A SURVEY OF VISUAL AIDS DESIGN, PRODUCTION, USAGE AND EVALUATION IN ENHANCING TRAINING AND CAPACITY BUILDING:

(A CASE STUDY OF IAR/NAERLS, AGRICULTURAL EXTENSION SERVICES)

BY

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DECLARATION

I hereby declare that this thesis has been written by me and that it is a record of my own research work. It has not been presented before in any previous application for a higher degree.

Paul Ajiya Ndahi

30 - 06 - 06

Date

The above declaration is confirmed.

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CERTIFICATION

This thesis titled "A survey of Visual Aids Design, Usage and Evaluation in enhancing Training and Capacity Building" by Paul Ajiya Ndahi, meets the regulations governing the award of the degree of Master of Arts of Ahmadu Bello University, Zaria - Nigeria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This thesis is dedicated to God Almighty, my Late Father Ajiya Tami; my aged Mother and with love to my dear wife Rejoice Malgwi, my children, Hyelni and Hyelhira.

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During the course of this programme, I have drawn a lot of inspiration from God Almighty and many people, to them I wish to express my very sincere appreciation.

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Above all I give glory to God Almighty for His grace to me.

ABSTRACT

The study covered Institute for Agricultural Research, Samaru and National Agricultural Extension Research and Liaison Services both of the Agricultural complex of Ahmadu Bello University, Zaria as a Case Study. The two institutions have been under the sponsorship of the Federal Ministry of Agriculture and Rural Development. Both have decades of experience within the Northern region of Nigeria. For this study, the North - West Agricultural Zone was identified as the Study Area.

Findings indicated that through the use of instructional material both the efficiency of learning and positive attitudes towards extension may be enhanced. Each person must decide which of the various instructional Aids should receive attention when planning and producing visual instructional Aids materials.

To satisfy the outcomes specifically, instructional materials would not only be of high quality but also should be selected or designed, produced, and used as an integral part of an instructional training programme, capacity building, monitoring and evaluation. They must make a definite contribution to the achievement of the extension's objectives. For this reason, resource persons interested in planning, producing and using instructional visual aids should also become acquainted with the process of systematic instructional design, skills, motivate, activate, retrain and train ("SMART") within which instructional materials arc to function.

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DEFINITION OF OPERATIONAL TERMS

1. **Balance -** An imaginary axis running through the center of a visual dividing the design.
2. **Bulletin Board -** This is also known as Tack Board set aside for displaying many items of interest and educational value.
3. **Chalk Board -** It is popularly known as blackboard in universal visual informal schools.
4. **Exhibit -** An arrangement of materials designed to inform the audience about a subject of educational significance.
5. **Model -** Objects and representations of things displayed along with specimen and exhibits.
6. **Pictures -** Versatile and effective visual aids, it could be black and white or coloured photographic print.
7. **Posters -** A notice designed to make a public announcement of a special idea. It usually includes only a few words with an illustration.
8. **Shape -** Simple asymmetrical, irregular outline.
9. **Slides -** A transparent film picture projected by sharing light through it, good for teaching sequential procedures.
10. **Space -** An opening around visual elements in design.
11. **Specimen -** May be part of an object or one for a group or class to represent the whole group.
12. **Texture -** A visual element that serve as a replacement for the sense of touch.
13. **Transparencies -** Sheets clear cellophane used to project images drawn or typed.

LIST OF ABBREVIATIONS

1. **A.B.U.** - Ahmadu Bello University.
2. **A.D.P.** - Agricultural Development Projects.
3. **A.E.S.** - Agricultural Extension Services.
4. **A.V.A.** - Audio Visual Aids.
5. **A.V.** - Audio Visuals
6. **D.A.C.** - Division of Agricultural Colleges.
7. **F.M.A.R.D.** - Federal Ministry of Agriculture and Rural Development.
8. **F.M.P.** - Farmer Managed Plots.
9. **F.O.A.** - Faculty of Agriculture
10. **I.A.R.** - Institute for Agricultural Research.
11. **M.T.R.M.** - Monthly Technology Review Meeting.
12. **N.A.E.R.L.S** - National Agricultural Extension Research Liaison Services.
13. **N.W.Z.** - North West Zones.
14. **R. P.** - Resource Persons.
15. **S.C.A.** - Samaru College of Agriculture
16. **SMART** – Skills, Motivate, Activate, Retrain and Train.
17. **S.M.S.** - Subject Matter Specialists.
18. **T.R.M.** - Technology Review Meeting.
19. **T & V** - Training and Visit.
20. **V.E.A.** - Village Extension Agents.
21. **V.I.A.** - Visual Instructional Aids.
22. **V.E.L.** - Village Extension Linkages.
23. **V.I.M.**- Visual Instructional Materials.

CHAPTER 1

1.0 INTRODUCTION:

The use of instructional aids in imparting knowledge has remained a universal phenomenon. The importance of instructional audio-visual aids has been emphasized so many times. The emphasis cuts across developed Visual instructional aids and it is the emphasis on their use that necessitated investments related to their sourcing, development, impact assessment and accelerated usage. It is both educational as well as extension strategy.

Like any other institution involved in research, teaching or knowledge extension, the Institute for Agricultural Research (IAR) Zaria and the National Agricultural Extension and Research Liaison Services (NAERLS) Zaria have relied heavily on instructional aids and facilities for their extension and research liaison activities: Their production and use of various instructional aids have been on since it was established in 1922. Unfortunately, there has not been any serious study about the use of instructional aids in those institutions.

The Institute for Agricultural Research (IAR) was established in 1922 and incorporated into Ahmadu Bello University Zaria in 1962. It is one of the institutes that make up the agricultural complex of the University which operates under the Federal Ministries of Education and Agriculture & Rural Development. Although IAR is primarily a research body, it also carries out extension activities such as workshops, conferences, and fairs. Its research and extension activities have had some impact on the farming systems for specific agro-ecological zones (Misari, 1989).

The original extension and specialist services component of the IAR was established and granted autonomy in 1975; Thus, giving rise to the National Agricultural Extension and Research Liaison Services (NAERLS), which maintain a strong Agricultural Extension and Research Liaison Services,- training, workshops, meetings, conferences, surveys, broadcasting, (publishing) printing exhibitions, fairs and so on for the purpose of disseminating research results to end users throughout the Federation. While the NAERLS pursues her national mandate, the IAR offers extension services to the North-West agricultural zone in collaboration with the NAERLS, and other collaborating institutes.

Both extension services units have made an appreciable impact in the development of national agriculture through the various states agricultural development programmes by providing professional, specialized education, skill development and capacity building.

1.1 BACKGROUND TO STUDY

Dynamic agricultural research and effective/efficient extension delivery system are critical pre-requisites for agricultural development. While a dynamic agricultural research is a function of adequate staffing, adequate funding, sufficient planning and sustained efforts, efficient extension delivery system is a function of adequate inputs supply, effective communication skills, motivation, strategies and consistency among others.

Prior to the adoption of the farming systems research extension in Nigeria, one of the major limiting factors to rapid agricultural development was the weak linkage between research and extension (Olukosi et al 1989). This concern was responsible for the introduction of the training and visit extension system which emphasized effective communication, planning, organization, directing, supervising, research and evaluation.

Consequently, it remains widely believed that without effective communication skills, instructional aid facilities and techniques, conducive atmosphere and selfless services, research extension linkages will still not make an appreciable impact in the development of materials for agriculture not just for Nigeria but elsewhere as well.

1.2 STATEMENT OF THE PROBLEM

The problem of this study lies in the factors associated with efficiency in the production techniques and usage of visual graphics designed periodically for use as instructional aids. A major concern here is the number and frequency of production, the time and efforts devoted to their production; the level of interest in them; the amount of resources devoted to their production and the zeal in taking advantage of them plus of course, the results of their use at the short and long run.

Experience in the 1990's had shown that most educational and extension services bodies in Nigeria lack adequate expertise in the production and effective use of audio-visuals, most training fora tended to ignore their use to the detriment of such fora. As a result, a number of experts have on several occasions called for emphasis on audio-visual's use during training workshops and related extension activities (Misari, 1990)

It has been widely held that subject matter specialists, resource-persons and grass-root extension workers would be more effective in performance when they use visual instructional aids. Therefore, one way of verifying this notion is by studies of this nature to unveil the realities of IAR/NAERLS long experiences. Thus, basically, the study seeks to answer the following research questions;

1. What are the recommended production techniques for visual instructional aids?
2. To what extent does IAR/NAERLS conform to such recommended production standard?
3. What has been the attitude of IAR/NAERLS towards visual instructional aids?
4. What factors have been responsible for such attitudes?
5. What is the mode of visual instructional aids usage in IAR/NAERLS?
6. What factors are responsible for such modes?
7. To what extent does public funds invested into visual instructional aids justified by the general public views?
8. What are the best options available for more effective sourcing, usage and management of instructional visual Aids generally?

1.3 OBJECTIVE OF THE STUDY

The main objective of this study is to determine the production practices and usage between what is known about instructional visual aids in IAR/NAERLS and what is yet to be seen or known. This study would, thus narrow the gap or bridge it considerably

1.3.1 SPECIFIC OBJECTIVES

The specific objectives therefore are to;

1. Find out whether, going by IAR/NAERLS experience, visual instructional Aids when properly managed, would reasonably contribute to knowledge improvement in enhancing training and capacity building of extension services.

2. Determine the various styles, processes used in the production of IAR/NAERLS instructional visual materials.

3. Determine the cost and time effectiveness of production in IAR/NAERLS instructional visual aids production and management.

4. Find out the factors determining the modes of sourcing, production, usage and management of IAR/NAERLS instructional visual aids.

5. Suggest alternative design approaches to IAR/NAERLS instructional visual aids production.

6. Offer recommendations on the best ways of easy storage and transportation of IAR/NAERLS visual instructional aids.

1.4. SIGNIFICANCE OF THE STUDY

Instructional materials are usually composed of devices which make use of the power of pictures, words and sounds to compel attention, and to help an audience understand ideas and acquire information too complex for verbal explanation only. When skillfully combined, pictures, words and sounds have the power to involve emotions, change attitudes, and motivate actions. Examples of this power can be seen everyday on television via the commercials that motivates the viewer to buy a product and so on.

The impressions that are created by the combination of pictures, words and sounds have been shown to be retained by viewers significantly longer than when they are only heard and read.

Since agricultural extension services lay particular emphasis on training of field extension staff and farmers generally, there is the need for greater appreciation of these aspects to allow for better training programmes for field staff developments and result oriented extension training.

Inadequacies noticed in the usage of visual instructional aids as medium of enhancing the activities of extension services, for the purposes of improving extension communication, can be improved better by studies of this nature. The training of field extension staff would not be adequate without the proper extension training materials, that will enhance training and capacity building, project implementation, monitoring and evaluation.

CHAPTER 2

2.0 REVIEW OF RELATED LITERATURE

A review of relevant literature in this study is presented below:

2.1 ROLE OF INSTRUCTIONAL MATERIALS IN THE LEARNING PROCESS

There have been increasing evidence of significant contributions of instructional materials to Educational advancement. When carefully designed, high quality instructional materials can ensure careful selection and organization of learning aids; standardized delivery; reduced hearing time; individual's more positive attitude to the learning process; changing roles for instructors. These are especially where the instructional materials have to be not only of high quality, but also selected, designed, produced and used as an integral part of an instructional programme (Akolo, 1986).

However, for any instructional programme to be successful, Arokoyo (1986) recommends that there must be a determination of who the programme is being developed for (learners); what is imparted; how (method) the subject (skill) is best learned, how to determine the extent to which learning occurs (evaluation).

It is also established that instructional materials may be classified into two broad categories; projected and non-projected visuals. Among the non-projected visuals are; the chalk board; the bulletin board; the flannel board (flash cards, roster and so on) pictures; models; specimen; exhibits slip charts and so on. On the other hand, projected visuals may include transparencies; slides; opaque devices and so on.

According to Misari, (1985); visual instructional materials must be chosen according to the objectives of a programme and the situation. Five criteria have therefore been suggested (1) content (2) availability (3) trainee characteristics (4) audience and (5) familiarity.

2.2 ROLE OF INSTRUCTIONAL MATERIALS IN AGRICULTURE

Visual instructional aids have assumed importance in the process of disseminating new innovations in agriculture and in many other technical fields. Today, the need of revamping the agricultural sector is one of our greatest challenges in the third world. Part of strategies to face squarely this challenge is to improve instructional and communication capabilities of which visual instructional aids are a major part.

Certainly, instructional materials provide powerful tools for making agricultural teaching more effective. This is because, they help in highlighting key points, gaining learners attention, adding variety, keeping the instructor on tract and maintaining consistency and emphasis. Gagne and Robert (1987) found that by the use of visual instructional aids, learning is improved by 20%, retention is improved by up to 38% and to explain complex subjects, it is reduced by 25%-40%.

Since the main task of agricultural extension workers is to impart knowledge and skills to adult farmers, the need for effective message presentation is vital. Extension workers must ensure that all facts, concepts and ideas that are innovative are made meaningful to farmers. Visual instructional aids can facilitate the achievement of such goals (Yazidu, 1973). Effective communication within and without the research-extension linkage system is critical to radical improvement of agricultural production in Nigeria.

2.3 VISUAL DESIGN AND LAYOUT

Examine some of the graphic materials that are a common part of the visual aids, out door bill boards, cartoons, charts and so on. You can find many ideas for designing your own materials by studying the arrangement of elements in such displays. The process of combining the various elements that comprise a visual (picture or art work, lettering, texture, colour and so forth), in order to create a pleasing entity, is known as layout. The layout must be understandable, legible, and aesthetically pleasing in terms of the purpose it is designed to serve. (Arnsto, 1988).

2.3.1 DESIGN PRINCIPLES

Design principles to consider include, simplicity, unity, emphasis and balance

Simplicity – charts, graphs and diagrams suitable for page printing may not be suitable for projection. They may include large amounts of information and be acceptable in a printed report or for a manual, but these permit detailed, close-up study, which is not usually possible with projected materials. Sikandra (1986) and Siegel, et al (1978) opines that, "the fewer elements into which a given space is divided, the more pleasing it is to the eye. Subdivide or redesign lengthy or complex data into a number of easy-to-understand related materials, limit the verbal content for projected visuals to 15 or 20 words. Drawings should be bold, simple and contain only key details.

Unity - The relationship that exists among the elements of a visual when they are perceived as one entity all functioning together (White, 1980).

Emphasis – Even though a visual treats a single idea and is simply developed, there is often the need to give emphasis to a single element to make it the center of interest and attention. Defever (1971) Holds that, "Through the use of emphasize relationships, perspective, and such visual tools as colour or space, emphasis can be given to the most important elements.

Balance – There are two kinds of balance – formal and informal. (Smith, et al 1985) Formal balance is identified by an imaginary axis running through the center of the visual dividing the design so that one half will be the mirror reflection of the other half. Such a formal balance is static .

Shape – An unusual shape can give special interest to a visual, open space around visual elements and words will prevent a crowded feeling, only when space is used carefully can the elements of design become effective.

Line - A line in a visual, can connect elements together and it will direct the viewer to study the visual aids in a specific sequence. (Defever, 1971)

2.4 PRODUCTION PRINCIPLES OF VISUAL AIDS

Attractiveness of visual aids are determined by many elements. The important ones among them are colour, size, shape and illustration. The message should be brief. It should be legible and easy to comprehend. It must also be clear.

Having considered all these, the designer should choose the code for communicating the message, words, pictures, diagrams and related symbols. Observation of proper sequence is essential. Ensure clarity of the materials (Abolade 1990) Brown & Harderoad (1973) Prye (1977) and Yusuf et al (1991).

The local production of instructional materials takes on at least 3 levels:

creative, design and mechanical preparation.

During the planning of the materials, attention must be given to factors such as identified in serving objectives, adaptability for certain individuals or groups, flexibility in method of use and integration with other experiences.

The skills developed in interpreting, responding to and using visual representations of reality (that is,visual intelligence) result in what is called visual literacy. The process of visual literacy therefore, involves the ability to recognize and read graphic/photographic illustrations representing objects, events, places or people; to sort and organize such visual representation into patterns and relationships that apply vocabulary of non-verbal visual expressions; productive use of visual materials as their own interpretation of actual objects, events, places and people. (Shaw Robert, Lean Amiel, 1955).

Figure 1 & 2

Figure 1:

Multiple bar chart which compares performance of ability to understand visual Aids and educational level.

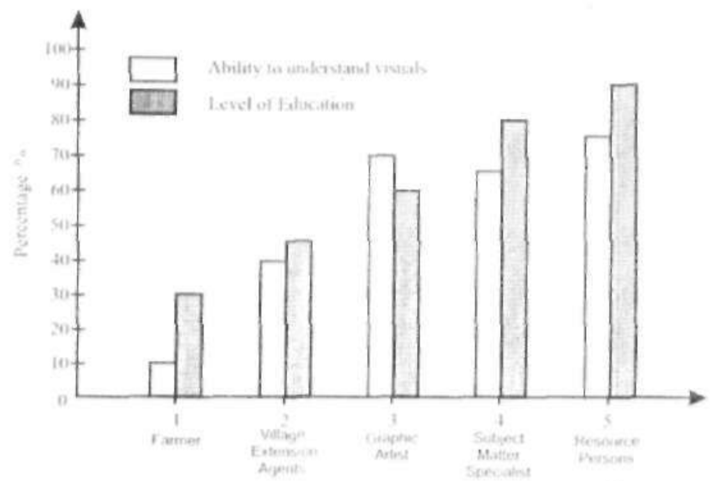
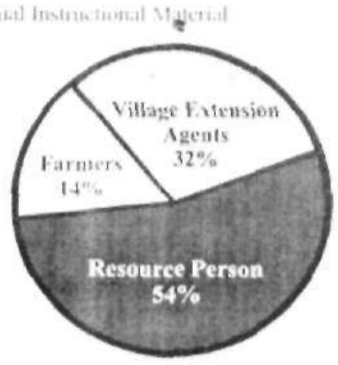


Figure 2:

Ability to use Visual Instructional Material



Source: Research findings, 1999

2.5 SIZE STANDARDS AND SPECIFICATIONS

In developing artwork, a number of important points are considered. Reliance on appropriate format will save time and ensure good reproduction quality. These included, a variety of sizes in circular, oval, horizontal and vertical shapes. By choosing the proper ones could build a good presentation (Dorothy & Smith, 1961)

2.6 ILLUSTRATING TECHNIQUES AND AIDS

With an ever-increasing awareness of the many valuable visual materials now available in magazines, newspapers, and other printed sources, creative individuals using the visual approach to instruction will want to turn to the production of materials based on some of their own visual ideas. When the decision has been made to visualize an idea, and the purposes, content, and method of presentation have been decided upon, the problem of the basic illustration arises. The difficulty in physically forming the image on paper or acetate becomes so frustrating to some people that they give up the idea, and all the potentials of visual communication are lost.

The inability of seen form, the lack of knowledge of materials and equipment, a nervous hand, a ripping perm often force the individual into an avenue of escape. Except for the few who have the advantage of training in drawing, or have access to art services, creating the visual image will be one of the most serious problems in developing materials. In recent years great advancement has been made in developing equipment on materials to help those who are not adept at creating their own graph, diagrams maps, and illustrations. Not only do these new materials help the inexperienced person, but they also speed production for the professional artist.

A knowledge of some of the older techniques of some of the older techniques combined with a knowledge of the newly developed materials and equipment will expand tremendously the potential of the non artist in developing visual imagery. It is, therefore, very important for the instructor to keep informed concerning the many production aids available for the process of visualization (Eastman Kodak, 1971)

Hundreds of drawing templates are being produced to facilitate the drawing of symbols of various kinds. Drafting tapes in a wide variety of sizes and patterns help to simplify the visualizer's problems. A large assortment of shading sheets is available to shortcut the monotonous drawing of repetitive patterns and textures. Symbols of various objects printed on sheets enable the individual to obtain repetitive silhouette images for use on graphs and charts.

Large assortments of prepared art to be used for paste-up are appearing in the form of sheets and booklets and may be subscribed to as one would a magazine to ensure a continuous, incoming flow of new and varied drawing and illustrations. It is the knowledge and use of these art aids that is vitally important to those interested in developing their own presentation materials. The greater the knowledge one has of these visual means of expression, the more flexibility one will have in expressing an idea.

Because of the variety of visual means of expression, size of the image becomes important. The size of the image may vary from a large drawing on the blackboard to a small drawing on papers to be passed out. Methods of enlarging and reducing image size must be understood. methods of transferring an image from one surface to another are important to know.

As one's knowledge of these areas grows, the creation of meaningful visualization becomes much increasingly easy. (Eastman Kodak, Nostrand Reinhold 1965)

2.7 VISUAL TRANSFER TECHNIQUES

It is often necessary to trace a visual on tracing paper and transfer in to another surface. One technique for doing this is pounce pattern. However, this may not always be the most convenient or desirable way because of the lack of facilities or certain characteristics of the visual being transferred. There are three other techniques quite closely valuated to pounce pattern, any of which have certain advantages over it. With any of these techniques it is important to start with a carefully drawn original visual on lightweight drawing or tracing paper. It is possible, however, to use the original visual if little damage takes place. Making an original tracing does allow for clarification and simplification of the image, which may be desired.

Pencil carbon technique

A common technique for marking a visual transfer is the use of pencil carbon. With the visual's drawing face down on a clean, smooth working surface, apply a heavy layer of soft pencil lead to the image lines of the visual. Be sure all lines are completely covered with lead.

Turn the visual over, and tape the surface on which the transfer is to be made. Using a stylus, pencil, or ball-point pen, carefully trace over the lines of the visual. Be careful not to use too much pressure, because this will leave an indentation on the transfer.

As the drawing instrument traces over the drawing, the pencil carbon on the back of the drawing will be transferred. When all lines have been traced, carefully lift one corner of the drawing to check the quality of the transfer. To ensure requisition, if required (repeating lines not transferred as desired), simply lower the drawing back down on the surface. If the transfer is satisfactory, remove the original and complete the transferred drawing in whatever medium desired. Although this technique works quite well, there is a tendency for extraneous carbon to rub off, causing smudges on the final drawing. (Shaw Robert, Lean Amiel, 1955)

2.8 GRID DRAWING

An easy way to reduce and enlarge existing drawing, symbols, letters and so forth is by the squaring method. In effect, the original image is sub-divided through a grid pattern into smaller, less complex areas. This enables a person with little or no drawing experinece to reproduce the small squared sections of the drawing, one at a time and, upon its completion, have effectively reproduced a rather complex image in any size desired from a direct reproduction to one either smaller or larger than the original.

The squaring process is to lay out a square grid pattern over the image to be reproduced. The size of the squares will be determined by the complexity of the original as well as the experience of the artist, light pencil lines for the grid will make it easier to follow the lines of the image. A grid of the desired proportion is next drawn on the surface on which the drawings to be made of grid lines are erased after the drawing is completed, this may serve as the final product.

However even if it is desirable to trace the finished drawing onto some other surface, tracing paper will serve as a good intermediate materials upon which to place the drawing. If squared graph paper of the desired size can be obtained, the drawing of an original grid will be eliminated (Dorothy S, Peter Smith, 1961)

2.9 SHADING (TEXTURE) SHEETS

To help the user bypass extensive amounts of monotonous, repetitive drawing, adhesive backed acetate sheets have been developed on which are printed repetitive opaque patterns.

These sheets may be backed with a wax-type or pressure-sensitive, heat-resistant adhesive. Shading sheets used in heat copying machines must be of the heat resistant variety.

In some cases it is desirable to use these materials directly on transparencies, should this be a requirement. The clear, transparent, heat-resistant materials is recommended.

Some shading materials are available which have the image printed on the top surface of the shading sheet. This permits the user to remove small areas of the pattern by etching off the surface. (Eastman Kodok, Nostrand Reinhold, 1965).

2.10 COLORING TECHNIQUES

The application of coloring or shading, in one form of another, adds an exciting dimension to visual Aids materials. Although no attempt will be made in this section to relate the psychological effect of certain colours upon the learning process. The tested coloring and shading techniques which make possible the application of coloring or shading to practically all types of instructional materials will be discussed and illustrated.

Visual Aids materials which may require colour or shading, or whose visual effectiveness may be enhanced by these techniques, include; charts, graphs, maps, diagrams, posters, illustration, photograph, slides titles, overhead projection transparencies, and duplication materials.

Each of the colouring and shading techniques included in this section has certain characteristics which may limit its application to specific types of instructional material. These characteristics will be brought out in the treatment of each technique. It cannot be overemphasized that colour or shading should not be used mainly for the sake of adding colour or shading to an instructional material. Moreover, colour or shading can be over used and can therefore lower the quality of the instructional material.

Colours, colour and shading ideas taken from magazines, newspapers, brochures, posters, commercial transparencies, and other printed materials, can provide answer to colouring and shading problems.

Pens, Pencils and Markers.

Many methods can be used to add colour to a visual. It is extremely important to study the characteristics of the colour ingredient used since the terms paste, chalk, crayon, and pencil are all interrelated and rather difficult to define.
Through experimentation one must finalize which colour characteristics work best for a particular situation.

Poster colours, chalk, crayons, and pencils vary from soft to very firm, permitting the artist to execute a range of effects for boards, flats surfaces to sharp, detailed drawing. When soft pasters, chalks, or pencil are used on posters, chart, etc. the danger of the image smearing is inevitable; consequently a method of protection must be devised by either conversing it with an acetate sheet, laminating it, or spraying it with some form of acrylic spray of fixating. Colour pencils available in a large range of colours may be used on acetate. When the drawing is completed, the surface must be sprayed with acrylic lacquer or a similar material to transparentize it. This will make the image projectable in colour: Not all colours will project equally, and so it is advisable to choose, by sampling, those colours that work best.

Fine-and medium-tipped marker may be purchased for use on transparencies in a variety of brilliant dyes and inks. Some are waterproof, and some may be removed with water. Some may simply be wiped off, while others require special solvent for removal. The felt-tipped pen of marker is very similar and is commonly used for making both opaque materials and transparencies. Some contain transparent watercolour and are valuable for tinting photographic transparencies such as are produced by the high- contrast method. Some felt markers may be refilled, and they have a choice of interchangeable tips, including sharp, chisel, broad, and square.

, The variety and possible use of pencils, pastels, chalks, felt markers, etc. are so great that only by experimenting will a person be able to choose the most desirable for the particular need. (Shaw Robert, Lean Amiel, 1955)

Watercolours

Transparent watercolours in their many brilliant hues have a variety of uses in the production of visual media. They may be purchased in both liquid and dry states. Liquid watercolour may be obtained in concentrated and diluted form in a number of sizes. Felt point markers containing transparent watercolour are available. The colours are brilliant but some what limited in shade selection. The feature of the felt point is its ease in use and storage.

Dry transparent water colours may be obtained in booklet form. A high concentration of dry colour is adhered to paper pages. When the paper is placed in water, a clear, brilliant liquid colour is produced. The depth of this colour is determined by the amount of water used.

The fine art of water colouring demands extensive instruction and practice. However, by following a few simple instructions, The novice can make excellent use of transparent watercolours in the preparation of materials.

This is especially true when one is working on treated surfaces such as the emulsion found on photographic films and papers. The colour may be applied with either a regular watercolour brush or a cotton application.

If large areas on transparent or opaque surfaces have to be tinted in solid or graduated colour, the use of the airbrush or transparent colour, in aerosol cans will greatly facilitate the process.

First, mask the areas around the section of the film to be tinted. Allow the masking liquid to thoroughly, with a cotton applicator on brush, flood the unmasked area with generous amounts of liquid water colour.

It is important to permit plenty of time for the water colour to completely penetrate the emulsion. The colour must be kept constantly moving to prevent dry spots from forming. When drying takes place, absorption is stopped and irregular tinting results. Complete saturation of the emulsion ensures an even tint over the entire area.

As an alternative, a tinted rubber cement mask may be applied around the image to be coloured and open all other areas to be protected from the spray. When the rubber cement has thoroughly dried, spray on an even coating of the desired dye, if a smooth, soil area of colour is desired, be sure to flood the areas slightly with colour: Place the sprayed image on a dry clean, level surface, in a short time the colour would have dried. Remove the rubber cement gently rolling it off with the tip of the finger: Belser, at el, (1977).

2.11 USING COMPUTER GRAPHICS SYSTEMS

Computers are now being used to produce visual aids such as Camera-ready art, (Charts, graphs, cartoons, and illustrations). Computer graphics systems offer many advantages beyond conventional methods of production. These advantages include:

1. Increased speed of production:

Generating a typical word slide (a few lines of text on a coloured background) by conventional graphic technique requires such intermediate steps as typesetting, and paste-up, high-contract photography, and colour photography. The entire process can take several hours, depending on the procedures used and the complexity of the material or aids. Producing a word or graphics system eliminates almost all handwork other than entering information through a keyboard or other input devices: a process that typically takes a trained operator just a few minutes.

2. Ease of revision:

A computer generated visual is stored electronically, it takes only seconds to retrieve the stored information in the computer . One makes use of the key board, a mouse or other input device to make revisions simplifier.

3. Increased emphasis on design

Because the colour, size, or style of the elements within a computer-generated visual can be altered rapidly, a computer graphics operator is able to explore alternative layouts before selecting the final design.

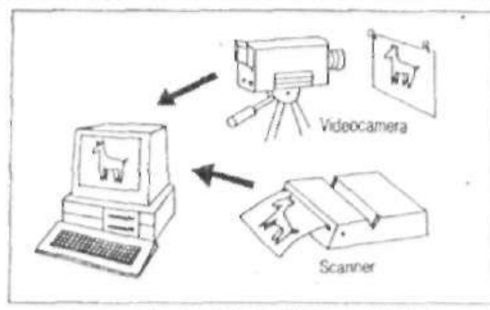
4. Greater sophistication of images

Complex images can be created to appear in true perspective, as mirror images, and as three-dimensional images, all with an array of vivid colours.

From one visual to the next in a series, text can be moved, overlays added, colours changed and special effects used, all of which can have strong visual impact.

PLATES 2 & 3

PLATE 2:
A COMPUTER ASSISTED INSTRUCTIONAL AIDS.



Source: Helmut Albrecht et al (1989) AGRIC. EXTENSION Vol. 1

PLATE 3:
AN ILLUSTRATED VISUAL AIDS MATERIALS USED IN AGRICULTURAL EXTENSION

Source: IAR information leaflet, [illegible]

2.12 THEORETICAL FRAMEWORK:

This study is based on the theory which was formulated by MacDonald and Harle (1980) reveal that some extension situations may require a personal visit to a farmer and that could be expensive. However, every personal visit backed up by using communications media makes them more cost-effective.

According to MacDonald and Harle (ibid), research shows that a combination of words and visuals after a three day time lapse is six times more effective than just words.

It is in line with this theory that practical work and demonstration are highly emphasized in Extension. These are closely followed by television and slides/pictures.The study therefore, falls within the media determinism perspective of Extension in which effectiveness for extension messages depends largely on the medium of communication, "SMART" – skills, motivation, activate, retrain and train.

2.13 STUDY HYPOTHESIS

In accordance with the reviewed literature and the theorectical framework coupled with the Research problem and study objectives, the following hypothesis shall be tested by this study.

1. Extension teaching and learning in the North-West Agricultural zone lack adequate visual instructional aids materials. As a result, Extension teaching, learning, implementation, monitoring and evaluation have been affected.
2. The High cost of producing and maintaining visual instructional aids materials has been responsible for the in adequacy of their use and the consequent low level of Extension teaching and learning.
3. Successful extension teaching and learning by IAR/NAERLS were largely attributable to effective use of visual instructional aids. (Misari, 1989).
4. Cycle of management functions in planning, organizing, directing, supervising, research and evaluation.
5. Establishing the curriculum for effective training and capacity building.

Figures 3 & 4

Figure 3:

Line graph typifying production medium and average cost

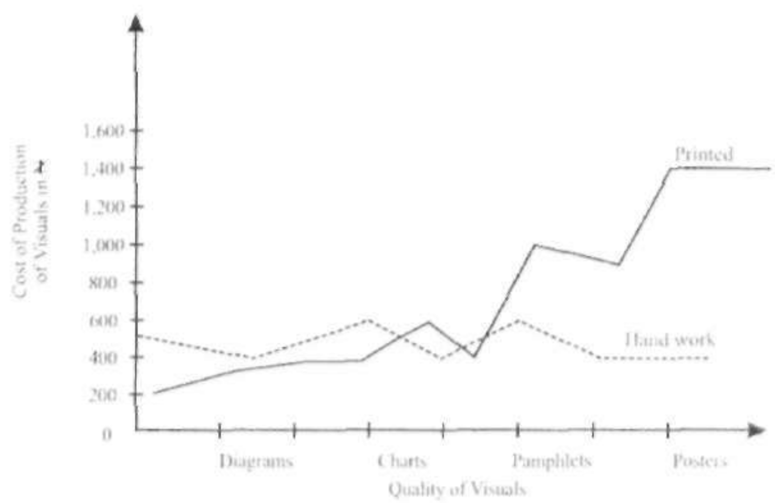
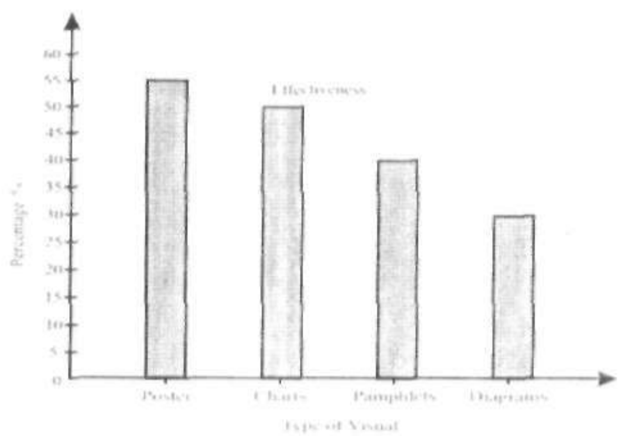


Figure 4:

Simple bar chart showing level of effectiveness of Visual Aids.



Source: Researcher's findings, 1999

CHAPTER THREE

3.1 RESEARCH DESIGN

Introduction

This section covers the methodology including the study area, sampling, methods of data collection and analysis. Selltiz et al (1967), remarks that, "a research design is the arrangement of condition for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure". A research design can also be the plan, structure, and ways of investigation, which helps the collection, and analysis of data. Adetoro (1985) adds that, research design shows the demography of the information concerning the population to be studied.

3.2 THE STUDY AREA

The study area consists of Institute for Agricultural Research, Samaru and National Agricultural Extension Research and Liaison Services, Zaria both of the Agricultural Complex of Ahmadu Bello University Zaria as case study. The two institutions have been under the sponsorship of the Federal Ministry of Agriculture. Both have decades of experience within the Northern region of Nigeria. For this study, the North-West Agricultural Zone is identified as the study Area.

3.3 SAMPLING AND SAMPLING FRAME

Staff of Institute for Agricultural Research, Samaru and National Agricultural Extension Research and Liaison Services, Zaria are key targets of the study. Others are Local Government Agricultural Officers, State Agricultural Ministry Officers, and State Agricultural Development Project Staff.

Simple random sampling method was adopted in sampling the respondents from Institute for Agricultural Research, Samaru, National Agricultural Extension Research and Liaison Services, Zaria and Village Extension Agents. Other respondents were selected using the systematic random sampling method as recommended by Alberecut et al (1989).

The five locations of study were representatively selected in the north west zone of Nigeria.

3.4 THE STUDY VARIABLES

The independent and dependent variables are as follows:-

3.4.1 INDEPENDENT VARIABLES

a) **Years in service** - This as indicated by the respondents, suggests the level of experience in service and will be determined by number of years in service given by respondent at the time of study.

b) **Educational qualification** - also as indicated by respondents, suggests the level of competence

c) **Participation in Training** - as indicated by respondents. Suggests the level of exposure to the subject of study.

d) **Sex either male or female** - each has his or her own level of inclination towards the subject of study.

3.4.2 DEPENDENT VARIABLES

a) **Access to visual instructional aids** - This as indicated by respondents, suggests the level of awareness.

b) **Use of visual instructional aids** (VIAs) also as indicated by respondents, suggests the level of exposure of VIAs

c) **Perception about VIAs** - as indicated by respondents, suggests the level of confidence or otherwise in handling VIAs.

d) **Effectiveness of use** - as indicated by respondent suggests the positive effect of using VIAs

e) **Ineffectiveness of use** - as indicated by respondents, suggests the negative effects of using VIAs

3.5 EXTENSION SERVICES IN THE NORTH-WEST ZONE

Agricultural extension services have been carried out in the North - West Agricultural Zone long before independence in 1960. The IAR Samaru and NAERLS Zaria have been at the centre of all the extension activities in the zone. Primarily, the institutions offer training, teaching and research for all categories of agricultural specialisation in the zone (Misari 1992).

During the process of teaching, training and research and extension, different VIAs were introduced and used by numerous instructors. Some of these were used on station. Others were used in the states. The types of the VIAs are from hand written sketchies to electronically and mechanically processed ones. These are as follows:-

i) Hand drawn maps and charts posters

ii) Transparencies and negative slides

Similarly the Agricultural Development Projects have equally at one time or another, developed their own instructional visual aids for use at monthly technology review meetings, forth-nightly training and related fora. The same is true of other international agricultural research institutes and the non governmental organisations.

3.6 METHOD OF DATA COLLECTION

This study relies on the questionnaire method as the primary source of data collection. Other secondary sources include library research and informal interaction with ADP staff and resource persons in IAR Samaru and NAERLS Zaria.

A total of 125 respondents were drawn from the five study locations which include Samaru, Kaduna, Katsina, Kano, Dutse, Gusau and Sokoto. 25 respondents were randomly selected from each location using the balloting method. Roy (1976), opines that, "questionnaire method specifies the nature of a given phenomena", while Selltiz et al (1967) says that, "questionnaire method is concerned with the characteristics of a community. Selltiz (ibid) further explains that, "Survey research involves the careful identification of population, the selection of the sample from the population and collection of comparable data to make quantified generalization". These can be study of samples from which inferences about a population can be drawn. Roy (1976) contends that, "to infer means to estimate or conclude on the basis of incomplete information." This means making inferences is an essential part of all survey field work.

3.7 SURVEY INSTRUMENTS

Written questionnaire were employed for field extension officers and farmers.

Structured interview, had questions presented to respondents with exactly the same wording and in the same order. Frederick (1976) expresses that an interview could be structured in which case the interviewer has a planned series of questions. Voh,

(1987) observes that, one way of getting information is by asking questions in form of a question, interview methods also have opportunity for greater flexibility in eliciting information and the researcher also has the opportunity of observing the subject and the total situation.

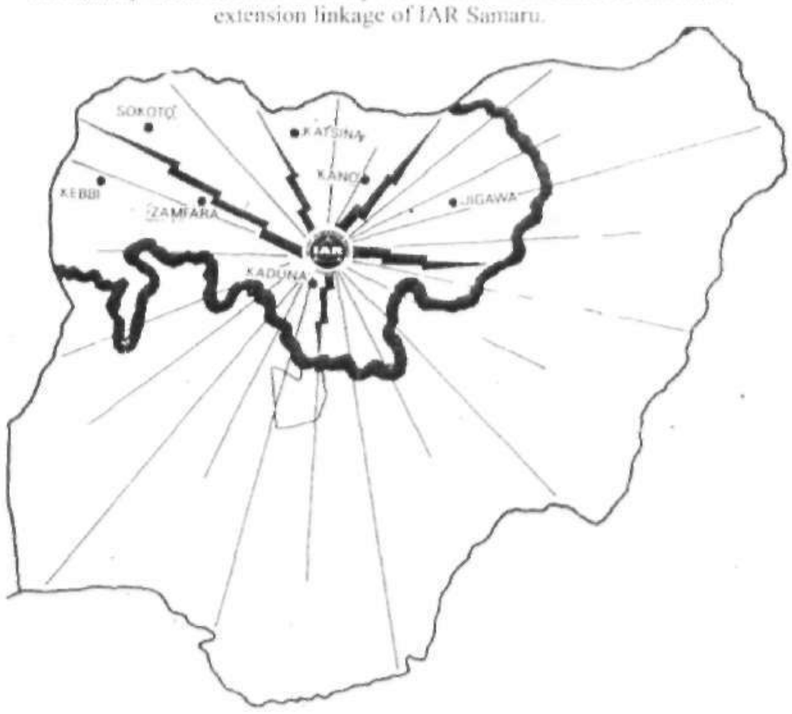
Niehoff (1976) states that, a non-participant observer takes record from what he sees happening without really taking active part.

3.9 METHOD OF DATA ANALYSIS

Frequency distribution and percentages were used to present the data. Similarly chi-square test and correlation analysis as recommended by Niehoff (1976) was used in the data analysis.

PLATE 1

Sketch map of the location of study area, North West Zone, research and extension linkage of IAR Samaru.



Source: Extension Services Unit, Institute for Agricultural Research, Samaru.

CHAPTER 4

4.0 DATA PRESENTATION AND INTEPRETATION

This section contains the research findings as presented below:

In analysing the data, the researcher used the mean standard deviation, variance, simple bar / pie charts, and line graphs. He also presented the relationship between the production cost, ability of staff and materials.

4.1 FINDINGS

The findings reveal the level of education of producers had significant effect on quality of instructional materials. It also significantly evident that ability to use instructional aids effectively has high relationship with level of education of the user.

Interaction between understanding visuals and user educational level had significant effect.

Since a major purpose for preparing instructional materials is to affect behaviours that serve objectives, it is appropriate to turn to the psychology of learning for help in locating principles that would guide the planning of effective instructional materials Schiff (1980).

A number of major theories have influenced psychology and education, they have received much attention. Schiff's approach to learning has been applied in "Programmed instructional materials" designed as programmes.

The emphasis is on presenting sequences of small amounts of subject content, requiring an appropriate response to each visual, and then followed by immediate knowledge of results (feed back). If the response is correct, the learning is reinforced.

Gardners, (1959), Basic information or simple skills that are learned contribute to the learning of more complex knowledge and skills.

4.2 QUALITY OF VISUALS

There is significant interaction between materials and method of visual production to the level of effectiveness in usage.

In the line graph and bar chart, there is significant effect on quality of visuals, production mode, and type. Even though the quality of visual, has significant cost of production but indicated greater percentage of effectiveness for any user.

Table 2: Distribution of respondents by usage of visual aids.

Visual Aids Usage	N = 25 Number	Percentage
Visual Instructional Material.		
Farmer	5	20
Village Extension Agents	25	100
Graphic Artist	20	80
Subject Matter Specialist	15	60
Resource Persons	15	60

In the table above, it was discussed that all the respondents interviewed participated in one way or the other in using visual instructional materials. Majority of them found it useful as often as it is available within their reach.

Table 3: Distribution of respondents by production medium.

Typified Medium	N = 25 Number	Percentage
Cost effectiveness of medium		
Diagrams	25	100
Charts	20	80
Pamphlets	15	60
Posters	20	80
Others	25	100

Table 3 above, noted that simple production is more cost effective. Complex designs that need colour work and printing, such as pamphlets, posters and charts that have more than one colour.

Table 4: Distribution of respondents by level of litracy

Education	N = 25 Number	Percentage
Education Background		
Farmers	5	20
Village Extension Agents	20	80
Graphic Artists	25	100
Resource Persons	25	100
Others	15	60

From table 4 above, the respondents level of educational background had significant effect on their participation in Agricultural Training, usage and handling of Visual Aids materials.

Most farmers have no formal education, but the rest of the respondents are highly above average, which influence their use and handling.

Table 5: Distribution of respondents by nature of problems

Problems	N = 25 Number	Percentage
Associated Problems		
Storage	20	80
Handling	25	100
Usage	15	60
Reproduction	15	60
Capital	20	80
All of the above	15	60

In table 5 problems faced by the respondents are illustrated. The analysis shows that handling constitute the greatest problem to users of visual materials. This was followed by problems of storage and capital.

The findings revealed that reproduction and usage depend largely on the availability of capital.

CHAPTER 5

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

Adherence to the procedures and principles of visual instructional production, results offered a better effectiveness in enhancing agricultural extension services. It is hoped, however, that this information guide the insightful production of quality visual instructional materials.

This suggest effective solutions which might otherwise have been.overlooked over the years. Duncan (1973) suggests some practical guidelines for designing and producing standard quality instructional visual aids to present factual information.

5.2 PRODUCTION

Traditionally, plans for instructional aids production were often made in intuitive fashion, and may be based on ambiguous goals, subject content is the basis for planning, and only casual attention is given to other details. It is now evident that instructional production process is complex and that attention must be given to many interrelated factors if outcomes are to be successful in training and capacity building.

5.3 VISUAL USAGE

Visual instructional materials are to be carefully selected for use for successful impact. There are three broad methods within which most learning takes place:

Presentation of information to group of learners, self-paced study, or individualized learning, which each learner working with visual materials can have essential desired impact for projects implementation, monitoring and evaluation.

Interaction; small group interaction between users can motivate complete dependence on any quality visual. Kemp (1968) asserts that by recognizing the features of these methods, you should be better able to decide on appropriate instructional materials for use in any of them, and then to design the materials to fit the requirements of the pattern.

5.4 COST EFFECTIVE MANAGEMENT

Cost effective production on visual materials is relative, rather than absolute. It was evident in the results that better produced visuals enhance greater impact. However, improvised production methods could drastically lower the cost of production.

Simplicity in design, choice of production materials and colour usage enhance cost effectiveness. The educational level of graphic designers also significantly affect the cost involved in visual aids production. Akolo (1986) added, for educational purposes designs should be simple so as not to over labour the brain.

Instructional material rests on the assumptions that people learn primarily from what they colourfully perceive and visually experienced, but simple and less crowded colour can influence behaviour in a positive way. Decent storage of any visual prolongs the life span and duration to be in use.

5.5 FACILITIES

Production facilities require updating to meet up with new challenges of modernization. The use of Computer facilities can not be over emphasized. Greater sophistication of images and complex images can be created to appear in true perspective with the use of computer. Hundreds of visuals can be stored electronically in the space normally occupied by a single piece of conventional art.

5.6 SUGGESTIONS FOR FUTURE RESARCH

1. The development of locally available materials for the production of visuals for Village Extension works.

2. Problems and prospects of adopting fully computerized visual instructional materials in National Research Institutes in Nigeria.

3. The application of Marketing Strategies in industrial production of Visual Aids for institutional consumption.

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APPENDIX I

QUESTIONNAIRE

A. GENERAL INFORMATION (TICK AS APPROPRIATE)

1. Sex: Male [ ] Female [ ]

2. Marital Status: Married [ ] Single [ ]

3. Occupation ....

4. Status: Management Staff [ ] Junior Staff [ ]

   Senior Staff [ ] Intermediate Staff [ ]

5. Years in service one year - [ ]

   i) - 5 Years [ ]

   ii) - 10 Years [ ]

   iii) over 10 Years [ ]

6. Educational Background (Tick as appropriate)

   Primary [ ]

   Secondary [ ]

   Tertiary [ ]

   Others (Specify) ....

7. Did you enjoy any formal training in Agric Extension.

   Certificate [ ]

   Diploma [ ]

   Degree [ ]

   Never [ ]

8. Have you ever participated in any Agric. training programme

   Once [ ]

2 - 5 Times [ ]

5 - 10 Times [ ]

More than ten times [ ]

Never [ ]

9. In what capacity did you participate most.

a. As a resource person [ ]

b. As ordinary participant [ ]

3. As organiser [ ]

B SPECIFIC INFORMATION

10. In your years of service, did you witness the use of visual instructional aids (VIAs)

Just Once [ ]

On several occasions [ ]

Never [ ]

11. In your years of service, have you by chance ever used VIAs directly

Just once [ ]

Always [ ]

Occasionally [ ]

Cant recall [ ]

Never [ ]

12 Do you have any reservations about the use of VIAs

Very worth while [ ]

Worthwhile [ ]

Somewhat worthy of use [ ]

Worthless [ ]

13. My attitude to VIAs use is influenced by

Poor production quality [ ]

Irrelevant contract [ ]

Lack of interest [ ]

No Idea [ ]

14 Use of VIAs have been

Very effective [ ]

Effective [ ]

Fairly effective [ ]

Ineffective [ ]

No Idea [ ]

C. ON AUDIO -VISUALS

1515. Are you aware of the use of Audio - Visuals in your institutes training?

Yes [ ] No [ ]

If yes how frequent?

Always [ ]

All times [ ]

Rarely [ ]

Just once [ ]

16. Have you used one before?

Yes, Always [ ]

Once in a while [ ]

Occasionally [ ]

Never [ ]

17. Are you in support of its use?

Yes as a necessity [ ]

As an aid [ ]

By chance [ ]

A liability [ ]

Un-called for [ ]

18. In your opinion, what are the negative factors hindering effective use of audio visuals in training workshops?

....

....

....

19. Suggest ways of arresting these negative effects please

....

....

....

D ON OTHER BENEFITS OF AUDIO VISUALS

20. Apart from Training in what areas did you have cause to rely of Audio Visual?

Personal works [ ]

Official documents [ ]

Class training [ ]

Private business [ ]

Home applications [ ]

None of the above [ ]

21. Does your organisation render commercial services in Audio - Visuals?

Yes [ ] No [ ] No Idea [ ]

If yes, how rewarding is the above?

Very rewarding [ ]

Rewarding [ ]

Fairly rewarding [ ]

Not so rewarding [ ]

Not rewarding [ ]

22. What factors are responsible for that ?

a. Inadequate arrangement [ ]

b. Lack of expertise [ ]

c. Poor motivation [ ]

d. Lack of patronage [ ]

e. All of the above [ ]

23. Would you recommend serving only your organization or both?

1. To serve only our organizational needs [ ]

2. To serve commercial needs as well [ ]

3. To close down the graphic unit [ ]

4. No idea [ ]

E. **CO-OPERATIVE COLLABORATION GESTURES**

25. If another organization offers to assist yours in Audio-Visuals, will that be acceptable?

Very acceptable [ ]

Acceptable [ ]

Not acceptable [ ]

26. Are you aware of any collaborative efforts with other bodies in Audio-Visuals?

Yes, Training of staff [ ]

Commercial venture [ ]

Administrative [ ]

Marriage of convenience only [ ]

All of the above [ ]

27. Have you attended any practice training in Audio - Visuals abroad?

Yes, Once [ ]

Twice [ ]

Several times [ ]

Still hoping [ ]

28. Are such training opportunities available locally?

Yes, but no sponsors [ ]

Not available [ ]

No idea [ ]

F. STAFF STRENGTH

29. The staff of your Graphic Unit are

Fully Engaged [ ]

Partially Engaged [ ]

Not Engaged [ ]

Always Idle [ ]

30. The Unit is Understaffed [ ]

Overstaffed [ ]

Adequately staffed [ ]

31. There is obvious Training need [ ]

Managerial need [ ]

Discipline need [ ]

Motivational need [ ]

Financial support need [ ]

32. Other missing links

Equipment [ ]

Transport [ ]

Housing [ ]

Remuneration [ ]

None [ ]