CPS-5 Mathematical method

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1.1 Introduction:

Social of the nation, Government plans long and short term for economic and educational upliftment. After independence in A.D. In 1951, the National Planning Commission was formed. Educational planning is fundamental in the National Development Plan, hence the importance of educational planning becomes special. We have the planning of school education at the base of educational planning at the national level, which can also be called institutional planning. In organizational planning, educational planning is done by NCERT at secondary and primary school level. Budget allocation and planning at the secondary level for the entire country is the best form of organizational planning is an example. Pre-primary education at the state level as well, plans are being made for secondary education, higher secondary and higher education. All these arrangements can be long term or short term depending on the educational objectives.

The success of every work lies in its good planning. Then he is a traveller, Be it an engineer building a building, a businessman running a business, a principal leading a school or a teacher teaching in a classroom, planning is essential for everyone and only then can one be successful in that field. Thus planning is the key to success in any field of life. The importance of planning is recognized in all spheres of life.

1.2 Planning concept:

The success of work objectives depends on its planning. A well-thought-out plan can yield better results with less time-labor and cost. What is planning?? Planning is the preconception or planning of things like objectives, tools, contexts, activities, evaluation procedures for the proposed work. In other words, planning is planning or thinking to achieve goals in a well organized and easily accomplished manner.

The need for such planning also arises in the field of education. School for their annual events, the teacher has to think of teaching plans for his daily work. A teacher thinking of planning teaching work should keep in mind the following points:

Course of the subject, Educational units and their objectives Students' prior knowledge, their rank and their aptitude Availability of teaching tools and references

Functionality of different teaching methods and activities Duration for work

Teacher's own competence, subject grasp and acquired skills

Method of evaluation of teaching

A teacher is an artist, is a sculptor, a framer and teaching is an art and a science. Teacher is a craftsman - means a teacher can become a skilled sculptor or maker. For this he needs good and excellent training and good planning for all his work. A skilled teacher never enters the classroom without planning his work. A new or trainee teacher prepares a written plan if necessary, whereas an experienced teacher prepares a mental plan within a short time due to his mastery of his subject and experience. But he becomes successful in class education only if he plans and implements it.

Lesson planning(Lesson-Planning):

Planning is the key to success in every area of life. Lesson planning is the planning of teaching work. Lesson planning is based on Gestalt psychology. In the study of human beingsGuest study theory ((Gestalt Theory of Learning)158 Reconsidered useful.

There are many types of planning, planning at national level, state

level planning, district level planning, organizational planning,

Planning at school level, educational planning etc.

In the above planning, planning at school level - educational planning (Edu - planning) is important for us as we are preparing to join the education profession. Educational planning is a very comprehensive process. It makes long-term and short-term plans according to the general and specific objectives of education in stages.

It includes everything directly related to education and supporting education. Many things like school physical equipment bios are placed in it. In school planning, the three important plans that tax the teacher are as follows:

(A)Annual planning((Annual Planning)

(b)Lesson planning((Lesson Planning)

(a) Unit Planning (Unit Planning)

1.3 Meaning of lesson planning (Meaning of Lesson Planning):

Lesson planning means planning the lesson well in terms of specific objectives as well as achieving the desired behavioral change. Therefore, lesson planning is a pre-class action stage (Pre-active phase) is called. Lesson planning is not only the blue-print of teaching work, but lesson planning is very essential for engaging and successful teaching work. A teacher, like a skilled craftsman, should carefully select his tools, i.e. educational cam method and equipment, to bring about the expected improvement in the student. Lesson planning is like a window for the teacher through which he tries to identify and see the students' eventual 1.. characteristics and abilities. Thus, Lesson plan is teacher's mental and emotional visualization of class-room activities.

bossing (According to Bossing) lesson planning means, "A Lesson plan is an organized statement of general and specific goals together with specific means by which these goals are to be achieved by the learner under the guidance of teacher on a given day." - Bossing

Davies (According to Davis),

"A teacher should be fully prepared before going to the class because nothing stands in the way of a teacher's progress except the teacher's incomplete preparation."

"Lesson plan must be prepared because this is nothing to a teacher's progress as unpreparedness."

Binning and Binning give the definition of lesson planning as follows:

"Daily lesson-planning involves defining the objectives, and arranging the subject matter and determining the method and procedure.
"Daily lesson planning decisions include defining objectives, selecting and sequencing the material, and determining the method and procedure for presenting the material."

Binning and Binning

thus, in lesson planning the teacher considers the educational objectives, content, teaching method, technique, educational tool-context, class activity etc. and tries to identify the abilities and characteristics of the students. It also contemplates an evaluation plan to check whether educational objectives have been achieved.

1.4 Lesson planningbenefit of(Merits of Lesson Plan):

Lesson planning student level, includes interests, characteristics, activities tools etc. Apart from that, potential or accidental situations are also made keeping in mind. Hence, lesson planning does not

become a binding for the teacher but in a real sense it is a teacher's compass. A teacher can steer his ship in the sea of education by planning just as a sailor steers a ship with the help of a compass. Also, after entering the class with solid planning, the teacher M If he feels that there is a need to change the situation, he is entitled to do so and can make changes in it.

Lesson planning has the following benefits:

The teacher gets an opportunity to prepare beforehand, so his self-esteem increases.

The teacher becomes clear about the objectives, teaching works by bringing about student behavior changes that can be achieved in one hour.

Time limit is maintained, does not digress.

It becomes possible to carry and make proper use of the necessary teaching materials and reference materials in the classroom without forgetting them., so education becomes interesting.

Better teaching-learning methods and techniques can be used.

It becomes possible to do teaching work by taking into account individual differences and different situations that arise.

Education comes with gradualism, mindfulness and continuity.

The extent to which the set objectives have been achieved can be ascertained.

The teacher develops an understanding of teaching and learning, he evaluates his own work and changes his teaching method based on experiences.

1.5 Analysis of Educational Methods

Teaching methods and techniques in the analysis of educational activities, learning – includes teaching activities, educational tools and reference texts, and assessment.

Teacher-Student Activities (Teaching-Learning Activities):

One type of activity is important in lesson planning. Teacher Activities Teaching Activities and Student Activities -Learning Activities. The teacher should plan the teaching activities in such a way that the determined unit can be taught to the student according to the determined method or procedure and the behavior-change that he has determined can be achieved. Learning activities should be varied. It is not always fair that students have to listen or answer the questions. It bores them, resulting in misunderstanding questions. Activities can be many - singing, reading, writing, drawing, counting, experimenting, observing, using etc. The teacher has to make the class environment alive by diversifying the activities.

Lessons have separate channels for teacher activity and student activity. The activity of the student can be considered based on the activity of the teacher.

Teaching methods and techniques– approach Once the objectives and content are determined, the teaching methods have to be decided upon. Age group of students, decisions about methods should be made keeping in mind interests and school constraints. Considering the objectives and content of education, the teacher should think in advance to use one or more methods from speech method, discussion, group discussion, experiment method, arrival method, analysis combination method, philosophical method, etc. and to what extent. Apart from this, what devices like description, example, questioning, self-reflection, • Ka.pa. Appropriate use of one or more of the work-like techniques can be premeditated.

Educational toolsand reference texts(Teaching Aids and Reference Books):

Use of educational tools to facilitate lessons, makes it interesting and effective. It brings variety in teaching-learning work. Students. You get nightly experiences. The teacher can present the content in a similar way through science. This is the realism and liveliness in education. The teacher should select audio-visual aids appropriate to the objectives and plan where, when and how they will be used.

Reference texts should also be studied to make the planning informative and interesting.

Depending on the level of the students, they should be taken to the depth that interests them.

Reference texts used in the lesson should also be mentioned where appropriate in the lesson planning notes.

evaluation (Evaluation Scheme:

Assessment is not a separate level of education, but is an inherent part of the learning process. A skilled teacher (1) evaluates the achievement of the objectives, (2) evaluates the appropriateness of the teaching methods approach (3) re-evaluates the technique used. Verbal and pre-verbal feedback from students also provides guidance to the teacher to rethink his teaching approach. Tests for assessment of objective can be written, oral or practical in nature. Learning is usually done through purposeful questions in lesson planning. have to be evaluated. Assessment can be done through blanks, pairs, true-false statements, weighted test, complement type (2-choice test, sequence deterministic test, relational reduction or example test, etc.) as per the unit you have taught.

1.6 Discrete Lesson Planning – Steps in Lesson Planning (Steps of Lesson-planning):

Lesson planning requires a lot of skill on the part of the teacher, so he must be knowledgeable about the subject, besides, it is necessary to have a good knowledge of psychology. Apart from this, he should be knowledgeable about new methods of teaching, procedures, techniques etc. and he is also expected to have knowledge of evaluation methods.

Much before Herbert Spencer's pentagram system of lesson planning. was prevalent, which has five main points:

(1) Preparation

(2) Statement of purpose

(3) Subject Delineation

(4) Evaluation

(5) Swadhyaya / Homework

(1) Preparation :

Pre-preparation is also known as subject entry or pre-knowledge check in other words. What children know about the content the teacher is teaching and that content. The teacher had to think about how his prior knowledge of the subject could be used. If the subject is introduced using prior knowledge, the student is motivated towards learning as the subject matter is familiar. thus, prior knowledge should be checked before entering the subject, so that teaching is successful and easy and students are subject oriented. The technique used for subject entry is noted in the pre-preparation stage.

(2) Statement of Purpose :

Subject-oriented students have a curiosity about what they will learn. This curiosity of students To satisfy the teacher what the teacher has to teach in clear words the students take time. This statement is called purpose statement through which students get information about what they are going to learn today.

(3) Subject-description :

: The basis of the entire lesson and the heart of lesson planning is visual representation. Topic representation means presentation of content, a discussion of the subject to be taught, the objectives to be achieved are fixed here. For that, the teacher uses appropriate methods and techniques, presents the content accurately through appropriate approach. Here the teacher behaves only in terms of this previously stated purpose. This step provides a complete overview of teacher-student activities.

(4) Evaluation :

To what extent students grasp the content through the teacher's presentation and presentation of the subject in its context., and the extent to which the content has been digested, the extent to which the objectives have been achieved, the extent to which the learned unit is understood, is answered by this scale. Here, the teaching done by the teacher is verified through short questions and purpose-oriented questions to obtain information about the student's grasp of the subject matter, achievement of objectives, understanding of what has been learned, etc. Note that the questions asked should not be from outside the unit.

(5) Homework / Homework :

To reinforce the unit learned, after the assessment, students are asked to write down the answers to one or two questions from the unit. The question asked here can be knowledge, understanding application or skill based which is noted in lesson planning.

1.7 Characteristics of good lesson planning (Characteristics of Good Lesson-Planning):

A good lesson plan should be in written form.

General objectives and specific objectives should be clearly stated in lesson planning.

Lesson planning should be prepared keeping in mind the background of the class.

Age of the child, Lessons should be planned keeping in mind interests, knowledge, growth, strengths, expectations and classroom environment. In short, the child should be at the center of rich lesson planning.

Procedures for Effective Learning Teaching, methods, approaches and techniques clearly mentioned in lesson planning should do

A good lesson plan should have suggested teaching-learning activities.

Effective use of audio-visual aids should be mentioned systematically in good lesson planning.

The unit should have harmony and coherence. Each sub-unit should become a foundation for moving on to the next sub-unit.

Good lesson planning should consider the use of reference books and textbooks by children.

Good lesson planning has rich content. It is also important that every self-motivation is encouraging and motivational, because Swadhyaya is the soul of education..

Good lesson planning has good questions. Prana Adhyayana – is the precious capital of Adhyadhana. Good questions or spur-of-the-moment ones require careful planning beforehand.

A good lesson plan has a lesson outline useful to the teacher in lesson development.

Time should be mentioned in lesson planning. (-Lessons are completed in time and as plannedlearnIt should be like that.

Assessment must be mentioned in detail in lesson planning. The assessment should be a test pattern.

Good lesson planning should also consider the relationship of the subjects to the students' lives.

Also consider classroom behavior in good lesson planning. is taken. of class contingenciesof the solutionConsideration should also be given. Hence excellent lesson planningStupid narahetashould be variable.

Lesson planning is a blueprint. The show is not meant to be treated literally as written in it. Lesson planning is as good as it gets, not the lord. It is important for a skilled teacher to use the classroom situation in an educational way. A single educational moment should not be wasted by the teacher.

Lesson planning should be flexible, not rigid. By recognizing the mood of the class, there is ample room for change by understanding the immediate needs and expectations and the situation.

Unit : 2

2.1 Concept of Unit Planning:

The basic content of the course counts as a unit. Organizational curriculum structures of units that are characteristically distinct yet internally interrelated can be effectively planned. Lesson planning takes only 35 to 40 minutes of planning for an hour. Continuity of interests in it is often broken as planning departments are fragmented. As a result, instead of planning scattered lessons, planning of three to five or seven hours together with the whole unit in mind can be done logically. A logical sequence can be arranged in sub-units. It can be arranged in psychological order from ease to difficulty as needed. And planning can be considered by covering the entire objectives of the unit well.

thus, a structured plan to teach by integrating content points of the same subject in 2 order is a unit Arsher unit planning, an educationist has said that, A is a unified learning experience.visit

Have educational experience.

A unit is not simply considered to be a blog subject matter procedure but a unit is the procedure subject matter also."Se Sem MayNot a set of content but a plan to give that content a good home in the continent.

thus, the content is organized in unit planning. The sequence is pre-determined, the teaching methodology, techniques and assessment plan are pre-thought out for its initiation thus planning based on a specific meaningful area of education – unit planning.

"A unit is a plan of instruction based on a significant area of learning."

2.2 Characteristics of Unit Planning (Characteristic Unit Planning):

Objectives are clearly explained. which is speech conscious, meaningful and useful to the student.
Allowing for individual differences, the activities are located in
There is and is a logical relationship between educational experiences. be sustainable.
Consistency and coherence between the departments of knowledge!" have.
Appropriate and adequate equipment is prescribed.
A wide and varied educational experience can be provided.
Swadhyaya, various procedures for consolidation, revision have been used judiciously.
Experiences that touch life and real situations are fulfilled.
Assessment techniques should support diagnostic and therapeutic work.
Both the teacher and the students are equally and properly synchronized in the process of object development.
Psychology should be kept in mind in getting academic results.
Have a plan that brings classroom learning into real life situations.
Developmental planning leads to higher levels of student achievement.

Advantages:

Consistency is maintained in the educational process, comes continuity.
The focus can be on general and specific objectives of the unit.
Enrich students, intensive and great learning experiences can be provided.
All-round development can be achieved as teaching experiences are thoughtfully conducted.
Swadhyaya, may prejudge evaluation methods and procedures.

Unit planningBeat No:

(1) Name of Unit : Any unit of mathematics can be considered here. The unit to be considered is usually one that can be divided into three to five or seven parts. The number of hours is determined based on the length of the unit. E.g. If we consider the unit of exponents in eights, dividing it into sub-units, it can be taken as a unit arrangement of four hours. Similarly, thinking can also be taken as a unit with the selection of appropriate tas. Thus any chapter or set of chapters can be considered as a unit.

(2) Names of sub-units :

The details of how many sub-units can be formed under the parent unit should be given here. Each unit is divided into sub-units so that each unit is one hour, whose weekly planning can be easily considered. E.g. The sub-units of the exponent in the above example can be given as follows. Sequences: Exponents Sub-Sequences: Definition of Exponents, Multiplication of Exponents, Division and Multiplication of Positive Exponents, Rules of Dividing Exponents, Subtraction of Negative and Zero Fractions in Exponents, Exponentiation Processes with Examples and Others. Thus any unit can be divided into sub-units.

(3) Purposes and Special Purposes :

The main objectives for the entire unit are noted here along with the specifications. Knowledge in general in objectives, understanding, application, skills and mathematical abilities can be included here. The general purpose of all tasas is presented together. Expected behavior to all intents and purposes-

Expressed in the language of change. Specific objectives have to be written differently according to different sub-units as well as according to time schedule. Specific objectives for different sub-units are expressed in terms of behavior-change.

2.5 Comparison of lesson planning and sequence planning:

A teacher can lesson plan or unit plan by considering the academic issue for teaching. Can lesson plan or unit plan based on previous topics. Based on the previous topics, the explanation of lesson planning and unit planning should be clear. Based on that let us compare these two types of planning.

Planning hours	Unit planning
A small unit of a subject, should be organized based on sub-units or sub-topics	Two to three units of the subject, unit planning can cover many similar topics across a lesson or subject matteris
30 to 40 minutes of teaching is planned.	Plan for 4 to 8 hours
As time is limited, there is no special scope for discussion, or the discussion remains incomplete–incomplete.	As time is sufficient, there is scope for full discussion, and it becomes universal.
The teacher has to prepare separately for each tas.	The benefit of one time painstaking preparation by the teacher lasts for 3-4 hours.
Planning takes more time, but there is little time for its implementation.	There is ample time for both planning and execution.
Consistency in this type of planning– Continuity is not maintained.	Harmony and continuity are maintained.
Education is superficial, becomes mechanical.	Education is intensive and lively.
There is a lot of intimacy between teacher and student.	Teacher-student intimacy becomes more possible- can be seen.
There is very little content on the students' side.	Students get more content, and has a homozygosity.
A much less specific purpose may be achieved.	Many or all of the specified objectives can be covered.

A teacher may not provide adequate educational experiences, activity or experiment demonstration can rarely be given a chance.	The teacher himself can conduct various activities, students have more, and more varied, opportunities to engage in activities and acquire educational experiences. There is scope for experimentation.
Tas planning becomes monotonous.	Unit planning becomes holistic.
There is rarely scope for continuous holistic evaluation during tas planning. There is hardly any scope for written test in Tas planning.	Unit planning leaves a good scope for continuous holistic assessment. A unit test can also be accommodated by allocating an independent task in the unit planning.
In Tas planning, it is only possible to impart knowledge or information to the audience. It leaves less scope for different skills or abilities or for achieving higher level educational objectives.	Different skills in unit planning, abilities, special possibilities for the achievement of higher category objectives.
Different techniques of teaching, there is little – negligible scope for application of procedures, methods.	Different techniques of teaching, there is ample scope for the use of procedures, methods etc.
diagnosis, therapy, guidance is not possible.	diagnosis, therapy, guidance is possible.
A variety of educational materials may be used to a limited extent in TAS planning.	Unit planning has good scope for the use of various educational materials. This makes learning effective and interesting.
Teaching becomes boring and stressful in Tas planning. Students have to be listeners. Their activity and involvement in the education process is negligible.	Interesting teaching in unit planning, are alive and experiential. It has more active and involvement of students in the learning process.
Repetition comes to blame.	Repetition can be avoided.
Students' interest in Tas planning, individual	Individual differences of students can be taken

differences in strength, attitude are rarely considered.	into account in unit lesson-planning.
Tas lesson planning does not create a learning environment due to lack of time.	Having enough time leaves room, and create an environment conducive to learning.
Students get less freedom. Teacher-centered or subject-centered.	Students get a good amount of freedom. It is academically centric.

2.6 Advantages of Unit Planning:

Unit planning is very useful in mathematics education. Advantages of unit planning are as follows.

(1) The process of mathematics education is continuous and continuous. Artificial fragments of content sections can be prevented.

(2) Teacher and student realize the totality of knowledge. Students get a clear understanding of various concepts. and can use the acquired knowledge effectively.

(3) Both the teacher and the student get used to thinking on a larger scale. Specific teaching objectives for the entire unit, he thinks holistically about behavior-changes, content, methods, activities and tools.

(4) Detailed consideration may be given to various points of content. Sub-units of a unit are precisely defined. Unnecessary repetition can be avoided, thus saving time and energy.

(5) Content teaching becomes effective. By making necessary changes in planning, the vision develops and the students become interested in the subject, as a result of which education becomes more effective.

(6) Teaching can be tailored to individual differences.

(7) Students get information in a continuous and organized manner thus maintaining consistency in study.

(8) Opportunity to use different educational methods.

(9) Opportunity to assess the child as a whole, valuation becomes inclusive.

2.7 Blue Print (Blue-Print) Concept:

Just as a building engineer first draws the plan of the building and then constructs the building, before designing the ideal questionnaire, it becomes necessary to create the blueprint first.Blue-print is a plan inter-relating the objectives – content units and question patterns in a question paper. The blue-print first determines the subject units of the question paper to be composed and assigns each of them an important proportion of marks. Objectives are then set for the purposes for which this content is included. Motives generally include knowledge, understanding, utility, skill. Each of these purposes is divided according to merit. Then different forms of question are decided. Like essay questions, short answer questions, objective or objective questions, the marks are divided according to these different forms.

Thus the content points, a blueprint is prepared, which is known as a Blue-print, linking the different qualities of objectives and question-forms.

Importance of Blueprint in Question Paper Making /No Blue-Print

Advantages:
Blue-print is an important step in designing an ideal question paper. Its location is very important in evaluation. The advantages of Blue-print can be enumerated as follows:

(1) Various purposes of education can be examined. Different objectives of education get due importance in pursuit of subject matter.

(2) All the questions are included in the question paper as the format of the question has to be considered in advance.

(3) Textbook points in Blueprint formulation Questions asked for it, unit lesson planning is also clarified for the amount of space allocated for that topic. As a result, the question paper can cover all the points of the syllabus. Also, the task of giving value to each point according to its merit becomes easy.

(4) How many questions of which form are to be asked for which point of the syllabus and also the options are clarified.

(5) Based on the blue-print, the question paper is made in scientific format. Any questions do not get any place in it. Unnecessary repetition of questions can be avoided.

(6) The question paper becomes balanced and accurate. Assessment of student progress can be objective.'

Sample Design Blue-print:

Allotment of marks according to subject matter

order	content points	questionthe number	Marks allotted	Weight (in percent)
1.	Calculated	05	06	24
2.	exponent	08	14	56
3.	geometry	05	05	20
	Total	18	25	100

Allocation of merit according to purpose

order	purpose	questionthe number	Marks allotted	Base (in percent)
1.	Enlightenment	09	09	36
2.	Application of knowledge	03	03	12
3.	meaning- Sense	04	11	44
4.	expression– Skill	02	02	08
	Total	18	25	100

Allotment of marks according to question type

order	Question type	questionthe number	Marks allotted	Weight (in percent)
1.	Essay type	01	05	20
2.	Short answer type	03	06	24
3.	Super short answer type	05	05	20
4.	Apathetic type	09	09	36
	Total	18	25	100

Three dimensional rooms																					
order	purposes		Enlightenment				Application of knowledge				Understanding				Expression skills						
	Sub unit	of question type	No. Q.	short Q.	Ati Short Q.	A. Q.	No. Q.	short Q.	Ati Short Q.	A. Q.	No. Q.	short Q.	Ati Short Q.	A. Q.	No. Q.	short Q.	Ati Short Q.	A. Q.			
1.	Calculated		-	-	3 (3)	1 (1)	-	-	-	-	-	2 (1)	-	-	-	-	-	-	5	6	
2	exponent		-	-	2 (2)	3 (3)	-	-	-	-	5 (1)	4 (2)	-	-	-	-	-	-	8	14	
3	geometry		-	-	-	-	-	-	-	3 (3)	-	-	-	-	-	-	-	2 (2)	5	5	
	Total question		-	-	5	4	-	-	-	3	1	3	-	-	-	-	-	2	18		
	Total marks		-	-	5	4	-	-	-	3	5	6	-	-	-	-	-	2		25	
	Total Question Total Marks		9(9)				3(3)				11(14)				2(2)				18	25	

Unit-3

Methods of Teaching Mathematics

3.1 Introduction:

"Teaching is not everybody's cup of tea."

"Teaching is not everyone's cup of tea."

There is a famous saying that,

"The scholars are probably not good teachers."

ie"A scholar may not be a good teacher."

Because complete knowledge of the subject and research activity does not make one a good teacher. Some individuals are born teachers. They are interested in teaching from the very beginning. Such professors have an uncanny ability to pique the interest of the faculty and focus their attention., because they have a good way of teaching science, a beautiful style. If science is not taught properly, it may have the opposite consequences.

In today's psychological age, teaching is considered the centerpiece of education. The purpose of education is to bring about an expected change in the learner's behavior. This is possible only when education is effective and efficient. To make mathematics teaching effective, methods of teaching mathematics must be effective.

A teaching method depends on two things: the sequence of the curriculum and the objectives. Based on these two components, the teaching method develops. E.g. Archimedes' principle can be taught using a philosophical method if the teaching aims to develop knowledge and observation skills. But if the aim is to develop practical skills then practical method has to be used. thus, Objectives, Curriculum and Instructional Method are the three pillars of successful science education.

3.2 Concept of Teaching Method:

Objectives tell us what kind of change in behavior is to be brought about as a result of mathematics education. So “the method adopted for the purpose of making the learners go through the process of education to achieve the specified objectives is called teaching method."

If you look at it another way,

“A set of activities arranged in a systematic and orderly manner is called a teaching method. It consists of sequentially arranged activities for both teacher and student."

From a third point of view,

"The system by which the learner acquires experiences in a systematic and orderly manner is called a teaching method."

3.3 Importance of Teaching Methods:

The importance for a teacher to acquire knowledge of teaching methods is as follows:

Knowledge of teaching methods gives a teacher mastery of teaching.

Some new and inexperienced teachers feel confused in classroom teaching. If they become fully aware of various teaching methods, their confusion is removed.

Knowledge of teaching methods instills confidence in the teacher.

A teacher with a sound knowledge of teaching methods, different tactics- Can make his teaching interesting and interesting with technology.

A teacher using different teaching methods often has to use educational tools compulsorily, thereby creating interest and aptitude in teaching in the teachers. E.g. A teacher using a philosophical method has to use graphic materials.

A teacher who is familiar with different teaching methods can succeed by using other methods instead if he does not get success using one method.

Making comparisons among professors using different methods, acquisition of knowledge, generalization, development of various skills etc. are developed as each method helps in developing some essential quality.

Now we will study in detail about various methods of teaching mathematics.

3.4 Lecture Method(Lecture Method):

Concept:

This method is also called discourse method. Generally lecturers in higher education adopt this method. Even freshers at secondary level, inexperienced and untrained teachers use this method. This method is most suitable where a large community is being studied.

In this method, the teacher talks to the students and introduces the content of education through it. In it, the teachers become silent listeners. They do not take any active part in this process. Teachers get only prepared details from the teacher's statement. Adhyatas just listen and after a few minutes they get tired so they don't stay focused throughout the tas and they become inattentive. While coming, they miss to hear some of the teacher's speech and thus remain somewhat raw in their enlightenment. In this method only the objective of knowledge is achieved on the part of the teachers and that too partially, not quite. Also it does not serve other purposes of education. Also, some powers like logic, observation etc. are not developed in Adhyetas.

The lecture method is a teacher-centered method, in which the role of professor is important and the role of professors is secondary. This method was widely used in ancient times. While using this method, the math teacher should ask questions in between. Also, the use of models, samples, charts etc. should be mentioned.

By doing this, the teachers will be saved from listening to monotonous lectures and they will not get bored. Also, the mathematics teacher should make efforts to make the lecture more relaxed than lecturing and should use such techniques. Get the attention of the professors, they should be lectured in a way that interests them.

The lecture or lecture method is an age-old form of education (out of date) method can be said to be. But it is not right to develop a sense of this method. Each method is sometimes very necessary. Also, each method has its own unique features and limitations.

Advantages of lecture method:

It is easy for a teacher to prepare a lecture.

A good and effective lecture inspires brilliant teachers in their studies.

A teacher can make a teaching topic interesting through different narrative styles and styles.

In the upper classes, students can develop the skill of taking notes quickly as the teacher lectures.

In this method the teacher is not active, there are no projects or demonstrations so there is no time wastage, lectures are smooth and learning is fast.

A teacher can gradually train to become a good speaker.

If the course is long, it can be completed within the stipulated time.

Teachers can be properly trained in the listening experience.

The teacher himself can be very active mentally.

Class cooperation or appropriate-inappropriate feedback does not affect the lesson as the teacher does all the activities himself., so if there is dominant discourse, the class system is maintained.

A lot of information can be conveyed in a single hour.

The teacher can present the content very succinctly and sequentially.

The teacher can maintain coherence in the lecture.

A teacher can attract teachers based on the skills they have acquired.

Homework is easy to assign.

Adhyetas develop the virtue of patience and cultivate in them the virtue of tolerance.

Some new and difficult units can be well taught and clarified with sharp lectures.

At the end of the lecture, the professor can ask questions to the lecturers to re-explain things they do not understand.

Lecturing is an art form, which is very difficult to acquire. The success of this method depends on the teacher. Its eloquence, presentation of content, pronunciation, teacher's dominance over academic issues, fluent presentation of ideas, clarity of the teacher's own content, style of presentation etc. can make the teacher's lecture impressive, effective and highly successful.

Limitations of lecture method:

Only the teacher is active in this method, so the learning process becomes one-way.

Only the objective of knowledge in mathematics education can be achieved and that too partially and other higher types of objectives cannot be achieved.

Lecturers become passive listeners, so they become inattentive and inactive.

Powers other than discourse of the teacher are stifled and thus wasted.

There is no scope for teachers to express their ideas.

Often, if the lecture is beyond the understanding of the lecturers, it becomes boring for them.

The professor talks all the time so he gets tired.

A long lecture also creates boredom among the lecturers. *

Teachers get frustrated and demotivated when they don't get the activity.

An excess of this method spoils the education and hence the quality of education goes down.

In this method more emphasis is placed on memory. So their powers of observation and other powers are not developed.

The power of independent thinking of the teachers is also not developed.

Verbal expression of teachers is not encouraged.

As teachers are served ready-made (subject matter) they do not get exclusive experiences.

The teacher keeps talking but does not care whether the students understand or not, hence the understanding of the professors. Power does not develop.

In this method there is no exchange between teacher and student, the correlation does not form.

If the lecturers get too bored with the lecture, they make noise and thus create indiscipline in the class.

If the teacher prepares the lecture only from the textbook and does not use the reference literature, the teachers do not get to know anything new.

In the lower grades, this method fails if the teacher's lecture is outside of the teachers' level.

→ 'Learning by doing' has no place in this method.

Teaching according to this method reinforces the tendency of teachers to memorize the content, thus, despite the advantages of this method, it is a necessary method, so it should not be neglected. Also, there are lectures in other educational methods, so we cannot abandon this method, so the teacher should try to make this method more successful.

3.5 Project method(Project method):

A plan method is a puzzling task that is arranged in a natural way leading to its completion. "Planning is a component of inclusive and harmonious activity carried out in the natural environment as far as possible."

A plan is a natural puzzle-solving activity. Stevenson (Stevenson) refers to it as problematic work carried out in the natural environment.

The purpose of education is to make the child learn why he learns instead of teaching him. It is a method of providing social experiences to the child who is a part of the society coming from the society' is. "A project is a small fraction of the real-life activity imported into the school," says Ballard.

A teacher who teaches through the scheme method in mathematics education should have a systematic and clear plan of work. Students should also be enthusiastic and oriented towards the subject. In the scheme method, one or more similar units are taught in different ways and hence the scheme is incremental., there needs to be clarity about the work-steps like selection, planning, implementation and evaluation.

Example:

of Class-8Learn the unit plan method of 'Manushya Sevak Bank'.

Steps of Project Methodology:

Creating the right situation(Providing a situation): The teacher will present the bank information, general literature, utility etc. to the students.

projectChoice of((Choosing the project) : Discussing the project of "Manushini Sevak Bank" with the students. Setting a time limit.

To determine the objectives of the project (Purpose of the project):

Details:

Taking interest in Arithmetic.

Familiarize yourself with the day-to-day operations of the bank.

Appreciate the Bank's contribution to industrial and social development.

Understand the importance of sources of relevant information.

group spirit, develop cooperation.

Understand the issues related to the subject unit.

Students (i) Establishment of Bank (ii) Function Entry (il) Types of Bank (iv) Account Transactions (V) Functions of Bank Employees.

Like money exchange, Understand Safe Deposit Vault Loan Schemes, Savings Schemes, Investments in Industries etc.

project Planning of work(Planning of the project)

The teacher will divide the students of the class into five different groups. Allotment will be based on students' aptitude and interests. Each of these groups will visit the bank as required and perform group work.

Bank Manager, will get the history of setting up the bank from the interview and literature of functionaries etc.

A note will be taken about bank functions and operations region wise and bank type wise.

Daily transactions from bank employees, will get information about their movements etc.

Get hands-on information on various transactions involving checks and types of cheques.

Interview with the manager of the bank, a study of its publications etc. gives an explanation of the specific functions of the Bank. Apart from group wise distribution, the teacher has to keep telling each group the necessary instruction and guidance and the knowledge of their group.

project committee((Executing the project):

Keeping the above work objectives in mind the respective group of students will continue to conduct their work-study and prepare work report as per the guidance given to them.

project report(Reporting of the project):

At the end of the whole task all the groups will gather. But it will share its information and report to the entire group. Each group will present its group report.

projectevaluation(Evaluation of the project):

A work study done in relation to the work objectives of the projectIn terms of evaluation of the project, the teacher will conduct a written / oral test of the entire class. The students' responses will be the evaluation of the entire scheme.

thus, the project method has no time limit. The project may be of one-two hours or several months. To organize the teaching work by project method keeping in mind the efficiency of the teacher and the level and aptitude of the students. In this method, planning on units of arithmetic is more feasible in mathematics education.

Like stocks and shares, insurance, area, volume, directions and map measurements etc. Algebra is the unit of linear planning, the unit of calculation. Can be taught by method.

symptoms(Characteristics):

(1) A project is an activity.

(2) The project is a problematic cooperative activity.

(3) A project is an intuitive activity.

(4) Truths are deduced by project.

benefit(Merits):

Students self-effort, self-directed learning and effective learning.

With this method“Learning through activity” can be given. Education becomes interesting.

Leadership training, the spirit of cooperation, qualities of association should be cultivated.

Gain real life-touching knowledge.

Detailed, study refers to self-study of information.
Internal latent energies emerge and develop.
Receives training in problem solving.

limit(Demerits):

Not possible for every subject unit.
Difficult to find adequate resource references.
Time, power, cost more wanted.
Less convenient for school administration.
There is a division of knowledge, solitary knowledge.
Enthusiasm of school, teacher and children is necessary.
This method can be considered unique in the current educational practice, because SUPW society is taught to nurture useful productive-work thinking.

3.6 Swadhyayamethod(Assignment Method):

Concept:

From Sanskrit language, "Gurunam Guru: SwadhyayHe is also Guru of Guru. Swadhyaya means self study. So Swadhyaya is the best Guru. A horseman as a teacher leads a horse as a teacher to a Bhagirathi as a teacher., but if he is not thirsty, he will not be able to drink the Ganges of knowledge. Thus, unless the learning experiences become his own, he will not gain knowledge. The content of mathematics is such that it necessarily requires the teacher, his guidance and experiments. Hence the scope of self-study is less than other subjects. This method is also known as Adhinyas method. Swadhya method is a type of group study method.
Some definitions of Swadhyaya are as follows:
• "Homework is work assigned to teachers in or out of class."
"Assignment is the work that is assigned to the students either in the class or out of the class- study.
"Swadhyaya is the educational activity which is done in recognition and acceptance of the unit which the students have to study and through which the unit can be studied competently." Bossing
doing :

The above definitions clarify the concept of Swadhya system as follows

Swadhyaya is an activity of self study.

Curriculum becomes competent through Swadhyaya,

Swadhyaya is not homework. Homework is only to be done at home i.e. outside the classroom, while Swadhyaya can be done in the classroom, in other rooms of the school or even outside the school so homework can be called a part of Swadhyaya.

Swadhyaya's motives are clear.

Swadhyaya has different forms. E.g. Reading is natural, Writing Swadhyaya, Observation Swadhyaya, Knowledge Acquisition Swadhyaya etc.

Swadhyaya can be of long term as well as short term.

Self-assigned work is a specific procedure for activity.

In Swadhyaya, the teacher's guidance is negligible.

Self-questions or activities should be carefully designed.

Swadhya can be given individually and can also be given in groups.

Swadhyaya can serve general as well as specific purposes of lesson planning.

Good self-discipline encourages and motivates students to learn by making minimum mistakes.

Students can develop study skills through Swadhyaya, can establish relationships, achieve maximum personal development by working without supervision, and develop the ability to discover and apply study material.

A good self-study establishes the coherence of the details under study.

Good self-discipline allows teachers to make maximum use of reference literature.

Knowledge of Questions in Swadhyaya, are motivated by comprehension, application of knowledge, and skill-oriented motives.

A good Swadhyaya is one that develops the mental powers of the Adhyatya.

Simple suggested questions and activities in good practice, medium and hard are of three types.

Age range of good teachers, related to needs, interests, interests and subject matter.

It should have complete guidance as to where students can get answers to self-questions.

If the teacher insists that the students learn by Swadhyaya method, he has to prepare properly for it. He has to prepare the Swadhyapatra for it.

Not just a textbook, but must also contain questions that require reference books, charts, filmstrips, or other tools to generate.

There should be variety in self-questions. The questions should be as short as possible and the number of questions should be specific in the syllabus. Essay questions in it, should be short questions and informal questions.

Answers to self-questions may not always be in written form. Sometimes draw a graph, drawing a figure, recording weight, length, size, calculating using formulas, etc. need to be fluent.

Adhyeta is not alone, but in discussing the answer, it should be allowed for one student's answer to benefit another.

It should contain questions that require answers to test understanding and application of a theory rather than direct verbatim answers.

With the help of family members, the variety of questions that can be answered by observing and questioning the home or immediate environment should be inherent. Such Swadhyaya can only be Grihas Swadhyaya.

Swadhyaya should be continuous covering any major unit or sub-unit. However, for the sake of convenience, Taswar leaflets can also be given in it.

To check Swadhyaya's answers, the method of improvement and evaluation should be as simple as possible. If these three processes cannot be done, then Swadhyaya becomes a file paper or a joke for self-professors.

This method takes into account the individual differences of the teachers and nurtures their personal development.

Good self-study questions should be related to the topics that the lecturers have studied in the syllabus.

Advantages of Swadhya Method:

The student acquires the information of the prescribed unit on his own.

Students learn to extract and record information through the use of various tools and references.

Extended topics of the syllabus can be covered simultaneously through Swadhyaya.

Teachers tend to make good use of free time.

Swadhya method can bring about specific behavioral changes in students.

The skill of using different tools and contexts can be developed in this method.

A democratic style of working in a group can be developed among the students through group self-help.

Reading from it, various skills like comprehension, creation, note taking etc. can be developed.

In this method integrated education can be made possible by coordinating mutual subjects.

Read it yourself, motivated to think, act and experiment.

A good education can be obtained through the cooperation of teachers with each other in group svadhyaya.

Confidence in teachers, develop habits of adventure, exploration and self-reliance.

Disciplinary issues do not arise.

This method is based on the principle of learning by action.

The experiment can run even if there is little equipment in the school as the teachers conduct different experiments at the same time.

If the teacher makes a progress chart of the students, just looking at it will give an idea of which students are bright and which are weak in the class. Therefore, the teacher can speed up the progress of the weaker students by guiding them in increasing their study pace and guiding the bright students in additional reading and additional experiment work.

Limitations of Swadhyaya Method:

The chances of success of this method are less in lower standards.

Fragments of knowledge fall where group self-interest is adopted. One group that self-identifies another group does not.

This method is not successful in a school which does not have a rich library.

The Swadhyaya system requires a lot of preparation on the part of both the teacher and the student.

In group autonomy some members are active while some members are inactive.

Usually Swadhyayos become bookish.

Equipment often used to assist students in their homework, it doesn't have a reading or family atmosphere.

Self-organization, the teacher is either not prepared or has no time for guidance and assessment.

Experimentation by self is very difficult. So it is almost impossible to develop practical skills with this method.

It is quite possible in this method that teachers do not work themselves but copy from others. A copyist does not benefit at all.

As the courses are long and time consuming in this method, the syllabus cannot be completed in the stipulated time.

3.7 Choice of Teaching Methodology in Mathematics:

The teacher needs to think which method is suitable for which unit from the above educational methods. A unit of content, structure, level, teacher's efficiency, subject readiness, readiness, convenience of the school, matters of time and money, cooperation of various organizations etc. the teacher should choose the method.

Here it is important to note that more than one method can be taught in some unit without thinking that only one method is useful for any one unit. A combination of different methods often gives better results than a single method.

Also, the purpose of education is to strengthen, diagnosis, remedial education or the fact that the unit is not taught for the first time is also important to be aware of in the selection of the medium.

Thus, choosing the right method is useful to the teacher in the success of teaching work.

Unit : 4

Assessment in Mathematics Education

4.1 Concept of Evaluation:

Evaluation may be defined as a systematic process of reforming the extent to which educational objectives are achieved by pupils.

Evaluation is the process of finding out the extent to which the expected changes in students have been achieved after the teaching work in mathematics education. Thus, evaluation means checking the achievement of the planned objectives in return for the work done. Planning aims to determine the extent to which both the objectives set by the teacher as well as the learning expected from the students have been achieved.

Teaching – Evaluation is the process of checking the effectiveness of teaching. Teaching materials, have the teaching methods been effective or not? Success of teaching tools, success of curriculum, The success of the textbook comes from the evaluation of the teacher's work. So many things

Evaluation is an ongoing process. During class teaching- evaluation is also done from the response of the students. Periodic tests, the evaluation work can also be carried out by Rechers and Gage's views on the evaluation process are worth knowing.

"The evaluation process is ongoing." It means that! The teacher should observe the children in as many ways and on as many occasions as possible. Today a picture of a child's progress is taken on special occasions - when he is tested and when his report card is filled. But every recitation, every lesson, every conversation, every process and behavior by the student becomes a tool for the teacher to assess the student and record on its screen important stored knowledge about the student can be gathered.

By making the evaluation process comprehensive, all the necessary aspects can be covered and all the evidence needed for the evaluation can be collected. The entire assessment is based on comprehensive information.

The degree to which the objectives have been achieved by the student is measured by the test and then this marking is described in a meaningful and systematic way is called educational evaluation. Thus a systematic description of the quality of teachers means evaluation. Now let us look at some definitions about evaluation, which will make the meaning of the evaluation more clear.

"Evaluation is a qualitative description of behavior pupils."
"Evaluations are qualitative descriptions of teacher behavior."

Nunley

"Evaluation is a continuous appraisal of the achievements of objectives of education, as well as the methods of teaching and learning with a view to continuous improvement, so that education becomes dynamic."

Sharma and Sharma

"Assessment is the continuous assessment of the achievement of learning objectives and teaching-learning methods from a continuous improvement perspective resulting in dynamic learning."

Dr. regarding evaluation. V. K. Kohli defines as follows:

"Evaluation is the scheme of collecting evidences of the behavioral changes and judging the directions and the extent of such changes."
"Assessment is the system of collecting evidence of behavior changes, by which the directions and extent of those changes can be judged."
"Evaluation means evaluation with reference to certain standards." David Nevo
"Evaluation is the process of gathering evidence about teachers' learning." Stanley
The extent to which students have achieved academic goals, the systematic process of knowing that is evaluation."
- Grown Lund

thus, assessment is a measurement i.e. testing a single area of subject-related achievement, skill or ability, but also covers testing of complex things like thinking patterns, ideals, study habits, interests, attitudes. Also, evaluation is qualitative in terms of standards. therefore

Evaluation = Measurement + Evaluation

Advantages:

(1) Whether the student has understood the material well or not can be well ascertained by supplemental questions.

(2) The student also has an opportunity to clear the ambiguity in the question asked.

(3) Students have to do all the course well for the oral examination, so it becomes regular in study.

(4) Oral examination may also serve as a diagnostic function of the examinee's raw concepts. After diagnosing misconceptions, remedial measures can be considered by the teacher.

(5) Saves time and energy for the teacher.

Limitations:

(1) Comparability is low.

(2) The student feels embarrassed while answering the examiner in person.

(3) Cannot cover entire syllabus.

(4) Evaluation is likely to become subjective.

Self-Assessment Possibilities:

The student got an opportunity to self-assess as shown belowcan:

Many teaching methods and practices are in vogue. Different methods are organized in teaching different subjects. Group discussion, projects, tutorials, etc., can provide opportunities for self-evaluation to students.

Through self-questions included in the textbook:

Self-examination questions are placed at the end of each chapter in all subject textbooks. Students write the answers to these questions, can find out how much they understand the chapter.

Students can calculate maths examples and get their answers by self-practice. In this way, the student can self-assess his/her subject achievement.

Through Interdisciplinary Studies:

Many subjects have the possibility of creating abhikramas. Three types of Abhikrams have been discussed in detail earlier in the same book. In graded learning, the subject matter is divided into successively smaller steps, called firms. A question is given to the student in each form. Immediately after the student answers the question, the student can evaluate his answer by comparing it with the correct answer given next to him. Thus, through Abhikrams, students can continuously assess their academic progress.

Through co-curricular activities:

Almost every school organizes some co-curricular activities along with the academic work. drama, Debates, Garba, Ras, N.C.C., N.S.S. Students can participate in activities of their choice and show their strength to others.

By Checklist:

The checklist is a non-validated device for assessment and self-assessment, about which we see further. Self assessment can also be done through it.

By scale:

Like checklists, a grading scale is an unproven device of self-assessment. By this the merits of the student, symptoms and functional skills can be assessed.

Through Questionnaire:

A matter to be assessed in relation to a student's academic or co-curricular activities, keeping it at the center, a corresponding questionnaire is designed. This questionnaire is given to the student to get the opinions of the student. It is properly interpreted and self-evaluation of the student is done.

Through Introspective Questions:

Self-directed questions are also a tool for self-evaluation. Which questions are presented with their correct answers. Students write self-attempted answers, with correct answers can prepare well for that unit. The teacher checks the answers to the non-self oriented questions with the student.

Consider the following to make self-assessment effectiveKeep:

The student should be given necessary guidance and training on how to conduct self-assessment.

What equipment will be required for self-assessment, it has to be known whether it is ready or not.

Self-evaluation has a positive effect on the learning process. So keep in mind the accepted norms of the society, self-assessment should be taken seriously.

In self-evaluation, the student assesses his own worth, so he should be warned not to over-estimate himself and become over-enthusiastic.

Importance of Self-Assessment:

By doing self-assessment, the student gets the education that he needs, with interest and rank most suited.

In a democratic approach to the education process, the student is considered an important partner. If the education system is organized in a student-centered way, evaluation should also be done in a student-centered way. In the self-assessment tool, the student locates himself.

A student can clearly know the success of his progress.

Teaching students to be responsible is the demand of today. By confidently delegating responsibility to the student, he can do the assigned work better, confidence increases.

If a student knows his own strengths and limitations, it gives him enough incentive to increase his progress. He becomes more motivated and determined to progress further.

Fatigue in student teaching from self-assessment, boredom, dullness or lethargy is not observed.

Limitations of Self-Assessment:

In self-evaluation, the student has to evaluate himself and no student should underestimate himself. When this happens, the reliability of the results is compromised.

Many students hide correct information if self-assessment is conducted through questionnaires.

The results obtained from self-assessment, it causes the lacunar gland or gravitary gland to bind in the pupil.

If the standards for self-assessment vary from place to place, self-assessment becomes less reliable and more subjective, e.g.

Through self-evaluation, the student becomes more confident in his own strength.

Criteria:

Introduction:

If you observe the various activities taking place in the school-mahashala, you will see different behaviors of the students. like, Dhansukh spends hours and hours arranging 1 performance if he has to organize a school performance. Very interestingly, enthusiastically, patiently crafted in the arrangement till the end. When Mansukh is caught and called, he tries to escape by making excuses.

Whereas Tansukh is the kind of student who will do whatever he assignsNeither says 'yes' nor says 'no'. He engages in any activity Then reluctantly joins.

thus, different individual rhythms of students are seen in schools and colleges. These traits reveal a person's behavior. The teacher observes such behavior of the students according to their unique insight, skills, intelligence, and evaluates the personality.

A student's behavior becomes more reliable if it is assessed through a grading scale.

What is Grading??

"The technique or instrument of systematically recording the degree to which different qualities are developed in a person by observing them from an outsider is called a gradation."

Evaluation is based on opinion. A tool for converting opinions into statistics is the ordinal scale.

The following are evaluated in the scale:

(1) Personality traits,
(2) functional skills,
(3) Individual and social adaptation.

Types of Grading:

AkikGrading(Numerical Rating Scale) :

This is the simplest type of ordinal scale. in which the assessee ticks the appropriate number to indicate the extent to which a given trait is present.

Ex. What is your opinion on Vinod's signature??

Assessment in Mathematics Education

in person, the second person is asked to tick the number corresponding to the degree to which this skill has developed in the student.

Rankof the hierarchy(Letter Grade Rating Scale) :

This is the form corresponding to the numerical scale. 1 in this formInstead of numbers like , 2, letters like A, B, C, 3, are used. This too can have a literal description of each letter.

E.g.A = Very Good, B = Good, C = Moderate etc...

Linear or unscripted ordinal (Graphical Rating Scale):

Created and used in 1915 by an educator named 'Boyce'. A person's qualities are integral ones. The rashi or multiplicative scale for measuring these methods is represented by a line. Different levels of quality or feature are shown on that line. A person's assessment of any trait can be indicated by marking (X) anywhere on this line.

Varshanatm Mamapadanda (Descriptive Rating Scale) :

Numerical scale or alphabetic scale is just a conversion. In this type of scale, each point describes the behavior of a person with that rank or trait.

Ex. : Duty

A hard worker, performs other tasks diligently in addition to his duties.
B works his part satisfactorily on the whole
C also rarely completes his work satisfactorily.

4.3 Importance of Evaluation:

Three stages of teaching can be considered - Planning, implementation and evaluation. Among these three stages, the third stage is very important. For this Univ. This suggestion of the Grants Commission is worth recalling.

"If we have to recommend only one reform, it is in the field of examination."

University Education Commission

thus, it is very important that we have to improve many things in evaluation testing.

The importance of evaluation can be considered through the following points.

Know what objectives have been achieved.

Students' progress can be scored.

The achievement of the aim of the study can be known.

Expected behavior among students—Determine what avenues should be taken to bring about changes.

Teaching method, provides guidance for improvement of technique and presentation.

curriculum, textbooks, educational materials, teacher's skills are required to guide.

Difficulty of Mathematics subject units, the sequence can be understood.

Deficiencies in planning and implementation of earlier stages of education can be identified.

Thus the learning objectives from assessment, methods, activities, subject units as well as student and teacher success. However, the success and failure of all such things can also be derived from the success-failure of the objectives of education itself.

thus, the evaluation can be said to be:

""Evaluation is continuous and comprehensive process covering every aspect of educational programs."
"Evaluation is integrated with the whole task of education."

Such importance of evaluation also suggests its inevitability and then the evaluation function on a national scale, subtle, continuous is very important.

4.4 Tests in Mathematics Education:

Tests in mathematics education can be divided into three types with reference to their functional purpose:

(1) Achievement Tests ((Achievement Test)

(2) standardized tests ((Standardized Test)

(3) Diagnostic tests ((Diagnostic Test)

One type of achievement test is the tests frequently administered in schools. Achievement tests can be divided into two main parts:

(1) Teacher Constructed Tests

(2) Standardized tests

(1) Teacher Conducted Tests :

At the school level, teachers prepare test questions or question papers to find out how much the children have achieved in relation to the teaching work they have done. Such a test is called a teacher-structured test. Question papers are teacher-made tests prepared by the teacher for periodical school examinations. It is prepared by teachers. It is designed keeping in mind the syllabus issues and objectives and question type.

These tests include a variety of units for the teacher to identify behavioral changes related to the teaching of mathematical concepts in such tests. These questions are related to the statutory field of assessment ((Cognitive domain) Objectives: Prepares knowledge, understanding, application and operational domain skills. The difficulty value of the question is roughly taken into consideration as well as the format of the written test. It includes essay questions, short questions, objective questions. For this, a complete blueprint of the composition of the Benjamin test can be created if the questions are selected based on it, which will be discussed later. should go Based on which, if the answers of the students are evaluated, the results can be more objective and reliable. Such exams are used for class promotion or profession entry.

Difficulty value or ease value of a question paper is not determined arbitrarily in the design of such a test. Also the reliability and validity of the test is not taken care of so the results of such test cannot be considered reliable. In this test believe that even instructions are not prepared, which is its major limitation. Yet such tests are widely used for class promotion as well as for career selection. The types of questions included in such tests are briefly discussed.

4.5 Characteristics of an Ideal Question Paper:

Following the recommendations for examination reform made by the Secondary Education Commission (1952-53) and the University Education Commission (1948-49), the examination reform program was initiated in India. In this examination reform program of India, Dr. of the

University of Chicago. Services of Benjamin Bloombecame available. The evaluation department of NCERT expanded the examination improvement program through various workshops. As a result of these efforts, the format of our question papers has changed. As a result of exam revision we have got an idea of the characteristics of a good question paper.

The salient features of an ideal question paper are as follows:

Proportionate weightage shall be established for all the units of the proposed syllabus of the question paper.

The question paper should be standard– i.e. the questions are only for the purpose for which the examination is conducted. E.g. Purpose of diagnosis, purpose of achievement.

A question paper is reliable i.e. the answers to its questions are accurate. Each student examiner must agree to his such answer. That is, student-examiner or changing answers should remain the same.

A learning-assessment should have questions that test all objectives.

The time limit for the examinee should be proportionate and reasonable. The question paper should not be too long or too short.

The question paper should maintain the difficulty value of the questions. It is important to keep in mind that there should not be too easy questions and too difficult questions.

The questions in the question paper should be of appropriate value i.e. questions that differentiate the children according to their individual differences.

The questions in the question paper should be organized, having required sections, appropriate questions as per question pattern and arranging questions in order of difficulty value.

The test task contains questions that allow administrative flexibility, there are issues of saving in administrative costs.

The language of the question, presentation, printing etc. has been given attention.

The question paper should be accompanied by a scoring scheme.

Structure of Question PaperBased on Blue-print

The question paper should be reliable and standardized.

The language of the question paper is easy, clear and specific instructions are clearly stated.

thus, In short, in terms of educational work, a question paper can be called an ideal question paper only if it is of an ideal form that is liked by the examinee, the examiner and the invigilator.

4.6 Different types of assessment questions:

Essay Type Questions:

Form:

Essay type questions are widely used today to assess knowledge acquisition. Answers to these types of questions are to be freely given by the child. No obligation or condition is placed on the examinees for answers. These types of questionsKnown as free response questions. Essay type questions are answered in one paragraph, two paragraphs or a few pages.

Example:

(1) The sum of the measures of all three angles of a triangle is 180°.
(2)If AABC has ZB = ZC and I is the incenter, prove that mABIC 1 = 90 + mA. 2

Importance:

Children can present well-organized logical arguments.
Organize and express ideas effectively.
Develop problem solving skills.
Collecting information and presenting it effectively.
Knowing the conceptual process for an accurate answer within a time limit.
Tips for Effective Essay Questions:
Some problems with essay type questions remained unsolved, yet has a prominent impression on the whole.
Questions should be tailored to the expected behavior-change or mental process of educational objectives.
The language of the questions should be tailored to the educational objectives, should be precise and accurate.

The language of questions should not be ambiguous. But specify in how many words and in how many lines the answer is to be given with necessary support.

The language of the question should be such that the student understands what the examiner expects.

Alternatives should be avoided in essay type questions.

The difficulty value of essay type questions should be such that the respondent can answer in the allotted time without any mental stress.

Essay type questions should be arranged from easy to complex in terms of difficulty.

Evaluation of Answers to Essay Type Questions:

As much care should be taken in framing essay-type questions as they are in their evaluation. Following are some points to keep in mind for effective evaluation.

An ideal answer should be formulated for essay type questions.

Answers should be analyzed and scored in expected points.

Whether precision and clarity are maintained in the answer should be considered.

Answers from high scorers should be rechecked!

A reviewer should be provided.

Self-awareness should be minimized as much as possible.

Short Answer Questions:

Form

Short answer questions can be written in short form as per the name. Answers to these questions can be written in specific words or sentences. The brevity and accuracy of the answer points depend on its composition. Consider examples mainly in these questions, Reason, Classify are instructions like.

Important:

As the answers to the questions are clear, the scoring becomes subjective and reliable.

More such questions can be placed in the question paper so that the entire syllabus is covered.

Questions may have objective measurement precision.

A deeper understanding of the content of these questions can be given well.

Things to keep in mind while framing short answer questions: These questions should be issue oriented.

Questions should be tailored to the expected behavior-change of educational goals.

The question should be linguistically simple and clear.

The form of the question should be such that the answer can be given briefly.

The notice of question should be clearly stated.

Objective Questions:

Form

Object oriented questions are impersonal questions. In EnglishObjective type questions are called. As the answer is fixed for the assessment of these questions, the examiner's personal opinion has no place. That is, if a person checks his answers at different times, the answer and the coefficient remain the same, it is called objective questions.

Another Meaning of Object Oriented Questions: The question should be worded in such a way that different respondents cannot derive different meanings from it, but all the students who know the subject must derive the same meaning from it.

Important:

The importance of objective questions can be shown as follows

The structure of these questions is simple.

Questions can cover a good amount of content. So content validity is maintained.

Apart from information, these questions also test reasoning.

educational (Since it is used as Instruction: can be interesting.

There is no self-interest in evaluation.

The main types of objective questions are as follows:

Multiple choice questions

Decisive questions

empty space

Questions of gravity type

Match type questions

Super short questions

True-false answer questions

Multiple choice answer questions

– Classification questions

Let us understand with the help of an example some important forms of the above object-oriented question types that are useful for the assessment of mathematics education.,

(1) Blank and Super Short Questions :

Form:

Blank type questions are also very popular. These questions are very easy to construct so even a common person can do them. These questions contain spaces between specific statements. In the brackets given at the end of this question'Some options may or may not be given, including the correct answer. Fill in the blanks from the answer to make the statement true.

Similar to blank space questions, super short answer questions require answers in only one word or sentence.

Example:

(A) Instruction : Fill in the blank so that each of the following statements is true

(1) The measures of all three angles of a triangle are equal.

(2) $a^3 \times a^2 =$

(3) 12x31 = 7, x∈NDope thenx = occurs.

(B) Instruction : Fill in the blanks by choosing the answer from the options given in brackets opposite to each of the following statements so that it is true.

Note : Sample Question-1 of Adarsh Question PaperSee B.

(C) Instructions : Answer each of the following questions in one word or sentence.

(1) State the sign of the denominator.

(2) What is brokering??

(3) State the unit component of the sum.

Things to keep in mind while framing blank and super short questions:

Do not leave multiple spaces in a single statement. Leave blank space only for key words.

Formulating an open-ended question with only one answer for a statement.

Keeping in mind the reasoning power of the student without putting the statements directly from the textbook.

Three to five options should appear as possible answers when blank answers are given as options.

A statement should not start with a blank space.

The statement of given short questions should be clear and precise. So that the answer is clear and short as requested.

(2) Multiple Choice Questions :

Form:

Multiple choice questions are mainly divided into two parts, the first part of which is a question of content, called a branch (Stem). Its suggested answers are called choices. The suggested options pack is a correct answer, while the remaining distractors are called foils. A question that sounds like as many potential answers as distractors

More effective..Example:

Instructions : Four options are given in answer to the following questions. Find the sequence of correct answers from these options and state them as indicated in front of the question. in

(1) (-0.4)× (-0.4) × (-0.4)No Shushadar Date Thai?

(a) -6.4

(b) -0.064

(c) -0.64

(d) 6.4

(2)How many square units is the area of a circle of radius r?

(a) 2πι

(b) 2r2

(c) $3\pi r^2$

(d) πr^2

Things to keep in mind for framing a multiple choice question:

branch (stem) should contain only one question.

branch (stem) should be as short as possible without unnecessary words.

options (Care should be taken not to reveal the correct answer automatically in choices).

The length of options should be kept the same as far as possible.

If there is a sentence, the number of options should be kept four to five.

Obviously wrong options should not be included.

All the options should be correct to the answer knower.

The question structure of the option should have a specific instruction corresponding to the type. The option should be designed accordingly.

Types of Multiple Choice Questions:

The types of multiple choice questions are as follows:

Excellent answer type question

A correct answer

type instead of

Two answer types

Mixed answer type

The least satisfactory answer

Dual section question type

A wrong answer

All of the above

A lot of answers

None of the above

Manoyatna type

Hidden character type

(3) Pair type questions :

Form

A Jodka type question contains the question content in two vertical columns. The left queue is called the exciting queue and the right queue is called the north queue. Each fact in the left row has to be correctly paired with a fact in the right row.

Example:

Notice : BelowA – Section gives types of triangles, B – Section gives some of its properties. Given against the order property of congruent triangles. show in

Prohibitive type
Section B

(1) Right triangle

All sides are congruent.

(2) Equilateral triangle

Two sides are congruent.

(3) Isosceles triangle

An angle is a right angle.

All angles are right angles.

Things to keep in mind while framing Jodka type questions:

What kind of conjunctions are to be made in the question statement, it should be clear.

The north queue should have more detail than the exciting queue.

The question should not be easy.

The details asked should be consistent and relevant.

The queue from which the sequence is to be selected must be specified.

Types of Jodka Type Questions:

pair type

Kotha type

Combined type

(4) True-False Answer Questions :

Form

Answers to these types of questions are to be given in only two options i.e. true or false. The answerer has to mark or (sa) against the true statement and against the false statementThe mark of X is to be (deleted).

Example:

Instructions : Some of the following statements are true and some are false. If the statement is true then sign opposite it and if it is falseMark the X.

(1) (-10) is a natural number.

(2)f is an empty enumeration notation.

(3) $(a^2-b^2) = a^2-2ab + b^2$

(4) A line is an undefined term.

Types of True-False Questions:

Simple true-false statements

Find the error type and fix it

Mixed True-False Statements

Controlled correction type

Combined type

cluster type

Things to keep in mind for framing true-false questions:

Keep the following points in mind for effective true-false questionsShould:

Keep the statement length of true-false questions the same.

In true-false questions, the proportion of both types of questions should be kept equal.

These types of questions should not have ambiguous syntax.

The method of indicating the answer should be kept simple, i.e. using a noun like N sign or (Sa) for true and X sign or (Kho) for false.

Unit : 5

Diagnostic and remedial education

5.1 Introduction:

DIAGNOSTIC FUNCTION IN MATHEMATICS EDUCATION:

The process of education has been scientifically considered from time to time in matters of teaching and learning. This is an important area. Errors in student learning, Diagnosing limitations, shortcomings and providing remedial education for their prevention. Someone is sick. The doctor asks the patient questions to find out the cause of the illness. Uses available instruments like stethoscope, thermometer, sphygmomanometer etc. Apart from this, pathological examination of blood, excretion, urine etc. is also done. The reason for doing all this is to make an accurate diagnosis and based on that specific treatment

Diagnostic and remedial learningto be held. One has to think very scientifically about both the cause and remedy of illness. Similarly, remedial education is required to remove the educational diseases like disability, deficiency, leprosy of the students. This concept is originally from medical science. Along with

this, the need for this type of education has increased manifold due to the acceptance of the truths of educational psychology in the entire teaching learning process.

thus, in mathematics education also the teacher has to perform diagnostic and remedial work.

5.2 Diagnostic Tests :

Diagnostic tests (Diagnostic) can basically be considered as a type of standardized cognitive tests. But it differs from a standardized cognitive test in terms of purpose and follow-up work.

A brief introduction can be found as follows.

A teacher teaches the same way than teaching in the same class, yet it is a common experience that some students lag behind academically. It is not only the individual differences of the students and the differences in their environment that are responsible for this. Sometimes some students fail to keep up with classroom teaching. For one reason or another they fail to climb some important Nika steps in the study of a subject. Other deficiencies and impairments arise from this deficiency or deficiency, which becomes a barrier to academic achievement. This gap widens day by day and finally the student becomes more and more crude.

In such a situation, the teacher should fix the individual and superior collective errors of his students— Weaknesses have to be found and come

Treatment should be done for students with low vision. For this, different subject diagnostic tests should be used.

thus, diagnostic tests are a tool for determining deficiencies in specific areas of academic achievement and for understanding the nature of impairments.

A diagnostic test is a type of standardized achievement test in subject matter, but it differs from standardized achievement tests in the following respects:

Achievement tests aim at gaining knowledge of the student. While diagnostic tests are aimed at finding out students' rawness in studies.

There is a time limit for solving the profit test, while the diagnostic test does not necessarily have a specific time frame.

Merit test is used for promotion to upper class, while diagnostic tests are useful for detecting student rawness.

This systematically diagnoses the student's laziness in studies.

5.3 Form of diagnostic test:

It should be kept in mind that the purpose of diagnostic tests is to find out the learning gaps of the students.

Do not put essay type questions in the diagnostic test, short answer type objective questions should be asked.

A diagnostic test should be designed based on the common impairments of the students.

A diagnostic test should be tailored as needed in terms of a particular unit across the subject.

I diagnostic and therapeutic education

Along with this, a text should be prepared indicating the questionable analysis of the true / false answers obtained through the diagnostic test.

It covers a wide range of subject specific areas.

Its purpose is to find out the academic rawness of the student. It provides information for treatment.

Diagnostic assessment is very rarely done in school. Today, the teacher hardly gets time to take the diagnostic test. 31 A diagnostic test can be used to find out which units of a subject a child is deficient in. If an attempt is made to remove such rawness by knowing the children of the class, then the true evaluation of the work done by that teacher can be known.

In short, what are the destructive factors that affect the entire process of education so that the student becomes raw in learning, the test prepared to diagnose it is called diagnostic test.

Below are the possible reasons for such rawness among studentsAs follows:

Individual differences of students

Class environment of students

The rawness of previous foundational issues

Irregular teaching of teacher

Failure of teacher's teaching method

Speed due to lack of teacher's time

Different educational tools of the teacher, Inexperience in the use of techniques or procedures

Apathy of students towards studies

School environment

So there are many reasons due to which students are left behind in units. After diagnosing such problems, if the principal thinks with the help of the teachers and strictly implements the necessary remedial educational plan, then the diagnostic and remedial work becomes successful.

5.4 Steps in Designing a Diagnostic Test:

Clarify the purpose of the diagnosis.

Determining the scope of diagnosis.

Homework of students on diagnosis, to observe notes, answer sheets, transcripts.

Formulate and review diagnostic questions.

Testing a small group of diagnostic tests.

Designing the ultimate diagnostic test.

5.5 Points to be kept in mind by the teacher in the diagnostic test:

Giving diagnostic tests only to vulnerable children, should not be compulsory for all children.

Psychologically inform vulnerable children when giving diagnostic tests, so that he does not feel that he is weak in the class.

Make diagnostic test questions mandatory. There is no scope for alternatives.

A diagnostic test does not require a time frame. It is very important to give each child enough time and plan for each child to answer each question on the diagnostic test.

Diagnostic and remedial education

Analyzing the answers to each question in the diagnostic test, students' misconceptions, misunderstandings, making a detailed note of the mistakes he made.

Thus, the diagnostic testAfter doing the error analysis, plan the remedial teaching work. Remedial education can be delivered in a variety of ways.

By doing re-education work

By making interesting learning activities using various audio-visual aids

By making the curriculum lighter

By providing individual or collective guidance

By providing successive lessons

Start by knowing the level of the children and plan it to their satisfaction.

5.6 Use of diagnostic tests:

Some things to keep in mind when using diagnostic tests in the classroom are:

Finding out the weak children in the class: The diagnostic test is not given to all the students in the class. To find out the weak students in the class. Students who seem weak in class can be detected through tests.

Not informing the students about the test: The students who are weak in the class are to be given the test, he should not know about the test. They should not realize that they are being tested because they are weak.

Allowing enough time to write the test: A diagnostic test should give students enough time to write all the questions. Only by writing all the questions can one get information about which question A is weak.

Proper scoring of answer sheets: After answering all the questions in the diagnostic test, the answer sheets should be analyzed thoroughly. A student can check which questions he/she gets well and which questions he/she doesn't get well.

5.7 Remedial Education:

Students lag behind in classroom learning due to individual and environmental differences as well as other factors affecting learning process. Thus, the education given for the personal improvement of students who are lagging behind in learning is called remedial or remedial education. This program can also be taken in group mode.

A program to correct these errors is remedial education in which therapy is central rather than teaching. It should not be forgotten that remedial education is education offered for prevention. So that the errors or shortcomings of the students can be removed. An important step after diagnosis

is treatment. Among the many methods of treatmentFrom the approaches, the teacher should resort to appropriate methods or approaches in his situation to provide remedial education.

"Educational reform (remedial work) is essentially true education which maintains the student at a fixed level and leads him to raise the standard of his condition by a true internal mechanism of motivation." Through diagnostic work, the defects of the students and their causes are to be found. Remedial work is the act of effectively removing both of them and removing the obstacles to students' goal achievement.

5.8 Matters to be kept in mind by the teacher in remedial work:

After the diagnostic work, find out the causes of rawness, remedial work should be undertaken to remove those causes -: While carrying out remedial work – following are some things to keep in mind:
Remedial work should feel realistic and necessary to the student.
Using various types of audio-visual aids required during therapeutic work.
Informing the student of the results obtained during remedial work.
It is essential that the student feels a constant sense of satisfaction during the therapeutic work.
Knowing the student's strengths and starting remedial work from there.

Provide individual or collective guidance where required.
The diagnostic test should have short answer type objective questions instead of essay type questions.
Remedial work can be carried out by providing adapted learning materials.
To provide successive benefits during therapeutic work.
In order to facilitate the remedial work, a questionnaire should be prepared indicating the correct-false question of the answers obtained by the diagnostic test.

Analyzing the information obtained by considering and implementing remedial measures about the subject matter.

5.9 Comparison between Diagnostic Test and Achievement Test:

A diagnostic test is basically a type of achievement test, but it differs from it in the following respects.

(1) The main purpose of an achievement test is how much a student has absorbed in a certain subject, is to know what has been achieved. While the purpose of diagnostic test is to find the rawness left in the academic performance of the students and to improve it.
(2) The entire syllabus (if unit test, the entire unit) is covered well in the achievement test., while the diagnostic test covers only the raw points of it.
(3) Achievement test taker has to write answers within a fixed time limit, when the test taker is given enough time to write the answers well.
(4) Diagnostic test questions are not selected based on discrimination value and ease value. It can contain all the tough questions. The questions of the achievement test are selected keeping in mind the discrimination value and ease value.
(5) The results of diagnostic tests are used to improve education, when achievement test results are used to classify children.
(6) The achievement test is for all children in the class, when the diagnostic test is given only to the weaker children in the class.

Unit : 6

Consolidation and overview

6.1 techniqueconcept(Concept of Technique) :

A trick is a trick, techniques, strategies etc. through which the action of education can be made effective. Praukti is a faculty, which, if acquired, can be used to represent content in a unique way. Special skill - Karamat can make lesson easy, make lesson interesting and light. The use of a technique gives good results in teaching work, but if this trick or karamat does not remain a trick or specialty and its presentation is not effective, then it becomes a mere action. E.g.

Presentation of the example may not be effective, if good examples are not presented, the exemplar technique is not a technique, but seems to be an action. The story of the Ramayana is presented by different narrators but very few narrators can mesmerize the listeners with effective examples. How does this enchantment? The story is one of a kind but if the art and technique of presenting it is effective then the audience gets interested and mesmerized in the story.

In mathematics education also, it is necessary for the teacher to acquire good techniques for effective presentation of teaching-learning. There are many such techniques in mathematics. See it in different sections as follows

Can be classified as:

Teaching Techniques: Questioning technique, example technique, ka.pa. work, oral work etc.
Learning Techniques: Self-directed Approach, supervised study technique
Special Technique: Point of View–Overview technique, diagnosis therapy technique
All these are important techniques in mathematics education. The technique of verbal work in mathematics education is useful in both teaching and learning. Let us discuss some of these techniques in detail.

6.2 Concept of consolidation:

Mathematics is a logical subject. In this the later points build on the points taught earlier. Rigorous exercises are done to ensure that the unit being taught is properly understood, call it consolidation. Drill work is considered. the most effective and widely used device for fixing the knowledge of Consolidation and overview
mathematics in our schools. Drill work is a serious activity and it provides opportunity of self serious activity students and especially for poor students

The technique of reinforcement is considered very important in mathematics. Reinforcement Reinforcement work is considered very important for the rapid simultaneous development of mathematical knowledge and understanding in students. Reinforcement is important in bringing about the expected behavior-changes in students. Many mathematical operations must be performed not only correctly but also quickly and assimilated by the student, and requires confirmation.
Acknowledgment must be accompanied by understanding. Affirmation without understanding is meaningless. What the student does not understand should not be reinforced. Such affirmations become unmotivated. It becomes meaningless and futile.
Controversy has raged for many years about the location of the fortification. Old-fashioned educators valued manual labor and mechanical processes and neglected society. New-thinking educators value facts. Anything that cannot come to knowledge and understanding has no place in education. That is the opinion of those people. These people do not value affirmations at all. It is entirely forgotten that it should be used frequently in developing an understanding of principles in new thinking. Thus both the schools of thought are finalist.
Modern thought rejects both the above ideologies. If teaching is to be effective, there must be a clear understanding of it. Deeper understanding of issues is achieved through consolidation. Affirmation work becomes a burden if it lacks motivation and understanding.

6.3 Principles of Persuasive Work:

Educational psychology has provided several principles to make reinforcement work interesting and effective, these principles are as follows.

Affirmative action should be inspiring:

Care should be taken not to mechanize the consolidation process. Students get interest from that work, it should be an act that motivates him to do it, makes him want to do it. If the student feels that the work he is doing is important or interesting then he will do the work enthusiastically. Thus if the reinforcement work is motivating, the students will do it with interest which will help in refining their remaining mathematical concepts.

Confirmation work should be varied:

There should be no mechanical repetition of the same soil-decade in consolidation work. There should be variety so that students do not get bored and all students should feel that they are experiencing something new in the unit. By changing questions to affirmations, can be varied by changing the method, changing the technique. Sometimes a special type of chart can be made to summarize all the information of the entire unit and reinforce it. Thus the teacher can vary the reinforcement by bringing in different techniques.

Validation function should be of definite form : :

A specific subject, focusing on the skill or concept, reinforcement work should be given on it. Since the purpose of reinforcement is to make a concept or skill permanent, it should be given a specific task that requires repeated use of that skill.

Confirmation work should be sensible-:

It is very important to develop students' understanding and skills in reinforcement. Only mechanical student instances in validation

It is not necessary to count. It works. One who considers the paradigm that acquires the concept, should carry out the task of curation in such a way that sufficient understanding of it develops in him.

The stratification work should take into account individual differences:

Not all students in a class are equally strong. Their powers of acquiring knowledge are different. It is pointless to assert that the gifted student's time is wasted and the weaker students have to trudge. That is, the reinforcement task should be arranged in psychological order of difficulty from

easiest to hardest. So that students can work according to their own speed and strength, it is necessary to have a provision in it.

Consolidation work should be of short duration:

Children with convulsions (attention span) is small. Prolonged mechanical work causes boredom. Also less work becomes uninteresting. The hardening should not exceed 10 or 20 minutes. Long hours of concentration are exhausting. Time for consolidation should be shared. If 40 minutes of reinforcement time is required for a skill or skill, it should be divided into 10 minutes per day over four days.

Students' confidence should be increased by:

Consolidation work is done to make the old concept or point more solid and mature to the student. It gives the student confidence in himself. Increases self-confidence. If this reinforcement work is done in such a way that the student gets bored and his confidence decreases and he feels confused, then such work is meaningless.

Reinforcement should not be in the form of punishment:

Reinforcement work is done to quickly explain a concept to a child and to improve his / her skills. to the student

If a certain point is given as punishment for lack of skill, it will discourage the child., will get frustrated and find the task burdensome. Thus no corroboration work should be done as part of punishment.

Confirmation work should not be done on things which the student does not understand:

The basic purpose of reinforcement is to mature the knowledge and understanding gained by the student, to increase its efficiency. Confirmation of things or issues that the child does not understand becomes a mere act. Mechanized work is not reinforcement, so mindless work should not be included in reinforcement.

Speed and accuracy should be given priority in standardization work:

The teacher should pay attention to the smallest mistakes made by the students in any concept and make reinforcement work to reduce their mistakes. After knowledge and understanding of the

concept in children, it is necessary to use it repeatedly to get good speed and accuracy. Speed and accuracy should not be compromised or inaccuracy. Consider the example quickly, it is equally important to count the correct pattern even though the exact pattern is counted. Thus speed, accuracy and correctness are important and fundamental principles of validation.

6.4 Importance of Consolidation Work:

Reinforcement work has a special place in mathematics education. Among the subjects taught in school, there are few subjects in which subjects are linked consecutively. Mathematics is one such subject. As the subject of mathematics is continuous, each different unit relates to the unit or subjects taught earlier and the same unit relates to the subjects to be taught in the future.is Therefore, it is said that students will be able to understand the new lesson well only if the knowledge of the things taught is good. Thus the unit to be taught needs to be reinforced so that it can learn using the material. If the student is not given an opportunity to refresh the memory of what he is learning, the student will not be able to refresh the memory when needed and the thing will be forgotten. Further learning depends on how easily a student can recall what he has learned in relation to mathematics. This requires a work of consolidation. Consolidation habit is a good thing in mathematics.

Effective drill, not only develops, knowledge and skills, but also is a means of maintaining good habits when they have been once established.

Reinforcement has the power to refresh the memory of an object, when the student reaches a level where he can easily remember what he has learned, he can also apply what he has learned and develop further in the subject of mathematics. Thus the importance of reinforcement work is paramount.

Its important points can be enumerated as follows:

Reinforcement work is useful for making knowledge permanent.

Reinforcement work is useful in developing an adequate understanding of the unit.

Reinforcement work provides opportunities for students to apply the knowledge they have acquired.

Reinforcement work builds confidence in students.

Reinforcement work is useful to solidify the foundational roles for new concepts.

Consolidation Work Continuity is maintained in starting the academic work of the second points from the previous points.

When can consolidation work be done??

Consolidation work at the beginning of a new unit, during unit teaching: a can be done at the end of unit teaching.

At the beginning of the teaching unit, the previous points can be recalled and reinforced to refresh the concept, so that a new joint start with the old issue can be maintained.

If some units have more than one method, refresh each method intermittently during a lesson, memorization can be consolidated and the complete form of a unit can be taught by relating different modes of the unit.

Sometimes at the completion of a unit a reinforcement unit can be given both to test understanding and to speed up application and skill by recalling what was learned in it. Thus it is left to the teacher's discretion to do the reinforcement at the workplace. For his own children, he can make reinforcements whenever the need arises.

6.5 Considerations in Confirmation Work:

As we have seen above, sometimes the task of reinforcement is taken at the beginning of the teaching of the lesson by making special types of kothas and placing them before the student. The material given in the box should be such that every student can work independently. Assignments in such classrooms are written by the teacher on a roll-up board before going to class or by printing copies on paper. Students have to do oral work or calculate and write in relation to mathematical problems given in this book. When the class is given work in this way at the beginning of the lesson, all the students in the whole class immediately get down to work and if the plan of work

A well-thought-out lesson will create a good role for what is new to be taught. In this way the teacher does not have to ask the students questions at the beginning of the lesson. The teacher shows the food from the audience in the classroom and the student answers. In this way, in the pre-preparation of a new lesson, reinforcement can be done in one way.

Often the task of reinforcement is taken after learning new things. The teaching task should be improved before the reinforcement task is given. Reinforcement work should be such that students are motivated to do a particular work by doing the work. How fast the student will learn and how

much the subject will be able to master depends on the type of attitude the student takes in doing reinforcement work. The work of consolidation should be taken as such, so as to benefit students of different mental levels and learning speeds. Students in the class work at different speeds, so if students are to be given reinforcement work in class, enough examples should be provided so that all students in the class are engaged in the work. The beginning examples of reinforcement work should be chosen so that students who work slowly will have the opportunity to work on all kinds of different aspects of the topic, and the other examples should be difficult enough for gifted students to consider. The act of reinforcement should also be interesting. If there is no work that generates interest, students will get bored with the work and will not like to do the same type of work over and over again. Consolidation work should not be for a long time. Only some time should be reserved for consolidation work. Affirmation work should be purposeful.

The teacher should monitor the work of the students after assigning them the work on affirmations. The teacher finds the mistakes in the work of the students

should be taken out and shown that the real way of working is the show.

The teacher assumes that all students will do well from the start

should not But those who are in trouble should be helped. Teacher

It should be known that it takes time to develop certain types of vision and develop certain types of powers, so one should have the necessary patience. The teacher should also teach the students to get a lock or check how correct the work they have done is. This matter is necessary, but each time the lock is acquired the total work is reduced in some time. Hence it should be brought to the attention of the students that lock should be obtained only if required.

It is up to the teacher to decide how much reinforcement work should be given. The teacher should decide what type and amount of reinforcement work students need. Confirmation work should be sufficient. Many teachers allow students to count so many examples, so that the student does not even get time to prepare other subjects. Some teachers do not pay much attention to reinforcement work and its type. If the mathematics textbook does not have enough examples for reinforcement and the examples are not varied enough, supplementary work from other books should be given. If the examples in a textbook are too difficult or too numerous, the teacher should let the examples be selected and counted.

6.6 Use of Deedhikha work:

Reinforcement work specifically benefits students in the following ways:

Consolidation work helps students to remember certain things easily. The sum of the three angles of a triangle is two right anglesbhorabhar doy che or $(a + b)^2 = a^2 + 2ab + b^2$.

In this regard, only if enough reinforcement work is given, students can remember these things quickly.

Adequate reinforcement work leads to mastery of mathematical methods and ways of doing different calculations. For example solving an equation.

A practical calculation can be made easily using some general derived rules. For example the method of calculating interest.

Students develop faith in calculation. For example, if an item is bought in the market and the price is to be calculated, the student has faith in the calculation and can easily calculate immediately. If there is not enough Mahavara, then he will not have faith in what he has counted.

The confirmation function can be of different types, such as written and verbal reinforcement work, reinforcement work on new concepts, reinforcement work on understanding of principles, work on some kind of calculation training, learning how to apply mathematical concepts to things that touch life, reinforcement work on forming good habits - thus reinforcement A task can have different purposes and for that a teacher should teach with the purpose in mind while teaching.

By asking confirmation questions, can be done by asking written examples, through the Kothas, initially by asking easy and then difficult - difficult examples.

6.7 Duration of Confirmation:

Hardness of the unit, should be reinforced keeping in mind the mental strength of the students. Don't stress too much. Generally, five minutes of reinforcement should be done every hour.

Unnecessary validation work will waste time, will waste energy, and will create dullness and boredom on the part of the student. The teacher has to think about how much and what kind of reinforcement should be done in which points. And the time limit should be decided based on the understanding of the teacher and the ability of the student.

6.8 Concept of Overview:

Overview ieCalled review work. This work confirms more than one thing. A reinforcement task is mechanical repetition, while an overview task is perceptual reinforcement. There is repetition, indicating acceptance of patterns with the use of sutras. An overview of examples of obtaining a

simplified form of the mathematical terminology of different types of organ formulas – syntactic terminology.

E.g. An example of the law of multiplication of exponents is reinforcement. It is an overview when using the various laws of exponents to simplify exponents.
thus, the scope of repetition taught in reinforcement is limited, while the scope of units taught in overview is extended.

6.9 Importance of Overview Task:

The function of reinforcement is to reinforce the concepts of mathematics in the minds of the students. But the function of an overview is to organize different points of content in addition to serving as a consolidation function, to explain the interrelationship between them and also to explain the peculiarities, similarities and differences of the things learned. E.g. It is a reinforcement to enumerate examples after learning a general factorization method, while enumerating such examples after all methods of factoring have been taught. be assigned

There are Mr. in which more than one method has to be used, so this action becomes an overview of all of them. Thus the overview covers the whole 5 subjects which is why mathematics textbooks have departmental revision tests after teaching certain units. His vision to decide if the action - method has to be used develops. Apart from this, he also gets training on how to apply the knowledge of mathematics in solving real problems in practice.

-6.10 Difference between Confirmation and Overview :

Overview work is slightly different from confirmation work. Since confirmation task and overview task have some features in common, they are often considered to be one and the same. Both involve repetition of mathematical concepts, but both have different forms and purposes. In reinforcement work, after teaching a subject, the knowledge of that subject is imparted with the objective of perpetuation. E.g. It is said that after teaching the whole class method of factoring, it is confirmed to count its examples.

A confirmation function of the overview function is included, but it also serves to organize different points of content and to explain the relationship between them. E.g. After learning all the ways of composition, if a single example includes more than one type of ways, then the task is called an

overview task. Here the student thinks about each way of composition. Selects the appropriate method for counting instances. Thus confirmation does not give an idea of the whole subject while overview gives an idea of the whole subject. The consolidation process is mechanized. When overview work becomes insightful. Subtle

Unit-7

Mathematics Board

7.1 Concept of Mathematics Board:

It is natural for children in the classroom to want to learn more after learning about the theorems of Pythagoras or Apollonius. Many children have a curiosity to learn more about mathematics. Also, students feel confused to solve the puzzle that comes in the newspaper or to solve the problem that arises in daily life. A teacher cannot devote time to such a feeling or situation under the burden of the curriculum. In such a situation a group of teachers and students interested in mathematics may form a society. Science Council in Schools, Sahitya Mandal, Ras-Garba Mandal, etc., Maths Mandal can be established. This association is not a supplementary activity or an extra-curricular activity of mathematics education. But there is an aspect for the overall development of the student. It is a system to provide the student with the interest, the interest, the activity, the special knowledge. Mathematical Society is a structure for organizing and managing the work of a group of people interested in mathematics related information, activity and extension.

7.2 Objectives of Mathematics Society:

A Mathematics Board may be established with the following objectives in mind:

To expose the students to specific interesting subjects not covered in the syllabus.

Discovered students with mathematical talent, to encourage them.

Eliminating bias towards mathematics. To develop positive attitudes towards mathematics.

Visits to mathematical institutes can be arranged.

Understand the place and importance of mathematics in life.

To provide information about developments and research in mathematics.

Preparation of Mathematics Department content for school magazine.

To expose students to future careers.

Providing opportunities to develop mathematical skills and strengths.

7.3 Importance of Mathematics Board:

In addition to study activities for mathematics education in schools, some co-curricular activities, if extra-curricular activities are organized, the subject of mathematics can be made interesting, can be made attractive, its education can be made effective. For such basic purposes Math Mandal becomes useful. A math club formed at the school level or at the district or state level can be very motivating for students of mathematics.

The activities of Maths Society are directly or indirectly useful to the students in overcoming their rawness towards their subject. These activities

Can also accommodate individual differences of students. Student-centered mathematics education, learning can be made central. Students' creative understanding and skills towards the subject of mathematics can be developed through mathematics board. The activities of the math club are also useful for all in introducing the essential streams of mathematics.

: Before forming a Mathematical Society, its broad and specific objectives should be clarified. It should be headed by a person or committee who is aware of the subject, interesting, functional oriented and subject oriented. Membership in this society can be given to any good or weak person or organization with interest in mathematics. Norms should also be framed regarding the membership of the Mathematical Society, which requires financial contributions considering the scope of its activities. The cooperation of every member in taking advantage of the activities of Mathematical Society should be held regularly. Along with Maths Society, the organization's functioning should be mutually cultivated with other subject societies and related social organizations.

7.4 Activities of Mathematics Society:

(1) Lectures, Discussions and Seminars: Lectures, discussions or seminars can be organized on various topics related to the mathematics subject to complement and motivate its teaching.

(2) Tourism, Visits: Direct teaching can be done by organizing excursions to visit institutions useful for teaching some units of mathematics like banks, insurance offices, building constructions, computer centers etc.

(3) Bulletin Board : Literature references related to Mathematics, paper cuttings, articles, photographs, puzzles etc. can be presented frequently.

(4) Projects : Teaching of some subject units related to Mathematics unit can be done through projects.

(5) Film, Filmstrip Darshan : NCERT - New Delhi, Rajya Shiksha Bhavan Ahmedabad, Gujarat State Information Account, Gandhinagar, Education Service Extension Centers can provide mathematics education by taking frequent film - filmstrips on loan.

(6) Question Box : Students can answer questions about some puzzles that they do not know and mathematical concepts that remain unclear through the question box.

(7) Demonstrations : Charts related to mathematics to the students if Maths Society organizes Maths-demonstrations from time to time, pictures, samples, models, puzzles, etc. get an opportunity to present things. Such exhibitions continue to inspire the creation and/or collection of literature.

(8) Mathematical Quiz: Mathematical quizzes are frequently presented in newspapers and related magazines. Using it and discussing it can effectively develop the reasoning skills of the members of the mathematics group.

Other Activities: Apart from this, mathematical relation in school prayer meeting, birthday celebrations of mathematicians, editing of math numbers, many activities like math museum can also be considered work-planning in terms of time, energy and cost.

Activities:

Functions of Maths Board: Under the initiative of Maths Board in the school the following activities can be organized:

Math Talent Search : Talented by organizing a test for talented students in school mathematics Find students, to motivate the bright students by awarding prizes or certificates. To guide them on future career.

Question Box: A question box program can be used to solve mathematical problems that are confusing students. He gave his answers in the prayer meeting, the ideal questioner should be respected

conversation, Organizing lectures, discussions: Lectures and talks by an expert in mathematics can be held on topics such as practical application of mathematics, history of mathematics, mathematics and human life, mathematics in the field of space exploration, etc. Teachers and brilliant students can be discussed.

Publication: A manuscript journal of Mathematics may be published under the initiative of the Mathematical Society. A variety of interesting information related to mathematics can be displayed.

* Celebrations: On the occasion of birth anniversaries of mathematicians, lectures are held on the life researches of the named mathematicians and posters related to them., can be celebrated through publications, handwritten issues or theatrical performances.

• Math fun activity: Number magic, magic square, math problems, short ways of calculation, math fun activities can be conducted in school. Such a presentation can be made on a bulletin board or in a prayer meeting. Try it, check it... etc. by giving information under the heading of problem and its solution, general information can be given.

* Creative activity: simple tools useful in mathematics– Can draw charts, graphs, diagrams etc. Solids : can be collected and demonstrated its use. Mathematical information, puzzles, problems, etc. found in current papers can be cut and made from references. Information from periodicals can be clipped and included in reference books. Objects from the environment can be collected and used to clarify content.

Demonstrations: Demonstrations can be arranged according to grade level or school related mathematical subject information. Tools that make math interesting, charts, books, graphs, diagrams, photographs etc. should be included.

• Library: To create a library that carries books and periodicals related to mathematics, which can be useful for supplementary knowledge. Periodicals and other periodicals published by Mathematical Society should be given place. Mathematical journals should be called for and read by members.

Conducting Competitions or Quizzes: Creative competition, conducting competitions like debate competition, essay writing competition and conducting quiz program.

Film Show: Slides related to Mathematics Education, to arrange for the showing of films, filmstrips, video cassettes.

Training System: Computer training system can be arranged. Training in the use of educational equipment, formation training can be arranged.

+ Project Research: To organize one or two projects a year from Maths Society. So the problem with math education, specificity, literature can be obtained. Information about etc

Unit : 8

Action research

Definitions of Action Research:

"Action research is a process whereby a researcher or experimenter studies his problem in a scientific manner so that he can be guided in his own actions and decisions, make improvements and evaluate success or failure."

- Stephen Corey (1953)

"The process by which practitioners study their problems scientifically for the purpose of guiding, improving and evaluating their decisions and actions is called 'action research'."

- Dr. K. P. Pandey

“Action research is research conducted by concerned researchers for personal improvement and professional use.” -Hildreth Hawk McNation

“Action research is research that anyone. It undertakes to achieve its objectives effectively. A teacher conducts action research to improve his teaching. A school administrator undertakes action research to improve his administration.”

- happy-Mehrotra

"The purpose of action research is to improve school and educational processes and also to improve those who seek to make these improvements." -John W. the best

"Action research is a research process carried out to solve school problems in the context of the whole situation, usually in schools, and is carried out by teachers as part of their educational activities through the consultation and cooperation of research experts." – Carter V. Good

"Research which is motivated by a specific local problem and which is organized in that situation only to solve that problem is action research." -David J. Fox

"Action research is a small-scale intervention in real-world functioning and a rigorous test of the effect of such intervention." — Cohen and Mannion

"Action research is the small irrigation scheme of the field of education." -Gunwant Shah

"A general teacher or administrator tries to solve the problems that confront him in a scientific manner, conducts research from a scientific and objective point of view without prejudice or bias and applies his conclusions (findings) in improving his management or classroom behavior is called 'action research'." - Dr. Motibhai Patel

"Action research is research undertaken by individuals to achieve their objectives more effectively, by teachers to improve their teaching, and by administrators to improve their school management and practice." - National Institute of Basic Education

thus, action research is....

- The work carried out by the workmen to bring about improvements in the works.
- Practical type or decision-oriented type of research.
- Any working person experiences problems during their day-to-day activities, identifies, understands, examines its causes and tries scientifically to solve them.
- of teachers, research conducted by teachers and for teachers.
-

v functional of research importance:

- Everyday instincts are useful.
- To solve inherent problems
- Diagnosing a problem in a particular context can lead to a solution in that context.
- Any immediate problem can be solved, 'and instant decisions can be made.
- Improvements can be made in the existing system.
- High intellectual ability is not indispensable in conducting research. Even a common man can carry out such researches.
- Conducting such researches increases one's efficiency along with problem solving.
- Apart from the teachers, other persons connected with the education sector like the principal, managers, education administrators can also conduct action research.

- Apart from the classroom problem, it is also useful in solving other academic or non-academic problems.
- Increases the likelihood that action research results will be implemented in practice, because the teacher himself is involved in the research process and the research results feel his own, not imposed from outside.
- renovations (An opportunity arises to incorporate innovations) into the learning process.
- As the teacher tries to solve the most pressing problems through action research, the results obtained can affect the current teaching process.
- By conducting action research the teacher becomes a reflective teacher (reflective teacher-practitioner) becomes.

above importance / important we benefit as Also saw can.thus, it can be said that action research that is so important and useful in solving local problems is very important in education.

- **v** Action research steps:

The basic purpose of action research is to bridge the gap between theory (knowledge) and practice. In action research the practitioner is the researcher himself. He himself becomes a producer and consumer of research findings. Hence, the improvement brought about by the student in both the situation and the practitioner is direct and immediate.

If we look at the words of Stephen Core before the research stage....'When a person tries to improve a situation to which a person has a special reference, behavior changes specifically. He then tries his best to interpret the results he obtains describing the evidence of the transactions he has assumed to be sufficient. When he describes a problem, turns tasks into hypotheses, engages in the tasks, studies the results, and draws generalizations from them, much more than if someone else had done these tasks for him, or if he had read about them somewhere himself. This experience is imbibing.'

From the above we can move towards a specific sequence for conducting action research. Some fixed criteria for research– Phases have to be followed. By doing so, the research process becomes more simple and scientific. Its findings - the results become more reliable.

Action research is an ongoing dynamic process. It does not require any special type of environment or specific conditions; It is a way to find a solution to the problem in a short period of time according to the need and situation. Following eight steps are followed for its implementation.

(1) Problem:

Unless the teacher has a problem, research cannot begin until the problem, the problem, is realized. Problem identification in schools and colleges works on the principle of individual differences. In the same situation, some people see a problem, while others do not. Most all teachers or professors go to the library every day; But there are some of them who are concerned about the inappropriate use of the library. The problem is all around us, all we need is our sensitivity to it, observation, keen eye.

A researcher can also clarify the choice of problem by dividing it into different sections. Such as the problem of moving in the classroom, behavior problems outside the classroom, behavior problems, relationship problems etc. Importantly, the problem should be self-evident. The problem should be raised by the teacher. It is also essential that the teacher is able to solve problems and that problem solving can accelerate the learning process of the school or education.

While identifying and selecting the problem in action research the following points should be kept in mind:

(1) The problem must be directly or indirectly related to the school.

(2) It is also necessary that the problem can be solved within the school itself.

(3) The nature of the problem must be real, not imaginary.

(4) The problem should be directly related to the person doing the action research.

(5) The problem area should not be too broad or too narrow.

thus, is the first step in the action research hierarchy. That is, action research begins with a problem and ends with a happy pedagogy.

(2) Problem area

Only those who are curious and willing to move towards continuous improvement have the ability to identify problems. After identifying the problem, the important task is its form, determining its field. By doing this, problem solving becomes easier. The crux of the problem is fixed and the problem can be systematically looked at — examined. By determining the area one can know about the root of the problem and if needed, one can also take guidance from the relevant people of that subject.

The problem area section also covers the description of the problem. Even if a word in the problem has to be explained or has to be done, it can be done in the problem area step. Problem Area The problem area in the hierarchy (What can be counted as Area) can also be specified. Since action research here is a small scale research, it will be encouraging for the researcher to assume that the problem of the field is understood by the researcher.

Regarding the problem of action research and its field, if the researcher self- In case of evaluation, he can evaluate himself according to the following question and determine the quality of the problem and its field:

(1) Does the nature of the problem appear to be determined by fixed motives? Yes/No

(2) Will researching the problem result in any change (positive) in school functioning? Yes/No

(3) Is research of the problem feasible in the school itself considering the situation? Yes/No

(4) Is the problem directly related to the researcher? Yes/No

(5) Is problem solving possible within the school environment and complex? Yes/No

(6) Has the researcher considered the main points of the research before selecting the problem? Yes/No

(7) Has the problem been properly defined and delimited? Yes/No

(8) Does the importance of the problem seem appropriate for the progress of the school, the students, the teacher and the principal? Yes/No

(9) Is the researcher interested in the problem? Yes/No

(10) Does the researcher appear to be able to successfully solve the problem through action research based on his/her abilities? Yes/No

If from the above questionsIf 6 or more questions are answered 'yes' then the researcher is accredited for researching the problem, otherwise reconsideration should be required.

(3) Basic information required:

The basic information level of action research is similar to diagnostic work. In terms of diagnosis, it is said in medical parlance that it is important to take care of three steps for the disease. in which (i) Actions to prevent the disease from occurring, (ii) Efforts to cure the disease if it occurs, and (iii) Efforts to prevent the disease from progressing if it is not cured. Even in action research, a practice by the teacher that the problem does not arise in the first place, efforts like action research to remove the problem if it arises and some theoretically prepared rules to prevent the problem from stopping can do a good job.

After determining the problem and problem area, the teacher perceives the problem as to why he perceives it? Is there really a problem? Does the teacher have any reasons why this problem really exists? If there is a problem that has been previously researched, its findings are also called basic necessary information for new research. By getting the basic information needed, the scope of the problem, its possible causes, the identification of the problem and the depth of the problem can be known. Generally, information can be collected on the basis of students' notes, examination of their answers, discussions with students, teachers or principals, interviews, observation of teachers in class, homework, questionnaires, taking personal interest in students, conversations, etc. Sometimes information from parents or peer group, friends also proves to be the basis for research.

If the problem is related to the rawness of academic content, the necessary information can also be gathered through oral assessment or diagnostic tests. A simple checklist or questionnaire can also be useful in obtaining the required information. There is no need to create or authenticate a formal instrument to obtain this type of information, as this is only preliminary research. Information can be collected through simple and handy tools that only the problem can get enough required information.

Basic information can make a seemingly important problem seem trivial or a seemingly trivial problem important., because the researcher gets the opportunity to look at the problem in depth in the

basic information needed. Action research is accelerated by the task of obtaining basic information. There are not few who just sit and choose the problem. Also, there are also a large number of people who give a hand saying why all the problems are happening to me. Here, when the researcher starts getting all the relevant information about the problem, its area and that problem, then the real sense of action research will be completed, the problem will be solved, the researcher will be confident that the problem will be solved. Thus, basic information can be considered as an important step in action research.

(4) Possible causes of the problem:Obtaining the necessary basic information determines the specific nature of the problem and then considers various possible causes of the problem. The problem the researcher has is why? Will this problem be everywhere or am I the only one experiencing it? What are the reasons due to which such a problem arises? The work of thinking about things etc. is done in this stage. We list as many reasons as we can find for the running problem. Here too parents, principals, peers etc. can help the researcher like basic information. It is often the case that there are causes other than what we perceive to be the cause of the problem, which we are not aware of, or when the field of thought is not ours, the help of others is sought. Techniques like questionnaires, face-to-face interviews, discussions are also used for probable cause and are also appreciated.

This level of action research can be considered as the top level if viewed from an intermediate level. This fourth step consists of four other steps, which most researchers find difficult. Let's look at that four section template.

Simply listing the possible causes of the problem in this step does not skip this step. Many researchers list only five to seven possible causes of the problem. It means that, the researcher knows why the problem exists or is done for the sake of research. It is essential for the researcher to consider more and more possible causes of the problem. The author believes that if eighteen to twenty reasons are considered, the research becomes more standardized, that is, the researcher gets an accurate and long-term solution to his problem. Thus, functional. Fourth level of research We tried about the first sub-level according to the table of possible causes of the problem.

The second sub-step is analysis. We have considered the possible causes of the problem, were imaginary, hypothetical reasons. Now it is determined whether those causes are actually responsible for the problem or not. For that a questionnaire or questionnaire is designed and filled by the students. Based on the possible causes of the problem, this questionnaire or questionnaire can be created. Only a few syntax changes have to be made. Like, 'Students of standard-8 find it difficult to draw the timeline

of sociology subject.' – If this problem occurs to a teacher, then the possible reasons for it are considered. In which... students may not know what a timeline is, students may not have been taught timelines in previous grades, students may believe that timelines do not exist.

It doesn't make any difference if you can... etc. If you want to know through a questionnaire which of the reasons that we have thought are really true, then you have to ask the question that....

- You know what a timeline is?
- They standard-Timeline was taught in 7th?
- You believe that if the timeline doesn't work, nothing will matter?

Answers When a researcher formulates questions from possible causesAccepting 'yes' or 'no' is considered imperative, but when there is a plan to get answers through the legislature, it is imperative that students give their answers by 'agree' or 'disagree'. like...

- I have no idea what a timeline is. Agree / Disagree
- I standard-Nothing is learned about the timeline in the 7th.
- I believe that, it doesn't matter if the timeline doesn't fit.

thus, after doing this the students' answers (whether in 'yes', 'no' or 'agree', 'disagree') are compared with our possible reasons. If the majority of students agree with the reason we believe, i.e. they believe the same as we believe, then it becomes a 'fact' or the reason becomes a 'hypothesis'. Here most students can interpret the word according to the depth of your problem. There is no absolute rule that only 60% of students or 75% of students say 'yes' to be a 'fact'; But it can be said that one of the possible reasons for a problem that we find is a fact that the students also see, and if the reason that we think for the problem is important at all to the students, then it becomes a 'hypothesis'. . Thus, here in the second sub-step against each statement 'fact', 'assumption' is determined.

From the possible causes of the problem, the fact that the assumption can be made or what the researcher can do about it is discussed in the third subsection. Only those statements which are factual i.e. the real causes of the problem are useful for the researcher, statements that are assumed to have reasons that are not real are not important for research. Thus, the statement which is

true, the statement is being checked step by step and thinking what can I (researcher) do to solve this cause? If 'Yes' then mark ``against Yes'' and ``No'' against No. So that the researcher does not waste time and energy in the cause in which nothing can be done. For example, the students were asked 'Do they like St. Was the timeline taught in the 7th?' If all the students say 'no' then it is proved that our belief is correct. Now what can the researcher do in it? If nothing can be done, he will mark 'No', so that the researcher does not waste time on that statement, that reason. If 'yes' means the researcher can do anything, then the researcher has to proceed to the fourth sub-step priority.

Suppose that, the researcher considered a total of 20 possible causes of the problem. Out of which the student finds out that 12 statements are facts and 8 statements are assumptions, then the researcher has to remember only the factual statements. Can I do anything from that factual statement? It has to be moved towards. Out of 12 statements the researcher can do something in 07 statements. Nothing can be done in 'Yes' and '05' statements, if there is 'No', now the researcher has to give rank 01 to which statement / reason can be solved first out of total 07 statements with 'Yes' and so on according to the order of solution. A sequence has to be given and the concept is formed accordingly.

thus, considering possible causes of the problem step by step...

- Forming possible causes of the problem.
- Formulation of questionnaires or questionnaires from probable causes.
- To fill the questionnaire or questionnaire to the students.
- Reason from students' answersDetermining whether it is 'fact' or 'perception'.

- There is nothing the researcher can do about how many statements are true, knowing that.
- If the researcher canTick 'Yes' and 'No' if unable.
- Research in as many reasons as possibleRanking the reasons marked 'Yes' in order of what can or should be done first to resolve them.
- From this number the projections will be made in the same order, which will be the fifth stage of action research, which will be discussed later.

(5) Concept :

This fifth stage of action research is also called action planning by many. After determining the possible causes of the problem, an action plan is formulated from those causes. An action plan is an orientation to the solution of the problem and the direction of the path to that solution.

Actionable propositions are usually in the form of a statement. That statement can be divided into two parts. Functional part and medicinal part. The action part indicates what is to be done to solve the problem and the remedy part indicates what the result will be.

The following are the bases for determining the action plan:

(1) The teacher's insight into his own work

(2) Teacher's subject matter experience

(3) Analysis of the causes of the problem

(4) Discussion with the principal and other colleagues

(5) A sense of school progress and knowledge of new trends in education.

The following points need to be considered in determining the action plan:

(1) Emphasis is placed on the action side in the action concept, so the concept should have a clear picture of what is to be done.

(2) The operative part must be practically correct, so that hypothesis testing is possible.

(3) There should be a clear idea of where and how much impact the action plan will have.

(4) The meaning of the operative predicate must be clear. The words appearing in it should be clarified if necessary.

Action plan in generallt is presented in the form of 'if - then'. In order of priority in the hierarchy of possible causes of the problem, it is easier to formulate the hypothesis of the cause which is first. like, :...

Students have no idea what a timeline is. - If this statement is given 1 priority by the researcher, then its hypothesis is formed as follows:

'- This problem can be solved if the students are explained what is timeline and its different sections.' Thus, as many sequences as hypotheses are formed,

Apart from this the hypothesis is also formulated as follows. Aslf there is a 'poor handwriting' problem.....

(1) Give the students ten minutes to write and self-monitor each day.

(2) Students have bi-linear (double-line) writing in a notebook.

(3) Give guidance in purchasing suitable writing materials.

(4) Insist on beautiful signatures.

(5) Display samples of beautiful signatures through charts.– So handwriting of students will improve.

An action plan is a conceptual plan of possible solutions to a problem. Both the extent to which the problem is relevant to the teacher and the extent to which he wants to solve it are both evident in the formulation of the action plan. The clearer the concept, the more specific both the research and the solution. Based on this step the researcher will know what I have to do now to solve this problem? What will be required? Who needs help? What educational tools will be needed? What references will be needed? ... etc. Thus, based on the hypothesis, the researcher will find it easier to design the next stage of the experiment.

(6) Outline of Laboratory :

After a hypothesis is determined to test whether it is true The outline of the program is determined and the work is done accordingly in the school. Applying the possible solutions to the problem and the problem in a fixed time The researcher sets a specific time frame to get the solution, in which what can be done to solve that problem? what will i do Plans things like

After this operational part of action research as planned is completed within a fixed time frame, an evaluation test of the hypothesis is correct and useful or even for decision making., opinion of teachers, questionnaires etc. can be used.

If the action concept is correct i.e. the good results of the experimental design are adopted daily then the action research contributes directly to the improvement of school work. The experiment is followed by the outline of the experiment, certain days the teacher works as planned and then the problem to what extent in the seventh step of research

(7) Evaluation:

Choice of problem, field, gathering the necessary information, formulating, prioritizing possible causes of the problem based on them, making predictions. After this work is completed, the stage towards the final stage of the research is evaluation work.

Problem solving is based on hypothesis and experimental design but on evaluating how much the problem is reduced or occurred. Action research is observed throughout action research. Hence, evaluation should be done very cautiously. should be evaluated, so that what really has to be done, remains.

(i) Observation: Evaluation of action research

This way can be done sincerely. Teacher here, the researcher or principal regularly observes and explores and tries to have his/her research evaluated objectively. The main advantage of observation is that it does not involve controlling the situation. A person can also be assigned the task for observation,

now a CCTV camera can also be helpful in observation. The recording done in it also gives you convenience of time. If the things to be observed are fixed, more precision can be brought to them.

(ii) Collection of feedback (Collection of Opinion): By taking feedback from various departments of students, teachers, principal, it can be known how much improvement has been made in the problem. A specific inventory to elicit these responses should be developed by the researcher. Also, responses should be viewed with skepticism, so as to prevent any bias.

(iii) Questionnaire: Questionnaires or manuals that we have filled the students in the hierarchy of the possible causes of the problem, we can also know the extent to which the problem has been solved by filling the questionnaire again. In research language it is called Pre test and Post test. An increase in coefficient indicates improvement of that problem. The questions of the question paper that will be formed during the answer test should be done carefully.

(iv) With / Interview (Interview) : Evidence is a simple method of evaluation. The thoughts of students, parents, class teachers can be known through evidence. To what extent the problem is improved, what difference do you notice in your problem after the experiment etc. we can know through ideas, description and the result can be predicted through these ideas, description.

(v) Check-list: Check-list technique is also used for evaluation. It lists certain things and asks the students to check them. This type of list is also called problem check-list. Answers to common questions can be quickly obtained through this technique.

(vi) Rating Scale: To know the extent to which the problem has been solved, the researcher uses five-point rating scale or: seven-point rating scale. This criterion consists of five or seven boxes against one statement. Students have to mark it as correct.

(vii) Test: If the subject of the research is related to the subject matter, the students can also be evaluated by taking a test. The extent to which the problem has improved can be known by examining the transcripts through the examination results. It is of course the responsibility of the researcher to ensure that this examination does not become subjective.

(vii)Numerical activities(Statistical Devices) :

functionalResearch has little place for hard and complex statistical calculations; But it can also be evaluated. It can also be evaluated by common measures of numerology such as median, median, multiple. Also, in the above various activities, statistics can be used wherever needed. Testing by statistical methods is more standardized and reliable.

All of the above should be evaluated by whichever method is easiest or most applicable, so that the next steps to solve the problem can be considered.

(ix) Findings, Conclusions and Implications: What was the conclusion of the experiment in the section? What percentage of success? In what matter did not get success? What could be the reason for it? What can be considered again for that? This is written in steps. etc. in detail with reference to matters

conclusion, results and simulations are held together in the same hierarchy, but the researcher may describe all three in different ways.

(A) Conclusion: Here the researcher should write a note about what can be concluded from the whole process that the researcher is researching to solve the problem, the various steps he has implemented, experimented, tried to solve the problem through various procedures. is These findings can be process oriented, interpretive, improvement oriented, problem oriented or outcome oriented. A conclusion is a precise observation of the researcher. Based on it, it is known how much the researcher's hard work was successful.

(B) Outcome: In action research the outcome has to be detailed. Throughout the various processes of evaluation If the process is statistically tested only after it has been evaluated, the analysis is considered a research result. If the result of the research is to be determined by general or superficial calculation, then the word % is used. like, Grades: 22% of students in grades 8–6 showed improvement in handwriting. Thus, the success of the entire research can be known from this result.

(C) Exemplary : The work is not completed when the research is completed i.e. its deadline is met. Research to find out how deep the problem is, why it can be solved; But to prevent it from reoccurring or to solve it for a long time so that the problem is eradicated etc., simulation is necessary. Replicable means the assurance that even after the research, the experiment, the improvement will continue. If

the trainees do action research in fifteen days during their training, then after fifteen days there students, teachers, parents, principal assure them that even after your departure, we will continue this work, keep such things in mind, bring such reforms, this problem will not arise again. If it is allowed to happen, it is called imitation. Oftentimes, when doing research on paper or just doing research for the sake of doing it, people easily ignore modeling standards; But this is also a part of research itself, it should be kept in mind.