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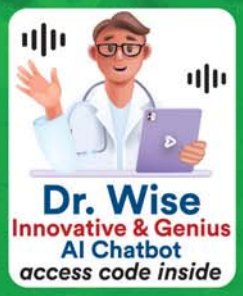
NURSING EDUCATION

Principles and Concepts

As per the INC Syllabus for MSc Nursing



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3 CHAPTER

Instructional Media and Methods

"The foundation of all learning consists in representing clearly to the senses, sensible objects so that they can be appreciated easily".

—Comenius

Chapter Outline

- Definition of Audio-visual Aids
- Senses as Gateway of Learning
- Use of Audio-visual Aids
- Classification of Audio-visual Aids
  - Audio Aids
  - Visual Aids
  - Combined Aids

Objectives

After reading this unit, you will be able to:

- Define audio-visual aids
- Classify audio-visual aids
- Apply the principles in using audio-visual aids
- Understand the advantages and disadvantages of audio-visual aids
- Explain the various types of audio-visual aids.

Introduction

Audio-visual aids are being increasingly used in modern day educational programs and has become inevitable to make the classroom teaching colorful and vivid. These are the devices by which the teacher helps the students to clarify, establish and correlate concepts and appreciate them through utilization of more than one sensory channel. They are means of communication that help to make learning more meaningful, more interesting and more effective. The term "Media" refers to the channel through which an idea or concept is communicated to the learners. In any instructional situation, media follows the method and both go hand-in-hand. Audio-visual media is highly exploited in the classroom situation for effective communication. Audio-visual aids supplement the teacher's explanation and are called "Teaching Aids" since teachers plan, prepare and use them in the classroom. It is to be remembered that in any situation, teaching aids can never be able to replace a teacher.

Definition

Audio-visual aids are any devices that can be used to make the learning experience more concrete, more realistic and more dynamic (Kinder).

Dent defines audio-visual aids as "all materials used in the classroom or in other teaching situations, to facilitate the understanding of the written or spoken words".

Mckown and Roberts define as "audio-visual aids are supplementary devices by which the teacher, through the utilization of more than one sensory channel is able to clarify, establish and correlate concepts, interpretations and appreciations.

Burton defines audio-visual aids as those sensory objects or images which initiate or stimulate and reinforce learning. An audio-visual aid is an instructional device in which the message can be heard as well as seen.

Audio-visual aids are defined as any device used to aid in the communication of an idea. This definition gives the idea that virtually anything can be used as an aid, providing it, successfully communicates the idea or information for which it is designed. Audio-visual aids are not a supplement to teaching and not a substitute for teacher or books.

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Senses as Gateway of Learning

Researches in America have shown that we learn about:

- 1% through the sense of taste
- 1.5% through the sense of touch
- 3.5% through the sense of smell
- 11% through the sense of hearing
- 83% through the sense of sight.

Further, with regard to the retention of learning, elaborate researches have shown that we remember about:

- 10% of what we read
- 20% of what we hear
- 30% of what we see
- 50% of what we see and hear
- 80% of what we say, and
- 90% of what we say as we do a thing.

The traditional teacher depended too much on verbal exposition. The pupil hears and forgets. Further, unless the individual has pragmatic imagination, it will be difficult for the individual to visualize objects and events however vivid, the verbal description is. It is highly possible that concepts formed will depend upon the nature of background experience of the individual. It is highly essential particularly in science and technology that knowledge gained by an individual is accurate where considerable visualization of objects (Pupil see and remember) and processes (Pupil do and understand) are necessary and formation of accurate concepts essential.

Where to use Audio-visual Aids

- Where they add to the clarity of the subject
- Where the subject is too far to be actually seen, as in geography and astronomy
- Where the subject is too big to be handled or brought to the classroom
- Where the subject is too small to be seen by naked eyes, e.g. germs, atoms, etc.
- Where the concept of teaching is related to abstract and nonvisual subjects.

Classification of Audio-visual Aids

- Audio aids
- Visual aids
- Combined aids

Audio Aids

They are also known as auditory aids and can be only heard. They comprise of radio, tape recorder, microphones, amplifiers, earphones, etc. The tape recorders are extensively used as teaching aids **(Flowchart 3.1)**.

Visual Aids

They can be broadly classified into projected aids and nonprojected aids. Those that are not requiring projection are nonprojected aids and are the most commonly used and important aids. This category includes graphic aids (including graphs, charts, diagrams, cartoons, flannel graphs, maps, flip charts, chalkboard, bulletin boards, etc.) and three-dimensional aids (including real objects, specimens, models, puppets, exhibits, etc.).

Combined Aids or Audio-visual Aids

They are a combination of audio and visual aids.

AV aids/media can be classified into three different perspectives as below:

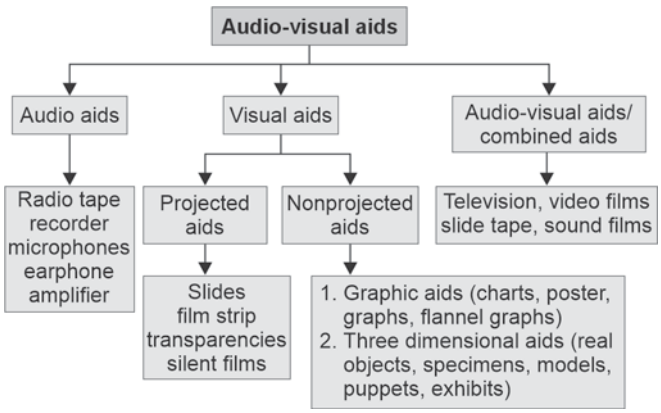
1. Hardware/software – Projected and nonprojected
2. Dimension – Graphics and models
3. Technology advancement – Traditional and digital

Projected and Nonprojected Media

Projected media is one which requires hardware like OHP, slide projector, LCD projector, etc. for projecting the software to be presented. On the other hand, nonprojected media does not require any hardware and can be projected for presentation straight. Some examples of projected and nonprojected media are:

Projected	*Nonprojected*
• Slides/film strips	• Chalkboard
• OHP transparencies	• Charts
• Movie (35 mm/16 mm film)	• Magnetic cut-outs/displays
• Video projection	• Felt cut-outs/displays
• Powerpoint slides	• Models
• Monitor	
• LCD	

Flowchart 3.1: Classification of audio-visual aids.



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Graphics and Models

The word Graphics emerged from the Greek word "Graphien" which means both writing and drawing. Pictorial representation was an earliest means of nonverbal communication. "One picture is worth a thousand words" is not a mere propaganda, but it is true. Graphics takes many forms such as program titles, diagrams, graphs, maps, etc. Graphics may also be used to catch the eye, to create atmosphere or to "humanize" a subject. Properly designed graphic images convey facts and ideas more economically and more elegantly than real images.

Traditional and Digital

A traditional media is one which is made by using common materials such as cardboard, hardboard, wood, plastics/ perspex, transparencies, films, photographs, color cardboard, black cartridge paper, poster color papers, fluorescent papers, poster color paints, thermocole, and so on. It could be a chart, transparency, a set of slides or film strip or a model.

A digital media is one which is developed using digital devices and computers. Powerpoints, graphic animations (2D or 3D), Computer Based Teaching (CBT) materials, Computer Based Multimedia Learning Packages (CBMMLP) are some of the digital media.

Principles in the Use of Audio-visual Aids

The following principles are to be followed in the use of audio-visual aids:

- **Principle of selection**: The instructional aids selected should be suitable for the level of audience, the educational objectives, and the nature of content that is to be instructed
- **Principle of preparation**: This refers to cost-effectiveness in preparing the audio-visual aids. It will be better to make the aids by using locally available materials utilizing the creativity of the students
- **Principle of presentation**: Getting an instructional aid is of no value, when it is not presented in an attractive and acceptable manner
- **Principle of response**: The teachers should motivate the students to respond properly to the instructional aids
- **Principle of evaluation**: There should be a continuous evaluation of both the audio-visual aids and teaching techniques in the light of realization of the desired objectives
- **Principle of preservation**: All the aids that are used by the teachers or the students must be maintained properly and kept away from dampness, dusts, insects, moths, etc.

Requisites for an Effective Audio-visual Aid

An effective audio-visual aid should be:

Motivating

- Meaningful
- Purposeful
- Accurate
- Simple
- Attractive
- Facilitating group participation
- Up-to-date
- Easily portable

Self-explanatory

- Clear
- Creative and vicarious
- Realistic and provide variety

Reinforcing

- Meeting individual differences
- Following scientific principles
- Facilitates positive transfer of learning
- Makes the concept to be easily understood, easy to handle and manipulate

Uses of Audio-visual Aids in Teaching

- Best motivators
- Concrete
- First-hand experience
- Variety
- Greater retention
- Attractive
- Promotes learning
- Saves energy and time
- Realistic
- Vividness
- Meets the individual needs
- Aids in mass education
- Promotes scientific temper
- Develops higher faculties
- Reinforces learning.

Advantages of Audio-visual Aids

- They provide a concrete basis for conceptual thinking
- They stimulate interest among students and hold their attention. It sustains and focuses attention on to the content
- They make learning more permanent and realistic and it helps to retain learned content permanently
- They help to communicate ideas clearly and precisely
- They stimulate self-activity on the part of the students by offering a variety of experiences

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- They promote group dynamics among the students
- They provide experience not easily obtained through other materials and contribute to the efficiency, depth, and variety of learning
- They economize time, effort, and materials
- They help in sharing experiences and motivate toward change of attitudes
- They are potent starters and motivators
- They provide variety of classroom techniques
- They give a true picture of the object/set-up/structure
- It relieves from boredom by breaking the monotony
- It supplies a concrete basis for conceptual thinking and hence reduces the need for verbal communication
- It contributes to growth of meaning and vocabulary development
- It provides experiences not easily secured by other materials and contribute to the efficiency, depth, and variety of learning
- It develops continuity of thoughts in teaching
- It is possible to show inaccessible things
- Motivates the teacher to do a better and purposeful teaching career
- It saves the teachers' time and enhances the efficiency of instruction and makes teaching easier
- It can motivate goal seeking and evaluate outcomes.

Disadvantages of Audio-visual Aids

- Audio-visual aids are not the panacea for all instructional ills
- They are not aids to teaching, but to learning
- They are not ends but means to facilitate good learning
- They should not be misused.

Criteria for Selection of Audio-visual Aids

The following criteria can be used in the selection of audio-visual aids:

- Type of objective to be achieved
- Entry behavior of the learners
- Size of the class
- Nature of the subject matter
- Availability of resources
- Availability of time
- Teacher's competency to use a specific method/media.

Problems in Utilizing Audio-visual Aids

- Apathy of the teachers
- Indifference of the students
- Ineffective aids
- Electrical problems
- Lack of knowledge in preparation and handling
- Language difficulty
- Financial problems.

Teacher's Role in Procuring and Managing Instructional Aids

Teachers play a crucial role in procuring and managing instructional aids, as these tools are integral to their day-to-day teaching. It is one of their key responsibilities to ensure that these aids enhance the learning experience, improve student engagement, and support the effective delivery of lessons. The teacher's duties in this area include selecting, organizing, utilizing, and maintaining instructional aids to meet learning objectives.

Assessment of Learning Needs

- **Assessment of learning objectives**: The course objectives and specific learning outcomes formulated by teachers help guide the selection of appropriate audio-visual aids to best support the learning process.
- **Assessment of learning styles**: Understanding students' diverse learning styles enables teachers to select audiovisual aids that provide a rich sensory experience and promote inclusivity in the classroom.

Selecting Appropriate Instructional Aids

Teachers must consider several factors when selecting instructional aids, including:

- **Type of aids**: Choosing the right format, such as visual, auditory, or interactive tools.
- **Relevance to subject and course**: Ensuring the aids are directly tied to the curriculum and learning objectives.
- **Usability**: Selecting aids that are easy to use and integrate into the teaching process.
- **Durability**: Ensuring the aids are robust and can withstand repeated use.
- **Facilities for repair and maintenance**: Considering the availability of support for maintaining or repairing the aids.
- **Quality and accuracy**: Ensuring that the aids are quality products and are accurate.
- **Cost-effectiveness**: Balancing educational value with budget constraints.

Procuring Instructional Aids

Nursing institutions should allocate a separate budget for instructional aids, which must be included in their annual budget projections. This allocation is necessary for purchasing new aids and replacing or updating older ones. Institutions should also have provisions for the repair and maintenance of these aids.

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The head of the institution, in consultation with department heads, should prepare the budget for instructional aids. Administrators must identify reliable sources for procurement, obtain quotations from vendors, and consult the purchasing committee before finalizing purchases.

After acquiring instructional aids, potential users (such as faculty members) should be trained in their proper use. If necessary, institutions should arrange training sessions to ensure effective utilization of these aids.

Effective Use of Instructional Aids

Teachers should use instructional aids to maximize their teaching effectiveness. Care must be taken when handling these aids, as improper use may result in damage. Teachers should integrate these tools thoughtfully into lessons to enhance student engagement and understanding.

Maintaining Instructional Aids

Instructional aids should be organized and stored in a dedicated space. Nursing institutions typically have an audio-visual aids laboratory, which can be used for this purpose. Regular maintenance is essential, following manufacturer instructions for upkeep. Periodic checks and updates are required to ensure that aids remain functional and relevant. Additionally, all nursing educational institutions must maintain an inventory of instructional aids to track usage and ensure accountability.

Evaluating its Effectiveness

Regular feedback from both teachers and students should be gathered to assess the effectiveness of instructional aids. Evaluation should consider how well the aids help achieve learning outcomes, satisfaction levels from both teachers and students, frequency of use, user-friendliness, and any issues encountered. Based on this input, administrators can determine the overall effectiveness of the aids and make decisions on updates or replacements as needed.

Graphic Aids

"Visual way of presenting the information".

Graphic presentation is a visual art, based on the use of visual symbolic and visual abstract forms. Graphic aids make it easier to understand and read the written text. They present the text in an interesting, concise and visual way, information that would otherwise be given in long and complicated written text. These aids make the textbook more comprehensible by summarizing concisely the major points of the text, actually saving the time in reading.

Selection of Graphics/Images

Psychological, technical and esthetic factors are involved in selecting images. The typographical forms that will heighten the learner interest and focus on key information transmit clear and memorable information about structures, relationships, processes and other abstract ideas. Important subliminal statements and degrees of emphasis will be imparted through the choice of colors, dimension, scale, layout and type face. The designer must gauge the speed at which an idea can be grasped when it has been converted into a symbol or schematic image.

Graphics techniques can be used for greater impact, to hold attention and to distinguish finer points of emphasis and grasping. Some graphic devices become so institutionalized that they replace language altogether, e.g. the arrow or pointing hands as directional signs. Bold, original and surprising effects have strongest initial impact. Pictures can be used as part of this, to intrigue pupils and develop ideas or liven up the page. The concept of contrast in its various applications helps us to understand which graphic element will "stand-out" more strongly.

Leonardo do Vinci was one of the first writers in science and technology who recognized the importance of integrating pictorial representation with verbal description as a way to communicate factual information clearly and efficiently.

The planning of a graphic aid is primary part, to determine which type of graphic aid best meets the necessities for efficient transmission of information. The secondary part is to decide where to place the graphic aid. The graphic aids like tables, photographs of specialized subjects or situations, drawings and diagrams, graphs, posters and charts make a presentation more impressive than a written description.

Especially, graphic visual materials like graphs, pictures, tables, and diagrams contain visual material that is pertinent to the main ideas in the chapter which aids improve:

- **Concentration**: By visually attracting attention.
- **Comprehension**: By helping us to interpret the visual information into verbal language.
- **Retention**: By reinforcing our memory, as we learn information visually and verbally.

Graphic materials are designed to be clear and accurate so that they will help us learn unfamiliar concepts. To make the text easily understandable, these aids should consist of the following components:

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Component	*Description*
Headings	Titles found above the graphic aid.
Legends	Symbols that explain a graphic aid.
Captions	An explanation accompanying a graphic aid.
Foot notes	An explanatory note found below a graphic aid.
Keys	Information used to interpret a graphic aid.

Graphic aids are the illustrative instructional material depicted on a two-dimensional surface combined with drawings, pictures, paintings, and words. They provide nonverbal or visual learning experiences resulting in the formation of mental associations between abstract and concrete ideas. The purpose of these pictures is to help us visualize, what is being described in the written text. They are included not only to illustrate a major point, but also to add interest to what we have already read.

Charts

"An illustrative visual media".

Charts may be defined as combination of graphic and pictorial material, designed for the orderly and logical visualizing of relationships between key facts and ideas. The main function of the chart is always to show relationships such as, comparisons, relative amounts, developments, processes, classification, and organization.

Charts can also be defined as a visual symbol summarizing, comparing, contrasting or performing other helpful services in explaining the subject matter. It is meant to depict pictorial and written information in a systematic way by effective arrangement of the key facts. They are visual displays arranged on thick sheets, poster paper, newsprint or cardboard.

Purposes of Charts

- It is used to motivate the students
- It serves as an illustrative visual media
- It depicts logical relationships between main idea and supporting facts
- It is useful in teaching situations where breakdown of a fact or a statement is to be listed
- It is useful in showing points of comparisons, distinctions and contrast between two or more things
- It is useful in learning situations for depicting organizational and hierarchical structures
- It is used for presenting abstract ideas in visual forms.

Classification of Charts

Generally, charts can be classified as:

- Tree chart
- Stream chart

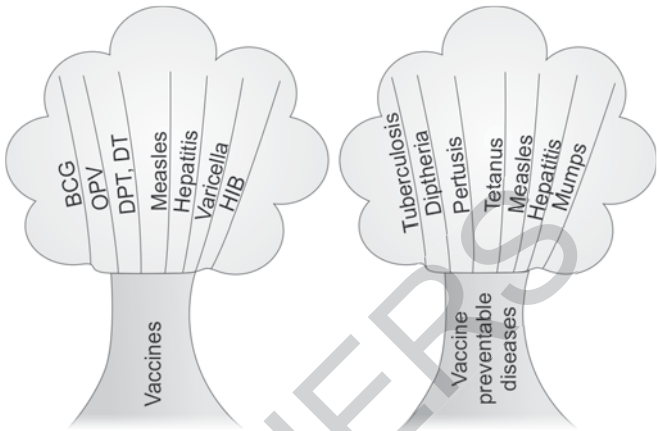

Fig. 3.1: Tree chart.

- Narrative chart
- Tabulation chart
- Flowchart
- Genealogy chart
- Time chart.

Tree Chart

A chart depicted in the form of a tree with several branches is called as a tree chart. The main concept is represented as the trunk of the tree and various subdivisions/developments of the concept will be depicted as its branches. The possible consequences of a complex disease could be explained well with the help of a tree chart **(Fig. 3.1)**.

Stream Chart

In these types of charts, the main concept is explained in the form of a stream of river, and its subparts in the form of tributaries coming out of it. It is more similar to a tree chart **(Fig. 3.2)**.

Narrative Chart

It is an extended left-to-right arrangement of facts and ideas used to express the concept(s). It is also used to explain the cause and effect.

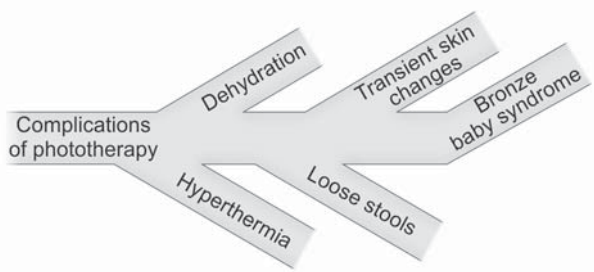

Fig. 3.2: Stream chart.

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Tabulation Chart

In these types of charts, the data is presented in a tabular form. They are commonly used for comparisons, or for listing advantages and disadvantages of a particular treatment or like. It presents information in ordinary sequence. They are very valuable aid in the teaching situation where breakdown of a fact or a statement is to be listed.

Advantages of essay	*Disadvantages of essay*
• Easy to construct	• More subjective
• Encourages creativity	• Time consuming to answer
• Helps in organizing ideas	• Offers less feedback
• Helps to assess writing skills	• Takes long time to score
• Allows for free expression	• Has limited range of application

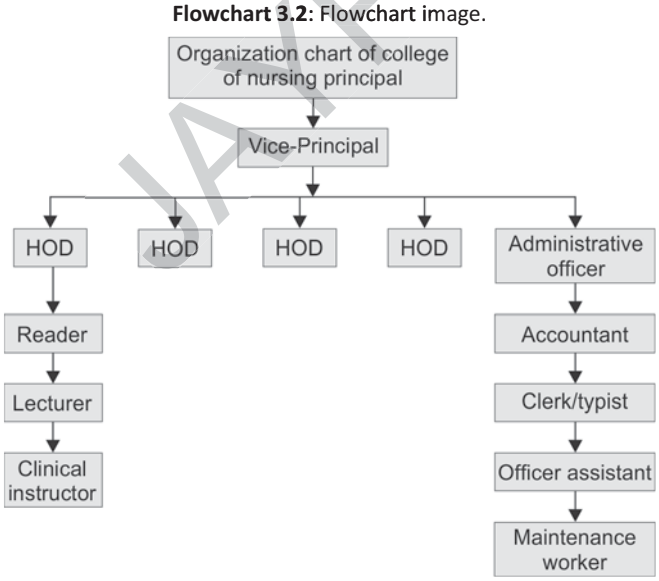
Flowchart

These are helpful in learning situations that requires the study of organizational or hierarchical structures. In these, lines/rectangles/circles or other graphic representations are connected by lines showing the directional flow. While designing a flowchart, care must be taken to preserve a sense of order and sequence **(Flowchart 3.2)**.

Genealogy Chart

This is used to represent the growth and development of an empire, dynasty or historical facts of this nature. Similar to a tree chart, these charts also take an analogy from the tree, the origin in a single line rectangle, circle or other representation of the trunk and the various changes or developments are shown as the branches **(Fig. 3.3)**.

Flowchart 3.2: Flowchart image.



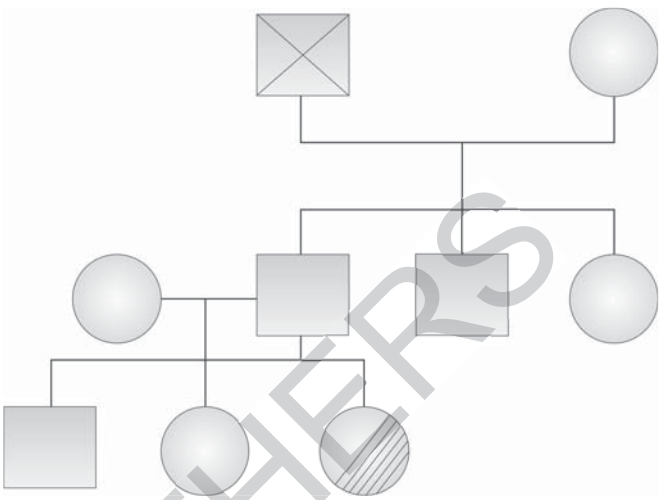


Fig. 3.3: Genealogy chart.

Time Chart

They provide a chronological framework within which events and developments may be recorded. They develop time sense among the pupils, helping them to comprehend and visualize the pageant of time and its relationships **(Table 3.1)**.

Advantages of Charts

- Charts are an effective tool for learning
- They arouse interest in the student
- They are prepared in a very low-cost
- They are portable and available for use and reuse
- They are easily prepared and maintained
- They are used to explain, clarify, and simplify the complicated subject matter
- They attract attention and reduce the amount of verbal explanation given by the teacher.

Principles of Preparing Charts

- Choose the appropriate material either thick or thin, depending on the purpose
- Decide on the information to be written or drawn
- Prepare a layout using the pencil. Draw margin in all four sides
- Decide on the size of the letter. Use of stencil will enhance the legibility of the work

Table 3.1: Time table for I year MSc (N) Program (for a week).

8–10 AM	Nursing education
10–12 noon	Advanced nursing practice
12–1 PM	Nursing research
1–2 PM	Lunch
2–4 PM	Clinical specialty

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- Draw picture neatly and artistically
- Use appropriate colors. Use dark color against a light color
- Decide on how to display.

Effective Uses of Charts

- Sufficiently large in size
- Explain only one concept
- Limited writing
- Neat appearance
- Provision for hanging the chart
- Use of pointer
- Proper storage, preservation and reuse.

Disadvantages of Charts

- Charts cannot be used for large groups
- They cannot be used for illiterate audience.

Pictures

"Representations of beautiful dreams of reality."

Most learners are visual minded; so pictures are a great help in teaching. They remind the learner of the meaning and help her to communicate. They help the teacher save her voice. Also the same pictures may be used for several purposes and for review purposes **(Fig. 3.4)**.

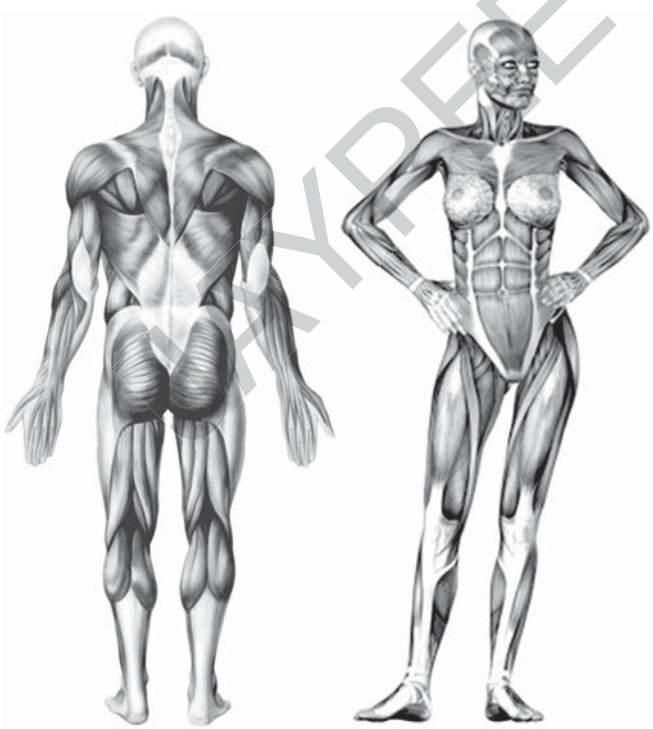

Fig. 3.4: Picture.

Pictures are the most interesting, easily available and understandable as well as interpretable graphic aids. They simplify the abstractions and help to create and maintain interest. They include photographs, paintings, illustrations clipped from periodicals (magazines, newspapers, newsletters, publicity materials or calendars).

The selected pictures are to be relevant to the text in which it is presented and it should be more colorful, attractive, informative, clear, and accurate.

Too many pictures may distract the attention of the students, which is to be avoided. The displayed picture should be genuine and not misguiding. A picture is a cheap and inexpensive graphic aid that can serve as valuable instructional material if used properly.

The picture should be invariably captioned and labeled. It should arouse the curiosity, imagination, and thinking of the student. One should remember that:"A picture is worth more than ten thousand words".

Points to be kept in mind while selecting and showing pictures:

- The picture should be large enough for the entire class to see clearly
- The pictures should illustrate, at first glance, the point under the study
- The colored pictures are more effective than black and white ones and can be used for many purposes
- The pictures should fit into the cultural pattern of the learner
- The picture should tell the learner something familiar to connect it with real life
- The pictures should be labeled to ease classroom practice
- Pictures should not be confusing
- It should be relevant
- Sufficient time should be given to see the picture
- Too many pictures should not be shown at a time
- Adequate lighting should be provided
- It should be removed after showing.

Types of Pictures

Various types of pictures that can be used in teaching are:

- Picture post cards
- Pictures made on charts or pasted on charts
- Textbook and reference book pictures
- Pageant type aids (well-drawn and colored portraits)
- Picture assembly
- Picture diagram.

Dioramas

It is three-dimensional scene in depth incorporating a group of modeled objects and figures in a natural setting. It is very effective in the teaching of biological and social sciences.

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Posters

"Visual representation of concepts".

A poster is an informational or educational tool with which many people in different locations can be reached easily. Posters incorporate visual combinations of images, lines, colors, and words. They are intended to catch and hold the viewer's attention long enough to communicate a brief image, usually a persuasive one. The most effective posters convey a single and simple message. A poster, when kept on display, is a continuing reminder of information being used.

Posters may be a method of communicating information and knowledge and educating the public and professional peers. A poster is an assignment nurses can relate to because posters are prevalent within the health domain.

Poster presentation requires students to know current information and understand a specific content area, as well as be able to reinterpret and organize information so it reaches the audience in a meaningful way. This requires complex skills, and this activity fosters and develops in a logical and applied way.

This approach fosters critical thinking, communication, creativity, analysis, and problem-solving skills, and it allows for different learning styles.

The activity engages students in a collaborative planning process that satisfies the need to know the how, what and why of learning.

Purposes of Posters

- To motivate the students to learn
- To convey information quickly and easily
- To create an esthetic effect
- To serve as an instructional aid both in the classroom and in the community.

Features of a Good Poster

A good poster should have the following features:

- Brevity : Message conveyed should be concise
- Simplicity : Message should be easily understandable
- Concept : Should be based on a single and relevant idea
- Layout : Should be simple and attractive
- Color : Poster should be attractive and eye-catching with suitable colors and color combinations

Preparation of Poster

Posters can be prepared using chart, drawing paper, poster board or thick chart. Posters are hand drawn using various colors or sketch pens. Posters vary in size and it depends upon the content and purpose. In general, overcrowding of letters is avoided and diagrams are used to convey the theme. Nowadays posters are designed and digitally printed using various materials.

Advantages of Posters

- Complex ideas and concepts can be conveyed more easily through posters
- Posters are very attractive and hence they convey the message more quickly
- Posters promote student's skill in creativity
- They can stand alone and are self-explanatory
- Assessment of the students' critical thinking abilities can be done through posters
- Posters provide students with feedback from peers and faculty
- Students get a sense of achievement from producing posters
- Evaluation of posters can be done immediately.

Disadvantages of Posters

- Posters involve faculty time to develop assignment and evaluation techniques
- Can be frustrating to students who are not visual learners
- Posters always may not give enough information
- When a poster is seen too often, it becomes a part of the environment and then no longer attracts attention.

Graphs

"Flat pictures which employ dots and lines".

Graphs are flat pictures which employ dots, lines or pictures to visualize numerical and statistical data, to compare and contrast different variables. Graphs make presentation of specific quantitative data for analysis, interpretation or comparison. A huge data and long list of figure is always boring but the same represented by a graph captures attention and makes students think. Just a single glance of a good graph can give a lot of valuable information. Graphs and diagrams are widely used in the presentation of statistical data either alone or in conjunction with other graphic aids. Graphs readily show a comparison between two or more variables or attributes.

Graphs are preferred to descriptive material as:

- They furnish a visual method of examining quantitative data
- They make a more lasting impression than detailed numbers
- They convey an idea forcefully
- They help us to have a real grasp of the overall picture rather than the details

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- They capture attention and stimulate thinking
- They are easily understandable and interpretable.

In order that these graphs and diagrams present ideas truthfully and emphasize correct ideas, they must be drawn according to certain basic rules which are dependent partly on convention, partly on mathematical considerations, and partly on personal preferences.

Types of Graphs

There are four main types of graphs:

1. Line graphs
2. Bar graphs
3. Pie graphs
4. Pictorial graphs.

Line Graph

Line graphs are used when a considerable quantity of data is to be plotted or when the data are continuous. The concepts are represented with the help of simple lines vertically or horizontally drawn **(Fig. 3.5)**. It is usually a free hand smooth line through various points indicating the instantaneous values of two variables at various moments. The line may be a straight line or curved line indicating the relationship between two variables. Pictorial illustrations and cartoons can also be occasionally used on the line graphs to increase their interest and readability.

Bar Graph

A bar graph consists of bars arranged horizontally or vertically from a "zero" base. Two perpendicular lines from a point (called origin) work as the reference lines. The size,

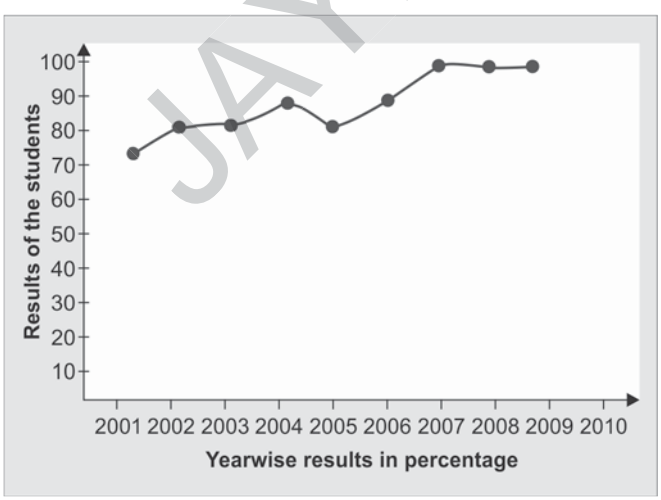

Fig. 3.5: Line graph.



Fig. 3.6: Bar graph.

length, and color of the bars represent different values. Especially, the length of bars represents the magnitude of a given attribute, while the spaces between bars represent second variable which should be uniformly changing.

Bar graphs are especially useful in comparing and contrasting two variables or two groups of the same attributes **(Fig. 3.6)**.

Bar graphs can be made more attractive by using different colors for different attributes, for them to be easily understood. Key to the various colors has to present at the right corner of the graph. The width of the bars and inter-space between the bars are to be equal.

Types of Bar Graphs

- **Simple bar graph**: May be vertically or horizontally arranged. Suitable scale must be used to present bar length.
- **Multiple bar graphs**: Two or more bars can be grouped together.
- **Component bar graph**: The bar may be divided into two or more parts, each part representing a certain item and proportional to the magnitude of that particular item.

Pie Graph

The pie graph is usually drawn as a circle, the sections of which are used to represent component parts of a whole. The circle, that resembles a disk, is divided into sectors of different angles to represent the fractions or percentages of the divisions of a distributive attribute.

Method of construction of pie graphs:

- The surface area of circle is to cover 360°.
- The total frequencies or values are equated to 360° and then the angles equaling the component parts are calculated.

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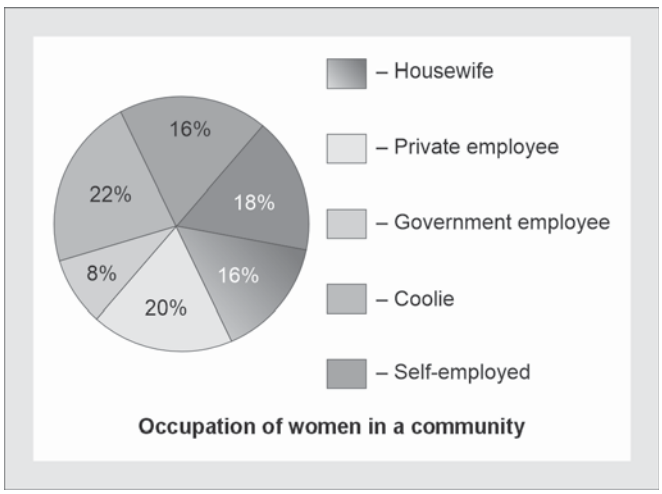

Fig. 3.7: Pie graph.

- After determining their angle, the required sectors in the circle are drawn.
- The numerical data may be converted into the angles of the circle **(Fig. 3.7)**.

Pictorial Graph

Pictorial graph is an outstanding method of graphic representation. In this type, graphic pictures are used for the expression of ideas, thus more attractive and easily understandable. We can either use same type of pictures but of different sizes, proportional to the magnitudes of attributes represented or else, pictures of same size different in number to represent different magnitudes **(Fig. 3.8)**.

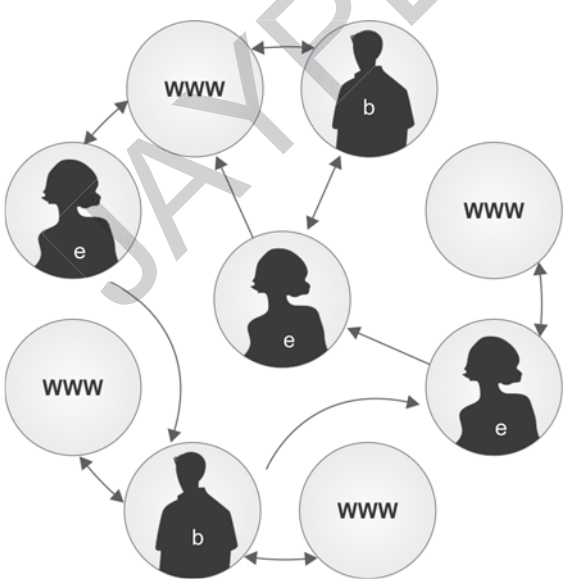

Fig. 3.8: Pictorial graphs (social graph).

Pictorial graphs are more attractive and effective in explaining the difficult concepts and are moreappealing to the viewers, especially children.

Disadvantages of Graphs

- Too many representations are difficult to follow
- If percentages are very small fractions—it may be difficult to represent clearly
- If there are too many slices in the pie, the observer may become confused
- If percentages are too similar, an individual may have trouble in making distinctions
- Careful, concentrated, time consuming effort is needed to prepare the graphs.

Maps

"Graphic representations of the earth's surface".

Graphic representations of the earth's surface or portions of it are termed maps. They are common graphic aids for teaching social sciences. They are more valuable while teaching abstract ideas of distances, sizes, directions of different places, regions and lands, world and universe that are to be put into concrete reality. The basic problem, that of depicting the varied, boundless and nonflattened surface of the earth on a limited plane surface is a difficult one and has resulted in the development of many kinds of map projections and many types of maps (Hiedgerken).

A map is an accurate representation of plain surface in the form of a diagram, drawn to a scale, the details of boundaries of continents, countries, etc.

Various Aspects of Maps

The user should understand and interpret the key of index.

- The user should understand the lines—boundary lines, lines of communication, lines indicating the rivers, contours, meridians and parallels
- She also should understand the colors, tints, shadows, symbols in a map or a globe
- The top of every map is not north, but the direction of northern pole is north
- She should distinguish between various types of maps
- She should understand the position of earth in the universe.

Types of Maps

- Relief maps
- Historical maps (boundary lines of various kingdom and symbol)

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- Distribution maps (population, language, race and economic maps)
- Geographical maps (weather, archeological, rainfall maps).

Cartoons

"Humorous caricature which gives a subtle message".

A cartoon is a novel way of using pictures or symbols or bold exaggerations for presenting a message or a point of view concerning a personality, news, situations, or events. It is more attention drawing and, in a small space, gives a lot of imagination, particularly on the current happenings.

A cartoon is metaphorical representation of reality, and can be defined as a humorous caricature which gives a subtle message. In a cartoon, the features of objects and people are exaggerated along with generally recognized symbols. It makes strong appeal to the emotions thus enhancing learning.

The cartoon is an interpretative illustration which uses symbols to portray an opinion, a scene or a situation. It makes use of personalized humor, fantasy, incongruity, satire and exaggeration. In short, a cartoon is figurative and subtle graphic aid **(Fig. 3.9)**.

Cartoons are meaningful in addition to be humorous. More clearly, they have a visual appeal along with a crisp message. Beneath a superficial exterior, they may portray a deep penetrating meaning.

The main sources of cartoons are periodicals. Newspapers carry cartoons daily which are either political or social in nature. Special periodicals and magazines may carry cartoons on science, management, economics, and education.

For a cartoon to attract attention:

- The quality of drawing should be high
- It should be suitable to the level of the learner
- It should be meaningful and intelligible



Fig. 3.9: Cartoon.

- It should be based on the educational objectives and background of students
- It should be simple and clear
- It should explain the concept without too much explanation/too long a caption, or excessive dialogue
- The symbols used should be familiar
- The drawing should be intellectual though sarcastic and ridiculing.

Advantages of Cartoons

A cartoon can be effectively used:

- To initiate lessons
- To motivate students to start discussion
- For making teaching lively and interesting
- To reveal truth or reality about the people, events and incidents
- To modify the behavior and develop positive attitude in the learner.

Disadvantages of Cartoons

When the instructor decides to use cartoons as instructional aids, she has to choose them judiciously and discriminately, as certain cartoons can injure the personal feelings of students. The amount of sarcasm and ridicule has to be carefully watched so that it does not hurt anybody's feelings.

The uniqueness and simplicity of the cartoons make them useful in appraising, interpreting, and emphasizing different concepts.

Flash Cards

"Flash of cards for communication".

Flash cards are a set of compact, pictured, paper cards of the same size, that are flashed one by one in a logical sequence. They can be self-made or commercially prepared and are made up of chart paper, drawing paper, and plain paper using colors or paintings.

The cards may be plain or laminated for long-term use. The size of the card for small group is 12 cm × 17 cm, 24 cm × 28 cm for the medium size group and 37 cm × 50 cm for large group. Either diagrams are drawn or cut out pictures are used to portray the theme for each card. Number the cards as per sequence. The letter should be legible in the flash card and use of minimum writing is encouraged. The message should be brief and up to the point in the card. A contrast color picture/diagram is used against a light background color. A margin in all four sides looks neat. For effective use, the group size can range from 5 to 15 in number.

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Method of Presenting Flash Cards

Preparation

- The cards should be prepared in such a manner that they are simple, attractive, and colorful
- Bold lettering and illustration should be used on the cards
- The message conveyed should be brief and to the point. Unnecessary material will distract the attention of the viewers.
- They should be numbered and arranged in a sequential manner
- The number of cards should not be more than 15 or 20.
- The presenter should be thorough with the content of the flash cards.

Presentation

- The presenter should give a brief introduction to the audience
- She should hold the card at chest level with both the hands to facilitate visualization by the learners
- She should flash the card in front of the learners, just for a very short period
- Explanation or commentary should follow flashing of each card
- Language used should be simple and realistic
- Sequence should be followed while explaining the cards
- Important points should be stressed and distraction from the theme should be avoided.

Evaluation

Questioning and discussion may be encouraged at the end of the session.

Important points may be explained again and doubts cleared.

Advantages of Flash Cards

- They can be used easily for illiterate groups
- They attract attention and convey messages quickly
- They are easy to prepare, portable, and economic
- They are dynamic and flexible and maintain continuity
- They are helpful in overcoming the language barrier
- They are very effective to convey important messages in areas where people gather
- They can be used to introduce, present, and review a topic.

Disadvantages of Flash Cards

- Way of presentation influences the effectiveness of flash cards
- Maintenance of the flashcards for a longer time may be difficult
- They cannot be used for a bigger audience
- Viewers may lose interest when too many cards are used
- Literate and high class people may not be attracted by this method.

The flash cards are called so because they are flashed or shown to the class just for a short time.

Pamphlets, Booklets and Leaflets

"Printed material in a crisp and concised manner".

Booklets, pamphlets, and leaflets are printed material containing relevant information in a crisp and concise manner. They may be used to supplement any classroom teaching method, especially lecture, or to disseminate information to the community in a short period. They provide opportunity for reading, learning, and referring a specific topic or subject.

A booklet is a small book with a cover page. It is particularly useful for topics which have a high degree of public interest like controlling obesity, care during pregnancy diabetic care, etc.

A leaflet is simple sheet carrying helpful information on useful themes.

A pamphlet is printed material consisting of only a few pages about a specific topic.

A pamphlet or leaflet should be:

- Colorful
- Attractive
- Illustrated with pictures
- Simple and precise
- Informative
- Self-explanatory
- Useful.

Advantages of Pamphlets, Booklets and Leaflets

- Information can be reached to a large group within a short time
- They are highly economic, flexible and portable
- Facilitates individualized learning
- Can be reproduced in any language
- Can be utilized for any group of people at any context
- Stimulates interest on the part of the learner.

Disadvantages of Pamphlets, Booklets and Leaflets

- Presentation is very important, if not found to be attractive, will be easily thrown out

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- Receiving feedback from all those who got the pamphlet or leaflet is not possible
- It cannot be used for illiterates
- It cannot be preserved for a longer time
- Printed teaching material is sometimes described as a frozen language, which may not serve its objective.

Chalkboards

"Most familiar visual aid and a good friend of the teacher".

The chalkboard is the most familiar visual aid in the classroom. Chalkboards or display boards, the plain writing surfaces, are among the most common, cheapest and perhaps the most effective teaching resources. Despite other advanced visual aids, the chalkboard, usually called as the blackboard, remains the most commonly used visual aid in the classroom as well as in the laboratory.

The blackboard provides a sure, quick, and easily accessible means of visualizing important ideas—particularly those which arise during discussion and virtually demand visualization for complete understanding. The teaching atmosphere is created only in the presence of a blackboard. It provides a tremendous help to the teacher for explaining, illustrating, and describing the concepts.

Types of Chalkboards

- **The traditional blackboard** was made with a large surface fabricated with wide planks and coated with dull black paint. It is held by an easel. This type of blackboard had only limited working area, but may be useful when classes are conducted in an open area. These are nowadays replaced by wallboards.
- **Wallboards**: The wallboards consist of either the plank board fitted to wall surface or a rectangular portion coated with suitable paint. The modern chalkboard is made up of the following different types of writing surfaces.
- **Paint-coated pressed wood**: Hard board or any plywood surface finished with dull paint.
- **Dull finished plastic surface**: Any special or suitable colored plastic sheet, PVC or laminated plastic sheet may find special use. For general use, such boards are not suitable because of the high cost and furthermore the surface wears out easily.
- **Vitreous-coated steel surface**: It is made up of steel and can be used as magnetic board also. On its surface, it is possible to use semi-permanent chalk or permanent chalk-ink. It serves as a very flexible and useful tool for teachers and students.
- **Ground glass board**: It is the ideal board for the modern classroom, which is made in a variety of colors. The most important aspect to be considered is that there is no coating of any material on the writing surface to wear out. The writing surface is ground glass, whose thickness will depend upon the size of the board.

  The roller board is like a mat, made of thick canvas wrapped on a roller.
- **White boards**, which can be used for classroom teaching for a small group, can be wiped off easily when written with marker pens.
- **Tariff boards** are used for price listing, reception, welcoming the delegates to a conference, etc.

Selection of color chalks for different chalkboard backgrounds.

Chalkboard background	*Color chalks*
Green	White, yellow, pink
Black	White, yellow, blue, green, pink
Red	Green, yellow
Orange	Blue or light green
Yellow	Blue
Rose	Purple, dark blue

Placement of Chalkboard

The height of the chalkboard is fixed with reference to the height of the human being using it. The lower edge of the board is placed at half the human height. The height of the board should generally be manageable by a human being by extending his/her hands above and below the mid-level of the board.

A teacher uses blackboard/chalkboard to:
- Illustrate the main points
- List questions and problems
- Explain abstract concepts
- Stimulate students' interest
- Draw diagrams, pictures and graphs
- Review the whole topic taught

Guidelines for Use of Chalkboard

The chalkboard is similar to a store window display. Everyone knows that an overcrowded and dirty store window display has little value as compared to one that is clean and neat and displays a few well-chosen items that secure the attention of the public.

The following rules for using the chalkboard should definitely increase its effectiveness as a visual aid:
- Prelesson practice pays good dividends
- A clean chalkboard is a help

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- Always hold the chalk between the thumb and the forefinger with nonworking end of the chalk pointing to the palm of the hand
- Hold the chalk at an acute (low) angle to the chalkboard in order to avoid uneven noise produced during writing.
- The fingers and thumb must act as a chuck for holding the chalk and should not contribute to forming the stroke shape
- The third and fourth finger nails may be used steadily on the chalkboard for special lines but over use of this practice will result in incomplete finger nails
- The strokes must be firm not feathery, whether they be light or heavy in intensity
- Develop the habit of slightly rotating the chalk as the stroke proceeds, and of changing to a new face of the chalk for a new stroke or work. This practice permits intensity without excessive thickness and helps in achieving an evenness of the chalkboard work.
- Always keep the chalk lengths in line with the stroke being drawn, so that chalk is pulled, unless one specifically requires a broad line. The technique sometimes necessitates the wrist being placed in an awkward position.
- Stand back so that the elbow is slightly bent, yet the reach to the board is easy
- Be comfortable and balanced
- Stand in front of the chalkboard such that the plane containing your body is approximately at an angle of 45º
- The stroke is made mainly through joint movement and to a lesser degree wrist, elbow and body movement.
- Use body sway to and fro to accommodate for differences of distance
- Use side sway of the body to obtain horizontal reach.
- Do not hesitate to bend the knees for low reach in vertical strokes
- Good balance is always essential
- Small circles are formed by wrist work and larger ones by a combination of elbow and shoulder movement
- The method which gives the best result is the right one to develop
- The qualities required in chalkboard writing are legibility and speed
- For chalkboard writing, use appropriate letter style, letter shape, letter size, spacing between letters, stroke thickness and levelness of lines
- Speed is essential for good coordination of chalkboard work and oral exposition but not at the price of legibility
- Printing is slower than writing, but it embodies a greater clarity and esthetic appeal and it is preferable to use it for headings and for emphasis
- The total work on the chalkboard should enable a teacher to consolidate his/her presentation in that session. This is known as the chalkboard summary.
- Do not overcrowd the chalkboard with too much matter. A few important points make a vivid impression.
- Make the material simple. Brief, precise statements are more effective than long sentences.
- Plan the work on the chalkboard in advance. Keep the layouts prepared for guidance.
- Gather everything needed for the chalkboard use before the group gathers (Colored chalks, ruler, eraser, etc.)
- Check the lighting conditions. Glare on the chalkboard should be avoided.
- Any writing on the board should be large enough to be visible at a distance and neat in order to be easily legible. Any diagram drawn should be large. Color chalks should be used only to emphasize or differentiate.
- Erase all unrelated material. Other work on the chalkboard distracts attention.
- Keep the chalkboard clean. A dirty chalkboard has the same effect as a dirty window.
- While writing or developing a picture, it is necessary/desirable, and essential that one should talk or narrate what is being done.
- Never talk to the chalkboard; keep turning back and forth; speak to the students while writing on the board
- Stand on one side of the chalkboard while explaining to the students. Use a pointer to draw attention of the students.
- Chalk can be obtained in two forms, standard and dust-free. The dust-free chalk will not deposit dust on the teacher's clothing or other audio-visual media present in the classroom.
- Upper case letters are used as main headings and all other writing should employ lower case.
- When writing on the board the teacher should stop talking, as the voice will not project to the audience. Some teachers feel this silence to be threatening, so they write as quickly as possible, with a resulting loss of legibility.
- The period spent writing on the board can be used as a minibreak for the learners, so that their arousal will increase when the teacher faces them again.
- Emphasis can be achieved by upper case lettering, underlining, encasing or encircling and coloring the words.

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- The diagrams must be large enough to allow the audience to see the details.

Advantages of Chalkboard

A blackboard is the most commonly used teaching aid as it has its own advantages:

- It is the never failing friend of the teacher
- Very cheap, inexpensive teaching aid that could be used again and again
- Could be maintained very easily, at a lower-cost
- Could be used any time, without much prior preparation
- Could be used for a comparatively larger audience
- More convenient to use, does not require any technical knowledge to handle
- Very useful in drawing enlarged illustrations from textbooks.

Disadvantages of Chalkboard

- Most of the times, blackboard is fixed to a particular place, hence confined to that place. It cannot be carried over from place to place, limiting its use in a classroom lecture alone.
- Teacher-centered and teacher-based lessons are only possible with a blackboard
- Constant use leads on to wearing of the surface, making further use difficult
- It makes the lesson a dull routine
- Material once written cannot be presented for a long time (e.g. complex drawings)
- It is two dimensional only
- It cannot show motion
- It can be used for the limited audience
- Chalk dust is another disadvantage.

Effective Use of a Blackboard

B: Be kind and gentle while using the blackboard
L: Layout the plan in advance
A: Arrangement check for:

- L-Lighting
- A-Angle
- G-Glare.

C: Check for cleanliness

- C-Colored chalks
- E-Eraser/duster
- R-Ruler
- C-Cane (Pointer)
- Any other templates.

K: Keep the board in a comfortable height
B: Be judicious while using it
O: Order SOS (Stand on side)
A: Attract by CUPS

- C-Color chalks and capital letters when necessary
- U-Underline
- P-Pointer
- S-Style in writing

R: Writing with a BRUSH

- B-Bright
- R-Readable
- U-Uniform
- S-Straight
- H-Horizontal.

D: Drawings and pictures to be based on PEN

- P-Purposeful
- E-Easy
- N-Neat.

Checklist for Effective use of Chalkboard

Before the lesson

- Devise the chalkboard plan
- Clean the board
- Clean the eraser
- Ensure that sufficient chalk is available in a variety of colors
- Check for glare spots by walking around room
- Check visibility using a sample heading and viewing from rear of room.

During the lesson

- Adhere to chalkboard plan
- Use appropriate lettering
- Emphasize the important words
- Write legibly
- Stop talking when writing
- Erase only when more space required, or when material will cause interference with subsequent points
- Check with learners before erasing.

End of lesson

- Use chalkboard material as a summary
- Erase completely for next class.

Smart Board

Smart board is otherwise known as interactive whiteboards, are digital tools that make learning more interactive and engaging. It allows teachers to interact with digital content directly on the board.

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Uses of Smart Boards

Interactive Learning

- It allows for interaction with the digital content directly on the board,
- It allows the educators and students to write, draw, highlight the keypoints of the lesson
- It permits access to online resources
- Teachers can conduct educational games, quizzes, etc. using smart boards.

Uses of Multimedia

- Teachers can show videos, animations, graphics and presentations while teaching
- It facilitates the teacher in making complex topics more understandable to the students
- It provides rich sensory experience and enhances understanding of the concepts.

Real-Time Annotations

- Smart boards allow instructors to make annotations on screen in real time.
- Teachers can add notes or comments on the screen
- Notes written on these boards can be saved, shared for later reference.

Enhanced Collaboration

- Multiple users can interact with the smart board simultaneously
- This can be useful in group projects or in fostering team-based learning.

Challenges in use of Smart Boards

- Smart boards can be expensive
- Technical issues arising during classes may interrupt the flow of teaching
- Teachers need training in effective use of smart boards
- Teachers may depend on technology and compromise preparation
- Need internet connection to use smart board.

Flannel Board

"Displaying material on the flannel board".

The flannel board is a wooden or plywood board covered with a piece of flannel, terry cloth, or felt cloth, on which desired pictures or items can be displayed. The items displayed, e.g. pictures, drawings, etc. should have a flannel or sandpaper pasted on the reverse side. If items to be displayed are cut-out from flannel, blotting paper and sandpaper, no additional rough surfaced backing is required.

The flannel board can be used as a chalkboard, on which we place prepared items and remove them when needed. Students may be often asked to fix these to arouse their creative interest.

Purposes of Flannel Board

- It enables teacher to develop an idea step-by-step in a very dramatic and impressive manner
- It is an educative media for both literates and illiterates, more appealing to the children
- The flannel board helps to convey idea more expressively, avoiding boredom
- It can be effectively used for teaching arithmetic, grammar, hygiene, nature study, geography, languages, etc.

Guidelines for Effective use of the Flannel Board

- Display material on the flannel board in a sequence, as the lecture goes on
- Change pictures or cut-outs while talking to the learner. Students may also be asked to fix these to arouse their creative interest.
- Use appropriate pictures for teaching different subjects
- Make sure that the pictures to be displayed on the board are attractive and sufficiently large to be clearly seen by all who are listening
- Make sure the environment is well lighted for the pictures to be clearly seen
- Be thorough with the sequence of the pictures
- Avoid pictures that are not directly related to the concept being taught.

Advantages of Flannel Board

- Flannel boards are inexpensive, easily made from local materials
- They are flexible, dynamic, portable, convenient, and reusable
- Easily maintained and transported to remote areas.
- Prepared figures can be reused in various other presentations
- It is ideal for showing sequence of events and reviewing lessons
- Holds attention of students, and attractive, if properly used
- Can be adopted for group participation
- The display materials can be changed without use of drawing pins or paste.

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Disadvantages of Flannel Board

- Requires considerable advance preparation
- Artistic ability is required in making homemade figures
- Can be used only for a small group
- May create confusion if sequence of pictures is changed
- Not useful for abstract learning.

Bulletin Board

Bulletin board is the display board which shows the visual learning material on a specific subject. They may range from expensive boards with protective glass doors and built-in lights to illuminate the material displayed, to those made of a wood panel covered with several layers of blotting paper, felt or other appropriate material to allow for the insertion of thumb tacks.

Purposes of Bulletin Boards

Bulletin boards have an important place in health education, as they often reach the audience very easily and effectively. The various purposes they serve in the college are:

- Attract the attention of the students
- Effective communication of the intended message
- Promotes the creativity of the students and the teachers
- Used as an effective educational media
- Can be used for a larger audience.

Classification of Bulletin Boards

The bulletin boards can be classified into two types:

1. Classification I
   - Classroom bulletin boards
   - All-purpose bulletin boards
   - Magnetic bulletin boards.
2. Classification II
   - An introductory bulletin board
   - Explanatory bulletin board
   - A summary bulletin board.

An introductory bulletin board is used to introduce the concept in a pictorial form. An explanatory bulletin board is made plain in a pictorial way a concept or principle that is hard to visualize from a verbal description alone. A summary bulletin board may be used to show applications of one or all of the generalizations studied. A magnetic bulletin board is made of light weight metal and the materials are held in place by means of small magnets. They are commonly used in homes to post grocery lists or remainders for family members, etc.

Principles to be followed to make the bulletin board display effective:

- *Location of the board*: Ideally the board should be placed, where:
  - The lighting is good
  - It can be easily seen
  - The potential audience passes by.
- *Height of the board*: The board should be placed at a comfortable height for the observer; boards intended for the children should be placed lower than those intended for adults.
- *Background* of the board should be neutral in color, so that when colored display materials are used, they will not clash.
- Classroom bulletin boards should be used only for teaching purposes; instructions for the employees, notices and similar items should be displayed elsewhere, so that they do not interfere with the teaching display.
- Careful planning has to be made regarding what to display on the bulletin board. The material displayed must:
  - Attract the observer's attention
  - Make clear what the display is all about
  - Project the message entirely on its own merits.
- *Content of the board*: The topic for the board must be appropriate for the potential audience and should include only one theme or idea at a time. Most of the people who may see the board are just passing by; the point is to catch their attention quickly and impress them with one idea.
- An effective display has a large, easily seen heading that states the subject of the display, and a central focus for the eye, such as an attractive colored picture and explanatory captions that are brief and to the point.
- The displayed materials are to be frequently checked and should be changed as appropriate to the situation.

Frequent assessments have to be done to check whether the boards are serving the purpose or not, attracts attention, people are interested enough to look at it closely, and whether the students are asking the teacher for more information about the topic being presented.

Advantages of Bulletin Boards

- A bulletin board display is one of the least expensive visual aids
- It makes available to students or public, those materials, of which there is only one copy
- It may be placed wherever required on a classroom wall, in the corridor of the college, or public building, or at an information center
- It stimulates interest

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- It serves as a good supplement to normal classroom teaching
- It adds color and liveliness to the classroom as they have decorative value along with educational value
- Bulletin board displays can be effectively used as follow-up of chalkboard work
- Bulletin board displays can be used to introduce a topic as well as to review it.

Disadvantages of Bulletin Boards

- Bulletin boards cannot be used for all inclusive teaching
- It has to be used only as a supplementary aid
- At times the collection of relevant material for certain specific topics may be difficult
- Arranging the display material on the board may be a challenging task for the teacher, as it requires artistic and creative potentialities
- If not used properly, may fail in its purpose to convey the central theme.

Three-Dimensional Models, Objects, Specimens, and Models

Objects may be defined as real things which have been removed as units from their natural settings, for example: patient care equipment that are portable, coins and stamps, relics, etc.

"Substitute for real things, replica of the original" can be used effectively as objects in teaching various subjects.

A specimen may be defined as a typical object or part of an object, which has been removed from its natural setting and environment.

Models are concrete objects, may be replicas of the real objects (of the same size, or smaller, or bigger) mostly three-dimensional or sectional to explain clearly the structure or functions of the original.

Why real objects cannot be used?

- Too small to be observed, e.g. atomic structures, microorganisms, etc.
- Too large to be available, e.g. airplane
- Too concealed to be observable, e.g. interior of the organ
- Too fast to be perceived, e.g. flying objects

Objects and Specimens

Collections of real things for instructional use refer to objects. Specimen is any typical object representing a class or group of things. As both of them are real things, they impart direct learning experience to the students. Replica is full-sized copy of an object. It looks, feels, and acts like the object itself. A replica of a written or printed document or art is called Facsimile. The advantage of using a replica is getting an accurate picture of finer points and details and it also presents a multi-sensory approach in learning. The students get firsthand experience or information by looking at or handling the objects and specimens.

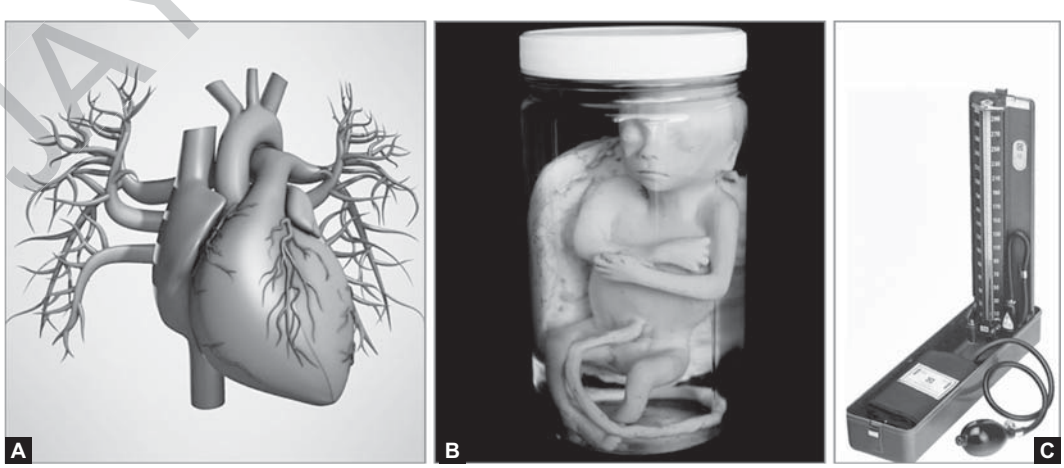
Models

The use of models for teaching/training purpose should definitely be highly effective. Models are concrete objects, some of them are larger than the real object and some of them are small replicas of objects which are too large to be seen as a whole, can be prepared. These may be mostly three-dimensional or sectional or assembly type to explain clearly the structure or function of the original **(Figs. 3.10A to C)**.

In many cases it will be more practicable to use a model. Models can be classified as given in **Table 3.2**.

The construction of a model should be simple. It should not be made out of fragile materials as far as possible.

Models may be defined as three-dimensional representations of real things. They reduce large objects



Figs. 3.10A to C: Objects, specimen and model: (A) Model of a heart; (B) Specimen of a fetus; (C) BP apparatus (object).

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Table 3.2: Classification of models.

			Structure	
Material	*Size*	*Nature*	*Type*	*Shape*
Wooden Thermocole Perspex	Enlarged Reduced Normal	Dynamic Working Static	Sectional X-ray Assembly	Three dimensional (or) Two dimensional

to a size convenient for observation and produce interior views of objects which are normally covered or invisible. Nonessentials are removed so that fundamentals can be more readily observed. Models can be handled, operated and seen from a number of angles and hence are generally more interesting and instructive than a picture or a chart which is two-dimensional. A model should have the essential qualities of accuracy, simplicity, utility, solidity, and ingenuity to be maximally useful.

Models are advantageous than real objects because it helps to explain the details in a clear and leisurely manner which is not possible in case of real objects. It can be used to show the minute parts of a system or a process through a model which cannot be done when it is actually in operation. It is used to show the internal functioning of a system which is not visible from outside with the help of cross-sectional or dissectible models. We can also use with safety and convenience.

Materials used in preparation of models
- Cardboard
- Plastic
- Plaster of Paris
- Wax
- Wood
- Clay
- Thermocol

Classification of Models

Models may be classified as:

Scale models: In order to form a correct idea of an object, scale models are used. For example, models of organs of human body.

Simplified models: They are made of clay to give an idea of the external form of the object. Although they are not made to exact scale, they have educational value.

Working models: Such models are used to demonstrate in a simple way, an operation or process, for example, the working model of a human heart.

Cross-sectional model: Such models show the inside of an object. They are of immense use in the teaching of technical objects.

Models can be useful for generating student interest. They should be used in an interesting manner as possible. Students may be encouraged to examine the models, ask questions and make generalizations. They should be encouraged to produce models to illustrate objects, concepts, or ideas. These teaching aids are powerful interest arousing devices which possess the capacity of involving all the five senses—touch, sight, hearing, smell, and taste.

Mock-ups

A mock-up refers to a specialized model or working replica of the object being depicted. In a mock-up, a certain element of the original reality is emphasized or highlighted to make it more meaningful. A mock-up may or may not be similar in appearance. Mock-ups of airplane, ships, buses, etc. are used in technical institutions to explain their structure and actual working.

Merits and Demerits of Model

The advantages of a model are:
- Models help in simulating a real situation
- The size can be adjusted as needed
- Distance and time do not become a limitation
- It gives the learner visual, tactic, and oral stimuli which increases the learning experience
- It can explain concepts, structures, and working of parts
- They stimulate interest and capture attention
- It enables to have a correct concept of an object
- Working model will secure immediate attention and serve as motivation to learn.

The disadvantages of a model are:
- Models are quite costly
- Needs more storage space
- They are useful only for teaching small groups
- Requires skill and talent to prepare.

- Objects are real things, visible, tangible aid, complete in itself.
- Specimen is a part taken from the whole, so as to represent the whole.
- Model is a recognizable imitation of a real object.

Slides and Films

"A small piece of film".

The use of slides and films is becoming increasingly popular in teaching contexts. They possess an attention focusing power which increases interest and motivation among the students.

Definition

A slide is still transparency of 70 mm, 35 mm, or 6 mm size which is optically enlarged and projected on a screen

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as a real image. It is actually a small piece of film or other transparent material on which a single pictorial image or scene or graphic image has been photographed or reproduced otherwise.

A film strip is a series of sequenced slides on a piece of film covering a large portion of a lesson. They are closely related to slides, but instead of being mounted as separate pictures, the film after processing remains uncut as a continuous strip.

Slides are small transparent visual aids which can be viewed with the help of a slide projector. They are effective promoters of discussions, making abstractions concrete and realistic.

Types of Slides

Normally, slides are of three types:

1. Photographic slides
2. Handmade slides
3. Computer made slides.

Handmade slides include the following types:

- Marker ink slides
- Cellophane slides
- Silhouette slides
- Etched glass slides.

Characteristics of a Good Slide

- *It is simple*:
  - Depicts one idea
  - Minimum description
  - Disseminate information in about 4 seconds.
- *It is legible*:
  - Area should not exceed 7.5 cm × 11 cm
  - Number of words is not more than 35
  - Number of lines is not more than six
  - Only two or three columns and rows are used for tables
  - Headings are depicted in bold letters.
- *It is accurate*:
  - There are no spelling mistakes
  - There are no factual errors.
- *It is appropriate*:
  - Content material relevant to subject
  - Depicts best visuals
  - Technically well executed
  - Properly exposed and developed
  - Properly mounted.

The slides and film strips are projected on the screen using an optical instrument called slide and filmstrip projector. It works on the principle that when an illuminated object is placed between the focus and twice the focus of a convex lens, it produces an enlarged real image beyond twice of the focus on the other side of the lens.

Preparation and projection of slides and film strips:

- Depending upon the nature of instructional objectives, the content for slides and films may include written words, sketches, graphs, cartoons, pictures, etc. after deciding what the content is going to be, the slides/film strips are prepared in the following manner:
  - Only one concept should be depicted in one slide
  - Written descriptions, if any, should be legible, simple, and precise
  - Only key points are to be stressed
  - The size of the letters should not be less than 6 mm and a maximum of seven lines can only be included in one slide.
- The prepared slides have to be numbered according to the sequence and kept in order
- The slides should be positioned correctly before projection
- The slide/film projector should be placed on a rigid and stable table
- The screen should be placed on an appropriate place so that the whole class can see it
- Insert the slide carrier or filmstrip carrier in its place, and mount a slide of filmstrip in its carrier
- Darken the room in which projection is to be carried out
- Present the slides or frames sequentially accompanied by due explanations
- After completion of the projection, equipment should be replaced in its place and the class should be opened for discussion.

Materials needed for producing slides:

- Plain, colored or etched glass
- Binding tape
- Cellophane
- Colored pencil
- Colored inks.

Advantages of Slide and Film Projections

The common advantages of slide projectors include:

- They can be projected in a partially darkened room thus facilitating further class discussion and notes taking
- They may be enlarged to any amount of desired size
- They are convenient aids for making classroom teaching interesting

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- The slides and filmstrips because of their repeated use are quite cheaper
- They provide a logical and sequential order of presentation and can be used according to convenience
- Slides and filmstrips are compact in size, and hence can be stored and transported easily. They can be preserved for a longer time.
- They produce an increased visual impact but cause less eye soaring
- A variety of printed, typed, or drawn material can be presented in different colors or combinations in the slides or filmstrips
- The image on the screen can be held for required amount of time
- They save the time of the teacher
- They capture interest and attention of the students
- It can be viewed by the entire class.

Disadvantages of Slide and Film Projections

- They are comparatively expensive
- They easily get dirty and smudged with finger prints.
- Projector bulbs do not stay long and are expensive to replace
- They require skill in operating
- The teacher may not have eye contact or direct interaction with the students as the classroom is partially dim. The size of the slide trays is not standardized, so a teacher's personal slide tray may not fit the projector used in a particular institution.

Slides can be obtained commercially, or made by the teacher. The former can be useful as many are produced specifically for nurses in a wide range of topics. Other outside sources that might be useful are the medical photography departments in the hospitals, who may be able to make slides for the use.

Checklist for Effective use of Slide Projector

Before the Lesson

- Position screen for maximum visibility
- Align projector so that required size of image is obtained
- Focus sharply using a slide
- Insert slides.

During the Lesson

- Switch off lights when showing slides
- Use a pointer on the screen.

After the Lesson

- Remove all slides, including the last one in the well
- Do not move projector until lamp is cool.

Puppets

"Education by entertainment".

Puppet show is a form of entertainment. In south India, especially in villages earlier, there were no fairs and festivals without puppet show. Traditional puppetry shows focused more on entertainment and teaching morals. It is one of the audio visuals used in educating not only the students but also the public. It is one of the recreational ways of education. Puppet is a doll which can be made to move. Puppetry involves creating puppets and making them to act.

Puppets are prepared from leather, fabric, carved wood, or bamboo. Nowadays, readymade puppets are available, prepared from waste papers. It needs skill and experience to prepare puppets.

Historical Background

It is believed that puppet theater began in India and China thousand years ago, and then spread to other parts of the world. Traditional Indian puppeteers make their puppets out of leather, fabric, carved wood, or bamboo. It needs years of training to make these puppets. If a puppet became old and could no longer be used, it was never just thrown away. It was taken to a river, and cast into the water with the chanting of sacred verses.

Types of Puppets

- Hand puppet
- Rod puppet
- Shadow puppet
- String puppet.

Hand Puppet

The puppeteer wears a hand puppet like a glove and moves it using his fingers. Tiny hand puppets, which are worn on the fingers, are called finger puppets. Usually the hand puppeteer sits at a lower level, behind a screen, and pushes the puppet up on the stage. So the audience sees only the puppet, while puppeteer remains hidden.

Rod Puppet

It is much bigger than hand puppet and is held by a central control rod which is attached to the head. It is also operated from below the stage.

Shadow Puppet

It is flat figure, usually made of leather. The figure is held close to a white screen which allows light to pass through. The puppet is then lit by a strong light from behind. The

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Fig. 3.11: Puppets.

audience sits on the other side of the screen, and when the puppet is moved, they see its shadow moving. The different parts of the puppet are loosely joined together and moved using thin horizontal rods or wires held against the screen.

String Puppet

It has a main body with movable parts manipulated by strings. There is also a main string which the puppeteer holds, to stop the puppet from swinging about **(Fig. 3.11)**.

Preparation of a Puppet

In olden days, they are prepared from leather, fabric, carved wood or bamboo. Nowadays readymade puppets are available. It is prepared form waste papers. The waste papers are immersed in the water. Then they are made into a solid paste after grinding. After adding some preservatives with this paste, puppets are made. After drying, these are painted. The other way to prepare a puppet is from plaster of Paris. With the help of many molds, puppets are made.

Advantages of Puppets

- They provide an entertaining way of education
- They are attractive and attention capturing
- They serve as audio-visual aids for all age groups, levels, and standards
- The message what they convey is easy to remember
- They improve the creative skills of the students
- They encourage observation, thinking, reasoning, and listening skills
- They are humorous
- Student teacher can express all inner qualities and capacities (singing, tone, mimicry, narrating a story, etc.)
- They are useful for health education in community, and in clinical set-up especially in children wards
- They are useful for advertisement.

Disadvantages of Puppets

- Puppetry is time consuming
- Requires skill in preparation and presentation
- It cannot be used as an audio-visual aid for all types of teachings
- It cannot be used for large group
- It requires coordination of voice of presenter and actions of puppet
- Need to use more puppets as more characters.

Handouts

"Learning in-hand".

Handouts or Reprographics

A handout is a well-planned duplicated document prepared by a teacher for her students in order to promote their participation in the teaching-learning process. Well-structured handouts can be very valuable in terms of interest, motivation and record of information.

One of the most common learning aids used in the classroom is the class handout. This consists of a sheet or sheets of paper given to each learner for permanent use.

Purpose

- To provide information
- As a lecture guide
- For further references and reading
- Assessment and questioning.

In the classroom, handouts enhance a lecture, serve as a platform for instruction, and ensure all students have access to the same information.

Handout provides organization and a reminder of what was said during the class session.

Adults prefer to come away with learning in-hand and with an opportunity to review material in a concise presentation, prefer receiving information in a printed form in handouts are given to stimulate critical thinking. Handouts may be styled for active and participatory learning.

Even in the internet age, handouts continue to be used, in either paper or electronic formats.

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MacLean (1991) offered the following suggestions for using handouts:

- Use handouts as advance organizers
- Provide a technical terminology handout either at or prior to the start of the course
- Consider whether it is worthwhile to produce an introductory handout that provides basic information that the students should read before attending class
- Use the handout as a study guide
- Integrate the handout with the lecture flow, so students engage in a variety of learning activities during the course of the session
- Introduce a handout-reading break during class at a point when students' concentration on the spoken word begins to wane
- Use a handout in small group teaching to identify issues or questions to be addressed.

Reprography is a branch of technology dealing with methods of duplication or reproduction. Duplication involves making a number of identical copies of the original. Reproduction enables preparation of one or more identical copies of the original, same size or different size in monochrome or color, e.g. duplicators.

In a discussion of peer evaluation to improve handout quality, McLeod and Tenenhouse (1988) listed the five most frequent evaluator comments, including:

1. Improve the clinical relevance handout data
2. Decrease unnecessary detail
3. Use more diagrams to illustrate points
4. Leave space to write notes
5. Break up text into paragraphs with headings, rather than using continuous prose.

When to Give Handouts?

- Much in advance of the presentation
- Just before the start of the session
- During the progress of the session
- Just after completion of the session
- Much after the presentation.

According Ellington (1985) and Heinich et al. (2002), there are various types of handouts, including:

- Complete notes on specific topics.
- Skeleton notes, containing blank spaces for learners to fill in.
- Shorter documents, often a single sheet, given out during a lesson to save student from copying complicated material, such as a diagram or map.

Characteristics of a Good Handout

When designing a handout, educators should consider variety (varying the style), balance (either formal with symmetrical elements, or informal with text and images placed asymmetrically on the page), and simplicity, it is clear and clean, with easy-to-find key point. In addition, development of quality handouts includes consideration of basic elements such as type and layout, purpose, focus topic, and visual appeal, and professional elements such as care in editing, inclusion of references, date of preparation, and copyright protection.

Focus Topic

Generally, a handout should have a single topic. Elements pertaining to the topic could be key points, definitions, story illustrations, pictorials, formulas, or statistical information. Interest can be added to the topic by including quotation from nursing scholars or leaders, quotations from popular literature, or poetry. The addition of appropriate light humor can make a handout delightful.

Visual Appeal

Adding, visual appeal to handout communicates an instructor's professional interest in the topic. With the aid of computer software, using clipart, borders, word art, interesting fonts, and color, makes it creative than ever before to be creative. Printing on color paper is visually appealing.

Educators must also consider spacing of material and design layout. Too many printed lines may be irritating to readers.

Using a font size of 12 to 14 and bold print can promote easier viewing. Handout length may vary according to their purpose, but it is worth noting that handouts can be a source of distraction when attendees have to move back and forth through multiple pages. Keeping handouts brief encourages the audience to follow the presentation points.

A handout which is prepared in a professional way will communicate the standard or quality of handouts to students and faculty members.

Care in Editing

It is imperative that faculty demonstrate care in editing, sound referencing practices, and consider other issues such as documenting the date of handout development and specifying if a handout is copyrighted.

Taking the time to carefully review handouts and make corrections communicates and models faculty's

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professional expectations and represents faculty's commitment to promote learning experience.

Spelling and grammar checking features may be useful for editing purposes. Asking a colleague to proofread the handout also helps to identify errors that may be missed because of the creator's familiarity with the document.

Inclusion of References

Accurate documentation communicates an expectation of academic honesty, and providing citations offers students an opportunity to build a bibliography as a learning resource.

Faculty may consider concluding handout content with a list of literature sources as a learning supplement. The listing clearly designates the usefulness of the reference to the learning experience.

Date of Preparation

Dating handouts serves as a quality checkpoint when the faculty reviews the course. Depending on content, a planned review schedule ensures the handout information in current.

Handouts are a common and practical instructional aid. The act of developing quality handouts involves applying education principles, while making the handouts purposeful to the learning experience.

Overhead Projector

The overhead projector is a versatile and popular device for projecting transparencies, with brilliant screen images suitable for use in a lighted room. It is a very vital teaching aid which has made projections so simple and easy.

Overhead projector permits daylight projection and face to face interaction with the students. It gives a bright evenly light image which attracts the student's attention. The operator has complete control over the presentation.

Parts of the Overhead Projector

Figure 3.12 shows the parts of an OHP:

- Projection head lens and mirror
- Focus wheel
- Projection handle
- Glass plate/transparency stage
- Fresnel lens
- Switch to intense or dimmer
- Switch for cooling fan
- Adjustment feet
- Overhead projector
- Metal box with a 1000 W/600 W halogen lamp.

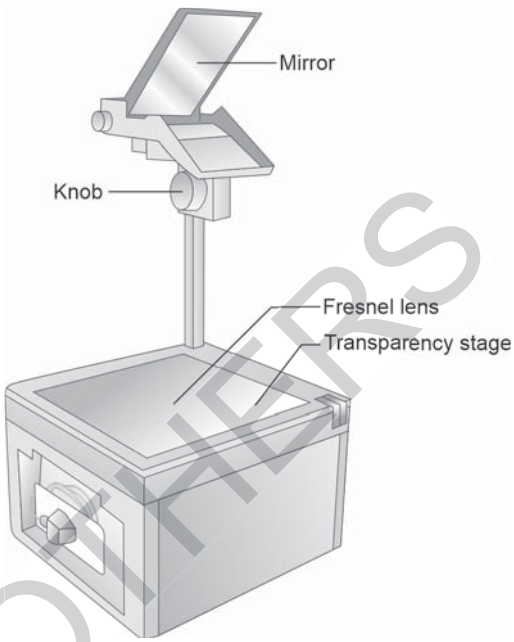

Fig. 3.12: Overhead projector.

Overhead Projector Transparencies

Overhead transparencies are easy to operate with the projector and are very simple to prepare. A standard size of acetate sheet measuring 18 cm × 22 cm is used to print, write or draw materials relevant to subject matter. When it is placed on the platform of the projector, a large image is projected on a screen that is kept behind. Good transparencies can be preserved for the future use.Roll transparency: Besides single transparency, we can use roll of transparency on which writings and pictures can be made in a sequence and can be projected on OHP in a classroom. It can be moved backward forward as required.

Method of Preparing Transparency

Various methods are used to prepare a transparency. *They include*:

- **Hand-drawn transparency**: As the name indicates, using marker pens the required material is either hand-drawn or written. The marker pens are available in water soluble forms or permanent form. Permanent ink can be erased by using spirit such as after shave, whereas soluble ink needs only a wipe with a damp cloth.
- **Photographic transparency**: Employing reflex printing, negative or reflex printing paper can be made, where some complicated drawings are pictured. With these negatives, positives can be printed on sensitized positive acetate.

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- **DIAZ process**: It is a process used to make large number of copies of transparencies from chemical acetate.
- **Copying process**: With the help of thermographic process, transparencies are prepared by the copying machines.

Preparation of OHP Transparencies

- Transparencies should be simple, preferably expressing a single concept on one sheet
- Letters should not be less than 6 mm in size. Simple lettering style should be used for writing.
- Figures and diagrams are to be relevant to the content
- Only key messages should be emphasized; overcrowding should be avoided
- Using different colors may attract student's attention
- Leave margin at each end of the acetate
- Avoid writing or drawing too close to the edge of the transparency, as it may be lost when the image is projected.

When the OHP is kept very low, it will distort the image, i.e. image will get wider at the top and narrower at the bottom. This distortion is called "Key Stone Effect".

Principles for Effective use of OHP

The principles for effective use of the OHP can be discussed in following phases:

Preparation Phase

The screen should be so kept that all students can view it without difficulty; lower border of the screen should be in level with the heads of audience.

- Collect all required materials well ahead.
- Focus the projection lens until the image is sharp.
- Keep the transparencies in sequence.
- Use appropriate masking strategies; reveal the transparency only when it is required.
- Explain clearly and concisely.

Presentation Phase

Switch on the OHP only while showing the transparency to the audience. Overheating of the bulb may blow it off.

Switch off when:

- Placing the transparency on table
- Removing the transparencies
- Explaining the concept or idea.

Use pointer to indicate, preferably on the transparency rather than on the screen.

Use mask to reveal points in a step-by-step fashion, whenever required.

Do not move the OHP when the bulb is switched on, as the filament of the bulb may break due to jerks during shifting.

When the content presented with the transparencies during presentation consume more than 3–4 minutes, switch off the OHP while giving the oral explanations or providing clarifications to the learners. Organize your presentation with transparencies in such a way that every 3–4 minutes the OHP should be switched off. Switch it on after a minute or two.

Aftercare of the Equipment

- Collect the transparencies and preserve them for further use.
- Never move the machine, while the lamp is still hot.
- Do not disconnect it from main supply while the fan is operating.
- Clean the lens with a moist pad and detergent cleaner.
- Cover the OHP and keep it safely.

Advantages of OHP

- The OHP produces a large projected image in a minimum of projection distance
- It helps the students in sequential learning, when the technique of progressive disclosure is used
- It can be used with other audio-visual aids more easily
- The teacher can have constant interactions with the class
- It can be used in a normally lighted room, hence the student can take down notes, and the teacher can observe the students' interactions
- The equipment is quite cheaper than other projected aids
- It saves a lot of class hours that could be used for other more important purposes, like providing more attention to weaker students, counseling students, etc.
- Operation of OHP is easy; it does not involve any complex technology
- It can be used for a large group of students.

Disadvantages of OHP

- Apparatus is quite costly; if the bulb blows of, a spare lamp is to sought for, which is costlier
- Electrical power consumption is high
- Requires extensive maintenance
- Teacher/students may become dependent on OHP.

Radio

"For ears by air".

Radio is a powerful mass medium used in action for disseminating information, imparting instruction,

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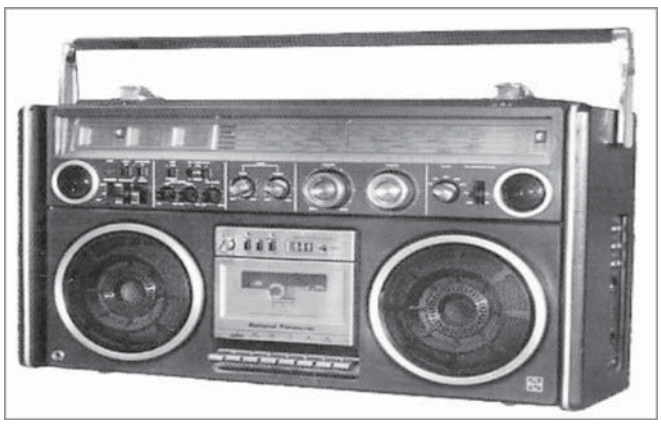

Fig. 3.13: Radio.

and giving entertainment: It serves with equal ease in both developed and developing countries. It spreads information to a greater group of population, thereby saving time, energy, money, and manpower in an effective way. Radio is a simple and cheap medium readily available as a small toy **(Fig. 3.13)**.

Now, small and handy transistors are available with even poorest of people. A small transistor can carry the message to any place on the earth. It needs very little for maintenance and cheaper production can be taken up with more and more resources. Radio speaks to an individual so also to millions at a time. Hence, any listener can think the broadcast is meant for him whereas when listened in group all think the message directed toward them. Each student takes the broadcast as very intimate to him. Due to its portability and easy accessibility radio could find its place everywhere whether it was a field, a school, a kitchen or a study room. Radio is a blind man's medium and is meant for ears only. It plays with sound and silence, where the sound can be anything like voice or word, music and effect. When one hears radio, simultaneously one can imagine happenings in his/her mind. So it is called as theater of blind or a stage for the mind. Radio can be listened to simultaneously along with another work like reading also.

The radio has been and is being used to serve a variety of purposes from its very inception—to inform, to educate and to entertain people. Continued technological innovations have radio broadcasting increasingly available to a large number of people throughout the world.

The radio is the cheapest and the most easily accessible of the other three electronic media, i.e. audiocassette, television, and videocassette. It caters to people of different ages and levels of maturity ranging from a primary school child to grandfathers.

The radio lends itself to serve different purposes. For instance:

- It provides learners with new joys of learning
- It can develop their command over vocabulary
- Promote concentration and critical learning to supplement/enrich a concept
- Give additional views on a theme
- It improves fluency and confidence in speech and discussion
- It can be used for formal and informal education
- It supplements and enriches the formal school subjects.

Strengths of Radio/Audio Medium

- Easy accessibility
- Wide coverage
- Low capital investment and operating cost
- Easy learner-reception
- Effective thought promotion
- Motivative, supportive facilities
- Easy production
- Effective creation/transmission of reality
- Feasible mode of learner enrichment
- Direct instruction.

Limitations of Radio/Audio Medium

- The radio is not a flexible medium
- There is no face-to-face interaction, dialogue or discussion between the listener and the speaker
- The doubts and queries arising in the mind of the learner cannot be attended immediately. There is no immediate feedback to the learner
- It may not be an effective medium for all types of course materials
- The more heterogeneous the audience, the more difficult it is to produce a radio program of common utility/appeal
- The span of attention of the learner is short and the retention of factual information is generally low
- Radio programming demands experienced and creative personnel with a sound academic background.

Tape Recorder

Definition

A tape recorder is used to record sounds on magnetic tape which can be reproduced at will and as many times as required.

Audio Tape

It is a magnetic tape used for recording sounds.

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Audio tapes can be adapted to any teaching/learning situation for any size of audience and also for self-learning. Audio tapes can be used to provide narrations for slide sequences, give commentary for silent films and filmstrips, demonstrate heart sounds and give instructions for use of equipment. Professionally prepared audio tapes are available which have recorded dialogues among subject experts on different topics. These audio tapes are good media for presenting discussion among experts on controversial topics.

Characteristics of Audio through Tape Recorder

- **Immediacy**: Books can describe events that have happened, but recordings can describe events as they happen.
- **Emotional impact**: The student's interest can be captured and her imagination stirred through the combined effect of voice, environmental sounds and music.
- **Authenticity**: Through tape recorders, it is possible for experts to visit any classroom anytime.
- **Conquest of time and space**: Through simulated programs, audio media can actually overcome the barriers of time and space.
- **One way communication**: Tape is a one-way communication tool; this limits its usefulness for teaching since it provides no possibility of feedback to the students.
- **Audition**: Tape programs can be auditioned to determine their educational value.
- **Needs and interest**: Recording made by the teacher and the students can be used to meet their specific needs and thereby enhance the teaching-learning situation.

Advantages of Tape Recorder

- Tape recorder can be used to record educational broadcasts and for replay at suitable and convenient times
- It can be used for music and other sound effects for use during staging of dramas in the colleges and cultural performances
- It can be used to record the speeches of important visitors to the institution and this can be effectively used later
- Tape recorders are largely used in language laboratories for giving speech training and for correction of pronunciation defects
- Tape recorders can be used for appreciation or and for teaching music
- Instructions for doing experiments or any activity can be recorded on cassette and the individual can listen to it through the headphones and do the necessary operations without disturbance to others
- A tape recorder can be used very effectively during the microteaching sessions. It will provide the necessary feedback for discussions to improve the lesson.

Disadvantages of Tape Recorder

- There is no personal contact with the speaker
- It does not cater to individual differences
- Listening for a long time generally distract
- It encourages passive learning
- It is costly, and so all people cannot afford it
- It does not provide a laboratory experience, though instructions may be given.

The principle of audio tape recording is that plastic tape, covered in ferrous oxide or chromium dioxide, is pulled at a constant speed past two electromagnetic heads. The tape is capable of being magnetized and as it passes over the "erase" head any previous signal is wiped off. It then passes over the "record" head, where magnetic impulses from the sound source are recorded on it. When the tape is played back, the record head picks up these magnetic impulses and converts them back to the recorded sound via the loudspeaker. The erase head in nonoperational during play, to avoid wiping off the recording.

Audio tape recording can capture the feelings and experiences of patients, which makes it a good medium for adding interest to sessions on nursing care. Such recordings are relatively simple to make.

Tape recordings are outdated now which is replaced by recording by mobile phones.

Making Audio Tape Recordings

Audio tape recordings can be made by direct recording of sound sources such as radio or records, or by the use of microphones. The modern tape recorders have inbuilt microphones, though it is necessary to use external microphones in recording in a noisy environment. If the teacher is reading a script for a recording session, then he should be sitting comfortably at a table, with the microphone high enough to avoid having to speak down to it. The head should be held up and the script must not intervene between the face and the microphone. Recording requires an assistant to switch the machine on and to monitor sound levels. It is important to position the tape recorder at some distance from the microphone so that amplifier hum is not picked up.

Public Address System

"A large group communication".

Public address system is required for communication in large groups (more than 30–50 students). This system

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Fig. 3.14: Public address system.



Fig. 3.15: Television.

aims at reproducing the original sound at a higher intensity. The quality of reproduction depends on the public address system and the acoustic qualities of the hall. The public address system consists of microphone, amplifier, and speakers **(Fig. 3.14)**.

Microphone is a sound sensitive transducer that converts sound energy into electrical energy. The electrical energy is reconverted to sound energy by the speakers at a higher intensity. Microphone could either be mobile (collar microphone) or fixed to a table or a floor stand.

The speaker should maintain a distance of about 20 cm from the lips to avoid sound distortions.

Amplifier controls the volume and the tone of the sound. Tone control consists of low frequency (bass) and high frequency (treble) components and helps in giving the desirable quality of sound.

Television

"A mass education media".

Television constitutes an important medium widely used to disseminate information to its viewers. It has the advantage of serving as both audio and video aid, thereby having greater appeal than the radio and print media.

Television is being acknowledged as powerful medium of mass education. In India, television is being used for imparting information and distance education through the UGC programs and other educational programs. It has the ability to bring the events and happening to the viewer in action **(Fig. 3.15)**.

Kinds of Television Broadcasts

Live Broadcast

Under this system, educational events are directly broadcasted. Immediate transmission of the programs to a large number of audiences is possible through the live telecast.

Recorded Broadcast

Under this system, prerecorded programs are telecasted as per the transmission schedule. The existing educational television services in the country depend mainly on the already produced programs. Such programs can be well planned and evaluated at each developmental stage. Recorded programs could be of a better quality than live broadcasts because all facilities in terms of time, manpower, equipment, etc. are exploited for producing these programs.

Closed Circuit Television Broadcast

Under this system, the prerecorded or live programs are transmitted on a closed circuit. It is the link between the studio and a series of classrooms, usually by means of cables installed in an institution to transmit educational programs. The system can link several classrooms or institutions, and allow transmission from any of the classroom studios.

Merits of Television as Educational Tool

- Television caters to the masses of people including people living in remote areas
- Television programs are well planned and presented, thus providing higher quality of instruction
- They are attractive, thereby holding the attention of the students
- Rapid and continuing change in curricula and instructional methods are made possible through educational television
- It reduces dependency on teacher
- Television provides in-service training for teachers to improve their teaching methods and skills

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- It has proved its effectiveness/supremacy in teaching certain subjects such as agriculture, science, geography, etc.
- Television programs break the monotony of normal dullness of classroom instruction by the teacher. It provides novelty and variety to classroom experience
- They are helpful in updating the knowledge of both teachers and students as they include the latest information and findings
- It can impart experiences which are out of physical reach (other countries, people, events, etc.).

Limitations of Television as Educational Tool

- Television is a one-way communication device, and as such it does not provide for interaction
- Teaching through television is expensive
- Students differ in their learning speed and style. Hence, it cannot cater to the speed of every learner
- The learner remains as a passive spectator and not an active participant.

Television induces effective learning as it appeals to the eye, ear and emotions of the learner and seeks total involvement from his part.

Films

"A variety entertainment".

Using feature films to teach nursing is a creative and under-utilized way to engage students in learning complex material. Films are widely used in other disciplines and films are taken seriously as a teaching strategy. Films have been used to teach a variety of college subjects including biology, communication, ethics history, philosophy, political science, psychology, and religion. Also films have been used extensively in teaching psychiatry and counseling.

Advantages of Films

- It increases the attention span
- It stimulates critical thinking
- It motivates the learner
- It helps in easy remembrance of the concepts
- It appeals to the visual learner
- It increases curiosity
- It increases observation skills
- It stimulates interest
- It increases participation
- It can make dry and abstract content alive
- It is accepted by the students
- It allows students to express negative feelings about people and situations in a setting where they are not responsible for care
- It can provide shared experiences and learning
- Watching a film in a group can promote group cohesion
- The film class can also create a pleasant learning environment and be social and fun
- Certain experiences which may not be given as practical learning such as disasters, violence, etc. can be given through films.

Disadvantages of Films

Teacher should have control over the students' learning. Otherwise, it will be a mere watching the movie. If not facilitated by the teacher, the student may not relate movie with the subject.

It is time consuming for the teacher. Selection, organization, displaying, and relating to learning is very difficult.

Not all the concepts can be taught by using the films.

Steps in Using Film

Planning

- Formulate the objectives
- Select the topic
- Check for feasibility and facilities available
- Plan for the content to be covered
- Choose the movie.

Preparation

- Access the movie
- Buy or download the movie and select the relevant portion for showing to the students
- Write the lesson plan
- Do the rehearsal.

Presentation

- Explain the purposes and what should be observed
- Inform objectives
- Project the film
- Discuss the issues
- Clarify the doubts and supplement.

Evaluation

- Evaluation of self
- Student learning
- Film as a teaching strategy.

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Tips for Using Films Successfully

- Buy videos and DVDs selectively
- Familiarize with copyright matters
- Videos must be shown in an instructional room such as classroom or an auditorium
- Films can be shown only for educational and not for recreational purposes
- Videos, not illegal copies, must be used and the copyright notice has to be shown
- Have an alternate film, handouts and discussion questions prepared in case the video does not work
- Instruct the students to have pen and paper to note down questions or comments
- Instruct the students what to be observed for
- Explain what you are doing to other faculty. Do not let them hear rumors that you are cutting theory classes to watch movies.

Computer

"A master brain by master's brain".

It goes without saying that the importance of computers is felt in every field and has become the integral part of our society. Learning the high-end technology has thus become a necessity for people in various contexts. Computers have become ubiquitous today and are found in every walk of life. Eric Ashby, the historian, has called information technology, the fifth major revolution in education, after instruction by professional teachers, creation of the written word, printing and advances in educational science and technology.

Computer is an electronic data processing machine capable of performing millions of operations with tremendous speed. It has the capacity of storing large volume of data, which can be used in future. Computer only follows the instructions given by the user, without any strain, self-thinking or reasoning. With the above qualities, computer can be used in almost all fields. Nursing field is not an exception.

Computer is often compared with the human brain which can be called as the most powerful super computer. Computer can perform excellent job that is tedious and complicated without error, but it is the human brain that is behind the computer to make the machine work competently. The human can make sense out of disorganized nonsense, but computer can make sense out of sense only **(Fig. 3.16)**.

Characteristics of a Computer

A computer possesses the following characteristics:

- **Speed**: Computers work at incredible speed. They can handle millions of instructions at one second.

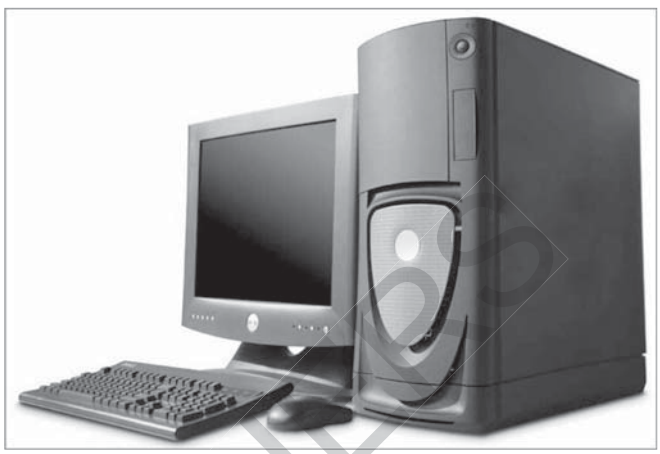

Fig. 3.16: Computer.

- **Storage**: A large volume of information be can stored in memory.
- **Accuracy**: A device that is nearly 100% accurate depends on the operator.
- **Ability to operate automatically**: Does not require prompt input from the operator at each stage of operation.
- **Diligence**: Computer does not get tired, bored or lazy.
- **Scientific approach**: The entire approach to problem solving in computers is scientific and logical.
- **Versatility**: The computer is a versatile tool for doing a variety of jobs.

Parts of the Computer

The computer basically consists of the following parts:

- Input devices
- Output devices
- A memory store
- A processing unit
- A control unit.

Input Devices

These devices help to feed the data to the computer. They include the following.

- **Keyboard**: They are the basic input devices through which data and programs are fed into the computer. They have numeric and alphabetic symbols, edit, control, and functional keys. A keyboard is very much like that of a standard computer.
- **Mouse**: It is used to position the cursor on the screen. Its manipulation on a flat surface moves the cursor in the same direction as the movement of the mouse. The box contains a ball underneath, which senses the movement and transmits it to the cursor over the screen.

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- **Light pen**: This is a pen like device connected by cable to display. When pointed at the screen the computer revises the position of the point. It can be moved and repositioned as required. It helps to draw pictures on the screen or make changes to an already drawn picture or figure.
- **Graphic table**: It is a computer-based terminal with additional features for creating, storing, and printing pictures. One can create an image of a picture by simply moving a stylus on the picture. As the stylus moves, the picture is created and drawn on the screen for checking.
- **Joy stick**: Moving a joy stick increases or decreases the voltage level in a resistor. It helps in playing games using a computer.
- **Optical character reader**: They are input devices used to read any printed text. They can interpret handmade marks and characters and special symbols and codes.
- **OCRs scan**: It reads the text optically, character by character and convert them into a machine readable code and store them into the system's memory. They can read at a rate of 2400 characters per second.
- **Voice input**: This is another means of communication via the computer. It incorporates the wave from which it is created, and analyzes it.

Output Devices

Output devices translate information back into understandable form. The data fed into the computer are processed as per the instructions given to the computer and returned in the form of output.

- **Printers**: It is the most commonly used output device. The paper copy obtained from the printer is often referred to as the print output.
- **Visual display unit**: When the program is keyed in, the screen displays the characters. The user can read the program line by line and make corrections before it is stored or printed. Screen sizes differ from system to system. The cursor on the screen is controlled by the cursor keys on the keyboard.
- **Computer output microfilm (COM)**: When large amounts of data are to be printed and stored for future reference, conventional paper output will not be economical. In such situations, computer output microfilm is used, which consists of photographed images produced in miniature by the computer.
- **Audio response unit**: Computer audio output or voice response units speak by arranging half-second records of voice sounds of prerecorded words.
- **Plotters**: They are used to produce output containing graphics or diagrams. With the availability of multi-color plotters, they are increasingly used for preparing financial documents, annual reports and engineering drawings.
- **Memory store**: It contains all the information, which has been fed into the computer through the input equipment.
- **Processing unit**: It operates and processes the information. It can add, subtract or multiply. It can also select particular information out of a large amount of stored information in terms of scientific criteria.
- **External storage devices**: The purpose of external storage device is to retain data and programs for future use. A number of files containing information can be stored in this manner.
- **Control unit**: This controls the actions of the processing units.
- **Floppy disks**: It is flexible plastic disk coated with magnetic material and works like a photograph record. Information can be recorded or read by inserting it into a disk drive connected to the computer.
- **Hard disks**: They are suitable for storing large volumes of information and are popularly known as the Winchester disks. A hard disk consists of two or more magnetic plates fixed to a spindle one below the other with a set of read or write leads. These are permanently sealed inside a casing to protect it from dust.

Computer as a Teacher

Computer can never replace a teacher. It merely complements a teacher's role. However, in some areas of instruction, it is even better than a human teacher. For example:

- It never gets bored or irritated
- It never makes mistakes on its own
- It permits individual attention (1:1 interaction)
- It permits a learner to decide his/her own pace of learning.

Computer is an electronic device that is designed to accept, store and process the data according to the instructions to produce desired results.

Multimedia

Multimedia refers to the integration of various forms of media—such as text, images, audio, video, and interactive content—into a single communication or presentation platform. A multimedia presentation uses various forms of media to deliver information in an engaging way.

Text is the basic element of multimedia which is used to describe or explain. Images are pictures, diagrams, and flow charts in various formats such as JPEG, PNG, GIF, TIF etc which adds clarity to the content. Audio

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such as sound effects, voice-over, background voice and music are used in multimedia. MP3 and WAV files are examples of audio files which provide a rich sensory experience. Video can be live or recorded and is the most enriching one in teaching-learning. The popular format is MP4. Interactive content facilitates interaction among users. Quizzes and games are examples of interaction which encourage user participation and enhance personalized experiences. The commonly used tools for multimedia presentations by the students are Microsoft PowerPoint, Google Slides, Canva, etc. There are many free, open-source software available for students to create multimedia presentations.

Advantages of Multimedia

- Improves attention and engagement of learners
- Enhances understanding through the use of animations and video demonstrations
- Quizzes, games, online polls attract and engage the participants.
- Its usage is inevitable in educational conferences.

Video Teleconferencing

Video Teleconferencing is a technology that allows two or more people interact in real time over a distance using audio and video. The word 'Tele' means distance and 'conference' means meeting. In video teleconferencing, two or more people at different locations interact in real time.

Types of Video Teleconferencing

- ***Based on number of Participants***
  - **Point to point**: It is ideal for one-on-one communication where two people can interact.
  - **Multipoint**: It is a video call to interact with three or more participants. It is suitable for team meetings and online discussions.
- ***Based on Technology***
  - **Desktop**: A video call made from desktop computer or laptop
  - **Room based**: A dedicated room is equipped with high-definition camera, audio system and large size monitor for conferencing purpose.
  - **Telepresence**: A video conferencing technology that offers high-definition visuals and spatial audio to create a more realistic user experience.

Uses of Video Teleconferencing

- To conduct team meetings
- To conduct webinars
- To conduct job interviews
- To show demonstrations
- To conduct online classes
- To enhance communication and interaction over audio conferencing
- Economical and cost saving
- It has global reach. It removes the physical boundaries
- It saves time as quick decision making is possible over discussion
- It facilitates remove collaboration
- Improves work life balance by preventing unnecessary commutation
- Increases accessibility and convenience
- Allows recording and sharing of video conferencing for future reference
- Supports remote learning and telemedicine
- Environmentally friendly-saves fuel

Equipment Needed for Video Teleconferencing

- Desktop/laptop/mobile
- Camera/Webcam
- Microphone
- Internet connection
- Video conferencing software—Zoom, Google meet, Microsoft teams, Skype, Cisco webex, etc.
- Head set

Challenges in Video Teleconferencing

- Availability of desktop/laptop and other accessories
- Internet connection
- Purchase of software for uninterrupted use
- Training on use of these technology
- Possible distractions
- Difficulty in maintaining attention of the audience
- Lack of suitable environment at all times
- Lack of integrity and transparency

Video teleconferencing has become easy and inevitable part of everyone's life. It's application in online/distance learning is still expanding. The technology is very simple, and the faculty and students can quickly adapt it.

Camera

Camera is a piece of equipment for taking photographs, moving pictures or television pictures **(Fig. 3.17)**.

Photograph

According to Emmert, the still photograph represents a cross-section of a visual experience of that instant in time.

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Fig. 3.17: Camera

Purposes of Camera

- To impart knowledge
- To increase perceptual and conceptual learning
- To bring remote events closer
- To provide field type of learning
- To provide realism
- To convey the message easily
- To attract group attention
- To start discussion or review.

Types

- Fixed focus simple box camera with single speed shutter
- Box camera with two speed shutter
- All metal reflex
  - Single lens
  - Double lens
- Miniature cameras with couple range finders
- Old model field cameras using plates
- Digital cameras.

Parts

- Lens
- Iris
- Shutter
- Rewinding mechanism
- Negative film
- Opaque box
- Press button.

Steps in Photography

- Loading the camera with suitable film
- Selection of shutter speed, lens aperture
- Required view
- Exposure
- Processing
- Printing
- Mounting.

Advantages

- Conveys message easily
- Helps in retention
- Holds attention and concentration
- Interesting, easy and fast
- Saves time
- Duplication is possible
- Entertainment
- Reality.

Disadvantages

- High maintenance
- High production cost
- Suitable for high audience only
- Considerable preparation and technical skills needed.

Liquid Crystal Display Projector

"Liquid Crystal Display".

LCD means liquid crystal display.

An LCD projector is a type of video projector for displaying video, images or computer data on a screen or other flat surface. It is a modern analog of the slide projector or overhead projector. The LCD projector was invented by New York inventor Gene Dolgoff **(Fig. 3.18)**.

How Images are Displayed?

To display images, LCD (liquid crystal display) projectors typically send light from a metal halide lamp through a prism that separates light to three polysilicone panels—one each for the red, green, and



Fig. 3.18: LCD projector.

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blue components of the video signal. As polarized light passes through the panels (combination of polarizer, LCD panel and analyzer), individual pixels can be opened to allow light to pass or closed to block the light. The combination of open and closed pixels can produce a wide range of colors and shades in the projected image.

Metal halide lamps are used because they output an ideal color temperature and a broad spectrum of color. These lamps also have the ability to produce an extremely large amount of light within a small area.

Projection Surfaces

These small metal halide lamps have the ability to project an image on any flat surface. LCD projectors tend to be smaller and more portable than other types of projection systems. Even so, the best image quality is found using a blank white or gray surface, so dedicated projection screens are often used.

Perceived color in a projected image is a factor of both projection surface and projector quality. Since white is more of a neutral color, white surfaces are best suited for natural color tones; as such, white projection surfaces are more common in most business and school presentation environments.

However, darkest black in a projected image is dependent on how dark the screen is. Because of this, some presenters and presentation space planners prefer gray screens, which create higher perceived contrast. The trade-off is that darker backgrounds can throw off color tones. Color problems can sometimes be adjusted through the projector settings, but may not be as accurate as they would on a white background.

Educational Uses

- When watching educational videos in the classroom, images projected on a large screen allow students to catch every detail, even from the back rows.
- As images can also be projected in well-lit environments, students can refer to their texts or take notes at the same time, thus effectively allowing the class to gain a deeper understanding of the subject matter
- With computers now being introduced in more and more classes, computer screens can be output directly to projectors to supply students with pertinent information in real-time
- Projectors become powerful teaching tools, particularly when instructing a class in how to operate computers
- Projecting the example of teacher's computer screen onto a large screen allows class progress to be closely monitored so that support can be given where needed
- Moreover, by installing a fixed projector in a large capacity venue, such as a gymnasium or hall, the benefits of projecting images on the big screen can be magnified to reach even larger numbers during intramural events or other occasions.

Meetings and Small Conferences

- Displaying presentation materials by projector at meetings allows information to be shared equally among those present
- Problem points and issues displayed on a large screen can be easily verified and thus facilitate more effective, smoother flowing discussions. This likewise sets the stage for accelerated decision-making and speedier administrative processes.
- Easy set-up and portability help reduce the loss of precious time
- Moreover, as images can be projected for viewing even in well-lit environments, participants can also engage in note taking and refer to printed materials or other documents.

Mobile Presentations

When presentations are made out of the campus, the use of projectors enables us to present highly appealing and communicative deliveries, on a large screen, which holds the attention of the audience completely. Big screen presentations deliver a visual impact that will leave an impression on clients long after the presentation is over.

Large Conferences

Projectors are now indispensable for conferences and seminars at large venues. They enable presentations that demand the attention of those present and leave a vivid impression through the synergistic effect of the presenter's oral explanation combined with a dynamic rendering of presentation content on-screen through an ensemble of animation effects. Highly appealing presentations can put together at will to consist not only of PC generated materials but also elements of video and website content as well. Seminars and conferences can proceed smoothly, while paper and labor that would usually be expended in distributing detailed materials to attendees are also saved.

Exhibitions

Projector generated images coupled with explanatory panels allow the staging of more dynamic presentations

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to achieve a greater impact at events such as exhibitions. Moreover, projection enables a combination of presentation images to be employed for a wide range of applications. Projectors can thus be freely positioned to project from the ceiling, the floor or from the rear of projection surfaces and realize environments orchestrated to suit to every time, place and occasion.

Disadvantages

- Clarity and visibility of the projected images are reduced when used in well-lit environment
- Smooth, white, flat surface is required to project
- Projectors do not have self-playing capacity. It requires input from the computer
- Expensive and less affordability
- Technical knowledge and skill is essential to use the projector effectively
- Video output alone presented and requires audio supplementation by the presenter.

Powerpoint Presentation

Microsoft Powerpoint is a versatile tool for developing computer-based graphical presentations.

Criteria for Developing Powerpoint Presentations

- Powerpoint presentations are meant for use as a presentation aid with a speaker. It is not best for presentations without a speaker.
- Powerpoint slides comprising a presentation should support the message, not substitute for the presenter or for a more detailed handout
- A balanced and structured approach is needed for a presentation. Text to give context for the audience's understanding of what the presenter will be speaking about, and graphics and multimedia to touch the emotions of the audience.

Guidelines for Preparing Powerpoint Presentations

- Decide clearly the purpose of presentation.
- A structured presentation will be highly effective.
- Select colors that have high contrast so that the text and graphics can be easily seen. It is preferred to have dark backgrounds with light colored text or vice versa.
- Use fonts that provide clear visibility
  - Never use a font size below 24.
  - For titles and headings, use 36–44 font size.
  - Never use too many fonts.
- For title, either bold letters or underline can be used, never use both.
- Use bulleted points and short sentences, preferably phrases consisting of 5–6 words, to deliver the key ideas.
- Avoid using moving/flying text or graphics unless a purpose is there.
- The most preferred effect that is suitable in a presentation is the "appear" effect.
- Transition between slides should be smooth and appealing. Otherwise distraction may happen from the message being delivered.
- Use graphics, clip arts or photographs only if they add message to the slides.
- Avoid overly complex diagrams or charts.
- Do not use images that are not relevant to the topic of the slide.
- Charts, graphs and tables can be used to present information precisely and concisely.
- Never use annoying sounds.
- Never use poor quality of video or audio segments.

Tips for Effective Presentation

- Never read out the slides as it appears during the presentation. Simply reading the slides that are jammed with text is an insult to the audience.
- Elaborate the points, phrases, and key ideas present on the slides.
- Avoid abrupt jump of the content.
- Go back to previous slides, if required.
- Face the audience and not the projection screen.

Video Compact Disk

Video CD (abbreviated as VCD and also known as View CD, Compact disk digital video) is a standard digital format for storing video on a Compact disk. VCDs are playable in VCD players, most modern DVD video players, personal computers, and some video game consoles.

Advantages of Video Compact Disk

- Easy to store
- Large storing capacity
- Cheap and handy
- Copying is easier
- Self-playing capacity
- Durable
- Cannot be affected by fungus
- Combined audio and video output.

Disadvantages of Video Compact Disk

- Easily breakable
- Scratches affect the video quality.

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Video Cassette Recorder

The video cassette recorder (or VCR, more commonly known in the UK and Ireland as the video recorder) is a type of video tape recorder that uses removable video tape cassettes containing magnetic tape to record audio and video from a television broadcast so it can be played back later. Most VCRs have their own tuner (for direct TV reception) and a programmable timer (for unattended recording of a certain channel at a particular time) **(Fig. 3.19)**.

Advantages of Video Cassette Recorder

- Directly recordable
- Reproducible
- Copies can be taken
- Combined audio and video output.

Disadvantages of Video Cassette Recorder

- Affected by fungus
- Affected by magnetic force
- Not economical one
- Less durability
- Outdated
- Transferred to digital format.

Microscope

A microscope (Greek: *micron* = small + *skopein* = to look or see) is an instrument for viewing objects that are too small to be seen by the naked or unaided eye. The science of investigating small objects using such an instrument is called microscopy. The term microscopy means minute or very small, not visible with the eye unless aided by a microscope.

Parts of the Microscope

The parts of the microscope are shown in **Figure 3.20**.

Aperture Iris Diaphragm

This device is part of the substage condenser. It serves to control the angle of the cone of light emerging from the top of the condenser. When adjusted so that the back lens of the objective, as viewed through the eyepiece tube, is just filled with light.



Fig. 3.19: VCR.

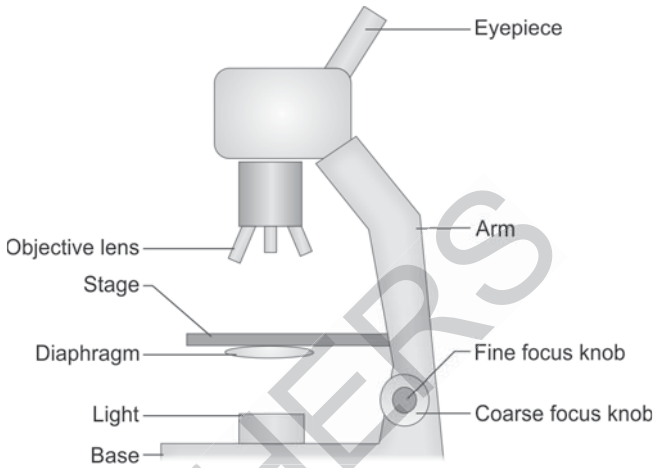

Fig. 3.20: Microscope.

Body Tube

This part supports the eyepiece and objectives. It is critical that the tube is constructed so that this optics shares a common axis. Mechanical tube length is the distance from the top of the eyepiece tube to bottom of the objective holder.

Coarse Adjustment Knob

As the name suggests, this control (typically a pair, one on each side) moves either the body tube, or the stage/substage, up or down in a quick manner. This is accomplished by means of a rack and pinion assembly. The pinion is a toothed wheel (the knobs are attached to either end of the axial) that rides along a diagonally grooved bar or "rack", attached to the stage or body tube. A good coarse focus control will provide smooth, back lash free movement.

Condenser

It is a vital part of the illumination system, and is designed to collect, control and concentrate light from the lamp onto the specimen. As with objectives, the optical elements can introduce a variety of aberrations which are corrected to varying degrees, depending on the type of condenser one is using. Condensers (as well as filters and objectives) are available to provide specialized and contrast-enhancing illumination.

Condenser Focus Knob

This control is used to precisely adjust the vertical height of the condenser.

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Eyepiece (Ocular)

Eyepieces are produced in a number of different designs. The top element is an achromatic doublet, and it provides a large, flat, and well corrected field of view.

Eyepiece Tube

A fixed tube, into which the eyepiece is inserted.

Fine Focus Knob

This control allows for precise focusing of the specimen. It is absolutely essential that this control works smoothly, with zero rebound effect, e.g. set the focus and leave for 5 minutes, the image should remain razor sharp.

Foot (Base)

It rests on the bench top and supports the stage and body of the microscope, and in many cases also houses the lamp. A well-designed base will ensure that the image does not dance about during focusing, or while manipulating the specimen. There are a vast number of different base designs.

Limb (Arm)

The arm is attached to the foot (in scopes without an inclined viewing head by means of an "inclination joint") and supports the body tube. The shape of the arm and the way in which the body is attached are often used to illustrate the history of the microscope's development. In modern stands the "body tube" has been replaced by two removal parts, a viewing head and an objective changer, with the top end of the arm forming the middle section. This type of arm is very strong and can better support additional equipment, such as video cameras.

Mirror (Or Internal Lamp)

The mirror serves to direct light into the condenser. Except for specialized mirrors, all are second surface mirrors, in other words the silver coating is applied to the back, rather than front glass surface.

Nosepiece (Objective Changer)

A rotating device to which objectives are attached. The quality of objective changer is often a good indication of a microscope's overall quality. It should move smoothly, and most important, should have a distinct click or feel when an objective is properly "seated".

Objective

This, together with the condenser, is the microscope. It is much better to start with two good quality objectives then four mediocre ones. In many cases the barrel of the objective is engraved with information on its optical characteristics. Objective lenses are very tiny and as a result great care is needed to form and assemble such lens systems. A revolving nosepiece permits rapid changeover between objectives. In practical terms it is essential that the focus of the image be preserved during the change of objectives.

Stage Clips

These are the basic stage slide holders. Supplied in pairs, they are adequate for general slide manipulation.

Stage

This is the platform or "stage" that supports the specimen (which are typically mounted on glass slides). To do this job properly it must be perfectly perpendicular to the optical axis, dead flat and of adequate size. A microscope with a dinged or out of line stage should be a void. As mentioned above mechanical stages are often supplied. They may be integrated into the stage itself (with the stage deck moving in one axis rather than the slide holder) or they can be attached see Figure 3.20 for the parts of microscope.

Types

"Microscopes" can largely be separated into three classes.

1. Optical microscopes
2. Electron microscopes
3. Scanning probe microscopes.

Optical microscopes are microscopes which function through the optical theory of lenses in order to magnify the image generated by the passage of a wave through the sample. The waves used are either electro-magnetic in optical microscopes or electron beams in electron microscopes.

Simple versus Compound Microscope

Simple Optical Microscope

A simple microscope, as opposed to a standard compound microscope with multiple lenses, is a microscope that uses only one lens for magnification. This use of a single convex lens to magnify objects for viewing is still found in the magnifying glass and the hand-lens.

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Compound Optical Microscope

The compound microscope would have a single glass lens of short focal length for the objective, and another single glass lens for the eyepiece or ocular. Modern microscopes of this kind are usually more complex, with multiple lens components in both objective and eyepiece assemblies. These multicomponent lenses are designed to reduce aberrations, particularly chromatic aberration and spherical aberration. In modern microscopes the mirror is replaced by a lamp unit providing stable, controllable illumination.

Optical microscopes, through their use of visible wavelengths of light, are the simplest and hence most widely used type of microscope. A stereomicroscope is often used for lower-power magnification on large subjects. Various wavelengths of light are sometimes used for special purposes, e.g. in the study of biological tissue.

Electron Microscopes

Electron microscopes, which use beams of electrons instead of light, are designed for very high magnification usage. Electrons, which can be accelerated to produce a much smaller wavelength than visible light, allow a much higher resolution. The main limitation of the electron beam is that it must pass through a vacuum as air molecules would otherwise scatter the beam.

Transmission electron microscope: It passes electrons completely through the sample, analogous to basic optical microscopy. This requires careful sample preparation, since electrons are scattered so strongly by most materials. This is a scientific device that allows people to see objects that could normally not be seen by the naked or unaided eye.

Scanning Probe Microscope

In scanning probe microscopy (SPM), a physical probe is used either in close contact to the sample or nearly touching it. By moving the probe across the sample, and by measuring the interactions between the sharp tip of the probe and the sample, a micrograph is generated. The exact nature of the interactions between the probe and the sample determines exactly what kind of SPM is being used. Because this kind of microscopy relies on the interactions between the tip and the sample, it generally only measures information about the surface of the sample.

Direction to Use the Microscope

- To carry the microscope, grasp the microscopes arm with one hand. Place the other hand under the base.
- Place the microscope on a table with the arm toward you.
- Turn the coarse adjustment knob to raise the body tube.
- Revolve the nose piece until the low-power objective lens clicks into place.
- Adjust the diaphragm. While looking through the eyepiece, also adjust the mirror until one can see a bright white circle of light.
- Place a slide on the stage. Center the specimen over the opening on the stage. Use the stage to hold the slide in place.
- Look at the stage from the side. Carefully turn the coarse adjustment knob to lower the body tube until the low-power objective almost touches the slide.
- Looking through the eyepiece, adjust very slowly, the coarse adjustment knob until the specimen comes into focus.
- To switch to the high power objective lens, look at the microscope from the side. Carefully revolve the nosepiece until the high-power objective lens clicks into place. Make sure the lens does not hit the slide.
- Looking through the eyepiece, turn the fine adjustment knob until the specimen comes into focus.

Care and Handling

- **Transporting**: When picking up the microscope and walk with it, grab the arm with one hand and place the other hand on the bottom of the base. Do not swing the microscope!
- **Handling and cleaning**: Never touch the lenses with the fingers. Human being's body produces oil that smudges the glass. This oil can even etch the glass if left on too long. Use only lens paper to clean the glass. Toilet paper, kleenex, and paper towels have fibers that can scratch the lenses.
- **Storage**: When finished with the "scope" assignment, rotate the nosepiece so that it is on the low-power objective, roll the nosepieces so that it is all the way down to the stage, then replace the dust cover. Do not forget to use proper transporting techniques.
- **Clean-up**: Clean all slides, materials, and work area when it is done. Be careful with the slides and cover slips.

  They are made of glass and if broken, one will get cut and will bleed.

Advantages

- Magnification
- Direct analysis
- Direct identification
- Some models work without power.

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Disadvantages

- Cannot store the result
- No self-interpretation
- Not suitable for large groups
- Handling and preservation is not easy.

Summary

A wide variety of instructional media is used to impart education and make the learning process interesting and effective. They are namely charts, graphs, projects, models, overhead projectors, LCD projectors ,tape recorders, radio etc. Audio-visual aids are any devices that can be used to make the learning experience more concrete, more realistic and more dynamic (Kinder). Audio-visual aids can be classified as projected and nonprojected, traditional and digital, and graphics and models. It is also defined as audio aids, visual aids, and audio-visual aids.

Each audio-visual aid is unique in its purpose, principle followed and methods of preparation and handling/use. Although there has been a rise in variety of AV aids since the advent of technological advancements, the traditional methods of administering the content remains the basis of delivering the educational content effectively by almost all educators.

Audio-visual aids can supplement teaching, but are no substitute for teachers or books. Audio-visual aids should not be misused; they should be used properly to attain the educational and instructional objectives.

Suggested Readings

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Review Questions

Essays

1. Explain the role of audio-visual aids in teaching.
2. There are some general functions which may be delineated for the use of audio-visual media in communication in teaching and learning-explain.
3. What are the types of audio-visual aids? Discuss the advantages of audio-visual aids incorporating the principles in the use of audio-visual aids.
4. Discuss the role of nurse educator in selection, procurement and use of various audio-visual aids.
5. a) Define AV aids. b) Classify AV aids. c) Explain various types of charts used in nursing education.

Short Notes

1. Principles in selection of AV Aids
2. Underlying principles for successful use of audio-visual media
3. Overhead projector
4. Advantages of field trip in Nursing Teaching
5. Classification of AV aids.
6. Selection and use of instructional media
7. Projected visual aids
8. Audio-visual aids used in seminar
9. Non-projected aids
10. Posters
11. Role of teacher in using instructional aids
12. Role of teacher in use of non-projected instructional aids

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- This book will be useful for faculty as well as postgraduate and undergraduate students, helping them gain a deeper understanding of nursing education.
- This book covers major concepts such as teaching-learning process, audio-visual aids, evaluation, curriculum methods, guidance and counseling, teacher training, communication, and educational technology in a clear and straightforward way.

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