of the group, and individuals are responsible for the progress of the educational process in the group.

Activities of the first chapter

1 - Determine the difference between the Teaching approach – Teaching methods.

2- Mention one of the teaching methods that depend on the learner (not mentioned in this chapter).

3- Prepare a lesson in mathematics for any stage of study, employing the method of cooperative learning.

4- Mention some of the teaching methods used by the teacher supervising the school in practical education.

Chapter 2: Teaching Strategies

After you study this semester is expected to be able to:

1- Know the concept of the teaching strategy.

2- Know the specifications of the teaching strategy.

3- Determines the criteria for selecting the teaching strategy

4- Learn about some modern teaching strategies.

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The concept of teaching strategy:

A strategic word: derived from the Greek word strategists, and concerns the art of leadership and its use is limited to military fields, the strategy is the art of using the means available to achieve the purposes to be implemented and accessed, namely:

1- The selection and identification of objectives.

2- Choosing scientific methods to achieve the goals.

3- Making executive plans.

4- Coordinating aspects related to all of this.

The use of this concept is no longer limited to military fields, but has extended to educational fields.

The teaching strategy is a teaching procedure planned by the teacher in advance, so that it helps him to implement teaching in light of the possibilities available to achieve the teaching objectives as effectively as possible.

The teaching strategy includes the following elements:

- Teaching objectives.

- The moves made by the teacher.

- Row management and regulation of the classroom environment.

- Learners' responses resulting from the exciting organized and planned by the teacher.

Quality teaching strategy specifications:

1- Comprehensiveness.

2-Flexibility and scalability.

3- To be related to the objectives of teaching the subject.

4- Take into account the individual differences between learners.

5- Take into account the type and type of teaching.

6- Take into account the possibilities available.

The criteria for selecting a teaching strategy:

1- The appropriateness of the strategy for learning outcomes: this means choosing the appropriate strategy to achieve the

target educational output (what the learner is expected to know and be able to perform, after the end of the lecture, course, or course.) for example when the product is to prove knowledge of certain facts and knowledge.

2. Strategic suit ion for academic content: The strategy should be linked to the content and nature of the subject matter; each subject has a special nature that requires the faculty member to choose a strategy and certain ways to teach it, as there are subjects that are more theoretical and more practical or experimental.

3. Strategic relevance to the level of learners: taking into account individual differences between learners, and their past experiences

4- To lead to active learning: in the sense of making the learner positive and active participant in the educational process, not just a recipient, and motivating the learner to self-learn

5- Taking into account the possibilities available in the educational institution: from classrooms, learning sources, tools and devices, and the numbers of learners.

Some modern teaching strategies:

First: PDEODE six-dimensional strategy:

1- Concept of six-dimensional strategy: The six-dimensional strategy is one of the strategies that helps students understand life and daily situations, as well as create an atmosphere full of discussion and diversity of views, proposed by Savander and Colliery in 2003, as a strategy to develop conceptual absorption in engineering, then used by Kohlari and his colleagues in 2005 in the field of engineering education.

There are many definitions of the six-dimensional strategy, including:

1- A teaching strategy based on the structural curve and includes a series of successive measures, including several stages: prediction, discussion, observational explanation, discussion, explanation.

2- A structurally oriented teaching strategy, which includes a series of successive actions, consisting of the following stages: prediction (Prediction) Discussion (Explain) Observation (Observe) - Discussion (Explanation) is carried out by raising a specific question or problem in which the student makes predictions, then justifies them, and in the light of which

activities are designed and implemented, collecting, analyzing and interpreting data.

From the previous presentation, it is noted that:

- The six-dimensional strategy is one of the strategies based on structural theory.

- The strategy depends on the positive of the learner and his interaction with his colleagues, through the exchange, discussion and interpretation of opinions and ideas.

- The strategy consists of six main steps: prediction, discussion, explain, observe, discussion, explanation.

PDEODE Steps:

Many researchers used the six-dimensional as a teaching strategy, and steps have been identified to implement it, and the steps to implement the six-dimensional strategy are as follows:

Prediction: in which the teacher presents a problem about the concept to be taught to the students, and then gives them the opportunity to predict the outcome of the problem individually raised, and justify those predictions before any educational events or activities begin.

Discussion: Students are given the opportunity to work in small groups to discuss their ideas, share experiences and meditate together.

Explanation: Where students reach a cooperative solution to the problem, with their results exchanged with other groups through the collective discussion of the entire class.

Note: Where students experience their thoughts and opinions on the problem by conducting activities and experiments in the form of groups and recording observations, the student may fall into a state of cognitive imbalance if they do not conform to predictions.

Discussion: Where pupils adjust their predictions through actual observations in the previous step, this requires pupils to practice analysis and comparison skills, and to criticize their group colleagues.

Interpretation: Pupils face all the contradictions that exist between observations and predictions by resolving the contradictions that exist within their beliefs.

The discussion in the second step differs from the discussion in the fifth step, where the discussion in the second step aims to talk members of each group of students about their ideas to get predictions of the solutions of the exercises, but the

discussion in the fifth step was defeated by the modification of pupils to their predictions in the light of their observations of activities, as well as the interpretation in the third step differs from the interpretation in the sixth step, where the interpretation in the third step aims to provide reasons for the solutions of the exercises they have gathered, while the explanation differs in the third step, where the interpretation in the third step aims to provide reasons for the solutions of the exercises they have gathered, while the explanation differs in the third step from the interpretation in the sixth step, where the interpretation in the third step aims to provide reasons for the solutions of the exercises they have gathered, while the explanation differs in the third step from the interpretation in the sixth step, where the interpretation in the third step aims to provide reasons for the solutions of the exercises they have gathered, while the explanation differs in the third step from the interpretation in the sixth step, where the interpretation in the third step aims to In the sixth step, his aim is to discuss the reasons for the agreement and the difference between their predictions and observations and to resolve the contradictions they have.

The importance of the six-dimensional strategy PDEODE:

The six-dimensional strategy has many features that take into account the needs and capabilities of students and motivate them with the aim of achieving better learning based on their previous experiences and knowledge in an atmosphere of discussion, dialogue and exchange of views, and the importance of the six-dimensional strategy in teaching mathematics is determined in the following points:

a- Make the learner the focus of the educational process by changing his role from recipient to active participant in his learning of mathematics knowledge.

B- Allows the learner the opportunity to discuss and dialogue with his colleagues or teacher in mathematical problems, which increases his math communication skills.

C- The learner acquires mathematical concepts and experiences in an active way, which increases the survival of the impact of learning.

D- The learner is responsible for his learning and his ability to acquire new mathematics experiences based on his previous experiences and knowledge.

E- Develop the spirit of cooperation among learners through cooperative working groups, participation and exchange of

views both within the same group and with the rest of the groups.

F- The ability of the learner to practice thinking skills such as observation, prediction and interpretation is developed.

G- The learner develops the skills of discussion.

The role of the teacher and the learner in the strategy of the six-dimensional PDEODE:

First: the role of the teacher:

shows the importance of the role of the teacher in the strategy of the six dimensions in accepting the non-traditional role within the classroom, where his role changes from a conveyor of knowledge and information to a guide and a mentor to the students, and the role of the teacher can be determined when applying the strategy of the six dimensions in the following points:

A- Asking questions to learners is a problem for them and provokes their thinking.

B- Provide appropriate educational opportunities to learn in small cooperative groups, discuss the group's ideas and

predictions of solutions collectively, and exclude false predictions.

C- Help learners resolve the contradictions between their predictions and actual observations.

D- Help learners formulate their mathematical conclusions correctly.

E- Exploring the knowledge and experiences of the learners, and linking them to new knowledge and experiences.

Second: The role of the learner:

The six-dimensional strategy indicates that the learner has a key role in determining what will be learned, where he discovers what he learns by predicting, researching, observing, discussing and explaining, and the role of the learner can be determined in the following points:

a- Cooperation with his colleagues in cooperative groups while solving the problem or the questions posed by the teacher.

B- Forecasting solutions to the problem and then justifying them, interpreting them and discussing them with the members of the group.

C- Distinguish between correct and wrong predictions.

D- Exclude false predictions of problem solutions or questions and emphasize correct predictions.

Second: flipped classroom strategy:

The flipped classroom strategy is one of the types of integrated learning that uses technology to transfer lectures and lessons outside the classroom, which is the popular idea that the founder and former CEO of Microsoft (Bill Gates), where he

sees this type of learning as an example of innovation, and although the concept of inverted class is a modern concept, his idea is based on the heart of roles between home and school, what is done at home is a solution for duties, activities and exercises done within the classroom What is done within the classroom is that students are exposed to the content of the subjects done at home, whether through an educational video recorded by the teacher, some audio files or other media.

In the traditional way, the scientific material is explained to the students by the teacher, and then they give questions and problems to solve at home, but most of the students are unable to do so, because they forget what the teacher explained during the class, but in the flipped classroom is the opposite where students depend on watching educational films at home at the right speed and time for them, you can re-watch the explanation of a particular point more than once, and the videos are watched through the computer Automated or mobile devices, students then take notes and questions while watching the video.

The class is converted within the flipped classroom strategy into registered lessons that are placed on the Internet so that the learner can access it outside the classroom class, to make room for other activities within the class, such as solving the

problem, discussions and solving duties, so that teaching through technology through the Internet solves the place of direct teaching in the classroom, and technology may take various forms including video, presentations, e-books, audio lectures and interaction with learners through educational forums, What is common in this area is the use of video, where the teacher prepares lessons and makes them available to learners online at home and before attending class.

There are many definitions of flipped classroom strategy, including:

- Flipped classroom strategy is one of the integrated learning models, in which the learning environment is reflected more usefully, where students watch videos before coming to class and use class time to answer students' questions, solve the problems they face, explain difficult concepts and integrate them into effective learning, connect students to their environment and daily lives, and despite the importance of videos in inverted classes, they are not aimed at The video clips to replace the teacher in the educational process are aimed at increasing the time available for interaction between teachers and pupils and using class time in active learning and practical application of knowledge.

What is done in the flipped classroom is not just the use of technology in the educational process, but a situation in which the appropriate technology available is used to enrich the educational process and improve the achievement of pupils, the new content is provided to pupils at home, but during the class the pupils conduct practical applications of the content and make experiments and discussions under the supervision of the teacher.

- Flipped classroom strategy is an educational strategy centered on the learner, where the learner watches short video lectures at home before class, while the teacher uses the time within the classroom to provide an active interactive learning environment for the learner in which he or she is directed and applied what he learned.
- flipped classroom as one of the modern technologies based on the heart of the teaching method, where lessons are provided to the learner on the Internet in the form of texts, pictures and videos before teaching, but in the classroom the teacher discusses the previous content and asks questions and working papers, activities to develop skills related to the content, and the teacher performs a set of procedures when planning and designing the content of the lesson through links on the Internet or re-editing and

recording, and then the students follow up These links and discussion of their colleagues through the Internet, the exploration of websites and video recordings related to the lesson provided at home, the participation of students and their classmates in the work of activities to discuss the content of the lesson whether individual or group, and then the teacher provided feedback to these students and evaluated them by performing assignments in the form of short tests and the practical application of student projects.

Through the previous presentation, it is noted that:

A - the strategy of the flipped classroom seeks to change the role played by the student in school and home to replace each other, and this is what gave this strategy its name, the student receives the cognitive aspect outside the class, and applies knowledge, discussion and problem solving within the class with the help of the teacher, the student interacts with the educational material more deeply, and realizes the importance of discussions that take place within the class and participates in it.

B- The flipped classroom also contains two types of educational activities, the first of which is individual learning performed by the student outside the time of the class, and

the second is group learning that is between the pupils within the class.

C- The application of the flipped classroom strategy does not depend entirely on educational video, but e-learning materials may vary in the form of presentations, e-books or educational platforms.

D- A teaching strategy through which education technology (videos and presentations) is used to connect the available academic content on the easy class educational platform , in order to employ class time in the actual practice of knowledge through various activities.

Flipped classroom strategy requirements:

The Flipped classroom strategy represents a recent trend in integrating technology into education and increasing its effectiveness, and in order to be applied efficiently, there should be basic pillars:

a - **The availability of a flexible learning environment**:

the rigid environment hinders the application of the flipped classroom strategy, as the teacher may need to constantly rearrange the learning environment in proportion to the educational situation and with the levels and needs of pupils, this may include the formation of a special part of self-study or work through groups Or research or application

and all of this can be in one learning environment, so there should be sufficient flexibility in the learning environment and I have the administrators to accommodate this dynamic within the classroom, and facilitate the task in front of the teacher to do so.

B- Change in the concept of learning:

There is a change in the concept of learning by moving from a central philosophy of learning about the teacher being the source of knowledge, to become the center is the student, where he constantly processes the formation of knowledge positively and effectively, and this framework ensures the intervention of the teacher; Individuality and collective i have pupils.

C- Careful thinking about the division of the world and its analysis:

The content is divided and analyzed to determine what will be provided through direct teaching and what can be provided to the pupils in other ways, and this depends on decisions made by the teacher based on the nature of the subject and the pupils.

D- The availability of competent teachers and trainers:

The need for an efficient and trained teacher becomes a necessity in the inverted class, this type of learning is not aimed at dispensing with the teacher, but the need for

teachers who are able to deal with this pattern increases, where he has a lot of decisions such as: moving between direct teaching and indirect teaching through the use of technology.

The importance of flipped classroom strategy:

The flipped classroom strategy is characterized by many features that take into account the needs and possibilities of students with the aim of achieving better learning based on the distinct learning opportunities provided by technology, and the importance of the flipped classroom strategy is determined by the following points:

A - In line with the requirements and data of the digital age:

The learner in the digital age has many features that distinguish him, the most important of which is that it is almost always connected to the Internet through various devices such as computers, telephone and other tablets The learner communicates with what is happening on various social media sites and YouTube, so the learner carries in his bag high-powered devices both in storage and processing, but he is not allowed to use these devices within the school.

B- Flexibility:

The mechanism in which the educational content is presented through educational videos uploaded online gives

the opportunity for learners to benefit, where the learner watches videos at the right times for him at home, writes his notes and questions to discuss with the teacher within the classroom, and this makes the learner free from anxiety due to overcrowding of the table, the possibility of not being able to follow the teacher's explanation in the traditional style, and the characteristic of flexibility in the inverted row is the ability of The learner has to stop explaining the teacher and return it until the subject of the lesson is absorbed, so that the learner can control the speed of explaining the content, which is often a source of frustration for him when the teacher moves from explaining one point to another before he understands the initial point.

C- Effectiveness:

Rearranging the elements of the educational process and its time makes interaction more useful, the goal is to take advantage of the possibilities of inverted class and traditional education, and to mitigate the disadvantages of each of them if applied alone.

D- Increasing interaction between teachers and pupils:

The interaction between the teacher and the learner within the strategy of the flipped classroom includes the time of class as well as outside it, as the role of the teacher becomes more in line with the requirements of learning in the twenty-

first century in which the role of the teacher shifts from indoctrination to more dynamic roles and interacts with the requirements of learning and the needs of learners, where he becomes a facilitator of learning outside the class through indirect teaching through educational video, while the role of the teacher within the classroom is focused In a big way on guidance, training and supervision, the interaction between the teacher and the learner takes the direct form within the classroom and indirect outside it.

E- Overcoming the lack of numbers of competent teachers as well as the absence of teachers:

the flipped classroom aims to overcome the shortage of teachers and their absence, through the use of videos recorded by more qualified teachers, as well as the possibility of the teacher to record videos.

The advantages of the flipped classroom strategy in the teaching of mathematics can be summarized as follows:

- Encouraging both the teacher and the student to use the best modern techniques in the field of education in general and in the teaching of mathematics in particular.

- Help the teacher to assess the level of students directly within the class when performing class activities and solving different exercises.
- The role of the teacher has changed from a teacher in the traditional ways to a mentor and a guide for the students.
- Attracting the attention of students to the educational subject by employing fixed and moving shapes, colors and images in the recording of lessons.
- Allows pupils to re-teach more than once to confirm understanding or take notes and questions that they would like to ask the teacher.
- Helps to take into account the individual differences between pupils, whether in the speed of learning or the method of learning. Promoting critical thinking and self-learning and transforming the student from a recipient of knowledge to a researcher of their sources.

Steps to implement the flipped classroom strategy:

Many researchers used the flipped classroom as a teaching strategy, and steps were identified to implement it, and from the steps of implementing the flipped classroom strategy:

a - Inform the student about the lesson before attending the classroom through video.

b- Directing the student to focus while watching the video, especially with regard to distractions that can reduce the student's concentration while pursuing the lesson such as a phone or tablet.

C- The student takes notes and questions while continuing to explain the lesson, where the student benefits from the possibility of stopping the video to take notes and questions, as well as can re-establish a certain part in the explanation.

D- At the beginning of the class, the teacher should give time to ask the students about the subject they have been briefed on, and this time is necessary to answer the students' questions, and it also allows making sure that the lesson is shared with me.

E- The teacher prepares the activity of the class, which may include laboratory experiments, research tasks or applied activity to solve a problem with regard to the lesson, and according to the teacher's order of class time, it is possible that the single share contains more than one activity or task.

One of the researchers suggested the teaching steps of the flipped classroom strategy:

The student watches the educational video developed by the teacher by the classroom class (at home through computers or mobile devices). The student writes down his notes and

questions while watching the lesson videos. The student attends the class with a basic understanding to answer questions and apply activities with the help of the teacher.

- **The flipped classroom is going in a series of steps that are interconnected, the most important of which are:**

- **Planning:**

The success of the flipped classroom depends on the harmonization of what pupils must accomplish before, during and after class, so the objectives must be achieved accurately and the appropriate content must be selected to achieve them, and choose the technological style in which the subject will be presented, noting that it does not require the full heart of the lesson but can be satisfied with some parts that will provide the pupil with the learning opportunities in question, and this comes through the precise identification of the tasks assigned to the pupils and the activities he is involved in carrying out within the Chapter, besides choosing the appropriate calendar method according to the objectives to be achieved.

- **Preparing the content before class:**

Once the objectives and nature of the material are set, the preparation must be made to present the content in an electronic template available to students before the

classroom, and the choice of this pattern is required to be attractive and interesting and present clearly, understandably and appropriately the nature of the goals, which may vary from presentations, educational video, e-books, etc.

- **Identifying learning activities before class:**

At this stage it is necessary to think about the type of individual tasks and activities that students will perform before attending the classroom, so it is necessary to prepare for some tasks that motivate students and provoke their motivation towards their implementation, including: online research activities, open-ended questions, preparation to discuss a particular problem, preparing a presentation on the most important elements of the lesson as well as points that are still questioned for pupils.

- **Identifying learning activities during class:**

This step is one of the most important steps of the flipped classroom that expresses his philosophy, some believe that the technological tool is his goal, but the real benefit is the activities practiced by students within the class, may be divided into individual activities at times, but predominantly collective, and the teacher must allocate between 10-15 minutes at the beginning of the session to present a brief introduction on the subject of the lesson, and learn about

the most important questions Which concerns the minds of the students as a result of what was studied before attending the class and answering it, and then the pupils are divided into groups to practice active learning together by discussing a topic, solving a problem, allowing the opportunity for students to share experiences among themselves.

- **Post-class activities:**

The learning process does not end as soon as the pupils leave class, but there are some activities to be exercised to continue the learning process, especially after the lesson has been better absorbed and the students' questions have been answered, and may be represented by research projects assigned to the pupils, and preparation for the new lesson.

- **The formative and final calendar:**

At this stage the extent to which the goals are achieved is judged, and this is illustrated by the ability of the students to carry out the tasks assigned to them, the solution of further training, in addition to summarizing the lesson and providing feedback to the pupils.

- **Through the previous presentation, the teaching steps can be displayed in the flipped classroom strategy as follows:**

The first stage: the planning and design phase:

a - the teacher prepares or brings videos or presentations for the lesson.

B- Download the teacher for these sections or offers on your account on the easy Class educational platform.

C- The teacher asks questions about the video or presentation to the student on his educational platform.

The second stage: Use:

- **Outside the class (at home):**

A - The student watches the video or presentation on the educational platform through the symbol given to him by the teacher.

B- The student's answer to the questions on the educational platform after watching the video or presentation.

- **Inside Class:**

A - Discuss the pupils in the world that has been seen in the videos at home, by asking a set of questions to the pupils, in order to identify the strengths and weaknesses of the pupils in the world.

b- Explain and clarify the weaknesses identified by the students.

C- Students solve various questions and exercises on the subject of the lesson in groups.

The third stage: Calendar:

A - The practical application of knowledge by directing students to answer the questions of the calendar in their student booklet, to be answered individually to make sure that the students are able to understand, generalize and skills addressed during the lesson.

B- Before the end of the session, the teacher reviews the concepts, laws and theories reached.

C- Assigning students a homework duty which is to watch a video or presentation of the next lesson on the easy Class educational platform.

Tools used when applying the flipped classroom strategy:

- Some of the tools used in the flipped class room include:

A- Knowmia: http:// www.knowmia.com an educational platform that provides many lessons through videos accomplished by teachers from all over the world, and also

enables the creation of short educational videos for the teacher, to share with his students and colleagues.

B- Explain Everything: http:// www.explaineverything.com an easy-to-use tool to design and activate dynamic interactive presentations and lessons as well as create and evaluate tests.

C- Edmodo: http://www.edmodo.com a site that allows teachers to create virtual classes that allow pupils to have dialogue with each other on the one hand, in addition teachers can send advertisements to all students, exchange documents and view slides, and create and evaluate tests.

Some of the free tools and sites used by the teacher in the production of videos for the flipped classroom :

•Jing: http:// www.techsmith.com/jing_ html is free and fits more than the operating system (Windows and Macintosh), and the time allowed to record one video is five minutes, and what distinguishes this program is the ease of sharing the video after preparing it by uploading it to the site (ScreenCast .com).

•ScreenCast-o-matic: http:// www.ScreenCast.com is free and does not need to download the program on the computer as it works directly on the Internet through the program's website,

and allows the use of the camera to record and upload video directly to sites such as YouTube.

•Brainshark: http://www. Brainshark.com it registers directly through the Internet, and after the registration is over, the site sends an email to the user with the video link.

Flipped classroom Video Production Steps:

Video tutorial is an effective tool and an important step when implementing the inverted grade strategy, so it is necessary that the process of producing video be done in a carefully planned and interesting manner and not done in a random way, where the video should be used to serve the lesson and benefit the students.

The points that the teacher should take into account when designing the video tutorial:

A- Planning for the lesson:

Video is an educational tool used in the flipped classroom, and the aim of its use is to improve the educational process and reach better outputs, and due to the importance of using educational videos as one of the tools used in the strategy of the flipped classroom, the content of the final video should be planned in advance,

focusing on the clarity and simplicity of the content of the lesson, as the teacher should write the video scenario before starting recording, as well as the teacher's knowledge of the subject of the lesson and the ability to have the scientific content.

B- Video recording:

The teacher shoots his explanation of the lessons with a video camera and use them later in similar lessons before the teacher applies the strategy of the flipped classroom, this does not require additional effort from the teacher, and can use many programs and techniques to record video after processing the tools used in the recording (computer, microphone and camera), where the teacher explains the lesson without the presence of learners while the program records its explanation, and the advantages of this method are the possibility of stopping the recording and following it later.

C- Video editing:

After recording the video needs editing because there are some problems or to add elements that do not exist in it, and through video editing the teacher can add signals and notes that may contribute to the learner's increased understanding of the content. Some of the illustrations, geometric and graphic graphics and text comments that

the teacher can add during video editing include some illustrations, geometric and graphic graphics.

D- Publishing the video:

After the process of recording and editing the video, the teacher should think about the way it will be used to deliver videos to learners, as well as take into account the appropriateness of the way the videos are posted, if the teacher decides to put these clips on the Internet, he should make sure that all learners have access to them. There are many alternatives, some of which may be more appropriate than the other for each educational environment and educational attitude.

The role of the teacher and the learner in the strategy of the flipped classroom:

First: the role of the teacher:

shows the importance of the role of the teacher in the strategy of the flipped classroom in accepting the role of the teacher within the class, where the role of the teacher changes from a conveyor of knowledge and information to a guide and a mentor to the students, as his role changes from time to time in one class, and the role of the teacher can be determined when applying the strategy of the flipped classroom in the following points: -

A- Continuing to learn and help students, this does not mean that the teacher should give up the method of lecture and indoctrination in full during the application of the inverted class strategy, but rather to reconsider the time allocated for indoctrination, instead of the time of the class for explanation and indoctrination, the time of the class is divided between explanation, discussion and practical applications.

B- The teacher monitors the students inside the class and intervenes to correct their mistakes, as well as direct them to different sources of learning and watch videos at home.

C- Dealing with students in dynamic and flexible groups depending on their levels and enabling them to skills and concepts dynamically, as it is possible for the student to move from one group to another during the week, day or class.

D- Provide appropriate feedback at the time of the session.

Second: The role of the learner:

The role of the learner in the strategy of the flipped classroom turns into a user of technology effectively through learning

outside the classroom, reinforcing critical thinking, self-learning and communication skills and cooperation with his colleagues, thus achieving the skills of the twenty-first century in education, and uses the technical learner where he watches the videos available on the learning platform, and conducts discussions with his colleagues about the content that has been seen.

The role played by the learner in the flipped classroom strategy can be summarized in the following points:

a - An effective user of technology:

He watches videos and presentations on the educational platform Easy class, and answers the questions and tests that the teacher prepares and uploads to the educational platform.

B- Discussing:

He asks questions about the unclear points that he is difficult to understand and link them to what he saw on the educational platform.

C- Self-organized ideas:

After the learner watches the content of the lesson through videos and presentations, he arranges his thoughts for the concepts, laws and theories he has obtained.

D- Cooperating with his colleagues:

Through the learner's cooperation with his colleagues within the class to solve the various exercises.

Difficulties in implementing the flipped classroom strategy:

The flipped classroom strategy is one of the modern teaching strategies that feature many features that benefit both the teacher and the pupils and improve the outcomes of the educational process:

A - provides the appropriate technology and the appropriate level for students to apply the inverted grade strategy.

B- The need to change the methodology and mentality of the teacher: many teachers will find it difficult to change their roles from teaching students to guiding them.

C- Accept the student to take responsibility for learning and give up his dependence on the teacher as it is used in traditional education.

E- Applying the flipped classroom strategy requires the teacher to have the skills to deal with programs in order to be able to produce materials for the flipped classroom.

BRAINSTORMING AS A STRATEGY IN TEACHING MATHEMATICS:

Brainstorming is a teaching strategy for releasing ingenuity and for enhancing critical thinking, especially in mathematics wherein higher order thinking skills of students should be more developed. Students can use this to come up with ideas until the group decides for the best solution.

Motivation in a mathematics class is indispensable, although it is a reality that all students should be properly motivated, especially the poorly motivated ones, the teacher should not ceased in finding ways to deliver the lesson at hand deliberately and accurately. One way to do this is through brainstorming, more so, when a teacher wants to expand a subject matter into the values arena, he or she can often use the power of brainstorming to uncover non obvious connections. For example, a teacher might conclude a lesson in multiplication by asking students to brainstorm real-life situations in which using multiplication would be helpful. The teacher can also ask students to think open-mindedly about a topic to generate lots of ideas without worrying if any of their ideas is reasonable or not. He or she might asks students sitting in a small or large group, to create as long a list of alternatives, say balancing the home budget or doing mental long division. If a mathematics teacher truly hope to release ingenuity and encourage productive thinking, then he or she need to use

brainstorming techniques. Brainstorming is a key tool that applies to most problem-solving and complicated mathematical concepts. In fact, brainstorming strategy is an assumed component in many subject areas not only in education, but also in other sectors of the society. Here are some basic rules for the teacher.

- Encourage free expression of ideas. The teacher explains that everyone's ideas will be heard and recorded. One thing to make clear is that the only bad idea is the one that isn't expressed. The goal is productive thinking.
- Encourage everyone's participation. Be sure everyone who is involved, or as many as possible, actually participates in the process. A recorder writes down every idea in a way that can be readily understood.
- Avoid killer phrases that close down communication. Killer phrases are comments such as these:" What a silly idea!" ," I wouldn't do that in a million years."" You're crazy. That's a rotten idea! "
- Sort the results. When the brainstorming portion of the group/s is/are completed, you may want them to have the group sort the suggestions by considering their probability, impact, implications, advantages, disadvantages and priorities. This part is optional. What is important is to select the best

results/answers to the problem being solved. It's good if all groups have best answers.

Brainstorming is a creative process that is used as an early step in generating possible solutions to a problem. Judgment is withheld to create a long list of ideas, including ones more creative or daring than those initially considered. You probably already had your own definition of brainstorming that is somewhat similar to mines. However, I bet you didn't know that there are several distinct types of brainstorming.

No, really. And in this piece, we will briefly discuss each one.

Reverse Brainstorming

A creative problem-solving technique in which the problem is turned around and considered from a different point of view to spur new and different solutions.

Stop-and-Go Brainstorming

A problem-solving technique in which a group alternately engages in brainstorming solutions without evaluation for ten minutes then engages in a short period of evaluation. The group continues alternating between brainstorming and evaluation.

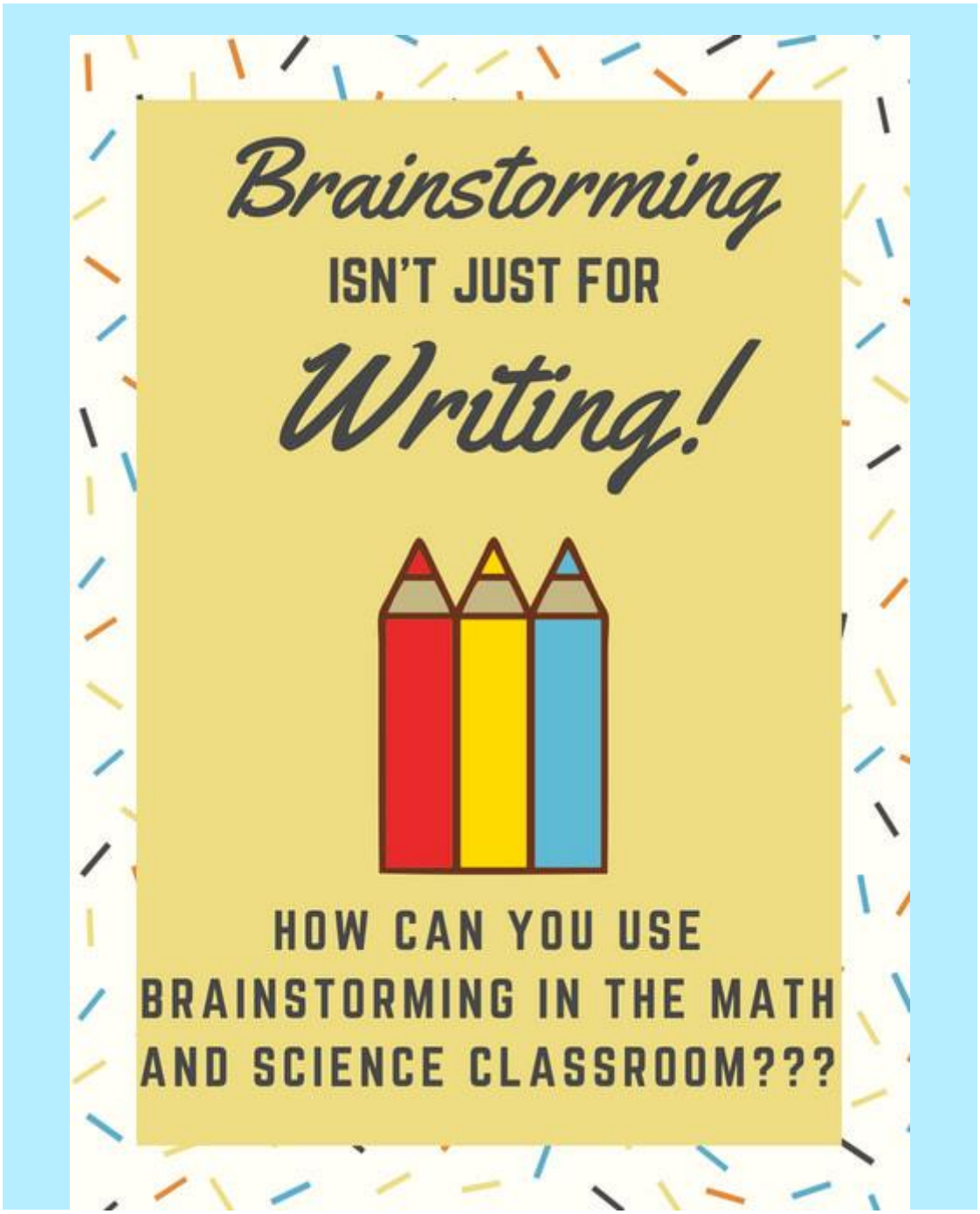
Phillips 66 Brainstorming

A problem-solving technique in which a group of six people brainstorms for six minutes and then a spokesman for each group presents either the best ideas or all ideas to the larger group.

Brain writing

A problem-solving technique in which participants individually brainstorm ideas and document them, then share them with a group to further push their thinking.

What did we miss? Can you think of any additional types of brainstorming?



This last year, I was fortunate enough to be apart of cohort through UT. After reading some more of the books, our professor gave us I started thinking problem solving, brain storm, and more.

As an adult facing a problem, I don't tend to generate a list of

possible solutions. Through experience (and trial and error) I've learned what to do when various types of problems arise. But often times I forget that my students most likely won't face problems that are not immediately solved for them by older siblings, electronics, or parents. (And yes, sometimes by myself, guilty!)

Students need to spend time generating ideas about how to solve problems of many varieties. Brainstorming establishes connections between ideas and methods to solve problems. These connections will help build up your students' mental tool box. And the more tools your students have, the more likely they are to be successful in any given problem solving situation.

Brainstorming in Math-

Before beginning a word problem, have your students list all the possible ways to solve it. Don't reject any ideas, even if they are blatantly wrong. Next, sort them into Good Ideas, Better Ideas, and Best Ideas.

Allow students time to verbalize or write (either whole or small groups) their justifications for the placement of each strategy. Practicing this several times a week will help your students remember and connect the skills they have already learned. It

will also help them analyze mathematical process on a deeper level. It may spark an interesting debate even.

Example;

Mrs. O has 24 students in her class. She wants each student to have 64 cubes for the math lesson today. If she has 1,500 cubes, will she have enough cubes for each student?

Strategies to solve this:

Repeated Addition Multiplication Make a T Chart Draw a Picture Subtract Divide

Examples of thinking: (Yes, you will have to model it for them often.)

* I would put adding into the better ideas. I would not put it into the best ideas because I don't want to add 64 twenty- four times. It would be faster to multiply.

*Or, I would put drawing a picture in the better ideas because drawing base 10 blocks twenty four times is going to take too long.

*We probably wouldn't want to divide because the problem is not asking us to share 64 things between the 24 students.

Brainstorming in Science

Cause and Effect-

Pose a problem and let students brainstorm a list of possible causes. (My plant died. What do you think happened to it? A certain type of animal disappeared from this region, why do you think that is?) Yes, you might hear that aliens abducted your cows. Allowing the creative responses every now and then is okay (and dare I say healthy for your classroom).

Later, when your students sort the ideas Good, Better, and Best, your students will know that aliens did not steal the cows. J And use your judgment. If you know the class would take that response and run the wrong the direction with this exercise then don't do whole group. Instead, allow them to generate the list in groups. Limit each group to one creative answer and two logical causes per group. They'll regulate themselves. J

Mystery Matter or Vocabulary-

Brainstorm a list of question to ask about something in a bag or a hidden vocabulary word. Next, give them a clue. Let them answer or discard their own questions. Finally, have them make a final guess and reveal the mystery. (My students love this!)

Part of the Whole-

Show a part of a picture or article. Allow students to generate a list of questions. What does a word mean? Why does it have this? Will we be studying something to do with plants?

Once a student asks a question fairly close to the content, encourage more questions along those same lines. Keep these questions until after you finished the unit or reading the article. Finally have the students answer their own questions

Active Learning Strategies

Active learning engages students in learning, using activities such as reading, writing, discussion, or problem solving, which promote analysis, synthesis, and evaluation of class content.

Active in-class learning also provides students with informal opportunities for feedback on how well they understood the material.

Click on the image below to explore some specific active learning techniques for engaging students in the learning process. These activities are meant for use in class, especially in lecture settings, and can be adapted to any discipline. Most of them take only a few minutes to complete. Some activities are meant to be done individually while others should be done in pairs or small groups.

Figure 9: Examples of active learning strategies that engage students in learning.

Active learning creates the opportunity for deeper learning; however, student resistance to this type of learning is often high. Active learning conflicts with students traditional views of teaching and learning. In high school, students were told information, memorized it, and were then tested on that information. Instead, active learning requires them to take risks and try learning strategies that they have no prior experience with.

For more ideas on active learning techniques that you can try in your teaching, go to the Introduction to Active Learning module.

Activities of chapter 2

1 - Identify the differences between the Teaching strategy - the teaching method.

2- What is the difference between teaching mathematics in the Traditional classroom – flipped classroom?

3 - Write a research in one of the teaching strategies (not mentioned in this chapter).

Chapter 3: Mathematic communication

after studying this chapter is expected to be able to:

1- **Recognize the concept of mathematical communication.**
2- **Know the forms of mathematical communication.**
3- **Determines the skills of mathematical communication.**
4- **Learn about the importance of mathematics communication.**
5- **Learn about the role of the teacher in developing the skills of mathematic communication.**
6- **Methods of evaluating mathematic communication**.

The concept of mathematics communication:

Mathematics communication is one of the most important criteria for learning mathematics, since mathematics is a language that has its own vocabulary of symbols, forms and terms, and has its own rules, the National Council of Mathematicians Teachers of the United States of America (NCTM) has considered that mathematical communication is one of the basic components of mathematical power, which represents the main goal of mathematics education, the ability to solve problems, the ability to infer, and mathematical communication with others about ideas and solutions. The National Council of Mathematicians of the United States of America defines mathematics communication as 'the ability of the individual to use the vocabulary, symbols and structure of mathematics in the expression and understanding of ideas and relationships'.

There are many definitions of mathematics communication, including:

It is the skill through which learners understand the importance of mathematics, its role in the service of other sciences, and the service of diverse life sciences.

Mathematical communication includes the process of using mathematics vocabulary (relationships, terms, forms, symbols) in expressing or describing the mathematical ideas of others. Mathematical communication means 'the ability of the student to interact in writing, oral and in a coherent and clear way using the language of mathematics with its symbols, terms, forms and relationships when confronting different mathematical situations, in order to express, understand, represent and clarify mathematical ideas and relationships to others'.

In the light of previous definitions, it is clear that mathematical communication includes the ability of the individual to use the vocabulary of mathematics symbols, terms and forms.

- Revolves around the ability to employ language skills such as reading mathematics texts, writing and speaking the language of mathematics, listening to mathematics texts with understanding, and math representation.
- Includes the ability of the individual to understand the importance of mathematics, and employ them in different mathematical and life situations.

Mathematical communication forms:

Mathematic communication has different forms within the classroom, including listening, speaking, reading, writing and acting, and here is a simplified presentation of mathematical forms of communication:

Math listening:

Listening in mathematics is a mathematical skill that expresses the student's ability to communicate mathematically with others, by conveying the mathematical ideas heard and clarifying them to others. Listening is one of the important communication skills for the teacher and learner, where students benefit from listening to the ideas of others, and listening to mathematical words spoken correctly, works to develop the discussion process, and math listening occurs when the student hears me describe a sensory model or geometric form, and implement the description he heard correctly.

One of the advantages of listening in mathematics is that students benefit from listening to the opinions of others in developing strategies to deal with mathematics activities, and listening to correctly spoken mathematical words

develops the student's ability to pronounce them correctly. The teacher's listening to students also helps to evaluate students, find out their mistakes, and choose the right learning method for the level of students and their thinking.

One of the activities that benefits in the development of mathematics listening is repetition of the audio thing, since good listening needs the teacher to ask the student to repeat what he heard to make sure that he heard it correctly, or that he understood what he heard, and the teacher may ask the student to explain what he heard or to repeat what he heard in his own language, or to discuss cooperatively with his peers what he heard.

There are some methods through which mathematics listening can be developed, most notably:

- The teacher asked the student to repeat what his colleague said or what the teacher said.
- Recording the lesson on a cassette tape, giving the student a chance to record what he heard inside the classroom.
- Listening to what has been recorded and compared to the recording of the writings of some students. The

student summarizes what he heard clearly and with an intellectual vision.

Pupils can also be encouraged to listen by asking questions posed by the teacher or other pupils so that listening is targeted and directed.

From the above it is clear that:

listening is one of the important forms of learning mathematics communication, where listening to the opinions and questions of others enables us to understand them and communicate with them, and listening is important for both the teacher and the student, the student benefits from listening to the ideas and opinions of the teacher and the rest of the students in some mathematical situations by employing them in similar or new situations, and the teacher listens to his students to help him evaluate them and identify their mistakes, which directs to choose the right learning method for them.

Math talk:

Mathematics speaking is one form of mathematical communication during which students practice oral communication skills, where students have the opportunity to speak or respond to teacher's questions using the

symbols and vocabulary of the mathematics language to express mathematical ideas and relationships.

He sees leaving the freedom for learners to speak and respond to teachers' questions, using mathematics language to express ideas and relationships, offer alternative solutions, and describe the procedures for resolving the math problem.

The student talked about mathematics and mathematics language strengthens his understanding and gives the teacher a clear picture of the student's understanding of what he says or the validity of the oral answer to the question.

The skill of speaking includes: The use of sports vocabulary, terminology, compositions, to express ideas (orally) for example:

- Description of numerical, or oral, geometric patterns.
- To provide an oral description of the situation of my life, which requires, for example, the collection process.
- Provide a verbal description of how to resolve a verbal issue.
-

The speaking skill also includes some abilities such as:

• The ability to move from one idea to another in sequence and objectivity.

• A linguistic outcome that can be used properly while speaking.

• Enough information about: when, and where the conversation is inappropriate.

• Clarity of the ideas contained in the hadith so that the listener can understand them.

• The ability to speak smoothly and launch without cost, with a clear voice, sound pronunciation, and interrelated phrases.

• The ability to use various sources of information to obtain information related to the topic of conversation.

It is clear from the above:

The importance of speaking as a form of mathematical communication, so the teacher should devote enough time to speaking mathematics in mathematics classes and provide opportunities for students to express mathematical ideas and relationships orally.

Mathematics Reading:

Mathematics reading means the ability to correctly pronounce mathematics vocabulary, translate and

understand terms, relationships, symbols, mathematical forms, interpretation and analysis of relationships between them. Reading skills include: reading educational materials, and sources of mathematics learning, paper and electronic. Read the literature on work areas and activities that use mathematics, such as: trade bulletins. Reading skills for regular language (silent reading, bass reading, strategic reading, and creative reading) are also required to develop reading skills in mathematics. The need for students to understand the meanings and mathematical symbols written before reading correctly.

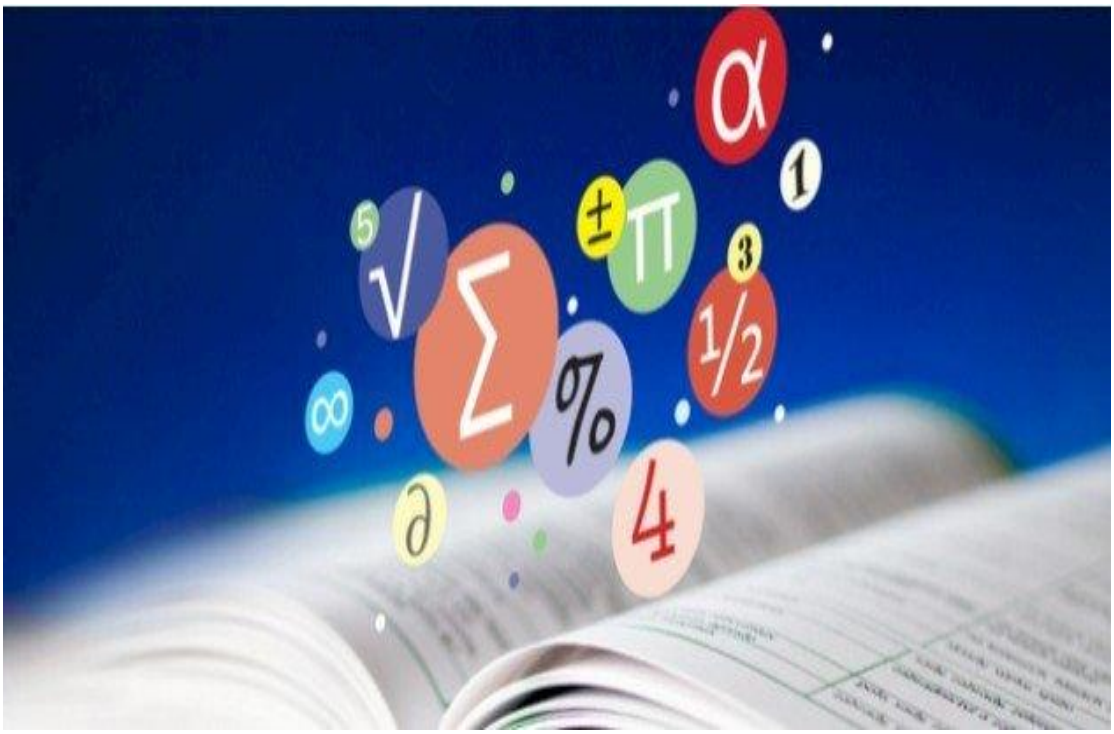
Attention to the development of reading skills can lead to:

- The student's use of symbols, terminology and mathematics vocabulary in solving mathematical and non-mathematical problems.
- The student understands of the methods of solving the readable mathematical problems accurately and clearly.
- The student's appreciation of the beauty of the language of mathematics, its accuracy and its brevity.
- Encourage students to read, learn and research mathematics subjects. Developing the skill of self-learning.

The education scientists stressed the importance of using mathematics magazines and helping students to read the math information contained in them, because this has an effective impact on the development of students' ability to communicate mathematics.

The National Council of Mathematicians also recommended to use reading activities to help students understand the math vocabulary, the vocabulary that a student needs to learn mathematics is divided into three sections: vocabulary for mathematics words such as: numeracy and denominator, math-semantic vocabulary (height, tendon), and mathematics symbols (>, %, =).

Mathematics writing:



Increased interest in writing in education in general and mathematics education in particular due to the importance of expressing writing about ideas, concepts and mathematical relationships, and clarifying this to others, which may help in the development of students' ability to communicate mathematics.

There are many different aspects that contribute to the teaching and learning of mathematics writing, such as:

- Writing mathematical concepts.
- Writing articles or mathematics subjects.
- Writing feelings and attitudes towards mathematics.
- Writing beyond mathematics issues such as: the nature of mathematics.

Teaching and learning mathematics communication also includes accustoming the learner to writing correctly for mathematics when solving problems or issues, and in editorial tests, the student should learn how to express correctly and systematically the solution, such as arranging calculations, developing numerical and forced symbols,

writing proofs, and writing discrimination in mathematical matters.

The most important written skills to be developed when teaching mathematics can be identified among learners:

- The use of mathematics language in writing expresses mathematical information. Description written for sports text using mathematics language.
- Description of an geometric shape using the language of mathematics.
- Formulating a mathematical problem.
- Express in writing the generalizations that are discovered.
- Writing logical evidence and evidence to solve a mathematical problem.
- Explanation and clarification in writing of the mathematical relationships and ideas involved in a mathematical position.
- Interpret the mathematical relationships involved in a mathematical position.
- Write the justification for choosing a specific answer to an athlete's position.
- Write a summary of the ideas, procedures and solutions for a particular exercise.

It can also be noted that some of the guidelines that a mathematician should take to develop the math writing skill of students:

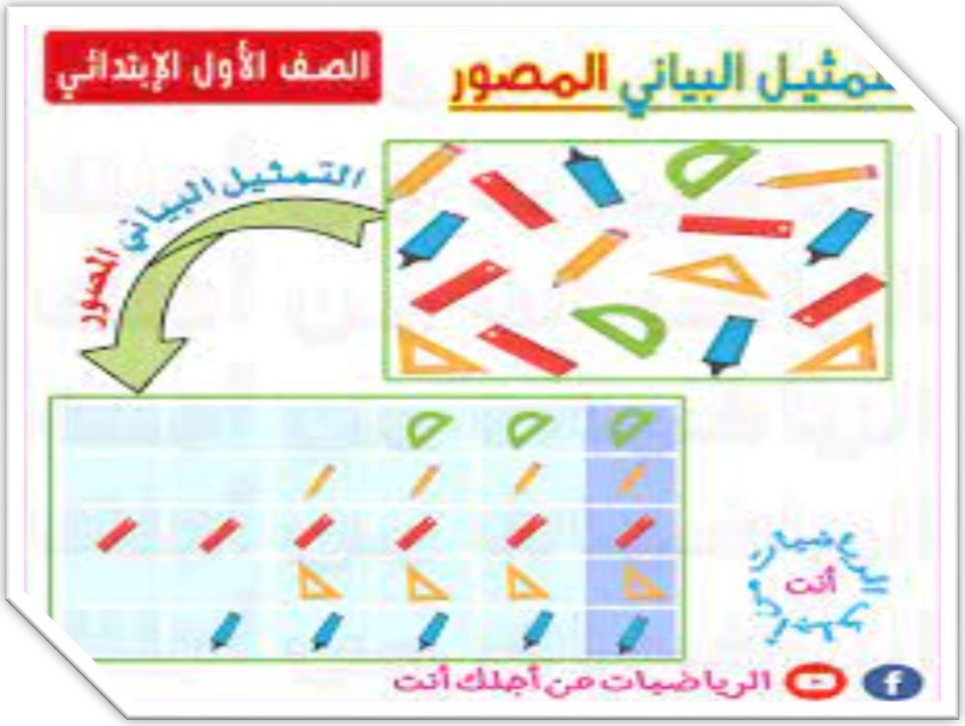
- Helping students understand the objectives of writing.
- Start writing that focuses on what students know of past experiences, and gradually turn towards what they do not know.
- Encourage students to discuss each other orally in what they have written, as a step towards writing, in order to communicate.
- Use language skills in mathematics through homework, such as writing a story that includes the mathematical concepts taught by students.
- Helping students who speak more than one language to write in their first language first, then their second language, and this transition helps these students to arrange their thoughts and feelings, as well as increase fluency in their second language.

It is clear from the above:

Mathematics writing is no less important than mathematics reading, due to the importance of writing in learning mathematics, it helps students to record their

ideas and responses to different educational situations, as well as help the teacher to provide students with written experiences and learn about their ability to communicate in mathematics.

Mathematics representation:



Mathematics representation means reintroducing or translating the mathematical idea, or the problem in another form or in a new form which may help to understand this idea or to find an appropriate strategy to solve the problem. Representation is the heart of the body for the study of mathematics, students can develop and deepen their understanding of mathematical concepts when they create, compare and use various forms of mathematical representations such as images, shapes, graphs, tables,

translation, symbolic processing and such representations help students to continue their mathematical thinking.

The process of mathematics representation goes through four consecutive stages:

- Production of more than one representation.
- Make a link between the different representations of the same idea or mathematical problem.
- Integration and flexibility of conversion between different representations.

The most important sub-skills of representation and mathematical translation that should be developed for learners can be determined by:

- Translating images and shapes into numerical symbols.
- Translate verbal problems into photographers, illustrations, information tables, sensory models, equations, and algebraic symbols.
- Translate illustrated problems into mathematical symbols, words and words. Translate verbal formulations into geometric shapes or algebraic symbols.
- Translate symbols into geometric shapes.
- Translate symbols into verbal formulations.

Communication is done through representation by representing mathematical concepts and processes using drawings, tables, charts and words, and examples of mathematical representation are the representation of numbers in different forms (by preparation, cubes, by firmness, by money), translating what different images of numbers represent into real symbols, and translating verbal issues into illustrative forms, tables or equations.

Mathematic communication skills:

Mathematic communication skills are one of the most important aspects of the process of educational interaction between learners and each other, and between teachers and learners; it is not possible to imagine a teaching position for any subject - especially mathematicians without communication.

The U.S. National Council of Mathematicians defines mathematics communication skills in:

1. Using the language of mathematics to describe and express mathematical ideas clearly.

2. Organizing mathematical thinking and representing mathematical attitudes and relationships in different ways.

3. Conveying mathematical phrases in clear manner to others.

4. Analysis and evaluation of mathematical solutions and discussions provided by others.

Math communication skills can be classified according to the math language and content into five basic skills: reading, writing, speaking, listening and acting.

Math communication skills can also be represented as follows:

1. The student's ability to explain and clarify mathematical ideas and relationships with an understanding of others.

2. Giving correct examples of mathematical concepts and ideas.

3. Mathematical justification for mathematical solutions and conclusions.

4. Use the language of mathematics to describe geometric shapes, figures and graphic representations.

5. Representing mathematical attitudes and relationships in a variety of ways.

It is clear from the above:

Multiple mathematical communication skills, but there are five basic skills for mathematics communication, namely (listening, speaking, reading, writing, acting) according to the mathematics language and structure, as well as the importance of mathematics communication skills in strengthening mathematics education and achieving its mathematics goals and purposes.

The importance of mathematics communication: Mathematics communication is of great importance in the field of mathematics education and learning, confirmed by the interest of the National Council of Mathematicians Teachers in mathematics communication by making it within the content of the school mathematics curriculum for all classrooms.

The importance of mathematics communication can be presented as follows:

1. Helps improve and enhance students' understanding of mathematics.

2. Helps to exchange ideas and consolidate the common understanding of mathematics of students.

3. Contributes to making the classroom environment freer as students express their ideas.

4. Helps to reduce the mistakes of the students and treat many of them.

5. Developing the ability of students to reflect on the mathematical ideas in his mind and express them and clarify them to others.

6. Enjoy understanding mathematics and its language and employing it in life situations.

7. Positively affects students' attitudes towards mathematics and their math thinking.

The development of mathematics communication skills is one of the basic requirements for teaching and learning school mathematics, where it would make the student positive and involved and this reflects on the class climate, which is freer for the student to express his ideas and explain them to others in a dialogue dominated by mathematics understanding and enjoyment of the subject.

The development of mathematics communication skills also makes students able to:

1. Represent physical materials, images and charts with corresponding mathematical ideas.

2. Express their thoughts and attitudes clearly.

3. Modeling positions orally or in writing using tangibles, images or drawings.

4. Growing their understanding of mathematical ideas including the role of mathematical definitions.

5. Employ reading, listening, watching, examining and insight skills in interpreting and evaluating ideas.

6. Discuss mathematical ideas and form compelling arguments and proofs.

7. Formulate mathematical definitions, and express the generalizations they discover by conclusion.

It is clear from the above:

mathematics communication is the cornerstone of the mathematics curriculum because it is of great importance in learning mathematics, because of the skills it earns the learner can employ in his daily and practical life, and the mathematical communication encourages students to use the terms mathematics based on their previous cognitive structure, and express the ideas that revolve in their minds freely in an atmosphere where the enjoyment of mathematics is prevalent.

The role of the teacher in the development of mathematics communication:

The teacher has a key role in the development of mathematics communication, so the student's habit of

using the language of mathematics leads to this language being common and used normally in daily life. The National Council of Mathematicians of the United States of America (NCTM) has referred to the role of the teacher in the development of mathematics communication, by participating in thinking, explanation and justification, and this must be integrated in a classroom environment that enjoys the spirit of encouragement for students to express their mathematical ideas**.**

The role of the teacher in the process of mathematical communication can be determined in building a classroom society in which the student feels free to share his ideas without fear of ridicule, and develop a classroom environment in which mutual trust and respect prevail, and this requires the teacher to be active, accessible, mentor, observer and discussion manager to achieve the desired goals.

The role of the teacher within the classroom to develop the mathematics communication of the students is summarized as follows:

1. Presenting questions and tasks that challenge the thinking of his students.

2. Listen attentively to the thoughts of the students.

3. Instructing students to clarify and justify their ideas verbally and in writing.

4. Determine what ideas students should continue to discuss in depth among the ideas they have come up with through their discussion.

5. Decide when and how to follow the language and mathematical symbols used by students to present their ideas.

Some of the roles that the teacher must play in the development of mathematics communication can also be added, including:

1. Accept the multiple methods of solution.

2. Allow the problem or mathematical issue to be represented in multiple forms.

3. Creating an atmosphere of mutual trust and respect between students.

4. Creating an educational environment in which the necessary time is provided to address important ideas and problems.

5. Give all pupils equal opportunities to contribute to the in-class discussion process.

6. Ask the pupil to repeat what he heard, so that the teacher can make sure that he heard it correctly.

There are a range of considerations that the teacher should take into account when developing the math communication of the students, including:

1. Learning is an activity process.
2. The student's previous mathematics experience is part of the mathematical and mental structure.
3. Mathematical and cognitive flexibility is an entry point for the development of communication.
4. The learner's activity begins with respect for his ideas, and encouraging him to perform and participate.

It is clear from the above:

The role of the teacher in the development of mathematics communication among students developed and renewed according to the educational position, and the teacher should realize communication as a human process whether in mathematics or other subjects, the teacher falls on the greatest burden in guiding the thinking of students and developing their ability to communicate mathematics, by helping them to express their ideas, and using the language of mathematics to

express mathematics relationships, as well as the work of mathematical representations using geometric forms.

Methods of evaluating mathematical communication:

Methods of evaluating mathematics communication enable the teacher to identify the student's ability to communicate mathematics, through his ability to express mathematical ideas through various forms of communication, whether in writing or verbally.

Evaluating mathematics communication skills requires multiple evaluation methods suitable for each of its different forms and skills:

1-note:

Observation is one of the methods of evaluating oral mathematics communication skills of students, where students are asked during the exercise of mathematics activities to obtain valuable information about the thinking processes of students and their levels of mathematic communication, and the teacher can record observations using the note card, or a grade measurement.

2- The work record:

The student's work record is a paper in which he records samples of his work in mathematics, and the teacher comments on it by writing in it, and the work record includes the name, date and address of activity, problem or activity, and the student's answer, this can include the student's work records on multiple activities. The evaluation of these records also depends on the teacher's reading and classification of several axes, and then determines the grades of work records using a graded scale with five levels interested in the student's organization of his work record, the quality of his work, the clarity of thinking, the explanation of concepts, and analysis of mathematical problems, and then the teacher puts personal comments for each student explaining to him the strengths and shortcomings in his work record.

3- Interviews:

One of the important means of evaluating the oral mathematics communication of the students, the interview is suitable for examining the thinking of students in depth, determining their understanding, diagnosing their difficulties, and measuring their ability to

communicate mathematical knowledge verbally, the interview form includes questions with a specific purpose, and can be used during the interview with tangible, visual, or life tasks.

4- Working in cooperative groups:

where the work of pupils is evaluated in cooperative groups by evaluating the performance of the group as a whole and the individual performance of each student in it, therefore a list of observations can be used to track pupils in discussions within the cooperative group, which can include the presentation of solutions and strategies and explain them to others within or outside the cooperative group, allowing for mathematical communication with others, and this method is appropriate to evaluate the oral communication skills of the pupils under the use of cooperative learning.

5- Open and extended tasks:

The task in mathematics means the activity or activities included in the classroom. Open tasks can be used to evaluate the work of students on situations related to one of the skills of mathematics communication, and require them to choose appropriate answers and write them with

clarification and justification of their validity, while extended tasks are within an educational project that may last days or weeks, and are planned, implemented and evaluated.

6- Performance evaluation:

In this method, tasks are used to evaluate pupils' understanding of mathematics, where pupils communicate their mathematics knowledge in a real meaningful and meaningful form based on the use of life tasks such as: extended tasks or projects on surveys, and the performance of pupils is judged in the light of the performance indicators they use in carrying out the task, and note cards can be used to record the performance of pupils individually or in groups.

7- The writings of the pupils:

The writings of the pupils can be evaluated in the tasks provided to them (closed and open), work records, articles, projects, and activities of the cooperative group, using registration indicators that are characterized to suit each task to be evaluated, in which case the task takes into account that the task is characterized by allowing pupils to either produce many solutions or use multiple

strategies to obtain a single solution, and this method is suitable for evaluating the written mathematics communication skills of the pupils.

It is clear from the above:

Methods of evaluating the skills of mathematics communication multiple, as it depends on the form of mathematical communication and its pattern or skill to be evaluated by the students, some of which work to evaluate the skills of oral mathematics communication, and others work to evaluate the skills of written communication, and the teacher can choose the method that suits the skills that he wishes to evaluate in the students.

Activities Chapter 3

1 - Mention activities that can be done that help develop the math communication of your students.

2- Write in search of the skills of electronic mathematics communication.

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