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**Visual Graphic Communication, Operational tables**

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# Audio - Visual Aids

**Definition:** A visual aid is an instructional or communicating device in which the message can be seen but not heard. An audio aid is an instructional device in which the message can be heard but not seen. An audio - visual aid is an instructional device in which the message can be heard as well as seen.

**Purpose:**

- Audio - visual aids are used to improve teaching, i.e., to increase the correctness, clarity and effectiveness of the ideas and skills being transferred.
- Possibility of misinterpreting concepts is reduced.
- Enables the audience to look, listen and to learn faster, to learn more, to learn thoroughly and to remember longer.
- Help reach more people irrespective of their level of literacy and language.
- Save time of teacher and learner.
- AV aids create lively conditions in the class room.
- Create and maintain interest of the audiences.

## Classification of Audio-Visual Aids

On the basis of senses, audio-visual aids can be classified as ahead.

<table>
<tr><th>Audio Aids</th><th colspan="2">Visual Aids</th><th colspan="2">Audio-Visual Aids</th></tr>
<tr><td rowspan="2">Radio,<br>Tape recorder,<br>Telephone,<br>Public address system,<br>Folk Song,</td><td rowspan="2">Slide,<br>Film strips,<br>Silent films,</td><td rowspan="2">Charts<br>Posters<br>Flip chart<br>Photograph<br>Modals, Spaceman, flesh Card, flanned graph, Illustration, Black board, bulletin board</td><td>Projected</td><td>Non-Projected</td></tr>
<tr><td>Motion picture,<br>Television</td><td>Drama,<br>Dance with folk song,<br>Puppet shows,</td></tr>
</table>

**Audio - visual aids** can also be classified in another way as - Display type such as poster, bulletin board, models, exhibits, etc.

Display type visuals are those which are spread before the audience for viewing the message by looking at them.

Presentation type visuals are presented or projected before the audience for viewing, but at the same time one explains or presents the message of the visuals, so that the audience gets a meaningful understanding of them.

❖ **Audio - visual aids their use and Effectiveness:**

➢ **Tape Recorder:**

A tape recorder is equipment for recording sound on magnetic tape by electro - magnetic process, which may be played back when needed. The tape may be of celluloid, plastic or high tensile polyester film. These have an ultrathin coating of iron oxide on one side. The tape is magnetized as it passes through a recording head. To play back, the tape is passed again through the magnetic head. Tape recorder is suitable for use in meeting, training program, campaign, recorded radio program, etc.

➢ **Telephone:**

Telephone is a system of equipment through which people can communicate both ways to distant places. It provides for instant interpersonal communication, in which the communicator and receiver change their roles while giving and getting information. By using telephones people can keep contact with the outside world, without physically moving out. This improves speed of communication and involves considerable saving of time, money and labor.

➢ **Public Address System:**

It is a set of equipments to amplify sound so that it is audible to a large audience over a distance. It is useful for extension programmes e.g. mass meeting, field / farmers' day, campaign, exhibition, etc.

**The Public Address System has three components:** Microphone, amplifier and loudspeaker. The microphone is connected to the input terminal of the amplifier and the loudspeaker to the output terminal. It may be run on dry / wet battery, or AC / DC power supply.

➢ **Folk Songs:**

The villagers have a great fascination of their popular / folk songs. We go closer to them if we organize such functions at the time of exhibition, meetings, weekly local market, etc. Related with the development and practices in local dialects can be composed by villagers or students and sung with the help of Harmonium, Tabla, Sarangi, Chimta, etc. This is a good way of conveying the information to the villagers.

➢ **Projected Visual Aids**

- **Slides:** Slide is a transparent mounted picture which is projected by focussing light through it from electric bulb, petromax or lantern. The projection may be made on roll - back screen or on white wall.

  If electricity is available in the rural areas, it is possible to use slide projectors fitted with electric bulb for extension work. There are two types of slide projectors. One is manually operated in which every time the projected slide is taken out and new slide is inserted in the slot and pushed by hand in position. The other one is automatic slide projector in which a large number of slides are serially inserted in the magazine slots before and changed one by one at the time of projection by a remote control device. Automatic slide projector is costly, but produces good quality images.

❖ **Advantages**:

- ✓ Attract attention and arouse interest of the audience.
- ✓ Selected slides may help in motivating the audience.
- ✓ Projection of slides may be synchronized with the talk.
- ✓ A few good slides can make a story.
- ✓ Have high credibility and can give the audience a real life experience less costly and easy to replace.

- **Film Strips:** Film strip is a continuous strip of film of a small number of photographs, drawings, diagrams arranged in a sequence. A strip may be of 35 mm film. It may be of two types: (a) single frame (24 x 18), (b) double frame (24 x 36). The number of frames in a strip may range from 30-60. The picture may have explanatory titles. The entire length of the strip has perforations on both sides, which facilitated forward or backward movement of the pictures. Some of the slide projectors have facility for projecting film strip.

  The film strips are generally used in extension programmes.

❖ **Advantages:**

- ✓ Film strips are light, unbreakable, easily stored, and contains much information in a small package.
- ✓ Less expensive than motion pictures.
- ✓ The villagers can participate through discussion on each picture, as presentation can be stopped without breaking sequence.

- ✓ A film strip, when projected, can be accompanied with commentary or mu sic played back by a tape recorder or gramophone.

❖ **Limitations**:
- ✓ Its sequence of projection is fixed and cannot be altered.
- ✓ The surface of the film strip may become scratched after prolonged use.
- ✓ The extension worker is often dependent on film strips produced commercially which may not suit his requirements.

➢ **Non - Projected Visual Aids**

- **Charts:** Charts are normally made on colored chart paper or poster paper. Charts are visual symbols for summarizing, comparing, contrasting, or performing other services, in explaining subject matter. In other words, they are diagrammatic presentations of facts or ideas. Pictorial charts are more useful for the farmers.
- Poster: The poster is an important visual aid. Poster as display visual or aid in class room or training situation has been largely used by extension workers to create awareness, giving information, and create interest among the villagers on subjects.

  As long as it remains in the village, it will serve as a reminder to the villagers. A good poster arouses or urges people to immediate action and is highly suggestive.

❖ **Advantages:**
- ✓ Helps in making announcements.
- ✓ Facilitates display of ideas to the audience.
- ✓ Quick communication of message to a large number of people dispersed widely and in remote areas.
- ✓ Facilitates motivating people
- ✓ To be useful, a poster must be planned for doing a specific job:
  (a) Promote one point or idea;
  (b) Support the local exhibits or demonstrations.
- ✓ Poster must also be planned for the people who are supposed to do the job:
  (a) Contain dramatic pictures that will stop people and make them look.
  (b) Tell the story in a few simple words, at a glance, with one idea and in bold letter.
  (c) Must picture everyday life and appeal all.
  (d) Should be at least 20 x 30 inches in size.
  (e) Must be timely.

- **Flip charts:** Consist of a series of individual charts which are tagged or bound together and hung on supporting stand. These individual charts carry a series of related messages in sequence. The teacher flips them one after another, as the lesson or story progresses. To be effective, a flip chart should deal with only a broad theme and give only the salient points without too much data or details.
- **Photographs:** Photographs are exact visual recordings of things in nature. They may be black and white or in color. They are used in personal teaching situations and also used as display type visuals in exhibitions or on bulletin boards. They are much closer to reality and have greater impact on the points.
  (a) Show the main subject prominently and
  (b) Have plain and simple background that does not distract the main subject.
- **Models:** Models are essentially recognizable imitations or replica of the original, whether workable or not, whether differing or not from the original in size, e.g. , farm machinery, models of compost pit, etc.
- **Specimens:** Specimens are real objects taken out of their natural settings, e.g., specimens of insects, ear heads, diseased parts of the plant, etc. Teachers / extension workers can easily bring in to the class room the specimens available to facilitate teaching or training. These real objects or models work effectively as visual aids in teaching.
- **Flash cards:** Flash cards are a series of illustrated cards which when flashed or presented to a group, in proper sequence, tell a complete story. They are used to tell about a process in a step by step manner. The story is told as each card is held before the group. The story is simple and tells about one theme, e.g., making a compost pit or germination test, etc.

  To prepare flash cards, select a topic which can be broken down into simple meaningful parts, such that each card represents a meaningful part of the whole. Write notes on the topic in a series of steps so that each step is covered by one flash card. Revise the notes before actually starting to prepare the flash cards. Number the cards in sequence and start drawing pictures or captions on each card in sequence. Once you prepare all the flash cards,

arrange the cards in the sequence and write notes on the back of the cards - write the notes of the Ist card on the back of the last card, then the notes of the 2nd card on the back on the I$^{st}$ card, that of 3$^{rd}$ on the back of the 2$^{nd}$ and so on till you finish all the cards. Follow the sequence properly.

It is best to limit the number of flash cards to 10 or 12 for one talk. In order to make the most effective flash cards, study your talk and pick the main idea that you want your audience to remember and put those ideas on the cards supported with suitable illustrations. Flash cards should be used for groups of not over 30 people. They need to be large enough for everyone to see - at least 22 "x 28" or 12 "x 15" for smaller groups. Flash cards need to be changed and adapted to local language and culture. Practice the story telling using the cards in sequence. As you become skilled in this type of teaching, you may invite people to participate in the discussion or telling the story.

To teach well through the flash cards:

- ✓ The story on each card must be familiar to you.
- ✓ You must use simple words and local expressions.
- ✓ You must bring in local names of people.
- ✓ You must hold cards so that people can see clearly.
- ✓ You must hold cards against your body and not up in the air. You turn your body towards the different parts of the group to show cards to all the members of the group.
- ✓ You point to important objects on the card without covering the card with your hand.
- ✓ You must be enthusiastic and you must enjoy telling the story.

- **Illustrations:** Illustrations are non - photographic reconstruction of reality, e.g., drawings, paintings, sketches, etc. These are used to illustrate the story or the point the teacher, extension worker makes. Drawings can be line drawings, off - tone drawings or even stylized sketches.
- **Flannel graph:** A flannel graph or khaddar graph is a visual teaching aid. Pieces of flannel, felt or sand paper, have rough surfaces, will stick to another piece of flannel stretched on a firm flat surface called a 'flannel board'. When pieces of flannel, felt are attached or sand paper to the back of the pictures, photographs, drawings, letters, etc., these objects will also stick to the flannel board. This device is called a 'flannel - graph'. Some extension workers who travel on foot or bicycle prefer to take only the flannel graph parts with them. When they arrive where the lesson is to be given they borrow a blanket, a piece of rough - textured cotton cloth or perhaps a mosquito net.

  This is draped over an upturned table, bed or fence, or is attached to wall to provide support.

  The size of flannel graph depends on the size of the audience. A flannel graph of 30 "x 40" can be used to tell a story to about 150 people. It will be convenient to keep several different sizes to accommodate different sizes of audience.

  For a useful flannel graph:

  - ✓ Decide exactly what to be told to audience.
  - ✓ The story should be developed in a logical, step - by - step sequence.
  - ✓ It should be kept as simple as possible.
  - ✓ Practicing presentation 2-3 times before giving it to an audience.
  - ✓ Do not stand in front of the flannel graph.
- **Black board:** Black board is the most universalized of all the teaching aids. It is not itself a visual material but a vehicle for a variety of visual materials. It is one of the cheapest, most effective, most versatile and easiest to use way.

  Here are a few suggestions for using the black board:

  (a) Have it clean.
  (b) Use clean eraser.
  (c) Write in large letters.
  (d) Use colored chalk.
  (e) Do not talk as you write.
  (f)Face group after writing and continue the discussion.
  (g) Keep drawings simple; and
  (h) Don't stand in front of the black board, stand on one side.

- **Bulletin board:** It is a simple inexpensive device that can be placed either outdoor, or indoors. A soft board that will hold pins or tacks is most suitable. It can perform basic communication functions. It can attract attention, stimulate interest, deliver a message and promote action. Items are generally used on a bulletin board include photographs , cut - out illustrations from publications, drawings, specimens, notices, posters and wall news papers.

➢ Objectives:

1. Local announcement of importance to all the villagers.
2. Photographs to show local activities.
3. Follow - up instructions for the villagers on things demonstrated and emphasized.
4. Reminders for things to be done - when, how and by whom.

➢ **Useful Suggestions:**

1. Better to communicate one or two ideas than to confuse the audience and communicate nothing at all.
2. Use colour for attraction and effectiveness.
3. Change material on the bulletin board regularly.

## Visual Graphic Communication:

**Why Graphics?**

A graphic format is a canonical representation for problems of a certain class: the format allows people to manage certain tasks that would be impossible or difficult if posed in words alone.

In general, people do not perceive absolutes. Our perceptional system is especially well adapted for making comparisons and distinctions. Such comparison may be explicit (presented side by side, soft type a charts), or implicit the learner compares new knowledge with a similar situation drawn from memory.

➢ **Purpose:** The prime purpose of graphic devices is to display conceptual information: logical, numerical: spatial and temporal data in the form like graphs, charts, diagrams, tables, notations and other devices which are specially adapted for presenting scientific, technical, social and commercial information.

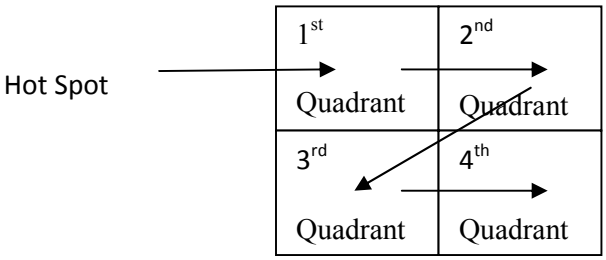
The term "graphic device" refers to a particular diagram, whereas the term "graphic format" refers to a family of devices like pictorial graph.

Before discussing about the application of various graphic formats and their devices it would be appropriate to highlight certain basic principles of graphics. The more you use the principles of graphics in all usual subjects, the more effective yours communication will be. A good graphics design is functional and implies in planning and ordering of all visual elements.

❖ **Elements of Visual:**

(1) Display or Typographical letters.
(2) Illustrations (pictures / diagrams, etc.).
(3) Colour.
(4) Empty space.

Manipulation of these 4 basic elements leads to balancing a visual, which is primarily guided by graphic principle such as:




Balance of elements is done in such a way that is soothing to reader / viewer and easy to read. Our eyes move in a "Z" like pattern and this "Z" movement starts from 1st quadrant and lastly in the 4th quadrant. This Z movement passes through all 4 hot spots and optical center, which is 5/8th of the length of the page from below. This optical zone is assumed to be very important by all graphic practitioners in arresting balance in any layout.

➢ **Balance:** Every visual should have a balance or rest. If a visual appears to be something wrong in terms of its layout then we can at once conclude that balance is lacking in the visual displayed.

Two types of balance namely formal and informal balance can be obtained by manipulating the size or shape of the illustrations / letters or color.

Color should be so chosen that it should be legible and which will fit the message psychologically. The dominant color should be selected to match the desired mood of the message.

| | |
|---|---|
| White: | fresh, pure, clean |
| Black: | dignified, fearsome |
| Red: | beloved, angry, dangerous |
| Blue: | cool, melancholy, depressed, mildness |
| Purple: | rich, imperial, impassioned |
| Orange: | festive, urgent |
| Yellow: | warm, light, ripe |
| Green: | growing, youthful, sickly |

- **Principle of Perception:**

Relative proportion of various elements of graphic format that occupy is also important. Deciding the right proportion would essentially depend on how you are planning to achieve balance, the point of emphasis in the graphic material and which is the most agreeable to our eyes. As a rule, rectangle is always preferred to circle and square. In the similar way, the choices to be made about typefaces, styles, sizes and spacing will also influence how the message in graph is perceived. For example, all capital words are harder to read because they lack the unique shapes of lower case.

- ✓ **Principles of Perception:**

1. Man's perception is relative.
2. Man's perception is selective, organized and influenced by the set.
3. Stable individual differences in perception do exist (Fleming, 1970)

In general people do not perceive absolutes; however, our perceptual system is especially well adopted in making comparison and distinctions. Such comparisons may be explicit (Isotype charts for example) or importance.

- ✓ **Perception of Objects / Picture / Elements (Fleming)**:

1. Apparent brightness and colour can be influenced by adjacent brightness and color
2. Magnitude of stimulus and magnitude of perceived effect are related, but not in simple linear form. Features (colors, straight lines) are accentuated in perception while others (uniform areas) are not.
3. Gestalt qualities (such as good figures) will be preferentially perceived
4. Objects and pictures of objects are remembered better than their name and concrete words are remembered better than abstract words.

- ✓ **Perceptual Capacity (Fleming)**:

1. Similar objects or objects placed close together will be perceived as related.
2. Familiar objects exhibit perceptual constancy.
3. Common themes, patterns and structures assist the process of interpretation.
4. Words in support of graphics assist learning.
5. Perception of depth is influenced by relative size of familiar objects, perspective, texture, superimposition and various qualities of light.
6. Perception of size, motion and time duration may be aided by providing appropriate frames of reference or comparison.

- ✓ **Presenting Quantitative Data:**

Tables, graphs, bar charts, circle graphs, pie charts and to some extent maps are more abstract than the pictorial charts. One must read verbal labels (legends) to understand the message. Naturally, this abstraction tends to be a barrier between the message and the reader. It follows that much of the designers are prone to make the information more immediate (by adding pictorial symbols to line graphs) and to reduce the sources of confusion to the reader. Numbers are the most abstract of all, no one can know the difference between 333 and 999 without an act of cognition (they both occupy a similar space). There may be complex tables, which may offer the readers thousands of numbers in a huge array. At least in bar - charts different quantities are represented as bars of corresponding length - allowing the reader to handle the data more easily with perceptual mechanisms. At the same time, it follows (obviously) that nothing presents data so exactly as a number or a formula. Thus, we may presuppose that no graphic format will prove universally superior. Equally clearly, although some formats may be interchangeable, there are limits. Each format has its own domain of application, which may be well or poorly defined and which may overlap the domains of other formats to some extent. Ideally, we may hope for conceptual analysis, empirical research and design experience to clarify such issues.

- ✓ **Tables:**

Until recently, the design of tables for presenting statistics has been an art, understood well by few people. Now, the work of Ehrenberg (1977) has clarified the process by showing how application of few simple principles can markedly improve the design of tables.

(1) Round number to two significant digits. This facilitates mental arithmetic.
(2) Provide row and / or column averages. They are reference points.
(3) Figures are easier to compare in columns. Columns should be used for the most important comparisons.
(4) Rows and columns should be ordered by size of numbers and not alphabetical order of the tables.
(5) Columns and rows should be set compactly, not artificially spaced out to fit the page.
(6) Numerical data are never to be in text form, if there are more than one or two items / variables to be presented.

Tables are not recommended for communicating data to the general public or farmers, tables are most useful for fellow professionals. Both constructing and reading tables require skill of a high order.

The main benefit of tabular presentation is its compactness; a great deal of data can be put on a single page. Also, even with the two - digit restriction a table presents numbers more exactly than bar or pie charts do , i.e., tables remain the preferred format for professional users .

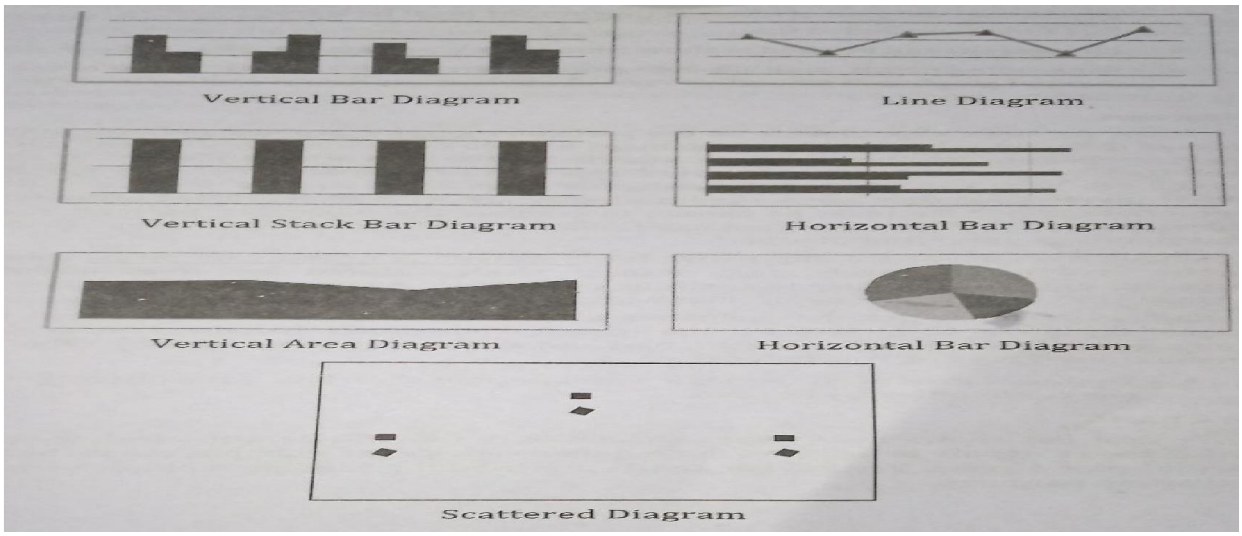
- ✓ **Charts and Graphs:**

The relative effectiveness of bar charts, circle charts, pie charts and graphics has been a subject of some controversy. Experimental studies have gradually sorted out the main issues though several researchers made the mistake of using poor - quality stimulus material and inappropriate tasks. A detailed review of this work has been completed (Macdonald - Ross, 1977), with the following conclusions:

- The quantity and the logical and visual arrangement of data have an important effect on bearing (Washbu rne, 1927).
- Comparisons based on bar charts were more accurate than comparisons based on circles or squares.
- No form is more effective in all respects than all other forms (Washburne, 1927).
- Bar charts are generally superior to circle (Croxton and Stein, 1932) and to line graphs (Culbertson and Powers, 1959).
- Circle (or squares) of differing sizes should be avoided, if used they should be range - graded (in stepped sizes) and a key provided to show the number represented by each step (Meihoefer, 1969).
- Where possible, labels should be placed directly on bars or lines; they should not be indirectly keyed (Culbertson and Powers, 1959).
- For general use, horizontal bar charts are understood better than tables and tables are understood better than text (Feliciceno, Powers, Keart, 1963).
- Text is to be put as a support to charts and tables (Washburne, 1927, Feliciano et al 1963).
- If pie - charts are used fine angular discrimination is to be avoided (Hoch).
- Any graphic format can be executed well, or poorly, for a particular purpose. This is often a more important variable than the choice of format (Macdone, Ross, 1977).
- Circles have certain practical advantage, which make them popular they can be placed on maps rapidly and don't take up as much space as bars.
- However, the relative values of circles are misperceived and these mistakes are systematic. If quantity is related to area, readers tend to underestimate differences.

- ✓ **3D charts:**

3D surface and 3D floating chart types suggest some kind of connection (not in dependent) between the 3 groups as well as over time. 3D connect group charts suggest a relationship between one group and the next. But a 3D connect series chart, which shows each group's year by year economic performance as a block is useful 3D connect series chart represents the data as well as line chart does as something changing over time, without problems of lines inserting and causing visual confusion.




Culbertson (1959) and his associate tackled the more specific question: "What characteristics of bar charts and line graphs make for ease or difficulty of learning?
They concluded:

- Bar charts proved convincingly easier to read than line graphs.
- Grouped line graphs (each element originated from base line) were easier to read than segmented line graphs, which proved very difficult.
- The elements of bars and graphs should be labeled directly rather than directly by key or grid. (Felceiano et al., 1962, 1963).
- The mean scores for alternative formats were in order Horizontal bar charts> short summary tables> long detailed table> text Weintraub (1967) suggested that the skill of interpreting graphs must be learnt.

**Schuftz (1961) discussed that:**

- Line graphs can be used to show time correlated data (trends).
- For reading points, multiple - line graphs were proved to be superior to segmented graph as it embodies sever all obvious sources of confusion for the reader.

✓ **Diagrams:** There are some experiments on the particular graphic problems of cartograms. Areas of different value in chloropeth maps have to be denoted by different color shade, or texture. Also, the information carried by the lines of an isopleth map can be reinforced by graded tones or colors applied to the areas. These cartographic possibilities have recently been investigated with some success. Jenks and Knos (1961) pointed out that when shades of gray are used to represent quantity an appropriate gray scale must be chosen to regulate the subjective, perception and ranking patterns by% inked is not itself sufficient, the texture of the gray can itself cause items to appear 'Out of order'.

Color is an important alternative for representing quantity on maps. Colors can be used quantitatively. (eg., weaker shades of red for areas of lower temperature) or qualitatively (e.g. strong red for high temperature, strong blue for low temperature, pale shades for intermediate areas).

Cuff (1973) found that the qualitative scheme could be misread by subjects who assigned the lowest temperature to the lightest shade rather than the coolest color. The quantitative scheme is definitely best and shades can be selected by value and chroma score. Thus Cuff looked that:

- To show values of a variable a progression of darkness and intensity of one color only may be used.

✓ **Bar Charts:**

Vertical Bar shows how values change over time. In contrast to line charts, vertical bar charts are better for a limited time series - for example, the vertical bar chart for past 4 years. Vertical bar charts are good for handing multiple series for comparison purposes.

Stacked vertical bar conveys the same information as an ordinary vertical bar, but also shows the contribution of parts to the whole - for example which types of 6 gadgets comprised what proportion of total sales in a given period. The same information may be best shown in a pie or multiple pie charts.

Horizontal bar is the best for simple comparisons of different individual values at one given time. If you want to express change in a value or value over time, switch to a vertical bar, line area or 3D rise chart. A% bar chart would show who got the lion's share as well as the growth over the time (years) in aggregate quantity of whatever you are measuring.

The multiple line graphs allow easy comparison between two or more graphs drawn to the same coordinates. The segmented graph uses one line as the base for the next line. The segmented graph is generally obvious source of confusion for the reader. For reading points, multiple lines and multiple graphs are equally good but for comparison the multiple lines is always superior.

- ✓ **Vertical Line, Vertical Area:**

Vertical line is the best for showing changes in a small group of values over longer periods of time. If you are trying to plot three or four series of values on line chart and they intersect so often you lose track. In this situation, a vertical area chart can be a good option.

Too many lines make visual confusion and as long as the lines don't seen close together and intersect too often.

Vertical area shows continuous proportions and totals, like line charts, vertical area charts don't handle multiple series well. The area representing larger quantities tend to observe there representing small quantities.

Normally, the most appropriate device for presenting exact data.

(a) Progress, trends / changes over time.

(b) Graph showing relationship among ATC, AVC, MC, MR needs color to make the elements clearly distinguishable.

- ✓ **Pie Charts / Multiple Pie Charts**:

Pie charts are often the best way to portray the contribution of parts to a whole. Multiple Pie charts encapsulate the idea of the constitution of parts to a whole and how the whole itself can grow or shrink over time if you assign each pie to represent a time period.

Pie chart is used for actual quantities not% growth rates. But if the slices are too "thin", if the percentages are very small fractions they are hard to read.

Scatter Charts show the correlation of two sets of numbers by plotting where the variables intersect. Scatter charts are useful for the coordinates on the horizontal scale.

Spectral Map Charts are best used with data that carries some kind of spatial relationship such as geographical area. Showing population density across a group of contiguous areas of a city would be an example of an application for a spectral map chart.

Histograms show the frequency of the values in a set of data. For example, plotting the frequency of test scores using a histogram (normally) produces a bell curve.

It must have 3 special conditions:

(a) Figures - one set of data.

(b) Class intervals equal.

(c) Numerical scale must be present on both axes.

The shape of histograms can be described by equations / bell curve or typical position distribution.

- ➢ **Tips and Hints**:

(1) The charting area should dominate.

(2) Putting too many in series, confusing line should be avoided.

(3) The bars should be grouped together - they belong together.

(4) Bars in bar charts, slices in pie (width), risers in 3D charts, should be made prominent by using black outlines / or a dark brilliant color. If you are making slides, the people at the back of the room will appreciate being able to distinguish the different elements.

(5) Use grid lines whenever needed to an appropriate idea of the value of soy given data point in the chart. Too many grid lines create visual clutter. Soft around the chart area) is usually black or a dark brilliant color and that the frame is a heavier in weight than the grid lines.

(6) For slide show, strong coordinating colors that attract attention may be used and help the people at the back distinguishing series.

(7) Use one or at the most two type face in each chart. Use the same size and weight for similar elements such as legend axes. Font size should be 1/25 of the height of the display screen size and bold.
(8) One should be careful about the background behind type, especially smaller areas.

- Avoid pink or violet type and medium or dark blue background. It should not look like the background is trying to swallow it up.
- Avoid complex fill pattern in the background (hard to read) especially smaller items legend / axis scale.
- Sophisticated fill pattern takes more disk space and take longer to print / show.

(9) The elements of bars and graphs should be labeled directly rather than indirectly by key or grid.

- ✓ **Pictorial Charts:**

For pictorial charts iconic symbols are to be used to show directly the subject of the usual argument being presented. Designing Pictorial Charts:

- Pictorial symbols should be self explanatory and different from one another.
- The same symbols are used to represent the same things again and again with no variations.

- ✓ **Isotype Charts:**

A special type of pictorial chart developed by Otto Neurath (1936). The isotype system is especially adapted for presenting social statistics to the general public and is the main alternative to bar charts. The main principles of the Isotype System are:

- The subject matter is represented by standard iconic signs.
- Each sign stands for a given quantity or percent.
- To show larger quantities, use more signs (not larger signs).
- Arrange the signs to make a "Usual arguments". Wrighstone (1936) found that:
- Pictorial charts were superior for locating and interpreting facts and for de layed recall Pictorial charts were thought to be more interesting than alternative for mats.

Other formats in use are:

- ✓ **Algorithms:** An algorithm is a visual instrument of telling. Ordinary language (OL) algorithm show rules, regulation, procedures and instructions in non - continuous prose - usually as flow charts. The source is usually a rule or regulation in prose linked by the words if, then yes or no, etc. The object of an OL algorithm is to break up this prose into its construct parts and arrange it on their page so that the reader has to deal with only one thing at a time. In mathematics, computer science, system analysis, an algorithm is a procedure which produces correct results.
- ✓ **Cosmography:** It is like pie charts, mainly depicts whole object divided into parts. Another element, such as time, location, or value is usually implied by the direction or structure of the charts. Cosmographs could be used to represent assemblies, for example how part of an organization also fits into a different organization.
- ✓ **Comic strips:** Comic strips are in their element used to show the irony of life, the valgaries of human nature and the complexities of personal interaction. According to Scultz (1952) and Feiffer (1958) comic strip has eye - opening qualities. Reader may find the format attractive and that can help motivate them to read further.
- ✓ **Presenting Exact Numbers**:

Exact numerical data are usually presented in a table or a nomogram. The chief purpose of these formats is to present exact data available for operational use. The choice between nomogram and table involves a complex trade off among cost, space, convenience, accuracy and speed.
Nomograms or compilation charts divided into two categories:

- ✓ Abacus
- ✓ Alignment chart
  - **Abacus**: Nomograms drawn on coordinate grids are abacus. They are easier to construct than alignment charts but less easy to use.
  - **Alignment charts:** It consists of a system of nomograms in which variables are represented as a series of scales. Easier to use than abacus, they are less easy to construct.

To present exact numbers; the following observations are useful:

(a) To show the results of experiments or investigations it is better to use graphs or tables.

(b) To present exact data for operational purpose, use nomograms (especially alignment charts) and tables (the two digit rules do not apply to these tables).

In abacus an equation is drawn as graph on Cartesian or logarithmic coordinates. In alignment charts, mostly 3 or more scales are arranged so that a straight line joining two known values cuts the third scale to give the required value (e.g., Flesch readability Alignment charts).

**Operational tables (such as logarithms, chi - tests, etc.)**

Experiments on the design of tables for presenting exact numerical data have shown that if the user of a table is required to carry out operations other than search and read, the number of competent users is markedly reduced. Tabulation schemes requiring synthetic or analytic operations by the user seem to buy economy of space at the cost of comprehension (Wright, 1973).

Wright also found that tables were used more quickly if so arranged the subjects scanned vertically rather than horizontally.

Coming to effect of typing tables in centered and ranged left forms, Hareley and Young, (1975) found that typists took twice as long to produce the centered table and made 25% more errors.

To summarize the experiments on table we can say:

- The logical, spatial and topographical organization of a table makes a good deal of difference to the users.
- Explicit tables (where information can be read directly) should be preferred whenever possible.
- When tables are typed both headings and columns should range - left.

Presenting Scientific Data Adequate collection, organization and presentation of numerical data are essential. Graphics design needs to go back to source documents to check the definition or parameters, research methods, to improve its performance. No one type of graph has yet been shown to be better for all communication purposes with all audiences. Accurate comprehension decreases as the number and complexity of mental operations required of the reader / viewer increases.

Type and number of messages intended to convey determine the amount of extraneous material to be included. Which graph or chart type best portrays any given set of data? In many cases data set can be portrayed in many different ways. Converting data into different chart types is not hard task. The hard part is determining which chart type emphasizes the point you are trying to make or puts the right "spin" on the data.


| **Reference Books** | | |
|---|---|---|
| **1.** | Dimension of Agri. Extension | Dr. A.K. Singh,Dr Lakhan Singh |
| **2.** | Fundamentals of Extension Education and Rural Education | Dr. Jitendra Chouhan |