**Unit-3**

**Non-Projected Teaching Aids**

**a)**      **Real Objects:-**

These are most useful and most effective means of providing direct experiences to the pupil Example to teach the area of four walls of a room we can make use of the four walls of class-room. Similarly black-board can be used to teach the area of a rectangle.

**b)**     **Models:**

                 In order to clarify and explain the abstract things, some things concrete like models have to be presented to explain those abstract things. Models are the three dimensional representations of the real objects E.g.

1.Models of geometrical solids such as cone, sphere cylinder etc. These models may be made out of card board (or) chart paper and may be used to teach topics such as area of a cone, are of a sphere, area of a cylinder etc.

2.The concept of angles can be explained easily if two strips are hinged at one end.

3.To prove that the sum of three angles of a triangle is 180o we can take a chart paper model of a triangle and fold it as under.

4.To find the area of a circle can be obtained by cutting a piece of cardboard. This      is then cut into 8 equal parts are these parts           are then assembled.

**Charts:-**

                   Charts are defined as a combination of graphic and pictorial media for the orderly and logical visualizing of relationship b/w important facts, ideas or concepts. “Edgar Dale defines a chart as a systematic arrangement of facts in a graphic (or) pictorial form, presenting for convenient reference comparisons of quantity, distribution, trends, and summaries

     The charts serve the following purpose:

1.showing relationship by means of facts, figures

2.presenting matter or statistics symbolically, graphically

3.These are used for depicting certain important formula (or) results of mathematics.

Ex: S.I = P X T X R

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                   100

Ex: Area of rectangle = length X breath.

1.Presenting abstract ideas in a visual from showing continuity in teaching – learning process and summarizing information presented.

2.Motivating and arousing students’ interest.

**c)**      **Black – Board:-**

Black-board is an integral part of the Mathematics classroom. The black-board should be well polished and smooth. It should be black in colour and fit for writing with a chalk. In some places the colour of black-board has now been made green. This has been done because the green colour is useful for eye sight.

**Advantages:-**

1.      It is used to develop various steps of the solution of a problem (or) proof of the -Orem.

2.      It is used for drawing important diagrams.

3.      It is used to compare and contrast certain important results. Such are noted down on B.B.

4.      Black-board can also be used to plot certain graphs (or) curves showing various inter-relationships, presenting statistical data etc.

**d)**     **Flannel – Board:-**

             The flannel board consists of a piece of flannel, stretched tightly over a strong backing of plywood, pictures, cards and other similar material can be stuck on the flannel board if sand paper, felt paper (or) blotting paper are give to their back.

**e)**      **Bulletin Board:**

            The bulletin board is used for displaying bulletins, announcements, and visual displays that are interesting to the students. Bulletin boards are usually made of wood with thick flannel cloth on them and a wooden frame running around it with a glass covering on the front side.

**Advantages:-**

1.      To motivate, arouse curiosity and build enthusiasm in students.

2.      To display work done by students.

3.      To display graphic and pictorial material linked with the curriculum in an attractive manner.

**ii)  Projected Teaching aids:-**

a)      **Magic Lantern:**This instrument of science had proved very useful for teaching mathematics. It helps to demonstrate different types of figures, diagrams, pictures related to various topics of mathematics through the slides. For getting better results, the teacher may also give explanation of the things demonstrated on the magic lantern.

b)      **Film Strips:** - In a film strip, 15 to 20 slides concerning useful topics are photographed on a 35 or 16 mm films. These film strips are then projected on the screen through a projector. The teacher may demonstrate the pictures for any period of time irrespective of speed as the situation demands. These are light in weight and easy to transport and a large variety of information can be presented.

c)      **Projector:**  OHP is a device that can project a chart, a diagram, a map, a table or for that matter anything written on a transparent sheet, unto a

d)     Screen (or) even a wall.

**Advantages:**

1. OHP’s are usually light weight and easy to carry.

2. Teacher can always face the class.

3. Lots of time is saved as writing on black-board can be avoided.

4. There are very useful with large groups the visibility is more.

**e)**      **Epidiascope:**

This device can be used to project transparent as well as can not pass through pictures. It can be used to project slides, film-strips etc. It can also be used to project the content, figures and diagrams of the printed (or) written pages. It is quite useful for depicting complicated figures.

**f)**       **Motion pictures:-**

**iii)  Excursions:**

Excursions are helpful in providing the knowledge of Mathematics and in developing interest and understanding of the subject. For such excursions students may be taken to post-office, bank, market, insurance office, agriculture fields etc.**Mass Motion pictures are**useful if we are interested in showing some action (or) motion. Such pictures are used to stress the applications of mathematics and development of concepts and generalization. Such pictures are capable of introducing real life situation in the class-room.

**Media:**

The term mass media stands for dissemination of information, ideas and entertainment by the use of communication media. The media include those which use modern means of communication such as radio, television, film, press, newspapers and advertising. In fact, they co- exist with the important traditional media such as folk dance, drama and puppetry.

**Mass Media and Education:**

Education in its modern form, involving the instruction of pupils with in specially designated school premises, emerged with the spread of printed materials and higher levels of literacy. The rise of mass media and the rise of mass ed/are closely connected, because of the letters ability to read & write to participate in public sphere. Media are generally classified on the basis of their distribution channels.

                             Print Media                                                Electronic Media

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                        Books                                                  Radio

                        News papers                                        Television

                        Magazines                                           Films

                        Direct mail                                          Tape & Disc Recordings

**Radio:**

Radio has been playing a vital role in the field of education and Radio has established due credit in the filed of education. Almost all the important centers of A.I.R. board cost programmes concerning ed/ either the regular classes on topics of mathematics are being held (or) the important discussions and speeches concerning principles and laws of mathematics, life history and contribution of mathematics, the application at mathematics in practical life are broad cast. Highly Experienced teachers, teacher educators, mathematicians and research persons take part in such programmes. The Radio as a means of communication takes their voices to the millions of students and teachers listening to their programmes.

**Television:**

Television has the greater advantages as it not only conveys the voices but the picture and actual scene also, the students sitting far away from the T.V. stations may be benefited through the telecasting programmes almost in the same way as it is happening just before their eyes. In television the programmes on mathematical speeches, Mathematics classes for competitive exam, History of mathematics and pictures about mathematicians, and also it has shown the places about related to mathematics.

             Eg: Bank, Post-office, share market etc.

         The teacher of mathematics should try to take advantage of such learning opportunities by making himself and his students fully conversant with such programmes

**Tape recorder:**

                 Tape recorder also we can use for the programmes on mathematics education. This is also used in rural areas. If the lessons are not understood for the students at a time, they record these programmes and they can listen any time. If the students miss the radio lesson for different timings they will able to listen in tape recorder by recording such programme.

**News Paper:**

News papers may be used an effective aid for teaching and learning of mathematics. They help in correlating teaching of mathematics with day to day happenings of life. The statistics given in the newspaper in the from of weather charts, the prices of various commodities, budgets of stage and central government, interest rates of various private and government  agencies stock and shares etc. All provide good means for making the teaching of mathematics interesting useful and purposeful. The cutting of the news papers may thus be employed to help the students in learning the practical application of mathematics in day to day life.

**Text – Books:**

Text-books are standardized collection of the subject-matter that has to be taught to the students. They facilitate the teaching of new concepts and skills and maintain the knowledge already acquired and help the correlation of the theoretical knowledge with the practical aspects of life

**Importance of text – books:**

**Usefulness to the teacher:**

1.      It provides suitable subject matter and guideline regarding the syllabus of the subject. So the teacher neglects no portion of the syllabus and does not waste time on relevant details.

2.      The text books help the teacher planning his lessons, deciding his method of teaching and preparing suitable aids.

3.      It provides certain well illustrated examples about a topic.

4.      Text books are usually written by the well experienced teachers and subject experts. A teacher can make use of their services by making use of their Text-books.

**Usefulness to the students:**

1.      They provide the students with well graded exercises for drill, revision and review.

2.       Text books help in pre-preparation. At their home, students may get themselves prepared for studying the next day lesson.

3.      Text-books help in doing self-learning, self-study and helping the students to acquire the habit of independent learning.

4.      Text-books are also quite useful in case a students has to remain absent from class due to one (or) the other reason.

**Usefulness to maintain the uniform standards**

Text-books play an important role of maintaining uniformity in standards. The text books are quite helpful to examiners in their Evaluation work because they come to know of the standards expected of a particular class.

**Characteristics of Good Text-books:**

1.      It presents the subject-matter strictly in accordance with the latest-syllabus.

2.      It is written by experienced teachers.

3.      It should contain well graded problems for revision.

4.      The day-to-day needs of the students and their physical and social environment should find due place in the text book.

5.      It should be according to the aims and objectives of teaching Mathematics in that particular class.

6.      The new development and invention in the filed of Mathematics should find their place in the text-book.

7.      The psychological as well as logical order should be followed in the organization of the subject matter of the text-book.

8.      All the definitions, concepts and principles given in the text book should be as clear and definite as possible.

9.      It should make use of the national and international standard terminology in terms of symbols, formulae and definitions.

10.  The principle “from simple to complex” should be followed in the arrangement of the topics of the text-book.

11.  It should meet the abilities, experience and interest of the students for which it has been written. It should cater to the needs of all types of students – slow, average and fast learners.

**Qualities of a good text-book:**

         I.  Subject matter:      1.   its usefulness

2.  Proper organization

                                            3. Coverage of the prescribed syllabus.

4*. Accordance with standard of students.*

                                            5. Logical and psychological sequence of presentation.

6*.*Up-to-date content.

**II. Language and style:**

1.      Simple and clear language.

2.      Simple language of question.

3.      Number and type of questions.

4.      Use of well defined and authorized technical words.

5.      Free from errors and mistakes.

**III. Form of price:**

1.      Impressive get up

2.      Good and mistake less printing.

3.      The type of print according to age group of student.

4.      Clear printing of figures and graphs.

5.      Use of good paper.

**IV. Author and publication:**

1.      Qualification. Rank and Teaching Experience of the author.

2.      Expert of the subject & specialization.

3.      Reputation of the publisher.

4.      Year of publication.