PN-ABZ-969

A TRAINING MODULE

Scientific Writing and Presentation

AUGUST 1996

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Preface

The International Service for National Agricultural Research (ISNAR) is mandated to assist national agricultural research systems (NARS) in developing countries in strengthening their agricultural research management. Through its training unit and in collaboration with national agricultural research organizations (NAROs) and management development institutes (MDIs), ISNAR produces training modules in agricultural research management. These training modules provide "researchers-trainers" with both a training plan and training materials designed to improve the knowledge, attitudes, and skills needed to manage agricultural research effectively.

The Agricultural Research Management Training (ARMT) Project aims at institutionalizing agricultural research management training in the Southern African Development Community (SADC) countries as well as improving the management capacity of research leaders. The current phase of the project, sponsored by the United States Agency for International Development (USAID), includes the development of a series of training modules on research management to facilitate the training of national trainers in order to ensure a sustainable capacity for training in the region.

Each draft training module comprises a curriculum, including learning objectives for each day's activities; descriptions of the training approach, methods, and techniques; and master copies of handouts, worksheets, overhead transparencies, and other training media that can easily be reproduced for distribution among participants in the workshop. In addition, the training modules include evaluation forms and a recommended bibliography for use by the trainers.

Texts and exercises from the region and from other parts of the world were collected to create the training modules. Whenever possible, the training design team has acknowledged original sources. In order to ensure the relevance of the basic materials and cases to the region, the training modules were designed in partnership with NARS and tested in a draft version during two-week workshops in the SADC region.

The first week of these workshops, brought together SADC trainers from MDIs and universities, and senior researchers from NAROs. ISNAR subject-matter and training specialists led the learning process and collected feedback from the participants to improve the training module. Feedback was incorporated and the module was further tested during the second week. The "new trainers," the main users of this module, led the workshop for national program leaders and senior scientists. The module was further improved by the participants.

The Scientific Writing and Presentation workshop was, however, implemented during one week. It was an event to train regional trainers and improve the draft module. This is the resulting version of the module, which was tailored to SADC users through this exercise. The trainers are expected to use the module to facilitate planning and implementation of training/workshop programs in the region. The researchers are expected to use the module to provide their colleagues with the opportunity to analyze NAROs' approaches and assessing ways of improving them within their organizations. In addition, the researchers are expected to assist national trainers in implementing training events in their respective countries.

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It is hoped that the trainers and researchers will adapt the module to respond to their specific needs and share the changes with Eastern and Southern African Management Institute (ESAMI) and ISNAR as a contribution to improving the materials for the benefit of the region.

ESAMI and ISNAR thank all the research management specialists, national trainers, and those who participated in designing, testing, and improving the module for their very valuable contributions.

Director General, ESAMI

Dr. Christian Bonte-Friedheim
Director General, ISNAR

Acknowledgments

The conduct of the activities to design, test, and produce the SADC/ESAMI/ISNAR training modules would not have been possible without the active participation and support of the ISNAR management, resource persons and training team, USAID and SADC/SACCAR officers in Gaborone, Botswana, and ESAMI/ISNAR officers in Arusha, Tanzania.

ESAMI and ISNAR are very thankful to USAID, the sponsor of the ARMT Project. Special thanks go to L. Setshwaelo, the manager of this project based in Arusha. Sincere thanks are due to R. Obura for his guidance in revising this training document to meet the needs of SADC countries and to J. Mugah, who together with L. Shio, and L. Staal, led the regional training-of-trainers workshop in Zimbabwe to test this module.

Special thanks are due to the training team responsible for the initial design of the training modules. This team was composed of Lisette Staal, ISNAR/ESAMI consultant and team leader; R. Obura, Egerton University, Kenya, ISNAR/ESAMI consultant; M. Mwala, University of Zambia, ISNAR/ESAMI consultant; and members of the ISNAR training team, composed of Zenete Peixoto Franca, Jacobine Verhage, Richard Claase, André Schaareman, Fionnuala Hawes, and Albertine Huybrechts. ISNAR also thanks Michelle Luijben who edited this module.

Source of Material

This training module is a revision of a training module entitled "Scientific Writing and Presentation," that was designed by Zenete Peixoto Franca (ISNAR), R. Obura (Egerton University, Kenya), and J.O. Mugah (Kenya Agricultural Research Institute, KARI), based on a handbook entitled, "Writing and Presenting Scientific Information," prepared by K.R. Kern (consultant), R. Obura, and T.A. Taylor (ISNAR). The original training module was used to train a group of trainers who subsequently implemented training programs for scientists at KARI in April and May 1994.

Revisions

The module has been revised by providing a new format and introduction, incorporating instructors' notes, revising exercises, and adapting overhead transparencies. The original sequence of activities and topics has remained the same.

Sponsor

The is material was produced for the SADC/ESAMI/ISNAR ARMT Project, funded by the United States Agency for International Development (USAID).

SADC/ESAMI/ISNAR

Agricultural Research Management Training Project

SADC/ESAMI/ISNAR
Agricultural Research Management Training Project

Introduction

Agriculture continues to play a major role in the economy of the SADC countries (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe) by providing food, energy, and some income for the majority of the population and raw material for the growth and development of the manufacturing industries. However, environmental problems such as soil degradation, deforestation, and the severe drought of the recent past remain serious constraints to national development. At the same time, the increased demand for food (due to rapid population growth), raw materials, and improved technologies present new challenges to agricultural research.

The responsibility for coordinating research and training in agriculture and natural resources in attaining SADC's goal of food security is vested in the Southern Africa Co-ordinating Committee on Agricultural Research (SACCAR). Early in its formation (1984), SACCAR recognized that national agricultural research systems (NARS) could greatly enhance their efficiency and effectiveness in technology generation and delivery if their management could be improved. This is particularly true in the planning and management of human, financial, physical, and agricultural resources, as well as in procedures for prioritizing research programs and linkages with policymakers and external sources of knowledge. The ARMT Project was conceived and developed in 1987 to address these concerns. The evaluation of Phase I in 1990 recommended that one way to make training sustainable was to institutionalize it in the region. The first step in this process was the integration of the project into a regional management development institution (MDI)—Eastern and Southern African Management Institute (ESAMI). This was to be followed by institutional capacity building in the region, of which the present exercise of training module development is an integral part

This project, which covers the period 1992–1995, is a collaborative venture among three partners: ESAMI, as the main executing agency; ISNAR, as a joint executing agency; and SACCAR, which provides the strategic regional perspective to the project.

The project is based in ESAMI's headquarters in Arusha, Tanzania. It is implemented through a network of SADC MDIs and individual experts from the region. This design aims to ensure adaptation and institutionalization of research management training.

Goal of the Project

The aim of the project is to *strengthen* the capacity of agricultural and natural resource policymakers and research managers in planning, organizing, and managing research systems in order to increase their efficiency and effectiveness in addressing the region's food problems.

The Modules

The ARMT Project strives to *institutionalize* and *sustain* management training within the SADC countries. The comprehensive action plan includes several training modules, which are to be used by ESAMI, MDIs, and NARS to implement workshops for training their local personnel. This will contribute to capacity building and, hence, sustainability and institutionalization of management training in the region. The modules aim to help MDIs and NARS develop their own capacity for gender-balanced multidisciplinary in-service training.

Eight modules form the core of the ARMT Project

1. Priority Setting for Agricultural Research Programs;
2. Planning, Monitoring, and Evaluation of Research Projects;
3. Information Management for Research;
4. Scientific Writing and Presentation;
5. Research Program Formulation;
6. Financial Management in Research on Agriculture and NRM;
7. Strategic Planning;
8. Gender Analysis for Management of Research in Agriculture and Natural Resources.

The Workshops

The modules provide the basis for trainers to prepare and deliver workshops. The majority of the modules are designed to run for five days. However, the training modules on Gender Analysis for Management of Research in Agriculture and Natural Resources and Information Management for Research are designed to run for four days and 10 days respectively.

Objectives of the Project

The objectives of the project are the following:

a. to increase understanding among high-level officials on the role of research in promoting and sustaining agricultural development;

b. to strengthen the capacity of national research leaders to plan, program, budget, and monitor research programs of relevance to national development goals;

c. to foster human resource development in agricultural research management within the member countries;

d. to build the skills of middle-level research administrators in the management of agricultural research activities;

e. to work towards building a base for a sustained capacity in management training for agricultural research within SADC.

Phase I laid the foundations for building specific skills and providing the knowledge and tools that helped SACCAR realize substantial progress in achieving its two main goals:

a. increased cooperation in research on agriculture and natural resources;

b. improvement in the capacities of individual countries to undertake carefully prioritized research and training projects.

This in turn enabled SADC countries to make progress towards achieving important goals in

a. increased agricultural productivity;

b. higher incomes and creation of employment in the rural areas.

Phase II is concentrating on institutionalization and sustainability of the AMRT-Project activities.

Target Audience

The ARMT Project aims at training the following persons:

a. **policymakers**: board of governors, agricultural research council members, planners, executive officers in the NARS, permanent or principal secretaries, etc.—those responsible for the long-range objectives of a NARS,

b. **senior research managers**: senior managers and executives of the system, for example, directors general/directors and their assistants—those responsible for overseeing the implementation of policies,

c. **middle-level research managers**: research coordinators, station heads—those responsible for supervising research operations at research stations, laboratories, institutes, etc.

Overview of the Module

Scientific Writing and Presentation

Overview of Module

Scientific Writing and Presentation

Rationale: Need for Scientific Writing and Presentation

National agricultural research systems (NARS) need to develop adequate management skills and resources to manage their information requirements.

Visits to many NARS reveal that most of the results of research are held in field notebooks and files awaiting formal writing and reporting to relevant end users. The delay is usually the result of a lack of courage or a lack of knowledge on scientific writing and presentation.

Scientific writing is a form of communication with distant audiences while oral presentation is face-to-face communication with a restricted or limited audience. Both are important because they offer avenues through which scientists can share their findings and also get feedback and information related to their work.

The module on Scientific Writing and Presentation is intended to equip agricultural scientists with the necessary skills and improved competence for effective written and oral communication.

Objectives

At the end of the workshop the participants will be able to do the following:

1. Discuss scientists' responsibilities in reporting on research.
2. Discuss some principles of planning and writing a reader-friendly report.
3. Identify and list the components of a scientific paper.
4. Define and edit abstracts.
5. Write acknowledgments and references.
6. Measure readability (using the FLESCH formula).
7. Identify and discuss several ways in which the use of the computer eases editing.
8. Apply knowledge and skills to appropriately edit scientific papers.
9. Plan and prepare an oral presentation using visual aids.
10. Plan future activities in scientific writing and presentation.

Duration

The workshop is planned for five days.

Topics to be covered

1. Introduction.
2. When a scientist reports research.
3. The layout of a scientific paper.
4. Titles.
5. Abstracts.
6. Acknowledgments and references.
7. Writing and rewriting.
8. Paragraphing.
9. Logical arrangement of paragraphs.
10. Use of definite, concrete words.
11. Work with words.
12. Phrases that say little.
13. Raw material—types of English sentences.
14. Simple, compound, and complex sentences.
15. Complete, incomplete, and run-on sentences.
16. Active and passive sentences.
17. Measuring readability.
18. Strengths and weaknesses of using the computer.
19. Editing.
20. Editing—first aid for sentences.
21. Applying what you have learned.
22. Application—editing a colleague's paper.
23. Report writing.
24. Oral presentation.
25. Participant action plan approach (PAPA)

Target Audience for Scientific Writing and Presentation Workshop

The workshop is intended for program leaders and scientists. SADC/ESAMI/ISNAR strongly encourages a balanced selection of participants with equal representation of males and females.

Training Approach

This training module provides trainers with the information, specific activities, and materials they need to effectively plan and deliver a training program. Because each trainer and each training situation is unique, planning is critical to the success of any program. This module encourages participation and provides hands-on, problem-solving experiences and exercises.

Applying the Experiential Learning Cycle

This training approach is based on experiential learning theory (Kolb and Fry 1975; McCaffery 1986) and is participatory by design. It is a learner-centered approach involving experience followed by a process of reviewing, reflecting, and applying what has been learned. Participatory methods keep learners active in the learning process. They are involving and interactive, and they encourage communication and group work. They are action oriented and experience based.

This experiential and participatory approach was chosen to enhance effective skill transfer, to facilitate conceptual and attitudinal development, and to encourage appropriate changes in participants' behavior. The experiential learning cycle is especially useful for skill training because most of its techniques are designed to involve the participants in practicing the skill. The experiential model helps people assume responsibility for their own learning because it asks them to reflect on their experience, draw conclusions, and identify applications. Participants ground the lessons in their actual work environment by considering the question of what can or should be done differently as a result of this training experience.

To be effective this module must be applied in both the design and delivery stages of training. The sessions, activities, and notes in this module present trainers with guidelines for reaching the training objectives by applying the experiential training methodology. An understanding of the adult learner, the role of the trainer as a facilitator, and of the experiential learning cycle is important to this approach.

The Adult Learner

Understanding the adult learner is critical to the success of this training approach. The adult learner has particular needs (Knowles 1978; McCaffery 1986; Zemke and Zemke 1981). Adult learners need continual opportunities to identify their needs and recognize the relevance of their learning in terms of their own lives. Adult learners need self-directed learning opportunities in which they can actively participate. They need to actively think, to do, to reflect on experiences, to discuss with others, and to practice and learn new skills. The adult learner needs interactive communication with both the trainer and fellow learners, which is different from one-way teacher-to-student communication. The learner needs to continually reassess the question, "Where am I now and where do I want to go?"

The Trainer

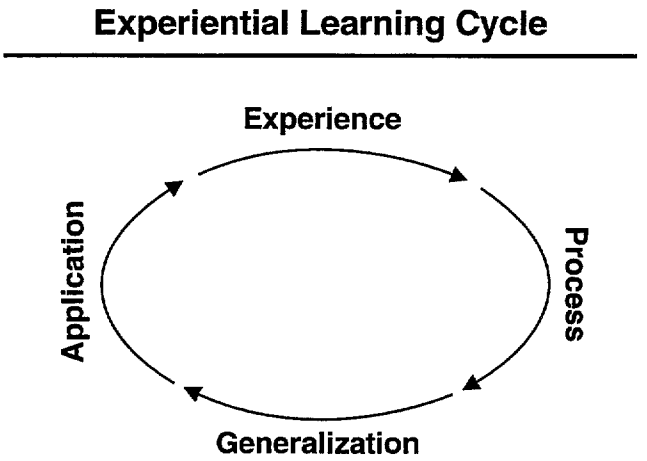
The role of trainer/facilitator is to manage or guide the training process rather than to manage the content of learning. Adult learners need to be able to share the responsibility for learning with the trainer. The experience of adult learners should be viewed and used as a rich resource in the learning environment and they should be encouraged to contribute to the learning environment whenever possible.

The Experiential Learning Cycle[1]

Experiential training or *learning* is a phrase often heard in the educational world. The strength of the approach is in the completeness of its cycle, which consists of four stages, each as important as the preceding or following one. The four stages are (1) experience, (2) process, (3) generalization, and (4) application.

The term "experiential" is often misused in practice. Experiential training seems to mean letting people participate in a presentation, having a question-and-answer session after a lecture, or a role play or case study without the subsequent steps of the model. The final stages are often left out of the design of the program. As a result, the power of experiential learning is significantly diminished or negated altogether. The stages of the experiential learning cycle are outlined below.

Figure 1: Experiential learning cycle



Source: McCaffery (1986) and adapted from Kolb and Fry (1975).

Experience: The experience stage is the initial activity and data-producing part of the cycle. This phase is structured to enable participants to "do" something. "Doing" includes a range of activities, such as participating in a case study, role play, simulation or game, or listening to a lecture, watching a film or slide show, practicing skill, or completing an exercise.

1 The section on the experiential learning cycle is adapted from USDA/OICD/ITD, Agricultural Trainer Development, Training of Trainers, Instructors Manual and McCaffery, James, "Interdependent Effectiveness: A Reconsideration of Cross-Cultural and Training," International Journal of Intercultural Relations, 1986.

Process: In this stage, participants reflect on the activity undertaken during the experience stage. They share their reactions in a structured way with other members of the group. They may speak individually, in small groups, or as a full training group. They discuss both their intellectual and attitudinal (cognitive and affective) reactions to the activities in which they have engaged. The trainer helps the participants to think critically about the experience and to verbalize their feelings and perceptions, and he or she draws the attention to any recurrent themes or patterns which appear in the participants' reactions. The trainer must also help the participants conceptualize their reflections so they can move toward drawing conclusions.

Generalization: In the generalization stage, the participants form conclusions and generalizations that might be derived from, or stimulated by, the first two phases of the cycle. The trainer must help participants think critically to draw conclusions that might apply generally or theoretically to "real life." This stage is best symbolized by the following questions: "What did you learn from all this?" and "What more general meaning does this have for you?"

Application: After participants have formed some generalizations, the trainer must guide the participants into the application stage. Drawing upon the insights and conclusions reached during the generalization stage (and previous stages), participants can begin to incorporate what they have learned into their lives by developing plans for more effective behavior in the future. Techniques used to facilitate the application stage can include action plans, reviewing each other's action plans, formulating ideas for action, sharing action plans with the whole group, and identifying additional learning needs. The trainer assists during this process by helping participants to be as specific as possible.

Participant Action Plan Approach

An integral aspect of the workshops is the ultimate application of the skills by the participants in the work environment. The participant action plan approach (PAPA) was developed by the United States Office of Personnel Management to help participants consider specific applications of lessons learned during training on their job sites. Participants commit themselves to action through a written plan developed at the end of the workshop. PAPA can help participants transfer what they learned in the workshop to their jobs, thus reaching the application stage of the experiential learning cycle.

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The Training Plan

How the Module is Organized

INTRODUCTION

The module provides the trainer all the information and materials required for planning and implementing a five-day workshop. It contains suggested activities that have been field tested, with instructions for trainers. The trainer is encouraged to draw on these ideas to devise tailor-made exercises appropriate for his or her specific training situation. The training-plan section is organized in the following way:

1. Pre-workshop instructions
2. Tips for trainers
3. Daily training program. For each day this section provides:
   - overview
   - schedule
   - checklist for trainers
   - instructions to trainers
   - summary of overheads
   - participant handouts
4. Overheads and reference materials are organized by day and session. These are located in a section following the daily training program.

MATERIALS

Overview: Includes the day's learning objectives and a list of required participant handouts.

Schedule: Includes suggested times. However, each trainer must consider the timeframe based on the situation and participants, and revise as appropriate.

Trainers' checklist for planning: Helps the trainer collect and compile the materials required for each day.

Instructions to trainers: Provide the trainer with specific information on the flow of the sessions and instructions on how to facilitate activities. A sample format of the "instructions to trainers" appears on the next page.

Participant handouts: Handouts that the trainer distributes to the participants are numbered in order by day and by session. For example *Day 1/Session 1/Handout 1 (1.1.1).*

Overheads: A summary of the overheads used appears in reduced format at the end of each session. Full-size copies of the overheads are organized by day in annex 2. Like the handouts, they are numbered *Day 1/Session 1/Overhead 1 (1.1.1)*. Overheads are available in **paper copies**.

Evaluation form (day five): A diskette with the text of the evaluation form in WordPerfect 5.1 is included and, if necessary, may be adjusted to meet your needs.

A Sample Format
Instructions to Trainers

DAY ONE	**Session 3** **The Layout of a Scientific Paper**
	Instructions to Trainers
SESSION 3	**14:15 – 14:45 Session 3. The Layout of a Scientific Paper**
OBJECTIVE	By the end of this session, participants will be able to do the following:
	• Identify and list the components of a scientific paper.
PROCEDURE	Training techniques: presentation, discussion.
PRESENTATION	(*experience*) Give a presentation focusing on key elements of the layout of a scientific paper. You will find the information in the handouts very useful. Five overheads support the presentation: 1.3.2 through 1.3.6. At the end of the presentation be sure to ask the participants if they have any comments or questions, or if they need clarifications. Distribute handouts 1.3.1 and 1.3.2.
EXERCISE 3	**Exercise 3. Discussion.** (15 minutes)
	After the presentation, ask the participants to formulate questions and comments. Enter into a discussion.
CLOSURE	**Closure** (5 minutes) 1. (*application*) Ask the participants to tell one of their neighbors two things they might do differently as a result of what they learned. Choose some volunteers to give examples. 2. Make a transition to the next session.

The suggested time and title of each section

The objectives are stated in terms of participants' ability by the end of each session.

Various training techniques employed during the session are listed.

Each exercise is numbered chronologically. The title for each exercise appears here.

Time: Total time for an activity appears in parentheses.

The stage of the experiential cycle is identified in italics.

Tips for Trainers

As a trainer, you are responsible for creating the learning environment and maintaining the flow of the workshop. You must be aware of the participants' needs and be sensitive to their concerns. Following in brief are several tips to help you achieve a successful workshop.

Ten tips for your success as a trainer:

1. Begin your working day by presenting:
   - objectives
   - schedule

   Make sure that the trainees are aware of what they are expected to learn each day.
2. Manage time wisely. Time is a motivating factor in training. If you slow down, the participants will lose interest and commitment.
3. Give brief presentations. Encourage your trainees to speak up and participate actively in discussions and exercises.
4. Follow the instructions of the proposed exercises:
   - use different techniques;
   - promote active participation;
   - increase interest and level of motivation.
5. Avoid "short cuts" while working on topics. Keep the same level of interest while making presentations, doing exercises, and listening to reports. Remember that as a trainer you are responsible for the results of the five-day workshop.
6. Don't let your interest and willingness to teach diminish. Show care for the participants' learning and be patient!
7. Be an attentive and good listener. The participants expect you to value their ideas and to look at them while speaking. These positive attitudes increase your credibility with the participants.
8. Praise your trainees for their efforts and for good performance. This shows that you recognize their input

and this consequently increases their level of motivation.

9. Make sure that your trainees feel positive and that they are satisfied with the workshop. Ask for their feedback at the end of each day.
10. Be confident of your success as a trainer. Go through the whole plan and be well prepared. Let them see you are competent and self-confident.

MANAGING GROUPS

Many of the exercises require the participants to work together in small groups, and then there must be a way to share the information with the rest of the workshop participants. The most common way is to have group presentations. You are responsible for managing the group activities and ensuring active participation. These tips will help:

TIPS FOR FACILITATING GROUPS

Seven tips for facilitating group exercises:

1. Be attentive to and supportive of the participants' needs in any situation.
2. Help them to understand the steps they must take to accomplish all the tasks.
3. Manage time effectively. Be sure to remind participants of the time remaining. Be firm! Keep to the schedule.
4. Show interest and be willing to assist them at all times. Circulate from group to group while they are working.
5. Follow the entire process. Remain in the classroom during all activities.
6. Provide the groups with constructive feedback.
7. Always summarize the major points made by the groups and relate them to the objectives of the session and exercise.

Pre-workshop

Pre-workshop

Instructions to Trainers

INTRODUCTION

As a trainer, you are responsible for the preparation and management of the entire program. This often requires pre-workshop actions. You must discuss the pre-workshop responsibilities with the workshop's sponsoring institutions. Some things that you must be sure to arrange are included in the following list. There may be several others. Pre-planning is essential to the success of your training workshop.

ACTIONS NEEDED

You must arrange for the following points long *before* the workshop starts:

1. In pre-workshop communication, be sure to inform the participants of any information they will require prior to arriving at the workshop. This can be accomplished by means of a pre-workshop letter. Consult with the sponsoring institutions for plans for pre-workshop communication with participants.
2. Arrange for appropriate officials to welcome the participants.
3. Compile a notebook for each participant. This notebook will be used by the participant to organize the training materials from each session. Before it is distributed at the workshop, each notebook should contain the following items:
   - welcome letter
   - workshop prospectus
   - tentative schedule (five days)
   - registration form

Samples of these items appear on the following pages.

4. Plan for implementing systematic activities. Prepare yourself to instruct participants during the opening session on the systematic activities of the workshop:
   - review of daily activities
   - daily PAPA exercise
   - daily brief evaluation

5. At the end of each day:
   - Invite a volunteer to prepare and present the following morning a brief report, reviewing the day's activities and summarizing major lessons learned. Provide the volunteer with transparencies of the day's objectives to facilitate his/her presentation, which should be delivered in 10 minutes.
   - Distribute the PAPA forms and invite the participants to list major skills that they have developed from the day's activities which could be applied in their job environment. Request that they keep the PAPA forms in their own notebooks. You will ask them to review these forms during the last day when they fill out the action plan for the follow-up process.
   - Distribute the evaluation form and invite the participants to briefly evaluate the day's activities. Collect the forms and summarize the results to report back to them the following morning. Note that it is necessary to cluster the answers in the evening.
   - The participants should evaluate the diverse features of the day's activities. You should provide the participants with a copy and/or list of these on the overhead during the evaluation session.
6. At the end of day two, during session 14, you need to distribute handout 3.17.3 for the participants to read in the evening, make sure you have enough copies of this handout ready on day two.
7. Arrange for the certificates to be ready for distribution at the end of the workshop.

WORKSHOP-SPECIFIC REQUIREMENTS

1. On day four, session 22, the participants will be working on some selected participant papers. Therefore, it is very important that you tell them to bring to the workshop a research paper on which they are currently working.
2. On day five, oral presentations will be video-taped. Make the required arrangements for video-taping and viewing the video tape.

Dear Participant,

Welcome to the Workshop on Scientific Writing and Presentation which has been organized by SADC/ESAMI/ISNAR.

We hope you will enjoy the coming five days. Our aim is to help you to become a skillful writer of scientific papers. Various subjects will be discussed. First we will consider the theoretical aspects, and then you will be given practical work to do using up-to-date training techniques. All of the exercises will be reviewed and discussed by the participants.

We realize that scientific writing and presentation is not easy. There are ways to improve your knowledge and skills on this subject. This workshop will give you a chance to brush up on your grammar, style, and vocabulary. You will learn how to formulate sentences clearly and concisely and how to write and present well-argued and documented scientific papers that are easy to read and comprehend. After all, many people want to read the results of your research!

You are requested to bring to the workshop a research paper on which you are currently working. Your paper may be used as part of an exercise during the workshop.

We wish you a pleasant and productive workshop.

Best regards,

SADC/ESAMI/ISNAR Trainers
on Scientific Writing and Presentation

Scientific Writing and Presentation Workshop Prospectus

Introduction

National agricultural research systems (NARS) need to develop adequate management skills and resources to manage their information requirements.

A visit to many NARS reveals that most of the results from research work are held in field notebooks and files awaiting formal writing and reporting in either annual reports or journals. The delay is usually a result of a lack of courage or lack of knowledge on scientific writing and presentation.

Scientific writing is a form of communication with distant audiences while oral presentation is face-to-face communication with a restricted or limited audience. Both are important because they offer avenues through which scientists can share their findings and also get feedback and information related their work.

The module on Scientific Writing and Presentation is therefore intended to help improve the skills of agricultural scientists and to help them acquire the necessary competence for effective written and oral communication.

Workshop Goal

To provide the ESAMI trainers with guidelines for conducting a workshop to help research scientists develop basic skills in scientific writing and presentation.

Major Objectives

At the end of the workshop the participants will be able to do the following:

1. Discuss scientists' responsibilities in reporting research.

2. Discuss some principles of planning and writing a reader-friendly report.
3. Identify and list the components of a scientific paper.
4. Define and edit abstracts.
5. Write acknowledgments and references.
6. Measure readability (using the FLESCH formula).
7. Identify and discuss several ways in which the use of the computer eases editing.
8. Apply knowledge and skills to appropriately edit scientific papers.
9. Plan and prepare an oral presentation using visual aids.
10. Plan future activities in scientific writing and presentation.

Duration of the Workshop

The workshop is planned for five days.

Workshop Format

At each event, the trainers will train a maximum of 20 scientists per training session in scientific writing and presentation. The workshop is designed to provide an interactive learning environment. Sessions generally include a brief presentation and participatory exercises. The participant action plan approach (PAPA) is integrated throughout the workshop to encourage participants to consider the application of newly acquired skills.

Workshop Requirements

Participants are requested to bring to the workshop a research paper on which they are currently working. Your paper may be used as part of an exercise during the workshop.

Expected Outputs

The expected outputs of the workshop are the following:

1. Improved scientific writing skills of the trained 20 scientists.
2. Action plans by the research scientists to improve their skills in scientific writing and presentation.
3. Action plans which include written proposals to set up editorial/writing committees in a research center.
4. Improved commitment from agricultural researchers to work as a team towards establishing, within the institute, a critical level of expertise in scientific writing and presentation.
5. Increased interest by scientists to serve the SADC-NARS in areas related to scientific writing and presentation.

Scientific Writing and Presentation - Workshop Schedule

Day One	Day Two	Day Three	Day Four	Day Five
08:30 - 09:00 *Welcome* **09:00 - 10:30** *Session 1. Introduction to the workshop*	**08:30 - 09:00** *Opening of the day's activities* **09:00 - 09:30** *Session 6. Acknowledgments and references. Exercise 6* **09:30 - 10:00** *Session 7. Writing and rewriting. Exercise 7* **10:00 - 10:30** *Session 8. Paragraphing. Exercise 8*	**08:30 - 09:00** *Opening of the day's activities* **09:00 - 10:00** *Session 15. Complete, incomplete, and run-on sentences. Exercise 15.* **10:00 - 10:30** *Session 16. Active and passive sentences. Exercise 16*	**08:30 - 09:00** *Opening of the day's activities* **09:00 - 10:00** *Session 20. Editing— first aid for sentences. Exercise 20* **10:00 - 10:30** *Session 21. Applying what you have learned. Exercise 21*	**08:30 - 09:00** *Opening of the day's activities* **09:00 - 10:30** *Session 24. (Continued)*
Tea/coffee break	**Tea/coffee break**	**Tea/coffee break**	**Tea/coffee break**	**Tea/coffee break**
10:45 - 13:00 *Session 2. When a scientist reports research. Exercise 2*	**10:45 - 12:05** *Session 9. Logical arrangement of paragraphs. Exercise 9* **12:05 - 13:00** *Session 10. Use of definite, concrete words. Exercise 10*	**10:45 - 11:30** *Session 16. (Continued)* **11:30 - 13:00** *Session 17. Measuring readability. Exercise 17*	**10:45 - 11:15** *Session 21. (Continued)* **11:15 - 13:00** *Session 22. Application— Editing a colleague's paper. Exercise 22*	**10:45 - 13:00** *Session 24. (Continued)*
Lunch	**Lunch**	**Lunch**	**Lunch**	**Lunch**
14:00 - 14:30 *Session 3. The layout of a scientific paper. Exercise 3* **14:30 - 15:30** *Session 4. Titles. Exercise 4*	**14:00 - 14:45** *Session 11. Work with words. Exercise 11* **14:45 - 15:30** *Session 12. Phrases that say little. Exercise 12*	**14:00 - 15:30** *Session 18. Strengths and weaknesses of using the computer. Exercise 18*	**14:00 - 15:30** *Session 22. (Continued)*	**14:00 - 15:30** *Session 24. (Continued)*
Tea/coffee break	**Tea/coffee break**	**Tea/coffee break**	**Tea/coffee break**	**Tea/coffee break**
15:45 - 17:00 *Session 5. Abstracts. Exercise 5* **17:00 - 17:30** *Feedback on the day's activities and PAPA*	**15:45 - 16:15** *Session 13. Raw material—types of English sentences. Exercise 13* **16:15 - 17:00** *Session 14. Simple, compound, and complex sentences. Exercise* 14 **17:00 - 17:30** *Feedback on the days' activities and PAPA*	**15:45 - 17:00** *Session 19. Editing. Exercise 19* **17:00 - 17:30** *Feedback on the day's activities and PAPA*	**15:45 - 16:15** *Session 23. Report writing. Exercise 23* **16:15 - 17:30** *Session 24. Oral presentation. Exercise 24* **17:30 - 18:00** *Feedback on the day's activities and PAPA*	**15:45 - 16:45** *Session 25. Participant action plan approach and workshop evaluation* **16:45 - 17:00** *Final remarks and closing*

SADC/ESAMI/ISNAR Workshop on Scientific Writing and Presentation

Registration form

Instructions: We would like your help in making this activity as beneficial to you as possible. In order to do this we request you to provide us with some information. Below you will find a number of questions relating to your background and expectations for the workshop. Most questions can be answered simply by placing a check in the appropriate space. Where a written answer is required, please print your reply clearly in the space provided. Please consider your responses carefully and answer truthfully. Everything you say will be held in strictest confidence. The information will be used only to help us make our activities more responsive to your needs.

Last name		First name	

Function in this meeting	❒ Participant ❒ Facilitator/presenter ❒ Organizer ❒ Observer ❒ Other _____

Title	❒ Dr. ❒ Mr. ❒ Mrs. ❒ Miss. ❒ Ing. ❒ Other _____

Gender	❒ M ❒ F

Date of birth	m d y / /19

Degree		Year
	❒ Diploma	19....
	❒ B.Sc.	19....
	❒ M.Sc.	19....
	❒ Ph.D.	19....

Other degree	
Year of other degree	19....

Position (type)	❒ Policymaker ❒ Senior manager ❒ Middle manager ❒ Researcher ❒ Information specialist ❒ Technician ❒ Other _____

Position (type)	
Department	

Institute	
Name of your immediate supervisor	
Your institute's address	
Telephone no.	
Telex no./ Fax no.	
Expectations	

What particular topics would you like emphasized in this workshop?	

What other management topics would you like to see covered in future events?	

DAY ONE

Scientific Writing and Presentation

DAY ONE — Overview

Objectives

By the end of the day the participants will be able to do the following:

1. Discuss the background, rationale, objectives, and schedule for the five-day workshop.
2. Explain the use of the participant action plan approach (PAPA).
3. Identify the trainers and the trainees.
4. Discuss scientists' responsibilities in reporting on research.
5. Identity key factors in choosing an audience.
6. Discuss some principles of planning and writing a reader-friendly report.
7. Identify and list the components of a scientific paper.
8. Categorise titles.
9. Identify mistakes in titles.
10. Categorise and edit abstracts.

Participant Materials

Workshop notebook (includes welcome letter, tentative five-day schedule, and workshop prospectus).

Handouts

1.1.1 Overview
1.1.2 Tentative Schedule
1.1.3 Participant Action Plan Approach (PAPA)
1.1.4 Exercise 1. Interactive Exercise (seven sheets to be cut into 21 forms)
1.1.5 Exercise 1. Exercise Sheet (list of questions)
1.2.1 When a Scientist Reports Research (summary of presentation)
1.2.2 When a Scientists Reports Research (text)
1.2.3 Exercise 2. When a Scientist Reports Research
1.2.4 Exercise 2. Worksheet
1.3.1 Exercise 3. The Layout of a Scientific Paper
1.3.2 The Layout of a Scientific Paper (summary of presentation)
1.3.3 How to Write a Scientific Paper (text)
1.4.1 Titles (summary of presentation)
1.4.2 Exercise 4. Improving Titles
1.4.3 Exercise 4. Worksheet

1.5.1 Abstract (text)
1.5.2 Exercise 5. Working with Titles and Abstracts
1.5.3 Exercise 5. Worksheet, Text 1 and Text 2
1.5.4 Strengths and Weaknesses of Day One
1.5.5 Guidelines to Provide Feedback on the Workshop
1.5.6 PAPA Form — First Stage

Scientific Writing and Presentation

DAY ONE — Tentative Schedule

08:30 – 09:00	**Welcome**
09:00 – 10:30	**Session 1. Introduction to the Workshop** – Workshop introduction, objectives, and schedule – Overview of day one – Introduction of PAPA – Interactive exercise (1)
10:30 – 10:45	Tea/Coffee Break
10:45 – 13:00	**Session 2. When a Scientist Reports Research** (Presentation and exercise 2)

13:00 – 14:00 Lunch

14:00 – 14:30	**Session 3. The Layout of a Scientific Paper** (Presentation and exercise 3)
14:30 – 15:30	**Session 4. Titles** (Presentation and exercise 4)
15:30 – 15:45	Tea/Coffee Break
15:45 – 17:00	**Session 5. Abstracts** (Presentation and exercise 5)
17:00 – 17:30	**Feedback on the Day's Activities and PAPA**

Scientific Writing and Presentation

DAY ONE — Checklist for Trainers

Pre-workshop preparation

1. Compile a notebook for each participant. The participants will use their notebooks throughout the workshop to organize the training materials. Before they are distributed each notebook should include the following: welcome letter, tentative five-day schedule, and workshop prospectus.

2. Cut the cards to be used for exercise 1.

Handouts to be distributed

		Yes ✔	No ✔
1.1.1	Overview	❒	❒
1.1.2	Tentative Schedule	❒	❒
1.1.3	Participant Action Plan Approach (PAPA)	❒	❒
1.1.4	Exercise 1. Interactive Exercise (seven sheets to be cut into 21 forms)	❒	❒
1.1.5	Exercise 1. Exercise Sheet (list of questions)	❒	❒
1.2.1	When a Scientist Reports Research (summary of presentation)	❒	❒
1.2.2	When a Scientists Reports Research (text)	❒	❒
1.2.3	Exercise 2. When a Scientist Reports Research	❒	❒
1.2.4	Exercise 2. Worksheet	❒	❒
1.3.1	Exercise 3. The Layout of a Scientific Paper	❒	❒
1.3.2	The Layout of a Scientific Paper (summary of presentation)	❒	❒
1.3.3	How to Write a Scientific Paper (text)	❒	❒
1.4.1	Titles (summary of presentation)	❒	❒
1.4.2	Exercise 4. Improving Titles	❒	❒
1.4.3	Exercise 4. Worksheet	❒	❒
1.5.1	Abstract (text)	❒	❒
1.5.2	Exercise 5. Working with Titles and Abstracts	❒	❒
1.5.3	Exercise 5. Worksheet, Text 1 and Text 2	❒	❒
1.5.4	Strengths and Weaknesses of Day One	❒	❒
1.5.5	Guidelines to Provide Feedback on the Workshop	❒	❒
1.5.6	PAPA Form — First Stage	❒	❒

Overheads

1.1.1	Scientific Writing and Presentation	❒	❒
1.1.2	Workshop Goal	❒	❒
1.1.3	Major Objectives	❒	❒
1.1.4	Expected Outputs	❒	❒
1.1.5	Workshop Duration - Five Days	❒	❒

		Yes	No
1.1.6	Objectives of Day One	❒	❒
1.1.7	Schedule of Day One	❒	❒
1.1.8	Participant Action Plan Approach	❒	❒
1.1.9	Why PAPA?	❒	❒
1.1.10	Uses of PAPA	❒	❒
1.1.11	Steps in PAPA	❒	❒
1.1.12	Step 2: In-course Activities, Stage 1	❒	❒
1.1.13	Step 2: In-course Activities, Stage 2	❒	❒
1.1.14	Step 3: Follow-up Activities	❒	❒
1.1.15	PAPA First Stage Form	❒	❒
1.2.1	Objectives of Session 2	❒	❒
1.2.2	When a Scientist Reports Research	❒	❒
1.2.3	Kern's Article Presents	❒	❒
1.3.1	Objective of Session 3	❒	❒
1.3.2	The Layout of a Scientific Paper	❒	❒
1.3.3	A Good Introduction	❒	❒
1.3.4	Materials and Method Section	❒	❒
1.3.5	Results Section	❒	❒
1.3.6	Discussion Section	❒	❒
1.4.1	Objectives of Session 4	❒	❒
1.4.2	Types of Titles	❒	❒
1.4.3	Indicative	❒	❒
1.4.4	Informative	❒	❒
1.4.5	Question Type	❒	❒
1.4.6	Main/Subtitle Type	❒	❒
1.4.7	DOs	❒	❒
1.4.8	DON'Ts	❒	❒
1.5.1	Objective of Session 5	❒	❒
1.5.2	Kinds of Abstracs	❒	❒
1.5.3	Elements of an Informative	❒	❒

Materials

• Overhead projector	❒	❒
• Projector screen	❒	❒
• Flip-chart stands (minimum two)	❒	❒
• Flip-chart paper/pads (about 10 per day)	❒	❒
• Markers for writing on newsprint/transparencies	❒	❒
• Blank transparencies	❒	❒
• Stapler/push pins/scissors	❒	❒
• Tape (strong masking tape and regular tape)	❒	❒
• Glue	❒	❒
• Pencils/note pads/pens	❒	❒
• Pencil sharpeners	❒	❒
• Extension cords	❒	❒
• Certificates	❒	❒
• Photocopying facilities	❒	❒
• Spare bulbs for overhead projector	❒	❒

DAY ONE

Welcome and Session 1 Introduction to the Workshop

Instructions to Trainers

PRE-SESSION

Distribute notebooks to participants. Make sure the cards are ready for exercise 1.

08:30 – 09:00 Welcome

SESSION 1

09:00 – 10:30 Session 1. Introduction to the Workshop

OBJECTIVES

By the end of this session, the participants will be able to do the following:

- Discuss the background and rationale for the workshop: goals, general objectives and expected outputs. The prospectus provides this information.
- Describe the workshop schedule for the entire five days. A copy of the schedule is in their notebooks.
- List the objectives of day one. Copies of the objectives and schedule are distributed.
- Explain the use of the participant action plan approach (PAPA).
- Identify trainers and trainees.

PROCEDURE

Training techniques: presentation, PAPA, interactive exercise.

(experience) Give a brief presentation providing background and rationale for the workshop. State the goals, general objectives of the workshop, and expected outputs. Explain the five-day schedule of activities (a copy of the schedule is available in the participants' notebooks). Seven overheads support the presentation 1.1.1 through 1.1.7. At the end of the presentation introduce the objectives and schedule of day one. Distribute handouts 1.1.1 and 1.1.2. Use overheads 1.1.6 and 1.1.7. Ask if clarification is needed. (30 minutes)

PAPA

Introduction of Participant Action Plan Approach (PAPA)

PRESENTATION

(*experience*) Introduce the participant action plan approach (PAPA) to the workshop participants using overheads 1.1.8 through 1.1.15. You will find the key points (listed below) and handout 1.1.3 very useful. Distribute handout 1.1.3.

Encourage the participants to begin formulating action ideas as the workshop progresses. (15 minutes)

Five basic steps

PAPA requires that participants develop action plans at the end of the workshop. They will prepare a list of activities that they want to try when they return to their jobs. The plans are based on the workshop activities just experienced. After some time has elapsed (usually six months later), the participants are contacted to evaluate which activities they have actually been able to implement. The five steps involved in carrying out this process are as follows:

Step 1. Planning for PAPA

In this step, the persons conducting the workshop determine the specific activities needed to apply PAPA, considering the available resources and the needs of the organizations involved. The trainers assign and schedule the tasks necessary to carry out the approach.

Step 2. In-course activities

This step consists of two stages. At the beginning of the workshop, trainers introduce participants to the idea of an action plan. They are asked to record, throughout the workshop, new ideas they may want to try when they return to their jobs.

At the end of the workshop, participants are asked to write an action plan. This is an edited list of new, workshop-related activities that they plan to try when they return to their jobs.

Step 3. Follow-up activities

At a scheduled time after the training (usually six months later), participants are interviewed or contacted by questionnaire. They are asked which of their planned activities they have been able to achieve up to that time, and what other activities they have attempted as a result of the workshop. Participants are also asked what effect their new activities have had on their work environment, and what problems, if any, they encountered in trying them.

Step 4. Analysis and conclusions

In this step, the data collected during the follow-up are categorized and displayed to show the extent and type of change resulting from the implementation of the action plan. The information can be displayed in the form of descriptions of behavior change. It can be summarized numerically (e.g., how many of the participants changed in certain ways). It

can also be reported using a combination of narrative experience and numbers.

Step 5. Report

The findings from the analysis, conclusions, and recommendations regarding the workshop are reported in a form that meets the information needs of the organizations involved. The format may be an oral report, but a written document is preferred.

Information that can be collected

PAPA gathers information about participants' behavioral changes on the job due to the workshop. Since the trainer asks questions during the follow-up, data can also be obtained on the following:

reaction—how well participants liked and accepted the workshop (viewed six months after its completion)

learning—the skills, knowledge, attitudes, etc., participants felt they acquired during the workshop

results—the impact the participants felt that the workshop had on their organization or work environment

Uses of PAPA

Participants commit themselves to action through a written plan developed at the end of the workshop. They leave a copy of the plan with the trainer for follow-up purposes.

Participants know that someone will be asking about efforts they have made to implement the action plan. This can motivate them to actually try new activities on the job. Thus, PAPA can help participants transfer what they learned in the workshop to their jobs—PAPA becomes a part of the workshop itself.

Besides directly helping participants with the transfer of skills and knowledge, the action plan process can play a role in supervisor/subordinate discussions of workshop utilization. In working with employees after the workshop, supervisors can help them implement the action plans and thus encourage and support the transfer of learning to the job.

Resources needed to use PAPA

No complex skills or knowledge are required for using PAPA. It does not require previous evaluation experience. No statistical tests are employed in the analysis. If interviews are used to collect follow-up information, interviewing skills are needed. A general ability to synthesize data and draw logical conclusions is also important.

The major resource required is time, mainly time to collect the data about changed job behavior and time for analysis. However, the trainer can take shortcuts in using the approach and still produce valuable information about the workshop.

Reference

United States Office of Personnel Management. (no date.) Assessing Changes in Job Behavior Due to Training: A Guide to the Participant Action Plan Approach. Washington, D.C.: Productivity Research and Evaluation Division, United States Office of Personnel Management.

INTERACTIVE EXERCISE 1

Interactive exercise 1. "Getting to know each other." (60 minutes)

1. (*experience*) Distribute a form to each participant (see handout 1.1.4). Note that each form has a different question. You must cut the forms before the session. Each participant fills out a form. Based on the information on the form, the participants introduce themselves to the group.
2. (*process*) Ask the participants how they felt doing this exercise. What have they learned about themselves? Others?
3. (*generalize*) How will this information/experience be useful during this workshop?
4. (*experience*) Distribute handout 1.1.5 and ask participants to complete the form in their own time. This will help them get to know each other better.

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants "How will you apply the lessons learned as a result of this session in your job?"
2. Make a transition to the next session.

10:30 – 10:45 Tea/Coffee Break

DAY ONE

Session 1
Summary of Overheads

Scientific Writing and Presentation

1.1.1

Workshop Goal

To equip NARS program leaders and senior scientists with tools to carry out scientific writing and presentation to ensure better results of agricultural research institutes

1.1.2

Major Objectives

1. Discuss scientists' responsibilities in reporting research.
2. Discuss some principles of planning and writing a reader- friendly report.
3. Identify and list the components of a scientific report.
4. Define and edit abstracts.
5. Write acknowledgements and references.
6. Measure readability (using FLESCH formula).
7. Identify and discuss several ways in which the use of the computer eases editing.
8. Apply knowledge and skills to appropriately edit scientific papers.
9. Plan and prepare an oral presentation using visual aids.
10. Plan future activities in scientific writing and presentation.

1.1.3

Expected Outputs

1. Improve scientific writing skills.
2. Action plans to improve skills in scientific writing and presentation.
3. Action plans which include written proposals to set up editorial/writing committees in a research center.
4. Improved commitment from agricultural researchers to work as a team towards establishing, within the institute, a critical level of expertise in scientific writing and presentation.
5. Increased interest by scientists to serve the SADC-NARS in areas related to scientific writing and presentation.

1.1.4

Workshop Duration — Five Days

1.1.5

Objectives of Day One

1. Discuss background, rationale, objectives, and schedule
2. Explain the use of the participant action plan approach (PAPA)
3. Identify trainers and trainees
4. Discuss scientists' responsibilities in reporting on research
5. Identify key factors in choosing an audience
6. Discuss some principles of planning and writing a reader-friendly report
7. Identify and list the components of a scientific paper
8. Identify and correct errors in titles
9. Define and edit abstracts

1.1.6

Schedule of Day One

08:30 – 09:00	Welcome
09:00 – 10:30	Session 1. Introduction to the Workshop
	Tea/Coffee Break
10:45 – 13.00	Session 2. When a Scientist Reports Research
	Lunch
14:00 – 14:30	Session 3. The Layout of a Scientific Paper
14:30 – 15:30	Session 4. Titles
	Tea/Coffee Break
15:45 – 17:00	Session 5. Abstracts
17:00 – 17:30	Feedback on the Day's Activities and PAPA

1.1.7

Participant Action Plan Approach

1.1.8

Why PAPA?

- Systematic and continuous planning of future activities by trainees as training evolves
- Formal link between trainees and trainers for follow-up activities: which skills have been used in the job?
- Further involvement of trainee in improving the training material after training event

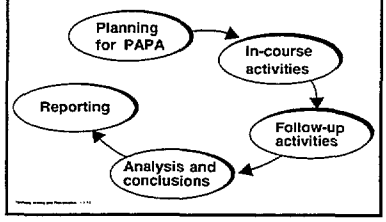
1.1.9

Uses of PAPA

- Assess the transfer of skill to work place
- Determine the impact of change introduced
- Identify problems of implementation
- Decide how to modify the course
- Evaluate the most useful parts/quality of training

1.1.10

Steps in PAPA



1.1.11

Step 2: In-course Activities

Stage 1

Objectives:
- introduce PAPA to participants
- identify possible action ideas to be tried on the job

Procedure:
Jot down action ideas during the training
- use format provided (annex 1)
- do it at end of last session each day
- confer with other participants/trainers periodically

1.1.12

Step 2: In-course Activities

Stage 2

Objectives:

- develop action plan

Procedure:

- prepare preliminary list of action items
- confer with partner
- finalize and prioritize list of action items
- report individual action plans
- make copy and submit to trainer

1.1.13

Step 3: Follow-up Activities

Trainers	Participants
• Formulate and send questionnaire →	• Fill out and return questionnaire
• Analyze and interpret data	
• Prepare report →	• Receive report and send feedback
• Modify course content	

1.1.14

PAPA Questionnaire, First Stage
Ideas for action items

Date : _____

Workshop title : _____

Date/Venue : _____

Name : _____

Organization : _____

Ideas I would like to try when I return to work at my research institute, based on what I have learned in this training workshop

_____

_____

_____

_____

_____

Note: You can use the workshop objectives, what you learn during the workshop, handouts, conversation with participants and trainers, as a way up with ideas

1.1.15

Special Notes to Trainers

1. Make sure that the notebooks are ready for distribution. Remember that the notebooks are comprised of the following:
   - welcome letter
   - workshop prospectus
     - tentative schedule (five days)
     - registration form
2. Make sure that the cards for the interactive exercise (handout 1.1.4) are cut out before session 1.
3. Make sure that you staple all exercise instructions and worksheets together one day before the sessions.
5. Note that a diskette is enclosed in the module with the evaluation forms in WordPerfect 5.1. You can use this if necessary.

Handout—Overview of Day One

Scientific Writing and Presentation

Objectives

By the end of the day the participants will be able to do the following:

1. Discuss the background, rationale, objectives, and schedule for the five-day workshop.
2. Explain the use of the participant action plan approach (PAPA).
3. Identify the trainers and the trainees.
4. Discuss scientists' responsibilities in reporting on research.
5. Identity key factors in choosing an audience.
6. Discuss some principles of planning and writing a reader-friendly report.
7. Identify and list the components of a scientific paper.
8. Categorise titles.
9. Identify mistakes in titles.
10. Categorise and edit abstracts.

Participant Materials

Workshop notebook (includes welcome letter, tentative five-day schedule, and workshop prospectus).

Handouts

1.1.1 Exercise 1. Interactive Exercise (seven sheets to be cut into 21 forms)
1.1.2 Exercise 1. Exercise Sheet (list of questions)
1.1.3 Participant Action Plan Approach (PAPA)
1.1.4 Overview
1.1.5 Tentative Schedule
1.2.1 When a Scientist Reports Research (summary of presentation)
1.2.2 When a Scientists Reports Research (text)
1.2.3 Exercise 2. When a Scientist Reports Research
1.2.4 Exercise 2. Worksheet
1.3.1 Exercise 3. The Layout of a Scientific Paper
1.3.2 The Layout of a Scientific Paper (summary of presentation)
1.3.3 How to Write a Scientific Paper (text)
1.4.1 Titles (summary of presentation)
1.4.2 Exercise 4. Improving Titles
1.4.3 Exercise 4. Worksheet
1.5.1 Abstract (text)
1.5.2 Exercise 5. Working with Titles and Abstracts
1.5.3 Exercise 5. Worksheet, Text 1 and Text 2
1.5.4 Strengths and Weaknesses of Day One
1.5.5 Guidelines to Provide Feedback on the Workshop

Handout—Tentative Schedule of Day One

Scientific Writing and Presentation

08:30 – 09:00	**Welcome**
09:00 – 10:30	**Session 1. Introduction to the Workshop** – Workshop introduction, objectives, and schedule – Overview of day one – Introduction of PAPA – Interactive exercise (1)
10:30 – 10:45	Tea/Coffee Break
10:45 – 13:00	**Session 2. When a Scientist Reports Research** (Presentation and exercise 2)

13:00 – 14:00 Lunch

14:00 – 14:30	**Session 3. The Layout of a Scientific Paper** (Presentation and exercise 3)
14:30 – 15:30	**Session 4. Titles** (Presentation and exercise 4)
15:30 – 15:45	Tea/Coffee Break
15:45 – 17:00	**Session 5. Abstracts** (Presentation and exercise 5)
17:00 – 17:30	**Feedback on the Day's Activities and PAPA**

Participant Action Plan Approach (PAPA)

As part of this training, you will do an exercise designed to help you apply what you have learned. You may not find everything taught in the training appropriate to your specific situation. In some cases, you may want to adapt some of the materials to fit your particular job or work setting.

To do this, the participant action plan approach (PAPA) was developed by the United States Office of Personnel Management. PAPA is an easy-to-use method for determining how you changed your job behavior as a result of your attendance at a training course or program. The method generates data that enables the trainers to answer questions such as the following:

1. What happened on the job as a result of the training?
2. Are changes that occurred the ones intended by those providing the training?
3. What may have interfered with participants trying to use on the job what they learned in the training?

With the information from PAPA, trainers (as evaluators) can also decide if the training workshop should be modified, and in what ways. Managers can use the information to determine the worth of the training and make informed decisions about its future.

Workshop Activities

The method consists of two stages. At the beginning of the training you are introduced to the idea of an action plan and are asked to consider throughout the workshop tasks that you might want to do differently when you return to your job as a result of the training. Then, at the end of the training you are asked to write an action plan. This is a list of new, workshop-related activities that you plan to try when you return to your job.

Follow-up Activities

At a scheduled time after the workshop (usually several months), you will be interviewed or contacted by questionnaire. You will be asked which of your planned activities you have been able to implement up to that time, and what other new activities you have attempted as a result of having attended the training. You will also be asked what effect your new activities have had on your work environment, and what problems, if any, you encountered in trying them.

FIRST STAGE

PAPA - ideas for action items

Date : _____

Workshop title: SADC/ESAMI/ISNAR Workshop on Scientific Writing and Presentation

Date/Venue : _____

Name : _____

Organization : _____

Ideas I would like to try out when I return to work at my research institute, based on what I have learned in this training workshop.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Note: You can use the workshop objectives, what you learn during the workshop, the handouts, conversations with participants and trainers, etc., to come up with ideas.

Guidelines for Writing Action Items

The most important characteristic of an action item is that it is written so you — or someone else — *will know when it occurs*. One way to help achieve this is to use specific *action verbs*. The following is a list of such verbs:

Mental Skills		Physical Skills	Attitude
State	Discriminate	Execute	Choose
Name	Classify	Operate	Volunteer
Describe	Generate (solution)	Repair	Allow
Relate	Apply (a rule)	Adjust	Recommend
Tell	Solve	Manipulate	Defend
Write	Derive	Handle	Endorse
Express	Prove	Manufacture	Co-operate
Recount	Analyze	Calibrate	Accept
	Evaluate	Remove	Decide to
		Replace	Agree

As you are working on the action items, ask yourself *Is the behavior described observable? Will it be obvious to me or others when it happens?*

The following are examples of the action items: *As a result of being in this training I plan to:*

1. *Describe* this workshop to my superior within a week of my returning to the job. As a result, my supervisor will know the contents of the training workshop, how I can apply what I learned to the job, and whether or not others in the organization will attend.

2. *Handle* every piece of paper only once to improve the management of my own time. I begin as soon as I am back on the job.

3. *Apply* the principles of performance analysis to the problem of incomplete or tardy case reviews in my research institute and request assistance from the training unit, as needed. As a result I will know whether training is required and/or if some other solution is appropriate. Begin within a month after returning.

4. *Talk* with my employees directly about a problem which arises, rather than avoiding a confrontation; discuss the situation in order to reach mutual understanding.

5. *Within* two weeks after I return, I will implement a _____ research management procedure/process in my research institute.

Implementing the Action Item

As you proceed to develop action items, *be sure to think of yourself in your actual job setting*, implementing the activity you have described.

If you have an idea of *when* you will be able to begin implementing the action items, make a note of it. Three categories can be chosen: 1) as it arises (you do not know when the opportunity to try this item will occur, 2) within two months, and 3) after two months.

You may find that you cannot try out your ideas exactly as you envisioned them, or that it is difficult to be specific. That is all right. It is still important to write out your *intent*, as a tentative plan, knowing you may have to modify it once you are back on the job. *Try to develop at least two or three action items*. One may not work, so it is handy to have others.

SECOND STAGE

ACTION PLAN

Date: _____

Workshop Title: SADC/ESAMI/ISNAR Workshop on Scientific Writing and Presentation

Name: _____

Organization: _____

Action Items	Start to implement action plan (check if known)		
I plan to:	Within 2 months	After 2 months	As arises

Questions about Your Action Items

1. *Preliminary nature of plan*

   - Were you specific in writing the action item?
   - What will you need to do when you return to work to find out which actions are possible?

2. *Resources*

   - Who would be carrying out the proposed action, or helping with it (formally or informally)?
   - Are the skills for carrying it out available?
   - How much time would this take?
   - Are there special materials or equipment required?
   - What is involved in obtaining them?
   - Will you be using a tool or system or aid from this training workshop?
   - If so, how much adaptation is required?
   - Is continual monitoring or follow through required?
   - If so, who will do it?

3. *Implementation*

   - Do you have the authority to implement the action?
   - If not, who does?
   - How do you think you can go about getting approval?
   - What do you think the degree of support is for your idea?
   - Will you need to sell people on it?
   - If so, who?

4. *Effects*

   - Whom will this action affect?
   - How will it affect them?
   - Will anyone be the worse for the results?
   - Will anyone be improved?
   - What will be affected?

5. *Environment*

   - What factors in the organizational environment might interfere with your doing this?
   - What factors in the organization will support your effort?

Forms for Interactive Exercise

Note to trainer:

Each one of the following forms has a different question for participants. Be sure to photocopy and cut the forms as indicated before session 1 begins.

Name: _____

Institution: _____

Area of Research_____

I feel motivated to write the results of my research when _____

_____

During this workshop I expect _____

_____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

When writing research papers, I feel disappointed with myself when _____

_____

However, my reaction is _____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

As a researcher, if I were to describe myself in one sentence I would say _____

_____

Because _____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information on the audience.

Name: _____

Institution: _____

Area of Research_____

My best professional quality is _____

_____

This helps me _____

_____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

When writing scientific papers, I perceive myself as a person who _____

_____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

My perception on disseminating my scientific results to farmers is that _____

_____

because _____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Name: _____

Institution: _____

Area of Research_____

I think that my peers in research perceive me as _____

_____

because _____

_____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

When I discuss my research findings with my peers I _____

_____

because _____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

People who really get to know me as a researcher say _____

_____

because _____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Name: _____

Institution: _____

Area of Research_____

I think my scientific-writing skills _____

_____

because _____

_____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

I like making presentations of my research results when_____

_____

because _____

My major expectation for this five-day workshop is_____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

As a scientific writer, I like myself when_____

_____

and I dislike myself when_____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Name: _____

Institution: _____

Area of Research_____

When I am making presentations of my research results I feel irritated with _____

_____

because _____

_____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

While writing a scientific paper, I prefer to discuss my thoughts and doubts with_____

_____

because _____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

When I am writing scientific papers, I like myself _____

_____

however,_____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Name: _____

Institution: _____

Area of Research _____

When I am among new peers, I _____

_____

because _____

_____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research _____

When I participate in a group discussion on scientific issues, I tend to be _____

_____

that is why I expect my team members to be _____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research _____

I am sure I could do a better job writing scientific papers _____

if _____

because _____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Name: _____

Institution: _____

Area of Research_____

As a scientific writer I dislike being frustrated. That is why I _____

_____

to improve my morale.

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research_____

During this sharing exercise I feel _____

_____

because _____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Cut here

Name: _____

Institution: _____

Area of Research _____

While writing my research results, I think of extension workers as _____

_____

because _____

My major expectation for this five-day workshop is _____

_____

The trainer will request you to introduce yourself through this information to the audience

Interactive Exercise

Questions

1. I feel motivated to write the results of my research when _____

   _____

   During this workshop I expect_____

2. When writing research papers, I feel disappointed with myself when _____

   _____

   However, my reaction is _____

3. As a researcher, if I were to describe myself in one sentence I would say _____

   _____

   Because _____

4. My best professional quality is _____

   This helps me_____

5. When writing scientific papers, I perceive myself as a person who _____

   _____

6. My perception on disseminating my scientific results to farmers is that_____

   because _____

7. I think that my peers in research perceive me as_____

   because _____

8. When I discuss my research findings with my peers I _____
because _____

9. People who really get to know me as a researcher say _____
because _____

10. I think my scientific writing skills _____
because _____

11. I like making presentations of my research results when _____
because _____

12. As a scientific writer, I like myself when _____
and I dislike myself when _____

13. When I am making presentations of my research results I feel irritated with _____
because _____

14. While writing a scientific paper, I prefer to discuss my thoughts and doubts with _____
because _____

15. When I am writing scientific papers, I like myself _____
however _____

16. When I am among new peers, I _____
because _____

17. When I participate in a group discussion on scientific issues, I tend to be _____
That is why I expect my team members to be _____

18. I am sure I could do a better job writing scientific papers _____
    if _____
    because _____

19. As a scientific writer I dislike being frustrated. That is why I _____
    _____
    to improve my morale.

20. During this sharing exercise I feel _____
    because _____

21. While writing my research results, I think of extension workers as _____
    because _____

DAY ONE

Session 2
When a Scientist Reports Research

Instructions to Trainers

SESSION 2

10:45 – 13:00 Session 2. When a Scientist Reports Research

OBJECTIVES

By the end of this session, the participants will be able to do the following:

- Discuss scientists' responsibilities in reporting on research.
- Identify key factors in choosing an audience.
- Discuss some principles of planning and writing a reader-friendly report.

Use overhead 1.2.1 to present the objectives.

PROCEDURE

Training techniques: presentation, group work, group presentations.

PRESENTATION

(experience) Give a presentation based on K. Robert Kern's article "When a Scientist Reports Research." This paper is also the basis for exercise 2. Overheads 1.2.2 and 1.2.3 support the presentation. Do not go into detail at this point because the participants will work through the paper in detail in exercise 2. Distribute handouts 1.2.1 and 1.2.2. (25 minutes)

EXERCISE 2

Exercise 2. When a scientist reports research. (1 hour 45 minutes)

1. Distribute handouts 1.2.3 and 1.2.4. Handout 1.2.3 gives clear instructions for the exercise. Go over the instructions with the participants step by step. Ask if clarifications are needed. (5 minutes)

Phase 1. Group work

2. Divide the participants into four groups. Give them 20 minutes to read the material. (20 minutes)
3. *(experience)* Each group works to prepare their presentation. As they work, circulate from group to group to check progress. Clarify any concerns the groups may

have while they are working. Be sure to remind them of the time remaining. (30 minutes)

Phase 2. Reporting and discussion

4. *(experience, process)* Each group has five minutes to present their results. After each presentation five minutes are available to discuss the group's presentation. Remain on time. (40 minutes).

5. *(process)* At the end of the exercise, discuss the groups' responses and provide feedback on the content of the presentations. Ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" in order to allow discussion of the process. (10 minutes)

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants to tell one of their neighbors two things they might do differently as a result of what they learned. Choose some volunteers to give examples.

2. Make a transition to the next session.

13:00 – 14:00 Lunch

DAY ONE

Session 2
Summary of Overheads

Objectives of Session 2.
When a Scientists Reports Research

4. Discuss scientists' responsibilities in reporting on research
5. Identify key factors in choosing an audience
6. Discuss some principles of planning and writing a reader-friendly report

1.2.1

When a scientist reports research

by Robert Kern

1.2.2

Kern's article presents:

- Elements in human communication
- Action model of communication
- How readers of science behave
- Importance of readability
- Measuring reading ease
- Analyzing your audience
- Starting to put words on paper
- Some parting thoughts

1.2.3

When a Scientist Reports Research (summary of presentation)

Kern's article presents:

- Elements in human communication
- Action model of communication
- How readers of science behave
- Importance of readability
- Measuring reading ease
- Analyzing your audience
- Starting to put words on paper
- Some parting thoughts

When a Scientist Reports Research*

Nearly all scientists write reports as a part of their job. Administrators call for reports. Some people who want to learn about scientist's findings demand written reports. Yes, scientists need to write reports. For some scientists, it's the hardest part of their work.

Most agricultural scientists today work for government. They look for knowledge and develop technology that will help the public. As public servants, they must answer to the public—at least in a general way. This is whey many scientists must write about their work.

That's reporting from the scientist's side

For a moment, think of the reader's side. Different people have different interests in what scientists find. Some don't care much for what agricultural scientists do, while some care a lot. Many people are glad to let others, especially government officers, make sure the scientists spend the public's time and money in the public interest. However, some want to know results of the work of certain scientists. Even among those people, interests are specific and limited. They vary from person to person and topic to topic. The bottom line is that few people, other than scientists, have much interest in the technical findings of agricultural research.

For agricultural scientists

This short paper just for agricultural scientists. It deals with reporting their scientific results. We approach the subject of reporting from their side: the scientists.

We believe scientists need to share results. It is part of the job of being a scientist. For one thing, they need to share results with those who make their work possible. For another, they need to share findings with people or organizations that can use the results.

We will work through three stages the scientist goes through in the process of writing reports:

1. selecting the audience for a report,
2. focusing on the interest of the audience,
3. preparing the report.

We emphasize the written report here. Many of the principles we'll take up would apply as well to other forms, such as talking and showing. But we focus on writing.

As a scientist, you may feel you have done all that others can expect if you have written what you want to say about your work. However, if you are to help others use your results, you need to do more. That often means something different from a simple research report.

* Used by permission of the author. Kern, K.R. 1993. *When a Scientist Reports Research*, Ames, Iowa.

Report to communicate

To share your results implies that you will communicate. (We use the word communicate to means something special: more than just putting your words in front of someone else. We use communicate as an action word—a verb, in terms of English grammar. *We use it to describe the act of making knowledge "common" between two people. That means the two people—writer and reader—must get the same meaning from the words.*)

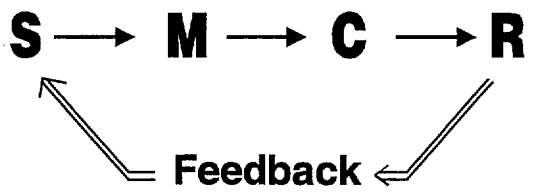
When we define communication that way, we have to pay special attention to the one who will receive the knowledge we want to share.

The writer plays a key role in the process, no doubt about that. But he or she can't do it alone. Regardless of how well you do your job as writer, another person holds the final key to whether communication takes place. If your intended audience doesn't read it—or if the reader doesn't get the meaning you intended—you didn't succeed. Communication didn't take place.

We're not going to dig deeply into communication theory. We'll skip most of the literature on the science of human communication. But let's look at some ideas that can help a scientist see his or her reporting job more clearly.

We will draw two modules (figure 1 and 2) that show elements of communication. Figure 1 is the classic S-M-C-R model offered nearly four decades ago by Dr. David Berlo, then a teacher at Michigan State University.

Figure 1. S-M-C-R Model (Berlo 1960)



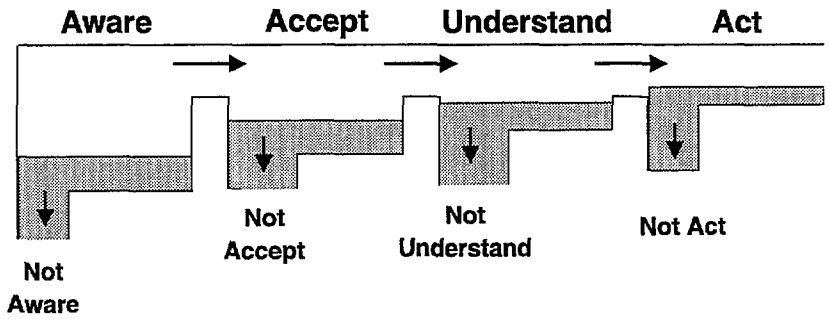
Elements in human communication

Dr. Berlo portrayed four elements. S stands for Sender, the one who intends to communicate. M stands for message formulated by the sender. C means the channel by which to deliver the message, and R is the receiver. In this model there is a fifth element: feedback. A feedback link connects the receiver back to the sender. Using this model, a thoughtful communicator can think through his/her task in a systematic way.

Action model of communication

Figure 2 was developed by the author and Dr. Paul Yarbrough, when the latter was a master of science candidate at Iowa State University.

Figure 2. An action model of communication (Kern and Yarbrough 1962)



Let's look in some detail at what we call an action model of communication. It highlights the receiving process. It helps us focus on what must happen for communication (sharing of knowledge or meaning) to take place. We have said that the decisive factor in communication is the behavior of the reader. In the action model, we show what has to take place in the mind of the reader (the receiver). Also, we show the points where we (the communicator) may succeed or fail in our attempt to communicate.

Three things must happen

There are three steps in our action model. They take place one after the other. If the receiver misses one step, the process ends right there.

1. *Awareness*

   The would-be receiver has to be aware (to know) that there is a message within his or her "reach." If he or she is not aware, for any of dozens of reasons, there's no way our message will get through.

2. *Acceptance*

   The receiver who is aware of a message decides either to accept it or ignore it. Think of how you act as a receiver. You don't accept every possible message. None of us take in all the messages we're aware of. We skip articles in magazines; we pay no attention to some things on radio; our minds wander and we miss some things a speaker says. Actually, we don't have the time or interest to bother with all the messages around us. (One writer called it a *buyer's* market for readers.) When the receiver doesn't accept a message, the communication process stops before communication has occurred.

3. *Understanding*

   When the receiver accepts a message, he or she must still get over another action barrier: that is, understanding the message. If the receiver doesn't understand the message (because of language or ideas that don't make sense, for example), the process stops short of communication. The information doesn't become "common" between the writer and the reader.

   These three steps may take the scientist as far as he or she wants to go. When a writer's intended reader understands the message, the writer has communicated in terms of our definitions. A scientist can't force people to use the knowledge.

   Most of us, however, want more to happen than merely understanding. We want the receiver to act on our information—actually to use it.

4. *Action*

So we shall add a fourth step to our model: action. In this step, the receiver uses the message. In the way he or she wants to use it. Now we can draw the whole process as shown in Figure 2.

Using the model to develop strategy

The simple model can help us focus our thinking on what we, as would-be communicators, have to do to make sure we communicate. It can help us think about strategy to get our audience's attention and then to lead it through the process of reading and understanding our message.

For awareness, for example, we know we have to put a message where the reader will see it. He or she must know that we have something to share. Our report must get into the reader's hand. An article in a scientific journal goes into the environment of some other scientists but of few farmers.

Simply being within the audience's environment is not enough, of course. Our audience may not notice the message. Something in the message must signal that it contains something important to the receiver, something that triggers the reader's awareness.

To be accepted, a message usually must suggest that it has something the receiver will find worth his or her time and trouble. Typically, that idea must appear in the title or the first few words of the article.

For understanding, the message must make its ideas known to the receiver. That means that its form and language must mean something to the receiver. (Few people read with a dictionary in hand!) The receiver controls all these activities of receiving. Each receiver decides if the process stops or if it goes on to completion. Of course the communicator plays the leading role in the process. It's he or she who decides about the message. He or she actually decides the content, how the message is created, and where it will be delivered.

It's the communicator's thinking and work that determine whether the message contains enough of value to the receiver (1) to catch his or her attention (awareness) and (2) to spark and hold interest (acceptance). It's the communicator's skill with the message that determines whether the receiver (3) can grasp the content (understanding) within the time and attention he/she is willing to devote to it.

The fourth step, action, is altogether up to the receiver. Most writers want that decision to be a thoughtful one. They want to be sure that the reader has all the information he or she needs—and understands the information. (But writers have to avoid a negative factor: giving the reader much more than he/she needs and wants to deal with.)

When the receiver stops the process at any of the three first steps, the sender of the message has failed. We'll say that again: it is the sender who failed. To blame the failure on the "ignorance" of the audience doesn't shift that responsibility!

The reader disposes of the message, by acting or not acting. Still it's the sender who starts the process. The sender decides whom he or she wants to reach. The sender prepares the message to which the receiver reacts.

The computer industry coined a phrase that communicators can borrow—the idea of user friendly. The computer specialist tries to make a software program user friendly: easy for the user to apply. A scientist-reporter can take the phrase to heart, setting as his or her goal: to write reports that are reader friendly.

How readers of science behave

Communication researchers, especially in North America and Europe, have studied behaviors of readers of scientific articles. They studied behavior of scientists as readers as well as behavior of other readers of science among the public. Writers can learn something from the results of those studies. Experiences of scientists and writers and editors of scientific information offer other insights we can use.

Let's look at some of the key points drawn from research and professional experience on communicating science.

Two kinds of readers

Most readers of scientific information show either of two types of reader behavior. Researchers have described them as a consummatory reader and an instrumental reader. Let's take a look at each type.

Consummatory

The consummatory type of reader turns to science information—especially in newspapers, magazines, or books—as a consumer. Such readers use the information in the way they consume food in a restaurant: to satisfy an immediate want. They pick and choose from the menu to eat today only those foods that appeal to them right now. Readers do the same sort of thing.

Consummatory readers look over all the materials within their view or reach. And they start to read whatever appeals to them right now.

Communications researchers have recorded data that help predict why certain subjects or articles appeal to a reader at a given moment—or why they don't. Generally those data say that this reader will pay attention to material that relates to something that he/she values—something important to his/her personally. Whatever the source of momentary interest, the reader reacts more strongly to an item that offers something he/she wants right now. When he/she finds the item no longer giving that something, he/she will leave the article and look for something else to consume with the time given to reading.

Among the public at large, most potential readers of scientific information fall in the consummatory category on most scientific subjects. However, a good share of them, especially those with more education, have some interest in and read at least some scientific information.

The fact that there are potential readers for scientific information doesn't mean that you have to try to interest them all in your subject. As a scientist and writer, you have your own factors of cost and benefit to consider. But when you do want to try to reach that big audience, you will do well to think of them as consummatory readers—not as people anxiously waiting for your report.

Instrumental

Instrumental readers differ basically from the consummatory type. The instrumental reader searches for information—certain information. He/she has a problem to solve or needs to fill a gap in his/her present knowledge. The need is important enough that he/she looks for the information. He/she most often looks in a source where he/she thinks the information may be.

It's not a random search. (If someone needs to know the principles of windsurfing, he/she won't likely browse books and magazines on human nutrition. An astrophysicist may do little instrumental reading in sociology journals.)

Instrumental readers of science information are relatively small in number and specific in their motives. They look for what they need. Scientists may make up the largest general group of instrumental readers, along with people who base their work or personal interests on scientific knowledge. The individual defines the areas of information he or she looks for. A writer can do little or nothing to cause instrumental readers to start a search for certain information.

The range of subject interests of an individual seem to get more narrow as more knowledge becomes available. Technical journals have narrowed their focus to more and more specialized topics. That is one clear sign of how much instrumental readers of science have reduced the number of sources they are willing to search. And it tells the reporter of science to identify the potential instrumental readers of what he or she has to report. He/she can then make judgments about where to place an article to reach those who may be searching for it.

As a scientist-reporter, you'll often be writing for instrumental readers. You can ask yourself how hard they will search for your material. The answer will depend on such factors as (1) how urgently they need certain information, (2) whether they think you have some answers they need, and (3) how well you present your material.

If their need is great, they will work hard to get your results. But if the need is not really pressing, they may act more like consummatory readers. They may pick up the journal in which you report but pay no attention to your article.

Summing up

These are some of the key ideas we consider in planning messages that we think will make a potential reader aware of and accept our writing. The next stage, understanding, brings up some different ideas. We take them up now.

The importance of readability

The following points about readability are no longer arguable (at least with respect to written English):

- Simple writing is better than complex writing in helping readers get content and meaning from written material.
- Readers prefer to read simple writing rather than complex writing. That is as true for scientists (as long as the content is complete and correct) as it is for casual readers.

Three key factors of readability have been firmly established through decades of research:

Short sentences

Words carry meanings between people—by themselves and in combination with other words. Readers understand short sentences more easily than long sentences.

In active English sentences, a subject acts on an object with an effect. Passive is the other type of sentence, of course. Passive sentences usually describe relationships rather than actions. (For

the record, research has shown that readers understand meaning in active form more easily than in passive form.)

In either active or passive sentences, readers grasp meaning more easily when they read content in limited "packages." One subject takes one action with one effect. That's easiest. One concept related to one other is easier to understand than is on interplay among many concepts in the same sentence. (We recognize, of course, that not all thoughts can be reduced to so few elements.)

The simplest measure of difficulty in content of sentences is the number of words per sentence.

Short words

The simplest measure of difficulty of individual words is the number of syllables words contain. The word "need" (one syllable) is easier to understand than "necessity" (four syllables); readers find "expect" easier than "anticipate."

Active voice

English is an action language. Verbs—the action words—carry much of the meaning (semantic content) of a message. When subjects act directly on objects, readers grasp meaning more easily and correctly. "Cattle gained 1.5 kg per day on the experimental ration" carries meaning more vividly than "Gains of 1.5 kg per day were recorded for cattle on the experimental ration."

Other factors affect readability

Not all other factors have the strong research base we can cite for the factors we've listed above. But a careful writer should know about them.

Personal references increase readability. Use names of professions, such as farmer, researcher, cane grower. Use pronouns "it, they, we, you" in place of repeating the longer subject or object name.

Contractions are readable. Don't be afraid of them. Few writing critics today consider them to be marks of careless usage. You need not use them all the time, but it's wrong to think you shouldn't use them at all.

Don't be afraid to use sentence fragments now and then. Don't use them a lot. But use them for power and change of pace in your writing.

Vary the pace, especially in lengths of sentences. Most readers prefer variety in written matter. Sentences of the same length and rhythm, whether short or long, tend to get monotonous. The reader may lose the thread of content because one sentence follows another of the same length and construction. (In writing, as in romance, predictability can wipe out much of the excitement or pizazz.)

Measuring reading ease

You can find a variety of measures for readability of written English. Most scales measure the same two factors: difficulty or ease of (1) words and (2) sentences.

Some tests use lists of words that research has shown to be known by most persons at specific levels of education in English-language schools. If you use a lot words not on such a list, many

readers may find your writing hard to read and understand. Such readability tests are time-consuming for a writer to apply. (Most of the lists were made by North Americans, based on words used in reading instruction by grades in school; they may have some cultural bias.)

One simpler—and proven effective—test calls for two counts taken on three or more samples of 100 words from your composition. This test measures difficulty of words based on the average number of syllables per word and difficulty of sentences based on the average number of words per sentence. In general, readable in this case means writing that can be read and understood easily by persons with nine to 10 years of schooling.

Analyzing *your* audiences

As a writer, think of audience in the plural. At least when you're thinking about writing a report. As we think you'll see in a moment, there may be a number of audiences you want to reach. All may not be of the same importance to you. Not all will have the same potential interest in the information you have. Your information won't have equal value to all audiences. Remember the consummatory and instrumental types of readers.

Start by thinking in terms of interaction: your audience interacting with your subject. Ask yourself which of the following two questions better fits your own situation:

1. I now have this scientific information; what audience(s) will be able to use it?

   Example: You have a new crop variety to be released. Who will want to know about it: producers? extension advisers? private seed trade? others?

   Another way to ask it is this: I know some important things about — you fill in the subject — who wants to know what I can tell them?

2. This audience expects to get something from my work: what can I give them that they can use?

   Example: Extension workers want to tell producers how to grow potatoes without losses to wilt: you have found a cultivar resistant to wilt in certain parts of your country.

   Another way to ask it is this: What do (you name the audience) want to know that I can tell them from my work?

You find both sides of this audience-subject interaction whenever a scientist reports. Every subject has a potential audience of interest. Every audience has potential to be interested in some subject. Like the head or tail side of a coin, you can start from either side to analyze your audiences. Just be sure you think about both audience and subject.

Some potential audiences

Let's think in general terms about some of the audiences to whom scientists may have something to report. We'll mention four main groups, call them generic groups;

- other scientists
- producers (or others) who can apply results
- people who give information and advice to producers or users
- administrators and policymakers who appoint scientists and allocate resources to support their work

Now let's think of these audiences as starting points to identify your potential readers. Let's begin with those closest to your own work: Scientists in your own discipline.

This includes those who are studying the same problems in other regions (in your own country and overseas); also scientists whose theories and procedures you're using in your own research.

We start with this group because you may find it easiest to analyze. Your own colleagues. You should know who they are. And, to the extent that they think and react as you do, you have some idea of what they may want to know. Unless you have specific information to the contrary, it seems safe to think of them as like yourself. Then be honest in thinking about how you react to their reports:

- Will you be satisfied if they give to you the same level of enthusiasm you feel when you read their report?
- Are there things you wish they had done differently in their style of reporting?
- Are there parts that you wish they had omitted, other parts they should have presented better?

Answers to such questions as these can help you set standards for your own work.

Scientists in related disciplines

Among these are people whose work you read as you look for ideas that relate to your main work. These may include scientists in plant protection, machinery, management, economics, sociology, or others. Perhaps you find only some of their material useful in the form you get it.

What do you wish the writer had done to make the reports more useful to you?

A thoughtful answer to that question may give you ideas on how to make your own reports interesting and usable to scientists in related fields. Again they are probably a little like you, but the context of their interests (call them "instrumental" reading urges) may be different: a little more difficult for you to predict. They may be interested in only some of what you report.

Producers (or others) who can apply your results

For the typical agricultural scientist, the reason for being in his or her job is that government thinks the researcher will contribute to better farm production. Some researchers like to have close, direct relations with farmers and suppliers. Some want extension workers or others to be middlemen who pass on findings.

The scientist who knows producers personally can often predict their interests and reaction to information. He/she may get to know users well enough to report directly in the terms of the producer. The key is again receiver-friendly reporting: giving information that producers are looking for, presented so producers can understand it.

People who give information and advice to farmers

Often the main audience in this category is extension workers—and that can mean a varied audience. Some extension staff specialize: they work in a limited field of production and tend to know a lot about that specialized area. Others are more general—they have to know a little about a lot of topics, but they can't know a great deal about any one. These two types usually

differ in how well they can understand scientific concepts in all subjects. The careful scientist/writer won't try to make the same approach work for both.

Sometimes scientists may not be close enough to workers (especially those in the field) that they really know the needs and interests of extension staff. They may not know that the extension worker is the "person in the middle," that different people expect different things from them. Those in the research system may expect extension staff to "sell" producers on using the latest technology. At the same time, producers or policymakers may expect him/her to advocate the producers' best interests. And it isn't always in the producers' best interests to invest in every new finding from research!

Of course, extension workers aren't the only group in agriculture who give advice and information to farmers. It's worth some time to look for others who work with producers in your subject area. These might be teachers, bank representatives, development project staff, suppliers of inputs (either private or public sector), farmer groups, and others.

In some of these instances, the researcher may find conflicts of interest that aren't obvious. An example: A crops researcher promotes a new crop variety when a supplier has stocks on hand of the previously recommended variety. How strongly will he recommend the new one to farmers?

Perhaps a key idea with this group is to look for the points where your interests and theirs overlap. The overlap is a basis of common interest. At the same time, it will help you find points of conflict you may need to think about when deciding how to prepare your report.

Administrators and policymakers who appoint scientists and provide resources to support scientists' work

Administrators and policymakers appoint scientists and provide resources to support their work. Persons in this group may include an immediate supervisor and go up the administrative ladder step-by-step into government and the political structure.

These persons have their own unique interests that research may serve. However, a lot of scientist may forget them or simply think of them as a point of friction or restraint. The thoughtful scientist, though, will understand that such persons divide limited resources among many users; and most of those whose work they support ask for more than they are getting now. Under this kind of pressure, the administrator or policymaker will tend to back those whose work meets his or her own policy (or political) needs. They will likely form their judgment on the basis of the reports they get (or don't get) about the work of different scientists.

An important fact in dealing with this audience is the structure for communication. What channels can a scientist at one level use to inform persons who may be several levels higher on the organization chart? Can he/she go directly, or should the information go through another person? It's a matter for careful analysis and diplomacy, often involving informing one person so he or she will inform another, who will inform another, and so on. Tedious, but often it's the only safe and workable way. This audience calls for a different strategy than the scientist would need if he/she could simply go directly to the people who need to know about the work.

This has been only a starting list of potential readers for the scientist-reporter. The idea was to raise the subject and urge you, the scientist-reporter, to turn your mind to the exact audiences you want to reach. You may get some ideas from audiences we have suggested here. But we can't do more than help you start the process; your audiences must come from your own analysis.

Once you have identified your audiences, you can begin to define the areas of interest for potential readers, based on their own needs and interests as best as you can guess them.

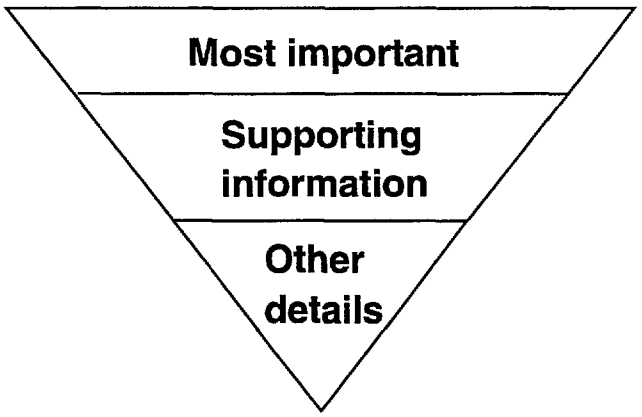
- Are they likely to be consummatory or instrumental readers?
- What are their specific interests according to your information? What do they want to know from your work? What information do you have that they can use?

These are all important questions to deal with as you set your strategy for writing. When you can answer these questions, you are ready for the writing task itself.

When they are reading for recreation, many people like the form of the novel or the suspense story. The author lays a lot of ground work and builds up to the climax. Busy readers don't buy that model—journalists discovered that. Busy readers want to know almost instantly whether an article has information in it that will be worth their reading time and trouble. And most readers of science are basically busy people!

Journalists developed a form called the inverted triangle. A triangle that stands on its point. (See figure 3.)

Figure 3. The journalist's inverted triangle



1. The most important information goes first in the story. If the reader goes through the first sentence or two, he or she will learn what the story is about and decide whether to read further.
2. Next the journalist gives information to explain, briefly, the opening or "lead." (Lead is what the journalists call their first sentence or first paragraph.)
3. After that, they add more information or explanation, presenting items in order of decreasing interest and importance.

Journalists expect a reader to stop as soon as he/she loses interest in the story. So journalists often begin with the most important information (important to the reader, that is!). Then they tell more to support it, to back up what they wrote in the lead. Most try to stop well before they have written everything that could be written, regardless of reader interest!

As a writer, you have to decide what about your information will be of highest interest to the audience you aim to reach. Expect different potential readers to have different interests. For example, another scientist may be most interested in a new methodology that you've developed. But a farmer may be most interested in the benefits to him if he uses your new variety or practice.

And a government policymaker may be interested in the public benefit that could come from your finding.

As a good planning exercise, divide a sheet of paper into three columns. In the first column, write a *heading*, that is, what you want to write about. In the second column, write your *audiences* (what audiences might be interested in the subject). In the third column,opposite each audience you've listed, write down what you think is its *main interest* in your subject. Now you have a starting place.

This process applies to writing for either scientist or non-scientist audiences. Other scientists, even if instrumental readers, want to know early in an article whether it is something they need and want. For our example, we emphasize writing for the non-scientist (often a more exacting task).

The first part of the planning task is to define clearly the audience and its interest. Second, organize your material. The inverted triangle is a useful form.

Start writing

We discussed earlier what tends to make readable or understandable writing: Short sentences and the simplest words that are accurate to present the meaning you want the reader to get.

In the drafting stage, be more concerned about choosing understandable words than about the short sentences.

Starting to put words on paper

Most people talk comfortably with one or two other people. They feel more comfortable then when they put our their thoughts in one-way presentation—such as a written report or a formal speech. One reason may be that we see clues in a conversation. We exchange a lot more than just the words we say and hear. We get clues about the interests and reactions of the other. We're more aware of the other as a person. We can make some "trials runs" with certain topics to find whether listeners are as interested in our ideas as we are. As the talk goes on, we know (from the other's words and manner) when interest is high and when we lose it. We can often tell when the other doesn't understand fully what we're saying.

When we talk, we usually have the chance to adjust our own end to keep the exchange going in a way that satisfies both of us. Of course, the writer lacks such direct feedback. We're hidden away from the people we want to reach. We get no direct cues.

Getting started

Let's use face-to-face conversation as our model for communicating through print. How do we start a conversation on a topic that we want to talk about? We usually look for some point of common interest. What is there about our topic that we think will interest the person we want to talk with?

We can do the same in deciding where to start our written message. In writing, however if we don't put across that common interest clearly and quickly, we'll lose our reader. We don't have a chance to see the reader's reaction and try again!

Writing for other scientists

Scientists have tended to set certain patterns in their technical reports to each other. They have specific parts, typically abstract, introduction, methods and materials, results, discussion (perhaps conclusions), acknowledgements, and references cited. Most journals include a page of instructions for the scientists who submit articles. The scientist-reporter needs to follow that particular format. The writers' big concern than is writing clearly and understandably.

Writing for the non-scientist

It's a different matter for the scientist who writes for non-scientists. Non-scientist readers are usually interested only in the results and what the results may mean to them. This reader is usually of the consummatory type—more like readers for whom professional journalists write.

Journalists learned many years ago that the headline and the first few words determine whether their story was read or ignored. (Remember that the consummatory reader is like the person at a cafeteria with many choices: he or she chooses the item that appeals right now!)

Readable, understandable writing comes mainly from REwriting. Consider the first draft as exactly that. It's your first try to catch the attention of your prospective reader AND to set down the key ideas in a way that will make sense to the reader.

Think about making the ideas as concrete as you can. Leave out the unnecessary details (even though you find them terribly interesting!) State the ideas and facts in the simplest accurate terms. Don't worry about long sentences yet.

Look back in terms of the flow of the message.

Have you found a common point of interest on which to involve the reader in your report? Does your report follow a reader's line of thinking? (A farmer may have a much different way of thinking than would a typical scientist.) Have you left out information a person has to have to understand your results—things that you know but many of your intended readers don't know?

Get serious about reading ease

The next section offers a way to make a valid test of the reading ease of your report. We suggest applying that test at this point. For two reasons: First, it will give you an overall impression of the ease (or difficulty) of the material you have drafted. The test described in the next section will probably show the draft to be much more difficult for readers than you think it would be. (This happens for most professional writers, so don't be dismayed if that's true for your work.)

The test will also let you know your main problems: whether your sentences are too long or whether you're using too many long, long words. And the test will show sections that stand out as problems.

Measuring reading ease

One of the simplest but valid tests of readable writing was created in the 1940s by Dr. Rudolf Flesch. Although born in Austria, Dr. Flesch became a leading world authority on readability of English. We present his formula in part here. It has been used widely as a research tool, as well as a practical tool to measure readability and help writers make their work more readable.

Several computer programs measure readability and some other grammatical factors of writing. They make measuring much easier and more complete than it would be by hand methods. However, a writer won't always have program and equipment at hand. So we will go through the process as a writer can do it without computer help. It takes only a formula, definitions, and a careful eye.

The **Flesch test** (named for Dr. Flesch) calls for two counts to be taken on three or more samples of 100 words each from your composition:

1a. Select a place to start a sample. Count 100 words, plus any needed to reach the end of the sentence that takes you past 100 words. Define a word as one or more letters set off by space in front and behind the letters. ("A" is a word; so is "unconstitutionality.") Write the number of words.

1b. Count the number of sentences in the sample of 100 or more words. A sentence is a group of words that begins with a capital letter and ends with punctuation that causes the reader to come to a stop. (To a U.S. writer that means a period; those in the British tradition call it "full stop." A semi-colon or a colon, or a comma is not a "stop."

1c. Divide the total number of words in each sample by the number of sentences. That gives average words per sentence (WPS) in the sample.

2. Count the total number of syllables in the first 100 words in the sample and divide by 100 to get a measure of average syllables per word (SPW).

Make these counts on each sample, then combine the samples and calculate the average number of words per sentence and the average number of syllables per word.

Easy-reading level (such as you might find in the weekly news magazine Time) has sentences averaging about 12 to 15 words each and under 1.6 syllables per word. A person with nine years of English-language education (in U.S. schools) would find this level fairly easy to read.

At the other end of the scale, the scholarly journal, the figures may be more than 25 words per sentence and more than 1.9 syllables per word. Very difficult to read. The U.S. person would need education through graduate school to read and understand such writing.

The important point for the writer is that these two factors interact to affect readability. If your words are long and complex, your sentences need to be short. Longer sentences are all right, if you keep the words short and simple.

Rewrite your report, based on the test results.

Before starting the rewrite, read again the short section on what research and experience tell us about what makes writing readable and understandable.

Look at both your sentences and your choices of words. You can improve the readability score (and reading ease) by improving both sentences and words.

***Sentences*:** Rewrite some of the long, complex sentences into shorter units. Compound sentences are those with two complete thoughts joined by "and" or another conjunction. You can often break these into two sentences and help the reader get the meaning. You can save some words by changing passive sentences into active voice.

Words: Find ways to replace the long words with shorter ones. First look for substitutes. Examples: "need" instead of "require" or "necessitative," "saving" for "conservation," "relate" for "associate." Often two or three words of one syllable take the place of one word with five;

that makes a better reading ease score. And easier reading. (Remember that readers understand concrete words more easily than abstract words. Concrete words are often shorter too.)

The standard for judging words should be what the reader will understand, not what the writer thinks is more elegant or impressive.

Most coaches urge writers to try to be conversational. That's a five-syllable word. It means to write the way you talk. Write with words that you use when you talk with others. Put your thoughts together as you would if a person from your audience were sitting across the table from you.

Many good writers use the mental trick of imagining a person they know is sitting across the table. The idea is that if what they write would make sense to "Joe," then others should understand.

After you've rewritten the report, ask a colleague to read it. Ask him or her to be critical about presentation. (And try to remember that criticisms—if there are some—refer to the way you've used words, not to the whole of your personality!)

If your colleague finds problem spots, you can be pretty sure other readers will too. His or her inputs can help you write a report that will gain credit for you. that should more than offset the quick, brief pain of having your writing criticized. It hurts some, to be sure, but it's for a good cause.

Some parting thoughts

We've barely touched the subjects that interest and guide successful writers. But we know that writing usually ranks less than top priority with most scientists. Thus we've tried to suggest areas where we think scientists can get the best benefit-cost ratio from time they invest in improving their written reports.

Rich resources abound for anyone who want to go deeper in the subject.

We will close with our own proposition (most teachers would agree):

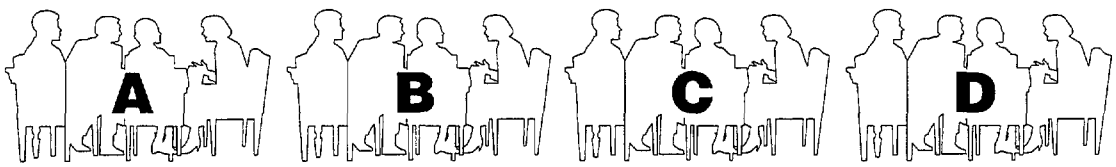
I have never met a person who learned to write well by talking about writing. Writers improve their writing by a process of write-critique-rewrite through as many cycles as the writer will devote.

K. Robert Kern
Ames, Iowa USA
February 1993

Exercise 2. When a scientist reports research (role-playing)

Phase 1. Group work (50 minutes)

1. Form four groups.



2. Each group reads a section from handout 1.2.1. (15 minutes)

   Group A: introduction, and elements in human communication (from pages 93-96)

   Group B: how readers of science behave, the importance of readability, and measuring reading ease (from pages 97-100)

   Group C: analyzing your audiences (from pages 100-104)

   Group D: start writing, measuring reading ease, and some parting thoughts (from pages 104-107)

3. Each group selects one or more members who will play the role of a trainer and give a presentation on the sections read. All group members participate in the preparation of the presentation. Be concise. Make sure to consider the following elements during preparation:

   - **presentation design** (introduction, body, conclusions) **presentation delivery** (keep on time, make eye contact, face the audience, make sure your voice is audible)
   - **design of visuals** (visuals should be easy to read by the audience, they should have titles)
   - **use of visuals** (presenter talks to the audience while proceeding smoothly from one visual to the next)

Phase 2. Reporting and discussion (50 minutes)

4. Each group has five minutes to give their presentation. After each presentation five minutes are available to discuss the results. (40 minutes)

5. The trainers will invite you to discuss the groups' presentations and provide feedback on the content of the presentations and the process of this exercise. (10 minutes)

Exercise 2. Worksheet

DAY ONE

Session 3
The Layout of a Scientific Paper

Instructions to Trainers

SESSION 3

14:00 – 14:30 Session 3. The Layout of a Scientific Paper

OBJECTIVE

By the end of this session, participants will be able to do the following:

- Identify and list the components of a scientific paper.

Use overhead 1.3.1 to present the objective.

PROCEDURE

Training techniques: presentation, discussion.

PRESENTATION

(*experience*) Give a presentation focusing on key elements of the layout of a scientific paper. You will find the information in the handouts very useful. Five overheads support the presentation: 1.3.2 through 1.3.6. At the end of the presentation be sure to ask the participants if they have any comments or questions, or if they need clarifications. Distribute handouts 1.3.1 through 1.3.3. (15 minutes)

EXERCISE 3

Exercise 3. The layout of a scientific paper. (15 minutes)

After the presentation, ask the participants to formulate questions and comments. They may want to use handout 1.3.1. Enter into a discussion.

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants to tell one of their neighbors two things they might do differently as a result of what they learned. Choose some volunteers to give examples.
2. Make a transition to the next session.

DAY ONE

Session 3
Summary of Overheads

Objective of Session 3.
The Layout of a Scientific Paper

7. Identify and list the components of a scientific paper

1.3.1

The layout of a scientific paper

1.3.2

A Good Introduction

- Presents clearly the background and scope of a problem
- Reviews pertinent literature
- Presents the investigation method
- Lists principal findings
- Summarizes main conclusions

1.3.3

Materials and Method Section

Materials
- describes exactly materials, quantity, and sources
- makes possible repetition of experiment

Method
- describes clearly the experimental design
- uses past tense
- gives references for unknown methods used, if any
- states the mode of (statistical) analyses

1.3.4

Results Section

- Big picture on *results*
- Impartial presentation
- Representative data
- Uses tables and figures

1.3.5

Discussion Section

- Principles, relationships, generalizations
- Exceptions and unsettled points
- Results compared with previous work
- Implications, applications, beneficiaries
- Clear conclusions
- Evidence summarized for each conclusion
- Possible future research arising, if any

1.3.6

Exercise 3. The layout of a scientific paper (plenary discussion)

1. Take notes of major issues presented by the trainer.
2. Formulate questions and comments to discuss in plenary.

The Layout of a Scientific Paper (summary of presentation)

A scientific paper has four main parts:

- introduction
- materials and methods
- results
- discussion

A good introduction

- presents clearly the background, nature, and scope of the problem investigated.
- reviews pertinent literature to orient the reader.
- states briefly the method(s) of investigation(s) as derived from literature.
- states the principal results (findings) of the earlier investigation(s) indicating clearly what areas of the problem were not addressed.
- states the main conclusions as suggested by the results of earlier investigations pointing out the existing gaps which supported the investigation being reported.

There is no clear-cut rule on length of the introduction.

The materials and methods section

- is clear enough that someone else will be able to repeat the same experiment without your presence.
- is written in the past tense, since you are reporting what was done.
- gives references only if methods are new or not well known.
- gives experimental designs, data collection, and analysis.
- describes exactly the materials, quantities, and sources of the experimental materials.
- gives detail on the method used to assign experimental materials to various experimental units.

The results section

- gives the big picture, not a repeat of the materials and methods section.
- is not a preview of the discussion section.
- presents the results as they were found and not as you would have liked to see them.
- seeks explanations for any variation observed.
- includes representative data — not endless repetition.
- presents the data that relate to the problem you stated and the results you report.
- uses tables and figures for numerical data. These offer a break for the audience (readers). Further they offer ease of comparison better than words and sentences.

The discussion section

- presents principles, relationships, and generalizations shown by results.
- points out exceptions and defines points not settled.
- shows how results agree or disagree with previously published work (link with your introductory literature review).
- discusses theoretical implications, practical applications, and any projected beneficiaries.
- states conclusions clearly.
- summarizes evidence for each conclusion.
- states future research arising from the conclusions, if any.

How to Write a Scientific Paper

The information in this handout is based on the third edition of Robert A. Day's book How to Write a Scientific Paper. [Phoenix, AR: Oryx Press]. 1988. Robert A. Day has taught scientific writing at the University of Delaware for more than 30 years. He has also served for many years with the journal of the American Society of Microbiology. The book should be in the library of each research institute where staff write the results of their research.

In his book, Day's main emphasis is on what he calls the "scientific paper." The author of that scientific paper, he notes, usually wants it to be published and thus become a part of the literature of science. But it begins as a scientific paper. The book is less than 200 pages and has 30 chapters and six appendices. None is a long treatise. The author calls it a cookbook — recipes on how to write and publish the scientific paper.

The acronym I M R A D

A scientific paper has four main parts:

Introduction - **M**aterials and Methods - **R**esults - **A**nd **D**iscussion

That's the heart. Of course, there are other elements. The title, abstract, acknowledgements, and list of references are all examples. We shall consider these latter items in their place, after the paper has been written.

Some specific rules should guide authors in writing each of the four main parts. We will examine those rules and consider some example cases.

Rules for a good introduction

Present first, with all possible clarity, the **nature and scope of the problem investigated**. Relate it to some "higher" good, for example, to solve a social problem, to overcome an economic constraint, to find an answer to a perplexing question, or to advance knowledge. Where and how does the problem appear? How wide are its impacts?

Review the pertinent literature to orient the reader. **Pertinent** is the key word! Use only literature pertaining directly to the study, rather than the bibliography of the author's reading on the subject. The purpose of the literature review is to give the reader background to understand the work.

State the method of the investigation. If necessary, state the reasons for the choice of a particular method. Identify the method, do not describe it. That will come in a section of its own! Let the reader know how you went about the study.

State the principal results of the investigation. A scientific paper is not a suspense novel. The reader wants to know early whether you found significant results. Not in detail, however; that comes in another section.

State the main conclusions suggested by the results. Describe, in brief, what the results mean. You will derive conclusions and argue for their support in the final, main section of the paper.

There is no clear-cut rule regarding the length of the introduction of a scientific paper. The ambiguous rule is that it should be no longer than necessary to introduce the paper and encourage the reader to stay with you into the full treatment.

Materials and methods

The materials section gives an exact description of materials used, their quantities and sources. Use generic names, not trade names. Provide the reader with enough detail that he or she could repeat your experiment.

The main purpose of the methods section is to describe the experimental design (and defend it if necessary) and to give enough detail that a competent worker could repeat the experiment. Widely known methods need only to be identified: randomized complete block design with your *n* replications is enough said. If you have adapted a known and published method, merely describe the adaptations. Write the methods section in the past tense, giving references only if methods are new or not well known.

Do not mix results in this section!

Results

The results section contains, first, an overall description of the experiment: the big picture, not a repeat of the materials and methods section. It is about **RESULTS** — clearly presented with support to prove or defend your findings. Second, representative data (not endless repetition) are presented. The data should relate to the problem you stated and the results you claim. Not everything you recorded or observed will be mentioned.

If there is a lot of numerical data to be reported, use tables and figures.

This is the most important part of the paper, but often the shortest!

Think about Dr. Day's remark "The compulsion to include everything, leaving nothing out, does not prove that one has unlimited information; it proves that one lacks discrimination."

Discussion

Be clear about the facts before you start to write. As Dr. Day notes, when a writer is unsure of his facts or reasoning, he often retreats behind a protective cloud of ink.

The discussion section presents principles, relationships, and generalizations shown by the results. It points out exceptions and defines points not settled, shows how results agree or disagree with previously published work, and discusses theoretical implications and practical applications. Finally, it states conclusions clearly and summarizes evidence for each conclusion.

DAY ONE

Session 4
Titles

Instructions to Trainers

SESSION 4

14:30 – 15:30 Session 4. Titles

OBJECTIVE

By the end of this session, participants will be able to do the following:

- Identify and correct errors in titles.

Use overhead 1.4.1 to present the objective.

PROCEDURE

Training techniques: presentation, modified "trip around the tables."

PRESENTATION

(experience) Give a brief presentation on titles. Use the information in handout 1.4.1. Overheads 1.4.2 and 1.4.3 support the presentation. At the end of the presentation distribute handout 1.4.1 and be sure to ask participants if they have any comments or questions, or if they need clarification. (5 minutes)

EXERCISE 4

Exercise 4. Improving titles. (50 minutes)

1. Distribute handouts 1.4.2 and 1.4.3. Handout 1.4.2 gives clear instructions for the exercise. Go over the instructions with the participants step by step. Ask if clarifications are needed. (5 minutes)

Phase 1. Group work

2. Divide the participants into four groups. Invite them to elect a rapporteur.
3. Groups read, discuss, and respond to the questions assigned to them. (10 minutes)
4. (*experience*) As the groups work, circulate from group to group to check progress. Clarify any concerns the groups may have while they are working. Be sure to remind the groups of the time remaining in the exercise.
5. (*experience*) Invite the rapporteurs to make the "trip around the tables." Note that the rapporteurs of group A and B will **not** visit group C and D. The rapporteur has five minutes to visit the other table. Remain on time. (15 minutes)

6. (*process*) Rapporteurs return to their own group and discuss the responses including the inputs the rapporteurs collected during the "trip." The rapporteur writes the results on a flip chart for presentation. (5 minutes)

Phase 2. Reporting and discussion

7. (*process*) The rapporteur present the group's results to the audience. Each rapporteur has three minutes to present. Be aware that groups A-C and B-D will report similar contents. Take advantage of this to make a comparative study of these responses and promote learning. (15 minutes)

8. Let the groups participate in a discussion. (5 minutes)

9. (*process, generalize*) Provide feedback on the content of the presentations. Ask the participants questions, such as "How did you feel doing this exercise?" and "What did you learn?" in order to allow discussion of the process.

CLOSURE

Closure (5 minutes)

1. (*application*) Ask the participants to tell one of their neighbors two things they might do differently in their job as a result of what they learned. Ask volunteers to give examples.

2. Make a transition to the next session.

15:30 – 15:45 Tea/Coffee Break

DAY ONE

Session 4
Summary of Overheads

Objectives of Session 4. Titles

8. Categorise titles
9. Identify mistakes in titles

1.4.1

Types of Titles

- Indicative
- Informative
- Question type
- Main subtitle type

1.4.2

Indicative

Effects of differential irrigation
on maize growth and yield on
a clay soil

1.4.3

Informative

Differential irrigation
decreases maize growth and yield
on a clay soil

1.4.4

Question Type

Does differential irrigation affect
maize growth and yield on a clay soil?

1.4.5

Main/Subtitle Type

Differential irrigation:
effects on maize growth and
yield on a clay soil

1.4.6

DOs

1. Use high impact words early in the title
2. Use short titles (≤ 15 words)
3. Reflect content

1.4.7

DON'Ts

Do not:

1. Use common names and scientific names of the species
2. Use abbreviations
3. Use symbols and jargon
4. Include material that should come under Introduction
5. Be verbose
6. Be so general as to be vague
7. Use dates
8. Use fullstops at the end of titles

1.4.8

Exercise 4. Improving titles (suggested answers)

Some suggested answers to exercise 4.

Group A

1. [Highlight on the] effects of salinity on the performance of cotton.
2. Effect of using stereographic analysis in the determination of the lattice relationship in an iron-nickel alloy.
3. The influence of parasitic infestations on metabolism, puberty and first mating of grazing heifers in the tropics.

Group B

4. The types of proteins in plants.
5. The effects of long-term application of manure on maize yields.
6. The relationship between tissue growth patterns and hormone profiles in cattle.

Group C

7. Effects of high-moisture barley on growing and lactating dairy cattle.
8. The role of the Kenya Forest Research Institute in protecting *Pinus radiata*: results from a one-month study.
9. Corn tolerance to salt at germination.

Group D

10. The effect of low dietary phosphorus on lactating goats. (This is our alternative title.)
11. Effect of applied nitrogen on the performance of maize.
12. Wrong title because mycorrhizae do NOT have chlorophyll, hence photosynthesis is not possible.

Titles
(summary of presentation)

A good title describes in the fewest possible words the contents of the paper. A title may be too short: **Studies of Maize Diseases**, for example. It can also be too long. Some words that make titles longer are **Investigations into**, **Observations on**, and **Studies of**.

Titles are **labels** not sentences. They are used by your audience for window shopping. Hence they must describe the text in five to 15 words where possible. Titles must also be in clear, correct syntax. Avoid abbreviations, jargon, proprietary names, and unusual or outdated terminology.

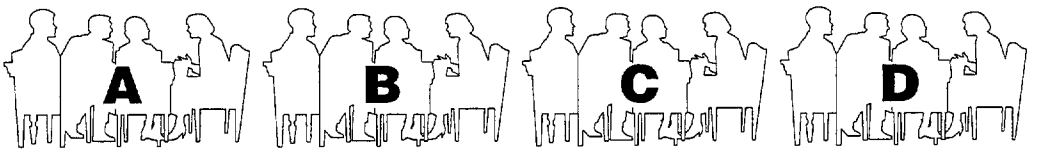
> Preliminary Canine Evaluation of an Antitumor Agent
>
> Infections Among Newborns Resulting from Implantation with **Staphlococcus aureus 502A**.

When deciding on the title, remember that titles help in cataloguing, indexing, and retrieval of information. Think about how you would look for this type of information in an index. Finally, make a good title by trial and error. Test versions on your friends before you make a final decision.

Exercise 4. Improving titles (modified "trip around the tables" technique)

Phase 1. Group work (20 minutes)

1. Form four groups of participants.



2. Each group elects a rapporteur.
3. Each group works on the three titles assigned to them, to identify errors in the titles and correct them. (10 minutes)

Groups A and C:

1. Highlights of the main observations made in a field and laboratory study conducted to compare the effects of salinity on the germination, growth, head diameter, seed yield and oil content of cotton *(Gossypium hirsurtum).*
2. The results of a study of investigating the effects of using stereographic analysis in the determination of the lattice relationship in an iron-nickel alloy.
3. The influence of parasitic infestations on metabolism, puberty, and first mating performance of heifers grazing in a tropical area.
4. Proteins in Plants.
5. Changes with time of crop yields in a long-term experiment.
6. An assessment of the relationship between tissue growth patterns and selected hormone profiles among sex phenotypes in cattle.

Groups B and D:

7. Utilization of reconstituted high-moisture barley for growing and lactating dairy cattle.
8. The role of KEFRI in protecting P. radiata: results from a study conducted in in human aorta lipids.
9. Salt tolerance in corn *(Zea Mays L.)* at the germination stage.
10. Response of lactating goats to low phosphorus.
11. Further studies in eczema and dermatitis.
12. Bacteriologic studies in acute enteritis in infants, including bacteriologic methods, morphology and cultural characteristics of streptococcus micro apoikia.

4. The rapporteurs compile their group's inputs on the worksheet (handout 1.4.3). Write a list of several alternatives.
5. Rapporteurs of groups A and B switch tables. The rapporteurs of groups C and D do the same. They have five minutes to present their groups' input and collect contributions to improve their list of responses.
6. The rapporteurs return to their own group. They share the contributions collected during the "trip" and decide on the best corrected titles. The rapporteurs write the results on the flip chart and prepare to present their group's results.

Phase 2. Reporting and discussion (25 minutes)

7. The rapporteurs present the results to the audience. Three minutes are available for each presentation.
8. The trainer will make a comparative analysis of the responses, after which you will be invited to participate in a discussion.

Exercise 4. Worksheet

DAY ONE

Session 5
Abstracts

Instructions to Trainers

SESSION 5

15:45 – 17:00 Session 5. Abstracts

OBJECTIVE

By the end of the session, the participants will be able to do the following:

- Define and edit abstracts.

Use overhead 1.5.1 to present the objective.

PROCEDURE

Training techniques: presentation, modified panel technique.

PRESENTATION

(experience) Give a brief presentation introducing abstracts. You will find the information in handout 1.5.1 very useful. Overheads 1.5.2. through 1.5.4 support this presentation. At the end of the presentation distribute handout 1.5.1 and be sure to ask the participants if they have any comments or questions, of if they need clarification. (10 minutes)

EXERCISE 5

Exercise 5. Working with titles and abstracts. (55 minutes)

1. Distribute handouts 1.5.2 and 1.5.3. Go over the instructions with the participants step by step. Ask if any clarifications are needed. (5 minutes)

Phase 1. Group work (15 minutes)

2. Divide the participants into the same four groups they worked in during earlier sessions today, and ask them to elect a rapporteur. (5 minutes)
3. *(experience)* Groups work on their task and prepare their presentations. As the groups work, circulate from group to group to check progress. Clarify any concerns the groups may have while they are working. Be sure to remind the groups of the time remaining in this exercise. (15 minutes)

Phase 2. Reporting and discussion (25 minutes)

4. *(experience)* Invite the rapporteurs to present the groups' results. Each rapporteur has three minutes to present. (15 minutes)
5. To follow through on the modified panel technique, ask the rapporteurs to sit together in front of the room. Allow a short discussion of the results among the rap-

porteurs, then open the discussion to the audience and, finally, provide your view on the results of the exercise. (15 minutes)

6. *(process, generalize)* At the end of the exercise provide feedback on the content of the presentations. Ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?"

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants to tell one of their neighbors two things they might do differently in their job as a result of what they learned. Ask volunteers to give examples.
2. Make a transition to the last session.

17:00 – 17:30 Feedback on the Day's Activities and PAPA

OBJECTIVES

By the end of this session participants will be able to do the following:

- Provide feedback on the day's activities.
- Consider possible actions they would like to implement in their own organizations. (PAPA)

PROCEDURE

Training technique: individual exercise.

Highlight positive and negative points of the day. Note areas that may need additional attention in the workshop. Participants can describe some strengths and weaknesses of this day on handouts 1.5.4. and use handout 1.5.5 to facilitate their task. (15 minutes)

PAPA

(application) Ask the participants to take some time to jot down some "action ideas" they may have for themselves as a result of today's activities. They can use handout 1.5.6. (15 minutes)

DAY ONE

Session 5
Summary of Overheads

Objective of Session 5. Abstracts

10. Categorise and edit abstracts

1.5.1

Kinds of Abstracts

- Indicative
- Informative

1.5.2

Elements of an Informative

- Objectives
- Highlights of materials and methods
- Highlights of results
- (conclusion(s))
- (recommendations)

1.5.3

Abstracts[1]

An abstract is a very important part of an article and is best placed before the text of the manuscript so that the reader can get a quick overview of the essence of the author's research. The formulation of an abstract into a short paragraph forces the author to express precisely the most important information of the research. The American National Standards Institute recommends that an abstract be included with every journal article.

According to *BIOSIS Guide to Abstracts* (2), "An abstract is a noncritical, informative digest of the significant content and conclusions of the primary source material. It is intended to be intelligible in itself, without reference to the paper, but not a substitute for it."

An abstract differs from an annotation, extract, summary, and synoptic. The *American National Standard for Writing Abstracts* (1) defines these in the following manner:

An *annotation* is a brief comment or explanation about a document or its contents, usually added as a note after the bibliographic citation of the document. An *extract* is one or more portions of a document selected to represent the whole. A *summary* is a brief restatement within the document (usually at the end) of its salient findings and conclusions and is intended to complete the orientation of a reader who has studied the preceding text. A *synoptic* is a concise first publication in a directly usable form of key results selected from an available but previously unpublished paper. It differs from an abstract (which it contains) in that it is often a combination of text, tables, and figures, and may contain 2000 words.

An abstract should contain about 250 words and should include such information as the following:

1. the objectives and purpose of the study
2. the materials, methods, techniques, and apparatus, and their intended use, as well as new items and new applications of standard techniques and equipment
3. scientific and common names of organisms (if given in the article) with special emphasis on new taxa or new distribution records
4. specific drugs (generic names preferred) and biochemical compounds, including the manner of use and route of administration
5. new theories, terminology, interpretations, or evaluations concisely stated
6. new terms and special abbreviations and symbols defined

An abstract generally excludes:

1. additions, corrections, or any information not contained in the manuscript
2. tables and graphs and direct references to them

1. Extracted from: *CBE Style manual*. Published by Council of Biology Editors, Inc. Bethesda, Maryland.

3. detailed descriptions of experiments, organisms, standard methods, techniques, and apparatus
4. references to the literature

When mentioning names of chemicals and drugs in an abstract, colloquial terminology and trade names should be avoided; generic names are preferred. Chemical formulas and compounds should be defined. Registered proprietary names are always printed with an initial capital.

For example, Levanil is a proprietary name for ectylurea, the generic name for (2-ethyl-crotonoyilurea.

In abstracts mentioning geographic locations, the state (province, prefecture, or republic) and country should be indicated (e.g., Moscow, Russian SFSR, USSR; Berlin, New Jersey, USA).

In abstracts mentioning Latin names of organisms, the author should remember that the specific epithet of an organism is never used without its accompanying generic name which may be abbreviated if first given in full (e.g., *Escherichia coli, E. colt*).

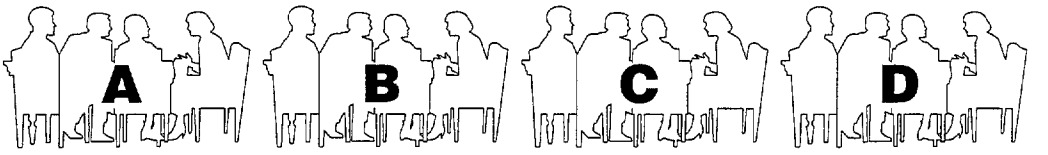
Distribution data, such as new records, new localities, maps, range changes, faunistic or floristic changes, and epoch or period of fossils are included in the abstract.

Common abbreviations and symbols should be used sparingly in abstracts. Less-common abbreviations should be avoided. For units of measurement, the International System of Units (SI) is preferred. Many journal guidelines for authors include a list of abbreviations that may be used without definition. However, long substantives used repeatedly, such as compounds, hormones, or enzymes, are abbreviated after first mention (e.g., succinate dehydrogenase (SDH), or pollen mother cell (PMC)).

Exercise 5. Working with titles and abstracts (modified panel technique)

Phase 1. Group work (20 minutes)

1. Form four groups of participants.



2. Each group elects a rapporteur.
3. The groups work on one text, as stated below:

   Groups A and B on text 1. Discuss and list two major errors in both the title and the abstract.

   Groups C and D on text 2. The title is too general, revise it based on the abstract. Then edit the abstract, which is extremely wordy.
4. The rapporteur writes the group results on the flip chart.

Phase 2. Reporting and discussion (30 minutes)

5. The rapporteurs present the results to the audience. Each rapporteur has three minutes to report.
6. The rapporteurs discuss the results first among themselves, and then the trainer will invite everyone to participate in the discussion.

Exercise 5. Working with titles and abstracts (text 1)

Discuss and list two major errors identified in both the title and the abstract.

A Method of Measuring Airborne Acidity:
Its Application for the Determination of Acid Content of Long-distance Transported Particles and in Drainage Water from Cypress

The acid properties of particles have been investigated by means of measuring the contents of mainly strong acid in leaching solutions of particle samples and in drain water from trees. The measures are based on Gran's plot and on a study of its curvature.

Title: List two major errors

_____

_____

_____

_____

_____

_____

Abstract: List two major errors

_____

_____

_____

_____

_____

_____

Exercise 5. Working with titles and abstracts (text 2)

The title is too general. Revise it based on the abstract. Then edit the abstract, which is extremely wordy.

Water Pollution and Human Health

This study deals with the question of establishing a statistical model to test the hypothesis that the use of "pure" water reduces deaths from diseases caused by pathogenic bacteria. The statistical analysis is based on data for 48 states of the United States for the year 1970. The results of this study suggest that an increase in use of "pure" water would, *centeris paribus*, decrease death rates due to certain diseases. The findings of this study are especially useful for developing nations where a very small proportion of the population is still served by publicly supplied water.

Give revised title

_____

_____

_____

_____

_____

_____

Write the edited version of the abstract

_____

_____

_____

_____

_____

_____

Strengths and Weaknesses

- **Please list what you consider to be three strengths of day one**

1.
2.
3.

- **Please list what you consider to be three weaknesses of day one**

1.
2.
3.

- **Suggestions for improvements**

Guidelines to Provide Feedback on the Workshop

1. **The Module**

   Content

   - usefulness/relevance
   - amount of information

   Structure

   - sequence
   - duration
   - balance between trainers' and trainees' participation
   - instructions to trainers
   - visual aids
   - handouts
   - extra reading
   - PAPA
   - evaluation

2. **Process: training techniques and direction**

   - usefulness/relevance/effectiveness
   - group interaction
   - clarity of questions/exercises instructions
   - opening and closure of the days

3. **Trainers', facilitators', and trainees' performance**

   - presentation/communication skills
   - interaction/effective participation
   - punctuality/interest/commitment/willingness to facilitate; learning/willingness to participate
   - other attitudes

4. **Logistical support**

   - organization
   - accuracy
   - punctuality
   - willingness to assist participants
   - services provided in general

5. **Workshop environment**

- physical (training facilities, training material, hotel facilities in general)
- sychological (personal feelings such as self-motivation, interest, satisfaction, self-achievement)
- social (development of friendship, relaxed, comfortable among participants, etc.)

6. **Workshop results/outputs**

- personal and professional assessment
- recommendations

7. **General comments**

PAPA — FIRST STAGE

Ideas for action items

Date : _____

Workshop title : SADC/ESAMI/ISNAR Workshop on Scientific Writing and Presentation

Date/Venue : _____

Name : _____

Organization : _____

Ideas I would like to try when I return to work at my research institute, based on what I learned in this training workshop.

_____

_____

_____

_____

_____

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_____

Note: You can use the workshop objectives, what you learn during the workshop, handouts, conversations with participants and trainers, etc., to come up with ideas.

DAY TWO

Scientific Writing and Presentation

DAY TWO — Overview

Objectives

By the end of the day, the participants will be able to do the following:

1. Write acknowledgments and references.
2. List and discuss major elements of a prose style for scientific writing.
3. Paragraph text so that it is easy to follow and understand.
4. Eliminate or replace unnecessary phrases and words.
5. Define sentences and classify them as simple, compound, or complex.

Handouts

2.6.1 Overview
2.6.2 Tentative Schedule
2.6.3 Exercise 6. Acknowledgments and References
2.6.4 Acknowledgments and References (summary of presentation)
2.6.5 References (text)
2.7.1 Exercise 7. Writing and Rewriting
2.7.2 Writing and Rewriting (summary of presentation)
2.7.3 Writing and Rewriting (text)
2.8.1 Exercise 8. Working with Paragraphing
2.8.2 Exercise 8. Worksheet
2.8.3 Exercise 8. A Result of Paragraphing
2.9.1 Exercise 9. Logical Arrangements of Paragraphs
2.9.2 Exercise 9. Worksheet
2.10.1 Exercise 10. The Use of Definite, Concrete Words
2.10.2 Prose Style for Scientific Writing (text)
2.11.1 Exercise 11. Work with Words
2.11.2 Exercise 11. Worksheet
2.12.1 Exercise 12. Phrases that Say Little
2.12.2 Exercise 12. Worksheet
2.13.1 Exercise 13. Types of English Sentences
2.13.2 Types of English Sentences (summary of presentation)
2.13.3 Raw Materials: Words and Sentences (text)
2.14.1 Exercise 14. Types of English Sentences
2.14.2 Strengths and Weaknesses of Day Two
2.14.3 Guidelines to Provide Feedback on the Workshop
2.14.4 PAPA Form — First Stage

Scientific Writing and Presentation

DAY TWO — Tentative Schedule

08:30 – 09:00	**Opening of the Day's Activities**
09:00 – 09:30	**Session 6. Acknowledgments and References** (Presentation and exercise 6)
09:30 – 10:00	**Session 7. Writing and Rewriting** (Presentation and exercise 7)
10:00 – 10:30	**Session 8. Paragraphing** (Exercise 8)
10:30 – 10:45	Tea/Coffee Break
10:45 – 12:05	**Session 9. Logical Arrangement of Paragraphs** (Exercise 9)
12:05 – 13:00	**Session 10. Use of Definite, Concrete Words** (Exercise 10)

13:00 – 14:00 Lunch

14:00 – 14:45	**Session 11. Work with Words** (Exercise 11)
14:45 – 15:30	**Session 12. Phrases that Say Little** (Exercise 12)
15:30 – 15:45	Tea/Coffee Break
15:45 – 16:15	**Session 13. Raw Material: Types of English Sentences** (Presentation and exercise 13)
16:15 – 17:00	**Session 14. Simple, Compound, and Complex Sentences** (Exercise 14)
17:00 – 17:30	**Feedback on the Day's Activities and PAPA**

Scientific Writing and Presentation

DAY TWO — Checklist for Trainers

Handouts

		Yes ✔	No ✔
2.6.1	Overview	❐	❐
2.6.2	Tentative Schedule	❐	❐
2.6.3	Exercise 6. Acknowledgments and References	❐	❐
2.6.4	Acknowledgments and References (summary of presentation)	❐	❐
2.6.5	References (text)	❐	❐
2.7.1	Exercise 7. Writing and Rewriting	❐	❐
2.7.2	Writing and Rewriting (summary of presentation)	❐	❐
2.7.3	Writing and Rewriting (text)	❐	❐
2.8.1	Exercise 8. Working with Paragraphing	❐	❐
2.8.2	Exercise 8. Worksheet	❐	❐
2.8.3	Exercise 8. A Result of Paragraphing	❐	❐
2.9.1	Exercise 9. Logical Arrangements of Paragraphs	❐	❐
2.9.2	Exercise 9. Worksheet	❐	❐
2.10.1	Exercise 10. The Use of Definite, Concrete Words	❐	❐
2.10.2	Prose Style for Scientific Writing (text)	❐	❐
2.11.1	Exercise 11. Work with Words	❐	❐
2.11.2	Exercise 11. Worksheet	❐	❐
2.12.1	Exercise 12. Phrases that Say Little	❐	❐
2.12.2	Exercise 12. Worksheet	❐	❐
2.13.1	Exercise 13. Types of English Sentences	❐	❐
2.13.2	Types of English Sentences (summary of presentation)	❐	❐
2.13.3	Raw Materials: Words and Sentences (text)	❐	❐
2.14.1	Exercise 14. Types of English Sentences	❐	❐
2.14.2	Strengths and Weaknesses of Day Two	❐	❐
2.14.3	Guidelines to Provide Feedback on the Workshop	❐	❐
2.14.4	PAPA Form — First Stage	❐	❐

Overheads

2.6.1	Objectives of Day Two	❐	❐
2.6.2	Schedule of Day Two	❐	❐
2.6.3	Objectives of Session 6	❐	❐
2.6.4	Acknowledgments and References	❐	❐
2.6.5	Acknowledgments	❐	❐
2.6.6	Ways of Citing and Listing References	❐	❐
2.6.7	Sequential Numbering	❐	❐
2.6.8	Nubering System	❐	❐
2.6.9	Harvard (author - year) System	❐	❐

		Yes	No
2.7.1	Writing and Rewriting	❒	❒
2.7.2	Objective of Session 7	❒	❒
2.7.3	Writing and Rewriting	❒	❒
2.8.1	Objective of Session 8	❒	❒
2.8.2	Paragraphing	❒	❒
2.8.3	Exercise 8. Results of Paragraphing	❒	❒
2.8.4	Exercise 8. Results of Paragraphing	❒	❒
2.9.1	Objective of Session 9	❒	❒
2.9.2	Results of Exercise 9	❒	❒
2.10.1	Objective of Session 10	❒	❒
2.10.2	Use of Definite, Concrete Words	❒	❒
2.10.3	Results of Exercise 10	❒	❒
2.10.4	Results of Exercise 10	❒	❒
2.11.1	Objective of Session 11	❒	❒
2.12.1	Objective of Session 12	❒	❒
2.13.1	Objective of Session 13	❒	❒
2.13.2	Raw Materials: Words and Sentences	❒	❒
2.13.3	A Sentence	❒	❒
2.13.4	Simple Sentence	❒	❒
2.13.5	Compound Sentence	❒	❒
2.13.6	Complex Sentence	❒	❒
2.14.1	Objective of Session 14	❒	❒
2.14.2	Simple, Compound, and Complex Sentences	❒	❒
2.14.3	Exercise 14. Results	❒	❒
2.14.4	Exercise 14. Results	❒	❒
2.14.5	Exercise 14. Results	❒	❒
2.14.6	Exercise 14. Results	❒	❒

Materials

• Overhead projector	❒	❒
• Projector screen	❒	❒
• Flip-chart stands (minimum 2)	❒	❒
• Flip-chart paper/pads (about 10 per day)	❒	❒
• Markers for writing on newsprint	❒	❒
• Markers for writing on transparencies	❒	❒
• Blank transparencies	❒	❒
• Stapler	❒	❒
• Tape (strong masking tape and regular tape)	❒	❒
• Push pins	❒	❒
• Glue	❒	❒
• Pencils/note pads/pens	❒	❒
• Pencil sharpeners	❒	❒
• Extension cords	❒	❒
• Certificates	❒	❒
• Photocopying facilities	❒	❒
• Spare bulbs for overhead projector	❒	❒
• Extra notepads and pens	❒	❒
• Scissors	❒	❒

DAY TWO

Session 6
Acknowledgments and References

Instructions to Trainers

PRE-SESSION

08:30 – 09:00 Opening of the Day's Activities
– Review of the previous day's activities.
– Summary of the evaluation of the previous day.
– Overview of the day's activities.

OBJECTIVES

By the end of the pre-session the participants will be able to do the following:

- Assess the progress of the workshop.
- List the objectives and describe the agenda for the day's activities.

OPENING

Invite a volunteer to review the previous day's activities. (10 minutes)

Summarize the evaluation of the previous day. (10 minutes)

Distribute the overview and the schedule for day two (handouts 2.6.1 and 2.6.2) to the participants. Review the objectives and schedule (overheads 2.6.1 and 2.6.2). Ask if clarifications are needed. (10 minutes)

SESSION 6

09:00 – 09:30 Session 6. Acknowledgments and References

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Write acknowledgments and references.

Use overhead 2.6.3 to present the objective.

PROCEDURE

Training techniques: presentation, discussion.

PRESENTATION

(experience) Distribute handout 2.6.3. Give a brief presentation on how to write acknowledgments and references. You will find the information in handouts 2.6.4 and 2.6.5 very useful. Overheads 2.6.4 through 2.6.9 support the presentation. At the end of your presentation be sure to ask the participants if they have any comments or questions, or if they need clarifications. Distribute handouts 2.6.4 and 2.6.5. (15 minutes)

EXERCISE 6

Exercise 6. Discussion. (10 minutes)

(process) Invite the participants to talk about personal experiences and knowledge related to acknowledgments and references. Facilitate the discussion.

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants "What might you do differently in your job as a result of what you learned?"
2. Make a transition to the next session.

DAY TWO

Session 6
Summary of Overheads

Objectives of Day Two

1. Write acknowledgements and references
2. List and discuss major elements of a prose style for scientific writing
3. Paragraph text so that it is easy to follow and understand
4. Eliminate or replace unnecessary phrases and words
5. Define sentences and classify them as simple, compound, or complex

2.6.1

Schedule of Day Two

08:30 – 09:00	Opening of the Day's Activities
09:00 – 09:30	Session 6. Acknowledgements and References
09:30 – 10:00	Session 7. Writing and Rewriting
10:00 – 10.30	Session 8. Paragraphing
Tea/Coffee Break	
10:45 – 12:05	Session 9. Logical Arrangement of Paragraphs
12:05 – 13:00	Session 10. Use of Definite, Concrete Words
Lunch	
14:00 – 14:45	Session 11. Work with Words
14:45 – 15:30	Session 12. Phrases that Say Little
Tea/Coffee Break	
15:45 – 16:15	Session 13. Raw Material: Types of English Sentences
16:15 – 17:00	Session 14. Simple, Compound, and Complex Sentences
17:00 – 17:30	Feedback on the Day's Activities and PAPA

2.6.2

Objective of Session 6. Acknowledgements and References

1. Write acknowledgements and references

2.6.3

Acknowledgements and References

2.6.4

Acknowledgements

Possible ingredients:
- any significant technical help, sources of special equipment, cultures, or other materials
- outside financial assistance, such as grants, contracts, or fellowships

Example:
The author thanks the International Business Machines Corporation for ...

2.6.5

Ways of Citing and Listing References

- Sequential numbering (Vancouver)
- Numbering system
- Harvard (author–year) system

2.6.6

Sequential Numbering

Sequential numbering (Vancouver) system Zachary[1] obtained ...

1. Zachary, N.M. (1990). Nitrogen-water interaction on a Nitisol. *Agron. J. 30(2)*, 41-29.
2. Alfred, O.J. 1974. Wind erosion and bean yields in a semi-arid environment. *Kenya, J. Sc. 4(1)*, 9-14.

2.6.7

Numbering System

Numbering System	(Alphabetical)
– Zachary (2)	Alfred, O.J. 1994. Phenological changes in sorghum. Proceedings of the 4th soil science society in Est Africa, Kampala, Uganda. pp. 21-27.
– Zachary et al. (2)	
– Alfred (1)	Zachary, N.M. 1995. Effect of wind erosion on maize growth in a semi-arid area. In: *Dryland Agriculture* Eds: J.J. Stewart and J.N. Nader, Oxford Publishers, Nairobi, Kenya. pp. 43-65.

2.6.8

Harvard (author - year) system

Citation	*Listing*
Harvard (author - year) system	(Alphabetical)
– Zachary (1993); (Zachary, 1993) – Zachary et al. (1990) – Alfred (1995)	Alfred, O.J. 1995. Effects of nitrogen on maize growth and field. *E. Afr. Agric. for J. 59(1)*, 24-27. Zachary, N.M, 1993. *Managing Salin Soils.* Jomo Kenyatta Foundation, Nairobi, Kenya.

2.6.9

Handout—Overview of Day Two

Scientific Writing and Presentation

Objectives

By the end of the day, the participants will be able to do the following:

1. Write acknowledgements and references.
2. List and discuss major elements of a prose style for scientific writing.
3. Paragraph text so that it is easy to follow and understand.
4. Eliminate or replace unnecessary phrases and words.
5. Define sentences and classify them as simple, compound, or complex.

Handouts

2.6.1 Overview
2.6.2 Tentative Schedule
2.6.3 Exercise 6. Acknowledgements and References
2.6.4 Acknowledgements and References (summary of presentation)
2.6.5 References (text)
2.7.1 Exercise 7. Writing and Rewriting
2.7.2 Writing and Rewriting (summary of presentation)
2.7.3 Writing and Rewriting (text)
2.8.1 Exercise 8. Working with Paragraphing
2.8.2 Exercise 8. Worksheet
2.8.3 Exercise 8. A Result of Paragraphing
2.9.1 Exercise 9. Logical Arrangements of Paragraphs
2.9.2 Exercise 9. Worksheet
2.10.1 Exercise 10. The Use of Definite, Concrete Words
2.10.2 Prose Style for Scientific Writing (text)
2.11.1 Exercise 11. Work with Words
2.11.2 Exercise 11. Worksheet
2.12.1 Exercise 12. Phrases that Say Little
2.12.2 Exercise 12. Worksheet
2.13.1 Exercise 13. Types of English Sentences
2.13.2 Types of English Sentences (summary of presentation)
2.13.3 Raw Materials: Words and Sentences (text)
2.14.1 Exercise 14. Types of English Sentences
2.14.2 Strengths and Weaknesses of Day Two
2.14.3 Guidelines to Provide Feedback on the Workshop
2.14.4 PAPA Form — First Stage

Handout—Tentative Schedule of Day Two

Scientific Writing and Presentation

8:30 – 09:00	**Opening of the Day's Activities**
09:00 – 09:30	**Session 6. Acknowledgements and References** (Presentation and exercise 6)
09:30 – 10:00	**Session 7. Writing and Rewriting** (Presentation and exercise 7)
10:00 – 10:30	**Session 8. Paragraphing** (Exercise 8)
10:30 – 10:45	Tea/Coffee Break
10:45 – 12:05	**Session 9. Logical Arrangement of Paragraphs** (Exercise 9)
12:05 – 13:00	**Session 10. Use of Definite, Concrete Words** (Exercise 10)

13:00 – 14:00 Lunch

14:00 – 14:45	**Session 11. Work with Words** (Exercise 11)
14:45 – 15:30	**Session 12. Phrases that Say Little** (Exercise 12)
15:30 – 15:45	Tea/Coffee Break
15:45 – 16:15	**Session 13. Raw Material: Types of English Sentences** (Presentation and exercise 13)
16:15 – 17:00	**Session 14. Simple, Compound, and Complex Sentences** (Exercise 14)
17:00 – 17:30	**Feedback on the Day's Activities and PAPA**

Exercise 6. Acknowledgments and references (plenary discussion)

1. Take notes of major issues presented by the trainers.
2. Formulate questions and comments to discuss in plenary.

   Use examples from your personal experiences and knowledge.

Acknowledgments and References (summary of presentation)

Acknowledgments

Robert A. Day's two possible ingredients in acknowledgments

1. Any significant technical help and sources of special equipment, cultures, or other materials.
2. Outside financial assistance, such as grants, contacts, or fellowships.

Bob Kern's personal prejudice:

When the writer of an acknowledgment states: "The author would like to thank the International Business Machines Corporation . . . .,"

I want to say, "Well, why don't you?"

Let the acknowledgment state:

The author thanks the International Business Machines Corporation for giving access to its minicomputing center in order that complex statistical measures could be made.

References

Day offers two rules:

1. List only significant **published** references. If you must refer to unpublished data, papers in press, or other secondary literature, do it parenthetically or as footnotes to the text.
2. Check all parts of every reference **against the original** publication before submitting the manuscript and again at the proof stage.

   And check — and follow — the style used by your intended publisher.

References[1]

References to be cited in an article can be either published or unpublished documents. Published documents include journal articles, books, technical reports, cataloged theses and dissertations, patents, maps, recordings, and other similar matter available to the public and to libraries, by subscription, purchase, lease, or free distribution. Unpublished documents include handwritten or typewritten documents (such as letters, diaries, or field notes) held by individuals or libraries in single copies or distributed primarily to limited segments to the scientific community. The placement of references to such documents within articles differs among journals, but references to published documents are usually listed in a bibliographic reference section at the end of the article. References to articles accepted for publication but not yet published and to unpublished documents held in a library or archival collection accessible to the public are often listed in this section. Other unpublished materials not accessible to the scientific public (such as letters, private tape recordings, data to be published, preliminary drafts of reports) are identified in most journals in footnotes to the text or in statements within the text.

Citing references in the text

Literature cited in the text should refer to well-documented sources of additional background information for readers who may find the subject pertinent to their own fields of interest and wish to know more about it. No reference should be included in the article unless it can be verified against the original document. The accuracy of all reference material is the responsibility of the author, not the copy editor. Practices for citing references in the text vary widely, but most editors endorse one of the systems described below.

Examples of bibliographic references

The American National Standard for Bibliographic References presents rules, rationale, principles, definitions, and examples to assist in formulating bibliographic references for a wide variety of materials (print and nonprint). These guidelines group bibliographic material in several hierarchical subdivisions (levels). A general guideline is to reference bibliographic data at the "lowest" level appropriate to the material to be cited and include reference to the pertinent "higher" level(s).

1) Analytical (or lowest) level. For example, an article in a journal, a chapter of a book, a paper in conference proceedings. Citations at this level must include reference to either of the two higher levels of which they are a part.

2) Monographic level. For example, a report, book, or filmstrip, unrelated to any other publication; if it is part of a series (collective level), that information should be included in the reference.

3) Collective level. For example, a series of monographs, an entire journal (as in a union list of serials) or issues of a journal,or a multivolume work.

1. CBE Style Manual Committee. *CBE style manual: a guide for authors, editors, and publishers in the biological sciences.* 5th ed. rev. and expanded. Bethesda, Maryland: Council of Biology Editors, Inc.; 1983.

The American National Standard also categorizes bibliographic elements in three classes to indicate their degree of importance. In an abbreviated bibliographic style, the reference consists only of the essential bibliographic elements, whereas a comprehensive style also includes recommended and sometimes optional elements.

1) Essential data. Required to provide unique identification of a work (author of a book, volume number of a periodical, or year of publication, for example).

2) Recommended data. Needed to provide valuable redundancy that helps to identify a work more easily (such as the issue number of a periodical) or to provide aids for the use and reproduction of nonprint material (width of a motion picture film, or speed at which a sound recording is played, for example).

3) Optional data. Aid the user by supplying such information as the affiliation of an author of a journal article.

The following bibliographic citations are examples of most of the data levels and types of references you may encounter. They also illustrate the punctuation, style of capitalization, and abbreviation recommended by the American National Standard for Bibliographic References.

Journals

Standard journal article

1. Steele, R.D. Role of 3-ethylthiopropionate in ethionine metabolism and toxicity in rats. J. Nutr. 112:118-125; 1982.

2. White, H.B., III. Coenzymes as fossils of an earlier molecular state. J.Mol Evol. 7:101-101; 1976.

3. Livanou, Th; Nikas, A. A quick test of protein bound iodine based on the dry ash method. Folia Biochim. Biol. Gracca. 9:116-123; 1972.

Corporate author of article

1. The Committee on Enzymes of the Scandinavian Society for Clinical Chemistry and Physiology. Recommended method for the determination of _-glutamyltransferase in blood. Scand. J. Clin Lab. Invest. 36:119-125; 1976.

2. Fujian Institute of Microbiology. [Studies on antibiotics 104:I. Identification of *Micromonospora roseopurpurea* n.sp] Acta Microbiol. Sin. 15:271-274, 1975. (In Chinese; English summary.)

Article with no identifiable author

1. Anonymous. Epidemiology for primary health care. Int. J. Epidemiol 5:224-225; 1976.

2. Anonymous. Food allergy and intolerance. Lancet 2:1344-1345; 1980.

Article with author affiliation

1. Norton, E.M.; Boe, A.A. (Dept. of Plant and Soil Sciences, Univ. of Idaho, Moscow). In vitro propagation of ornamental rosaceous plants. HortScience 17:190-191; 1982.

2. Rosen, B.P. (Section of Biochemistry and Molecular Biology, Cornell Univ., Ithaca, NY, and Dept. of Biological Chemistry, Univ. of Maryland School of Medicine, Baltimore). Basic amino acid transport in Escherichia coli: properties of canavanine-resistant mutants. J. Bacteriol. 116:627-635; 1973.

3. Halbert, F. (Chronobiology Laboratories, Dept. of Pathology, Univ. of Minnesota, Minneapolis); Katinas, G.S. (Dept. of Histology, Pavlov Medical Institute, Leningrad). Chronobiologic glossary of the International Society for the Study of Biologic Rhythms. Int. J. chronobiol. 1(1):31-63; 1973.

Article with subtitle

1. Johnson, L.A.S.; Briggs, B.G. On the Proteaceae: the evolution and classification of a southern family. Bot. J. Linn. Soc. 70:83-182; 1974.

2. Scheller, R.H.; Anderson, D.M.; Posakony, J.W.; McAllister, L.B; Britten, R.J.; Davidson, E.H. Repetitive sequences of sea urchin genome: II. Subfamily structure and evolutionary conservation. J. Mol. Biol. 149:15-39; 1981.

Title-first journal reference

1. Interferon: preparing for wider clinical use. Med. World News 23(9):51-54; 1982.

2. Rates of synthesis and source of glycolate in intact chloroplasts. Kirk, M.R.; Heber, U. Planta 132(2):131-141; 1976.

Article in translated journal

1. Mokul'skaya, T.D.; Smetanina, E.P.; Mychko, G.E.; Mokul'skii, M.A. Secondary structure of DNA from phages T4 and T6. Mol. Biol. (USSR) 9:446-449; 1976. Translation of Mol. Biol. (Moscow) 9:552-555; 1975.

Single page of an article

1. Tatemoto, K. Neuropeptide Y: complete amino acid sequence of the brain peptide. Proc. Natl. Acad. Sci. USA 79:5485-5489; 1982 (p. 5487 table 2).

Article on discontinuous pages

1. Saperstein, S.; Spiller, G.A.; Amen, R.J. Nutritional problems and the use of special dietary foods. Food Prod. Dev. (April):58, 61-64; 1974.

2. Crews, D.; Gartska, W.R. The ecological physiology of the garter snake. Sci. Am. 245(5):158-164, 166-168; 1981.

Entire issue of journal

1. Weiss, B, Chairman. Current status of behavioral pharmacology: a symposium. Fed. Proc. 34(9); 1975.

Journal paginated by issue

1. Oppenheimer, S.B. Causes of cancer: gene alteration versus gene activation. Am. Lab. (Fairfield, CT) 14(11):40, 43-46; 1982.

2. Eliel, E.L. Sterochemistry since LeBel and van 't Hoff: Part II. Chemistry 49(3):8-13; 1976.

Unpaged periodical

1. Evans, J. How many botany books did Thomas Jefferson own? Bot. Garden Bull. 64(6): [8p]; 1976.

Article in parent journal and in subdivision

1. Merriam, G.R.; Wachter, K.W. Algorithms for the study of episodic hormone secretion. Am. J. Physiol. 243(4):E310-E318; 1982.

2. Merriam, G.R.; Wachter, K.W. Algorithms for the study of episodic hormone secretion. Am. J. Physiol. Endocrinol. Metab. 6(4):E310-E318; 1982.

Article in issue published in more than one part

1. Cochrane, C.B. Mechanisms involved in the deposition of immune complexes in tissues. J. Exp. Med. 134(3, pt. 2):75_S-89_S; 1971.

Article in issue with special volume designation

1. Thamer, C.; Karlson, P. Nachweis der Proteinbindung von Ecdyson bei der Schmeissfliege Meizen *Caliphora erythrocephale.* Z. Naturforsch. 27B:1191-1195; 1972.

Item within another periodical

1. Bertolo, L.; Novakovic, L.; Penna, B.S.M. Les effets antirhythmiques du Dropéridol. Anesth. Analg. Réanim. 31:155-156; 1974. Condensed from: Anesthesiology 37:529-535; 1972.

2. Etienne, M.; Henry, Y. [Apparent digestibility and metabolic utilization of nutrients and reproductive performances in pregnant gilts as affected by the energy supply] Ann. Zootech. 22:311-326; 1973. Taken from: Biol. Abstr. 59:1273; 1975 (abstract no. 11904).

Article on computer readable magnetic tape

1. Poglazov, B.T.; Levshenko, M.T. Bacteriophage T4D-induced proteinase. J.Mol. Biol. 84:463-467; 1974. In: Chemical Abstract Condensates [Data base] Columbus, OH: Chemical Abstracts Service. 1974 September 30(81)13: abstract no. 74715f. Magnetic tape; 9 track, 800 and 1600 bpi, CAS standard distribution format, ASCII.

Journal published in microform

1. Osborn, E.C.; Rigby, C.V. The radioimmunoassay of angiotensin: further studies. IRCS Library Compendium [Microform]. 1974 May; 2(5):1294. 1 microfilm reel; 16mm; 24X reduction ratio.

Books and Monographs

Personal author(s)

1. Osler, A.G. Complement: mechanisms and functions. Englewood Cliffs, NJ: Prentice Hall, Inc.; 1976.
2. Altschul, S. von R. Drugs and foods from little-known plants; notes in Harvard University herbaria. Cambridge, MA: Harvard Univ. Press; 1973.
3. Eason, G.; Coles, C.W.; Gettingby, G. Mathematics and statistics for the bio-sciences. West Sussex, England: Ellis Horwood Limited; 1980.
4. De Robertis, E.C.P.; Saez, F.A.; De Robertis, E.M.F., Jr. Cell biology. 6th ed. Philadelphia: W.B. Saunders Co: 1975.

Corporate author

1. AMA Department of Drugs. AMA drug evaluations. 4th ed. New York: John Wiley & Sons; 1980.
2. ASTM Committee E-8 on Nomenclature and Definitions. Compilation of ASTM standard definitions. 3d ed. Philadelphia: American Society for Testing and Materials: 1976.
3. International Anatomical Nomenclature Committee. Nomina anatomica. Amsterdam: Excerpta Medica; 1972.

Editor, compiler, chairman as author

1. Wood, R.K.S., editor. Active defense mechanisms in plants. New York: Plenum Press; 1982.
2. Rhodes, A.J; Von Rooyen, C.E., compilers Textbook of virology: for students and practitioners of medicine and other health sciences. 5th ed. Baltimore: Williams & Wilkins Co.; 1968.
3. Padilla y Padilla, C.A.; Padilla, G.M., compilers and editors. Amebiasis in man: epidemiology, therapeutics, clinical correlations and prophylaxis. Springfield, IL: Charles C Thomas; 1974.

Section, selective pages, or chapter in a book

1. Strauss, J.H.; Strauss, E.G. Togaviruses. Nayak, D.P., ed. The molecular biology of animal viruses. New York: Marcel Dekker, Inc., 1977: 111-166.
2. Kirkpatrick, C.H.; Sohnle, P.G. Chronic mucocutaneous candidiasis. In: Safai, B.; Good, R.A., eds. Immunodermatology. New York: Plenum Medical Book Co.; 1981: p. 495-514. (Good, R.A.; Day, S.B. Comprehensive immunology; vol 7).

DAY TWO

Session 7
Writing and Rewriting

Instructions to Trainers

SESSION 7

09:30 – 10:00 Session 7. Writing and Rewriting

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- List and discuss major elements of a prose style for scientific writing.

Use overhead 2.7.1 to present the objective.

PROCEDURE

Training techniques: presentation, discussion.

PRESENTATION

(experience) Distribute handout 2.7.1. Give a brief presentation focusing on the key concepts of writing and rewriting. You will find handouts 2.7.2 and 2.7.3 useful. Overheads 2.7.2 and 2.7.3 support the presentation. At the end of your presentation be sure to ask the participants if they have any comments, questions or if they need clarifications. Distribute handouts 2.7.2 and 2.7.3. (15 minutes)

EXERCISE 7

Exercise 7. Discussion. (10 minutes)

(process) Ask the participants to tell you one thing they learned from this presentation. How will it make a difference in their writing. If time permits, ask them to do this in pairs to stimulate discussion.

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants to tell one of their neighbors two things they might do differently as a result of what they learned. Choose some volunteers to give examples.
2. Make a transition to the next session.

DAY TWO

Session 7
Summary of Overheads

Writing and Rewriting

2.7.1

Objective of Session 7. Writing and Rewriting

2. List and discuss major elements of a prose style for scientific writing

2.7.2

Writing and Rewriting

- Choose a form and stay with it
- Make the paragraph the unit of composition
- Use the active voice
- Put statements in positive form
- Use definite, specific, concrete language
- Omit needless words
- Avoid a succession of loose sentences
- Keep related words together
- In summaries keep to one tense

2.7.3

Exercise 7. Writing and rewriting (plenary discussion)

1. Take notes of major issues presented by the trainer.
2. Formulate one thing you learned from this presentation and how that will make a difference in your writing to discuss in plenary.

Writing and Rewriting (summary of presentation)

Key points in writing and rewriting:

- choose a form and stay with it
- make the paragraph the unit of composition
- use the active voice and passive voice where necessary
- put statements in positive form
- use definite, specific, concrete language
- omit needless words
- avoid a succession of loose sentences

Writing and Rewriting[1]

The writing strategy discussed in "When a Scientist Reports Research" by R. Kern suggests that the first effort simply should be to get statements on paper without concern for how well the material is expressed. Improvement in flow and reading ease comes in rewriting.

Some guidelines can help the writer. The Strunk and White volume has been used widely throughout the world to offer guidelines. We have selected certain principles from Stunk and White, presenting them and illustrating them with examples. In some cases, there are exercises related to the principles.

Choose a form and stay with it

Matters of form were discussed earlier: IMRAD, the report, the journalist's approach. They need not be dealt with again here.

Make the paragraph the unit of composition

The writer has only words to carry the thoughts and meanings he or she wants to convey. Writers use three building blocks: the word, the sentence, and the paragraph. How well the writer uses them determines his or her success.

The base unit of the English language is the word. The writer can choose among up to two million English words to find just the right one. The choice, of course, depends at least some on the sentence in which the word will appear.

Sentences give the writer a way to fit words together to give meaning. In the English sentence, a subject acts on an object with an effect. The writer in English has three main types of sentences to portray that sequence. They are the simple, the compound, and the complex.

The writer puts sentences into a paragraph to organize those blocks of meaning into more complex patterns. When used well, paragraphs help a reader deal with the writer's message in a systematic way.

A typical paragraph has three main parts. One is a topic sentence, which tells the reader what the paragraph is about. The second is the main body of thought. The third is a short summary or, more often, a transition to the next paragraph.

Use the active voice

Verbs are words of action:

> The wheat broke through the ground five days after planting. (active voice)
> After the wheat was planted, its emergence began in five days. (passive voice)

1. Extracted from: Kern, R, Obura, R. and Taylor A. *Writing and Presenting Scientific Information.* A trainer's handbook based upon ISNAR-KARI Workshops (1990,1991,1993), ISNAR Training Series, 1994.

Put statements in positive form

Formulate statements in positive rather than negative form.

> He was usually late getting to the office. (positive form)
> He did not often arrive at the office on time. (negative form)
> Drought halted the experiment. (positive form)
> Due to drought, it was not possible to complete the experiment. (negative form)

Use definite, specific, concrete language

Make definite statements where possible.

> Foot and Mouth Disease can cut production in half. (definite statement)
> Under certain conditions, Foot and Mouth Disease may hamper productivity by as much as 50%. (uncertain statement)

Choose specific over general formulations.

> BR-8 and BR-17 ranked highest in the yield trials. (specific)
> High-yielding rice varieties generally performed well. (general)

Use concrete rather than abstract words.

> Fish grew faster in water fertilized with duck dung. (concrete)
> The excreta of ducks, when incorporated with water in the fish pond, was associated with increased growth by fish. (abstract)

Omit needless words

Examine the following list of words and phrases. The phrase on the left can almost always be substituted with the word or words on the right.

The question as to whether	whether
There is no doubt that	no doubt
He is a man who	he
At this moment in time	now
At such time as	when, then
If conditions are such that	if
In the vicinity of	near
Large numbers of	many
It is often the case that	often

Avoid a succession of loose sentences

The trial included 14 varieties of pigeonpea. Many people eat more rice than anything else. Meat costs a lot of money, especially for people who are out of work. And too much rice and not enough protein in their food isn't good for people. Pigeonpea gives low yields most of the time. If farmers had better varieties, health of a lot of people would be better.

Keep related words together

This is a portrait of Nehru, grandfather of Rajiv Gandhi, who became prime minister in 1948.
He saw a large weed in the plot right in the center.
All the experiments were not finished.
He only found two mistakes in calculations.

In summaries, keep to one tense

As the sun is going down we knew it was time to quit work. At the end of the day the job was finished and the researchers are happy. They had accomplished enough that the director general should not think it necessary to have kept a "spy" among the crew. (more tenses)

As the sun went down, we knew it was time to quit work. The job was finished and the researchers were happy. They had accomplished enough that the director general would know that it was not necessary to have a "spy" among the crew. (one tense)

DAY TWO

Session 8
Paragraphing

Instructions to Trainers

SESSION 8

10:00 – 10:30 Session 8. Paragraphing

OBJECTIVE

By the end of this session the participants will be able to do the following:

- Paragraph text so that it is easy to follow and understand.

Use overhead 2.8.1 to present the objective.

PROCEDURE

Training techniques: individual practice, discussion.

EXERCISE 8

Exercise 8. Working with paragraphing. (25 minutes)

1. Distribute handouts 2.8.1 and 2.8.2. Handout 2.8.1 gives instructions for this exercise. Go over the instructions with the participants step by step. Ask if any clarifications are needed. (5 minutes)

Phase 1. Individual practice (10 minutes)

2. *(experience)* Ask the participants to work on on the exercise individually. Responses can be written on the worksheet (handout 2.8.2).

Phase 2. Reporting and discussion (10 minutes)

3. *(experience, process)* Ask some of the participants to read to the audience their answers to this exercise.
4. Display overheads 2.8.3 and 2.8.4, and distribute handout 2.8.3. Discuss the possible alternatives. Ask the participants to discuss the differences and similarities between their responses and those on the overheads.
5. *(process, generalize)* Ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" in order to allow discussion of the process.

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants to tell one of their neighbors two things they might do differently as a result of what they learned. Choose some volunteers to give examples.
2. Make a transition to the next session.

10:30 – 10:45 Tea/Coffee Break

DAY TWO

Session 8
Summary of Overheads

Objective of Session 8. Paragraphing

3. Paragraph the text so that it is easy to follow and understand

2.8.1

Paragraphing

2.8.2

Results of Exercise 8. Paragraphing

Information management is one of the critical needs of the healthy organization, yet few managers think of information handling as a basic subject of agricultural research management. Not many give it a high priority for their attention as managers. Some people refer to information as the blood of an organization. They say that an organization cannot function without a vigorous flow of information. The organization needs two main types of information flow: inside and outside.

The inside flow carries information throughout the organization, making it possible for managers to disperse resources, monitor use of resources, and evaluate the results of their use. It provides managers with information they need to justify the organization's use of resources and to furnish a base for attempts to get more resources. Also, members of the organization need the flow of information to fit their own activities with those of others.

2.8.3

Results of Exercise 8. Paragraphing

The outside information gives the organization a way to be in touch with its own environment. Outside information can be broken down into two kinds. One is information brought into the organization from the environment, such as literature and ideas that suggest subjects and methods for research. The second is information provided from the organization to others who want and need to know its results. These others include scientists, policymakers, resource providers, users of research results, and others.

Some observers use the terms input, throughput, and output to differentiate the kinds of information significant to an organization. They use throughput to define the flow of information inside. Input refers to information brought into the organization, and output refers to information the organization brings out.

2.8.4

Exercise 8. Working with Paragraphing

Phase 1. Individual work (10 minutes)

1. Read the following text. Then mark the points where a division into paragraphs would make it easier to follow and understand.

Information management is one of the critical needs of the healthy organization, yet few managers think of information handling as a basic subject of agricultural research management. Not many give it a high priority for their attention as managers. Some people refer to information as the blood of an organization. They say that an organization cannot function without a vigorous flow of information. The organization needs two main types of information flow: inside and outside. The inside flow carries information throughout the organization, making it possible for managers to disperse resources, monitor use of resources, and evaluate the results of their use. It provides managers with information they need to justify the organization's use of resources and to furnish a base for attempts to get more resources. Also, members of the organization need the flow of information to fit their own activities with those of others. The outside information gives the organization a way to be in touch with its own environment. Outside information can be broken down into two kinds. One is information brought into the organization from the environment, such as literature and ideas that suggest subjects and methods for research. The second is information provided from the organization to others who want and need to know its results. These others include scientists, policymakers, resource providers, users of research results, and others. Some observers use the terms **input, throughput, and output** to differentiate the kinds of information significant to an organization. They use **throughput** to define the flow of information inside. **Input** refers to information brought into the organization, and **output** refers to information the organization brings out.

Phase 2. Reporting and discussion (10 minutes)

2. You will be invited to share your answers with the group and the trainer will discuss the results of this exercise.

Exercise 8. Worksheet

Exercise 8. Working with paragraphing

Result of paragraphing
(possible alternative)

Information management is one of the critical needs of the healthy organization, yet few managers think of information handling as a basic subject of agricultural research management. Not many give it a high priority for their attention as managers. Some people refer to information as the blood of an organization. They say that an organization cannot function without a vigorous flow of information. The organization needs two main types of information flow, inside and outside.

The inside flow carries information throughout the organization, making it possible for managers to disperse resources, monitor use of resources, and evaluate the results of their use. It provides managers with information they need to justify the organization's use of resources and to furnish a base for attempts to get more resources. Also, members of the organization need the flow of information to fit their own activities with those of others.

The outside information gives the organization a way to be in touch with its own environment. Outside information can be broken down into two kinds. One is information brought into the organization from the environment, such as literature and ideas that suggest subjects and methods for research. The second is information provided from the organization to others who want and need to know its results. These others include scientists, policymakers, resource providers, users of research results, and others.

Some observers use the terms input, throughput, and output to differentiate the kinds of information significant to an organization. They use throughput to define the flow of information inside. Input refers to information brought into the organization, and output refers to information the organization brings out.

DAY TWO

Session 9
Logical Arrangement of Paragraphs

Instructions to Trainers

SESSION 9

10:45 – 12:05 Session 9. Logical Arrangement of Paragraphs

OBJECTIVE

By the end of this session the participants will be able to do the following:

- Paragraph a text so that it is easy to follow and understand.

Use overhead 2.9.1 to present the objective.

PROCEDURE

Training technique: group work.

EXERCISE 9

Exercise 9. Logical arrangement of paragraphs. (1 hour 15 minutes)

1. Distribute handouts 2.9.1 and 2.9.2. Handout 2.9.1 gives clear instructions for the exercise. Go over the instructions with the participants step by step. Ask if clarifications are needed. (5 minutes)

Phase 1. Group work (25 minutes)

2. Divide the participants into four groups. The groups should be different from the groups in which the participants worked in on day one. Ask the groups to elect rapporteurs.
3. *(experience)* Groups read the text and respond to the questions.
4. As the groups work, circulate from group to group to check progress. Clarify any concerns the groups may have while they are working. Be sure to remind the groups of the time remaining.

Phase 2. Reporting and discussion (45 minutes)

5. *(experience, process)* Invite the rapporteurs to present the groups' results. Each rapporteur has five minutes to present. (20 minutes)
6. Set the scene for the discussion. Tell the participants to think of themselves as an executive who has been contracted for a report. They should consider the group responses as the correct way to write this report. Start the discussion with the following question: "With

which report are you most satisfied and why?" (20 minutes)

7. At the end of the exercise provide feedback on the groups' results and summarize the major points. Ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" (5 minutes)

CLOSURE

Closure (5 minutes)

1. (*application*) Ask volunteers to list three major things they learned from this exercise.
2. Make a transition to the next session.

ANSWERS

Answers of exercise 9

LOGIC

A. Try:

a) Order: 1, 4, 3, 6, 5, 2

b) Headings:
1 – Pigskin as a commercial product
4 – Consumer considerations or stimulation of consumer market
3 – Marketing approach
6 – Costs and profitability
5 – Raw material resources
2 – (Processing of skins or processing of raw material

c) Link words:
1-4 Nevertheless; 4-3 none, none needed; 3-6 none, none needed; 6-5 With regard to; 5-2 Usually

d) Topic sentences:
1 – Pigskin is potentially ... a product
4 – Nevertheless, little use ... today
3 – It is suggested that ... campaign be initiated
6 – Costs of ... distribution
5 – This paragraph lacks a topic sentence, it is about conditions for raising pigs. Give it one!
2 – No topic sentence here, either. How about, "Skins intended for eventual sale as leather goods require a number of treatments before they can actually be used in the manufacturing process."

Put this as a first sentence. The paragraph then tells you about these processes.

e) Key words:
pigskin/leather/curing/dipping/finishing/ commercial product/markets/advertising/custom trade/leather goods/pig-raising/production costs.

DAY TWO

Session 9
Summary of Overheads

Objective of
Session 9. Logical Arrangement of Paragraphs

3. Paragraph the text so that it is easy to follow and understand

2.9.1

Results of Exercise 9
(possible alternative)

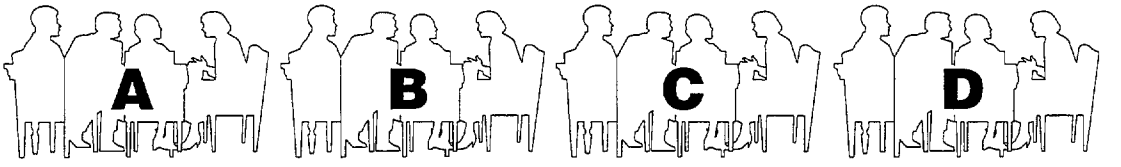
a) Order: 1, 4, 2, 6, 3, 5
b) Headings:
1 – Pigskin as a commercial product
4 – Consumer considerations or stimulation of consumer market
3 – Marketing approach
6 – Costs and profitability
5 – Raw material resources
2 – Processing of skins or processing of raw material
c) Link words: 1-4 Nevertheless; 4-3 none, none needed; 3-6 none, none needed; 6-5 With regard to; 5-2 Usually
d) Topic sentences: 1 – Pigskin is potentially ... a product
4 – Nevertheless, little use ... today
3 – It is suggested that ... campaign be initiated
6 – Costs of ... distribution
5 – This paragraph lacks a topic sentence. It is about conditions for raising pigs. Give it one!
2 – No topic sentence here, either. How about, "Skins intended for eventual sale as leather goods require a number of treatments before they can actually be used in the manufacturing process." Put this as a first sentence. The paragraph then tells you about these procedures.
e) Key words: pigskin/leather/curing/dipping/finishing/commercial product/markets/advertising/ custom trade/leather goods/pig-raising/production costs.

2.9.2

Exercise 9. Logical arrangement of paragraphs (group work)

Phase 1. Group work (25 minutes)

1. Form four groups of participants.



2. Each group selects a rapporteur.
3. Read the text, discuss it, and do the following:
   - Arrange the paragraphs in a logical order (use scissors to cut and paste the individual paragraphs of handout 2.9.2 on flip-chart paper).
   - Underline (or supply) a topic sentence for each paragraph.
   - Circle the word or words that link one paragraph to another.
4. The rapporteurs summarize the responses in order to present them.

Phase 2. Reporting and discussion (45 minutes)

5. The rapporteurs present the results to the audience. Each rapporteur has five minutes to present.
6. The trainers will invite you to discuss the groups' responses and provide feedback on the content of the presentations.

Feasibility Report: Developing Pigskin Leather as a Commercial Product[1]

1. Pigskin is potentially a valuable commercial commodity. It is easily cut, stretched and stitched. It is waterproof. It has a rich and elegant appearance and appeals to the discriminating purchaser.

2. Usually, in order to obtain high-quality skins, immediately after the animal is killed, the skin is removed in one piece. It must then be dipped in a mild antiseptic solution and allowed to dry, prior to curing. The curing process is of primary importance, since without it, the skins would smell, shrivel, or actually fall apart. Methods which are suitable include a number of chemical treatments, as well as mild, dry heat or steam heat treatments. The processes selected depend on the required quality as well as on the state of the skins at the time they reach the curing plant. "Finishing", i.e., inspection, treatment of minor faults, and polishing, are often also done at the curing plant.

3. It appears at the moment that a good market for pigskin as a quality leather product could be developed. It is suggested that a wide promotion campaign be initiated. The main thrusts of the campaign could be directed in several ways. Samples of high quality pigskin in varying colors and thicknesses could be sent to manufacturers of leather goods. Alternatively, people in this trade who are potential customers might be invited to trade shows set up by our agency to see the range of materials we can supply. Visits to trading and storage centers and curing plants in the vicinity of potential buyers should be arranged to promote their interest in pigskin. A direct appeal to the potential buying public is also recommended.

4. Nevertheless, little use of pigskin is made today. One problem is competition from synthetic materials, which are cheaper, and easier to dye, cut, sew, and handle. The main reason, however, is lack of development of the custom trade market. The beauty and softness of pigskin is not well known among the younger generation who have grown up with synthetics. Its potential exploitation in the manufacture of luggage, gloves, bags and wallets has been hardly recognized. The public buys such goods made of a range of other materials perhaps through lack of information that pigskin, although costly, is immensely durable and keeps its looks for a long time compared to even the better synthetics, which tear and scuff much more easily.

5. A good supply of pigskin can be obtained quite cheaply, for farmers usually regard it as an economic side-benefit and do not set high prices. Pigs are grown for food in almost every country. They are sturdy, not readily susceptible to disease, grow fast, and are not fastidious in their eating habits. If provided with cover as well as a small ranging area, they remain healthy and maintain their growth over a wide range of temperatures, from -5 degrees C in winter to 40 degrees C in summer. They are usually profitable when grown for their meat alone.

1. Text from A. Colodner and M. Kaye (rights reserved)

6. Costs of pigskin production (other than manufacturing and marketing) include purchase of skins, handling, curing, finishing and dyeing, transportation, and storage and distribution. In order to obtain maximum profitability, costs must be kept down, while at the same time ensuring that the skins reaching the market are long-lasting, in good condition, attractive in appearance, and soft enough for easy cutting and machine stitching.

Exercise 9. Worksheet

- **cut here** ✂ -

1. Pigskin is potentially a valuable commercial commodity. It is easily cut, stretched and stitched. It is waterproof. It has a rich and elegant appearance and appeals to the discriminating purchaser.

- **cut here** ✂ -

2. Usually, in order to obtain high-quality skins, immediately after the animal is killed, the skin is removed in one piece. It must then be dipped in a mild antiseptic solution and allowed to dry, prior to curing. The curing process is of primary importance, since without it, the skins would smell, shrivel, or actually fall apart. Methods which are suitable include a number of chemical treatments, as well as mild, dry heat or steam heat treatments. The processes selected depend on the required quality as well as on the state of the skins at the time they reach the curing plant. "Finishing", i.e., inspection, treatment of minor faults, and polishing, are often also done at the curing plant.

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- **cut here** ✂ -

1. Text from A. Colodner and M. Kaye (rights reserved)

DAY TWO

Session 10
Use of Definite, Concrete Words

Instructions to Trainers

SESSION 10

12:05 – 13:00 Session 10. Use of Definite, Concrete Words

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Eliminate or replace unnecessary phrases and words.

Use overhead 2.10.1 to present the objective.

PROCEDURE

Training technique: individual practice.

EXERCISE 10

Exercise 10. Practicing the use of definite, concrete words. (50 minutes)

1. Distribute handout 2.10.1. Go over the instructions and ask participants if any clarifications are needed. (5 minutes)

Phase 1. Individual work (20 minutes)

2. Ask the participants to complete the questions. Ask if any clarifications are needed. (5 minutes)
3. As the group works, circulate around the room to check progress. Clarify any concerns they may have while they are working. Be sure to remind participants of the time remaining. (15 minutes)

Phase 2. Discussion (25 minutes)

4. After participants have completed their forms, display overheads 2.10.3 and 2.10.4. Ask for responses from the participants, and **write on a blank overhead, which is placed over overheads 2.10.3 and 2.10.4**, some possible solutions. Encourage discussion of the responses as you review.
5. **Only at the end** of the exercise distribute handout 2.10.2 for futher reference.

6. *(process, generalize)* Provide feedback on the exercise. Also, ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" in order to allow discussion of the process.

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants to tell one of their neighbors two things they might do differently as a result of what they learned. Ask volunteers to give examples.
2. Make a transition to the next session.

13:00 – 14:00 Lunch

DAY TWO

Session 10
Summary of Overheads

Objective of
Session 10. Use of Definite, Concrete Words

4. Eliminate or replace unnecessary phrases and words

2.10.1

Use of Definite, Concrete Words

2.10.2

Results of Exercise 10

Use definite, concrete words

Prior to that time	
An abundance of	
Frequently	
In the event that	
For the purpose of	
In the majority	
Make enquiry regarding	
Utilization	
At the present time	
In view of the fact	

2.10.3

Results of Exercise 10 (continued)

Use definite, concrete words

Terminate	
Hold a meeting	
Remunerate	
Close proximity of	
Employ	
Commence	
Necessitate	
At this point in time	
In the initial instance	
Magnitude	

2.10.4

Exercise 10. The use of definite, concrete words (individual practice)

Phase 1. Individual work (15 minutes)

Find definite, concrete words for each of these phrases or words. (10 minutes)

Prior to that time _____

An abundance of _____

Frequently _____

In the event that _____

For the purpose of _____

In the majority _____

Make enquiry regarding _____

Utilization _____

At the present time _____

In view of the fact _____

Terminate _____

Hold a meeting _____

Remunerate _____

Close proximity to _____

Employ _____

Commence _____

Necessitate _____

At this point in time _____

In the initial instance _____

Magnitude _____

Phase 2. Discussion (25 minutes)

The trainer will invite you to discuss the results of this exercise.

Prose Style for Scientific Writing[1]

A scientific article should hold the attention of its readers by the importance of its content, not by a presentation calculated to impress the reader with the author's intellect and scientific status. The meaning should be clear, not obscured by imprecision, verbosity, or obvious rhetorical devices. Generally, details of prose style are best considered after the basic structure of the manuscript is complete to the author's satisfaction. This is usually done in the third or later draft.

The article should be rewritten as often as necessary to achieve logical order and maximum clarity of expression. At a late stage of revision, the manuscript should be reviewed sentence by sentence and word by word. Incorrectly used words should be recast until they are so clear that they cannot be misunderstood.

Sentence length and structure

An excessively long sentence makes it difficult for the reader to connect the opening words with the closing words and to grasp the point of the sentence at first reading. Excessive length cannot be defined simply, but a sentence of more than four or five typed lines should be examined to see whether it can be rewritten to form two sentences. Consecutive sentences of like structure can make monotonous reading; changing the word order will add variety to sentence structure.

Verbiage

Review the text of the manuscript to eliminate phrases and words that are not needed. Although writing can be too compact and terse, wordiness is the more common fault. For example, a phrase such as "it is interesting to note that" adds no information and only delays getting to the point of the sentence. Change expressions such as "It was reported by Smith that..." to "Smith reported that ..." Below are some frequently used wordy phrases and their more concise equivalents.

a number of	few, many, several
an innumerable number of tiny veins	innumerable tiny veins
as far as our own observations are concerned they show	we observed
ascertain the location of	find
at the present moment, at this in time	now
bright green in color	bright green
by means of	by, with
(We) conducted inoculation experiments on	inoculated
due to the fact that	because
during the time that	while
fewer in number	fewer
for the purpose of examining	to examine

1. Extracted from: *CBE Style manual.* Published by Council of Biology Editors, Inc. Bethesda, Maryland.

for the reason that	because, since
from the standpoint of	according to
goes under the name of	is called
if conditions are such that	if
in all cases	always, invariably
in order to	to
in the course of	during
in the event that	if
in the near future	soon
in the vicinity of	near
in view of the fact that	because
it is this that	this
it would thus appear that	apparently
large numbers of	many
lenticular in character	lenticular
masses are of large size	masses are large
necessitates the inclusion of	needs, requires
of such hardness that	so hard that
on the basis of	from, by, because
ovalin shape, oval-shaped	oval
plants exhibited good growth	plants grew well
prior to (in time)	before
serves the function of being	is
subsequent to	after
the fish in question	this fish
the tests have not as yet	the tests have not
the treatment having been performed	after treatment
there can be little doubt that this	
is throughout the entire area	this probably is throughout the area
throughout the whole of the experiment	throughout the experiment
two equal halves	halves

DAY TWO

Session 11
Work with Words

Instructions to Trainers

SESSION 11

14:00 – 14:45 Session 11. Work with Words

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Eliminate or replace unnecessary phrases and words.

Use overhead 2.11.1 to present the objective.

PROCEDURE

Training techniques: group work, discussion.

EXERCISE 11

Exercise 11. Work with words. (40 minutes)

1. Distribute handout 2.11.1. Go over the instructions with the participants step by step. Ask if any clarifications are needed. (5 minutes)

Phase 1. Group work (10 minutes)

2. Divide the participants into the same four groups they worked in earlier today, and ask them to elect a rapporteur.
3. Groups eliminate wordiness in the three sentences assigned to them. As the groups work, circulate from group to group to check progress. Clarify any concerns the groups may have while they are working. Be sure to remind the groups of the time remaining in the exercise. (10 minutes)

Phase 2. Reporting and discussion (25 minutes)

4. *(experience, process)* The rapporteurs present the groups' results to the audience. Each rapporteur has five minutes to present. (20 minutes)
5. Provide feedback on the content of the presentations. Ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" in order to allow discussion of the process. (5 minutes)

CLOSURE

Closure (5 minutes)

1. (*application*) Ask the participants to tell one of their neighbors two things they might do differently as a result of what they learned. Ask volunteers to give examples.
2. Make a transition to the next session.

DAY TWO

Session 11
Summary of Overheads

Objective of
Sesion 11. Work with Words

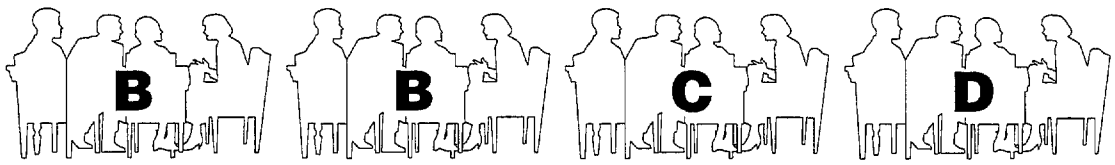
4. Eliminate or replace unnecessary phrases and words

2.11.1

Exercise 11. Work with words[1] (group work)

Phase 1. Group work (10 minutes)

1. Form four groups of participants.



2. Elect rapporteurs to record the groups' results.
3. Eliminate wordiness in the three statements assigned to your group on the following page. (10 minutes)
4. The rapporteurs write the improved statements prepared by the group on the flip chart or on a blank overhead.

Phase 2. Reporting and discussion (25 minutes)

5. The rapporteurs present the groups' results to the audience. Five minutes are allowed for each presentation.
6. The trainer analyzes the responses, after which you will be invited to participate in a discussion.

Eliminate wordiness in the following sentences:

GROUP A

1. An innumerable number of tiny veins were observed.
2. At the present time growers are more careful.
3. We first tested three samples at room temperature, and when these tests had been completed we heated the others to a temperature of 150 degrees C and subjected them to the same tests.

GROUP B

4. In view of the fact that time is short, please hurry.
5. During the time that the course is being given, silence is to be expected.
6. For the reason that men are careless, foolish deeds are often brought to accomplishment.

GROUP C

7. As far as our own observations are concerned, they show no effect.
8. When the choice of a new truck is made, the length of the body on the model chosen should be at least 1½ times greater than the length of the body of the truck that we are using at the present time.
9. This tube serves the dual function of being both a trap and an outlet.

GROUP D

10. In terms of the illustrations, we will always find a whole spectrum of variety with regard to quality.
11. Due to the fact that time is short, please hurry.
12. There can be little doubt that these data are accurate.

1. Extracted from: A. Colodner and M. Kaye (rights reserved).

Exercise 11. Worksheet

DAY TWO

Session 12
Phrases that Say Little

Instructions to Trainers

SESSION 12

14:45 – 15:30 Session 12. Phrases that Say Little

OBJECTIVE

By the end of this session, the participants will be able to the following:

- Eliminate or replace unnecessary phrases and words.

Use overhead 2.12.1 to present the objective.

PROCEDURE

Training technique: "trip around the tables."

EXERCISE 12

Exercise 12. Phrases that say little. (40 minutes)

1. Distribute handouts 2.12.1 and 2.12.2. Handout 1.12.1 gives clear instructions for the exercise. Go over the instructions with the participants step by step. Ask if clarifications are needed. (5 minutes)

Phase 1. Group work (20 minutes)

2. Divide the participants into the same four groups they worked in earlier today, and ask them to elect a rapporteur.
3. *(experience)* As the groups work, circulate from group to group to check progress. Clarify any concerns the groups may have while they are working. Be sure to remind the groups of the time remaining in the exercise. (5 minutes)
4. *(experience)* Invite the rapporteurs to make the "trip around the tables" spending three minutes at each table. It is essential for the exercise to keep the groups on time. Make sure that the rapporteurs switch tables **at the same time**. You must be strict. (10 minutes)
5. *(process)* Rapporteurs return to their own group and discuss the responses, including the inputs the rapporteur collected during the "trip." The rapporteurs write the results on a flip chart for presentation. (5 minutes)

Phase 2. Reporting and discussion (15 minutes)

6. *(process)* The rapporteurs present the groups' results to the audience. Each rapporteur has three minutes to present.
7. Provide feedback on the content of the presentations and invite the participants to discuss the results.

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants what they might do differently as a result of what they learned.
2. Make a transition to the next session.

15:30 – 15:45 Tea/Coffee Break

DAY TWO

Session 12
Summary of Overheads

Objective of
Sesion 12. Phrases that Say Little

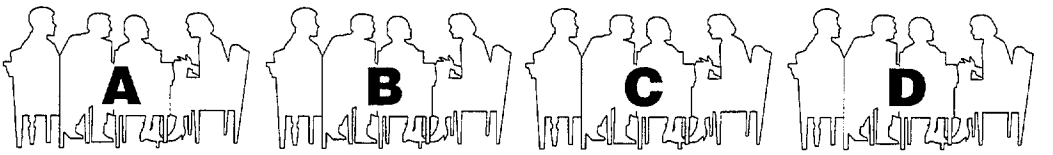
4. Eliminate or replace unnecessary phrases and words

2.12.1

Exercise 12. Phrases that say little ("trip around the tables" technique)

Phase 1. Group work (20 minutes)

1. Form four groups of participants.



2. Each group selects a rapporteur.
3. Each group works on two statements as assigned below. Improve the statements, which include pointless generalities. (10 minutes)

GROUP A	1.	It should be mentioned that in the case of several observations there is room for considerable doubt concerning the correctness of the dates on which they were made.
	2.	There are two cases where the growth rate changed with considerable rapidity.
GROUP B	3.	Taking into account the current state of the art, we can say with confidence that this aspect of the problem as yet awaits resolution.
	4.	Care should be taken in arriving at any definite conclusion.
GROUP C	5.	A detailed analysis of the parameters of the system shows that temperature is the main factor in promoting growth.
	6.	Considering all the experimental evidence, it is quite clear that the enzyme is only partially active.
GROUP D	7.	Phenomenologically speaking, defoliation is a sign of an abnormal state of the plant.
	8.	There occur in the field changes which are quite exceptional in respect to the rapidity of their advent.

4. The rapporteurs compile the groups' inputs on the worksheet (handout 2.12.2).
5. The rapporteurs begin their "trip around the tables." They have three minutes to visit each table.
6. The rapporteurs return to their own groups. They share the contributions collected during the "trip" and write the final results on the flip chart. (5 minutes)

Phase 2. Reporting and discussion (15 minutes)

7. The rapporteurs present the groups' results to the audience. Five minutes ar allowed for each presentation.

8. The trainer analyzes the responses, after which you will be invited to participate in a discussion.

Exercise 12. Worksheet

DAY TWO

Session 13
Raw Material—Types of English Sentences

Instructions to Trainers

SESSION 13

15:45 – 16:15 Session 13. Raw Material—Types of English Sentences

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Define sentences and classify them as simple, compound, or complex.

Use overhead 2.13.1 to present the objective.

PROCEDURE

Training techniques: presentation, discussion.

PRESENTATION

(experience) Distribute handout 2.13.1. Give a brief presentation focusing on types of words and sentences. You will find the information in handouts 2.13.2 and 2.13.3 very useful. Five overheads support the presentation: 2.13.2 through 2.13.6. Be sure to ask the participants if they have any comments or questions or if they need clarifications. Distribute handouts 2.13.2 and 2.13.3. (15 minutes)

EXERCISE 13

Exercise 13. Discussion. (10 minutes)

Invite the group to participate in a discussion on the presentation, getting the participants to talk about personal experiences and examples. Ask the participants how they see this information as useful to them.

CLOSURE

Closure (5 minutes)

1. (*application*) Ask the participants what they might do differently as a result of what they learned.
2. Make a transition to the next session.

DAY TWO

Session 13
Summary of Overheads

Objective of Session 13.
Raw Material: Types of English Sentences

5. Define sentences and classify them as simple, compound, or complex

2.13.1

Raw Materials: Words and Sentences

2.13.2

A Sentence

A sentence is a series of words that convey meaning.

The series begins with an initial capital letter and ends with a full stop.

2.13.3

Simple Sentence

A simple sentence is one that expresses one complete thought

Example:

The technician planted the experimental plots.

2.13.4

Compound Sentence

A compound sentence is one that contains two or more complete thoughts joined by a connecting word, such as *and, but,* or others

Example:

The technician planted the experimental plots and then the weed scientist applied the pre-emergent herbicide.

2.13.5

Complex Sentence

A complex sentence is one that contains one complete thought plus one or more dependent clauses

A dependent clause is a series of words that cannot stand alone

Example:
With the weed scientist following, the technician planted the experimental plots.

2.13.6

Exercise 13. Types of English sentences (plenary discussion)

1. Take notes of major issues presented by the trainer.
2. Formulate questions and comments to discuss in plenary. Use examples from your personal experiences and knowledge.

Types of English Sentences (summary of presentation)

A SENTENCE is a series of words that convey meaning. The series begins with an initial capital letter and ends with a full stop.

A SIMPLE sentence is a sentence that expresses one complete thought.

Examples:

- The dog walked along the road.
- The technician planted the experimental plots.

A COMPOUND sentence is a sentence that contains two or more complete thoughts joined by a connecting word, such as: and, but, or others.

Examples:

- The dog walked along the road and a puppy followed the dog.
- The technician planted the experimental plots and the weed scientist applied the pre-emergent herbicide.

A COMPLEX sentence is a sentence that contains one complete thought plus one or more dependent clauses. A dependant clause is series of words that cannot stand alone.

Examples:

- With a puppy following, the dog walked along the road.
- With the weed scientist following, the technician planted the experimental plots.

Raw Materials: Words and Sentences

E.B. White and his professor put considerable stress on sentences and words as elements in style. So shall we. This isn't a lesson in grammar. Our interest is in writing, putting together words and sentences to communicate. Ability with grammar can't make anyone a great writer. It can help a writer avoid a lot of problems that keep readers from understanding him or her. We'll not undertake to bring you up to date on English grammar. We'll look for ways to encourage you to use more of your writing ability than you have been using.

We'll do it with practice. Here is the motto Bob Kern gives to his trainees:

I have never known a person

who greatly improved

his or her writing

just by

Talking about writing!

This next part may sound a bit like grammar. But the intent is to remind you of some rules concerning the way English users put words together to make sentences. First we'll present three main types of GOOD sentences. Then we'll look at two types of WRONG sentences. Finally, we'll review a weak form and a strong one.

Types of English Sentences

A sentence is a series of words that convey meaning. The series begins with an initial capital letter and ends with a full stop.

Simple sentence

A simple sentence expresses one complete thought.

Example: *The technician planted the experimental plots.*

Compound sentence

A compound sentence contains two or more complete thoughts joined by a connecting word, such as and, but, or others.

Example: *The technician planted the experimental plots and the weed scientist applied the pre-emergent herbicide.*

Complex sentence

A complex sentence contains one complete thought plus one or more dependent clauses. (A dependant clause is a series of words that cannot stand alone.)

Example: *With the weed scientist following, the technician planted the experimental plots.*

Incomplete sentence

An incomplete sentence is incorrect because it lacks a subject or verb (and perhaps an object).

Examples: *Walked along the road.*
The dog along the road.
Dog walked.

Run-on sentence

A run-on sentence is incorrect because it includes two or more thoughts connected only by a comma.

Example: *The dog walked along the road, a long dusty road, a puppy followed.*

Active sentence

An active sentence is one in which a subject takes direct action.

Example: *The dog walked on the road.*

Passive sentence

A passive sentence is one in which a subject is acted upon.

Example: *The road was walked on by the dog.*

Recall White's advice on sentences:

- Use the active voice
- Put statements in positive form
- Use definite, specific, concrete language
- Omit needless words
- Avoid a succession of loose sentences
- Keep related words together

DAY TWO

Session 14
Simple, Compound, and Complex Sentences

Instructions to Trainers

SESSION 14

16:15 – 17:00 Session 14. Simple, Compound, and Complex Sentences

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Define sentences and classify them as simple, compound, or complex.

Use overhead 2.14.1 to present the objective.

PROCEDURE

Training technique: individual practice.

EXERCISE 14

Exercise 14. Types of English sentences. (40 minutes)

1. Distribute handout 2.14.1. This gives clear instructions for this exercise. Go over the instructions with the participants. Ask if clarifications are needed. (5 minutes)

Phase 1. Individual work

2. Ask the participants to work on the exercise. (15 minutes)

Phase 2. Reporting and discussion (20 minutes)

3. *(experience, process)* Ask the participants to exchange their papers with their neighbor, and to correct their answers.
4. Display overheads 2.14.3 through 2.14.6, showing the answers. Display only one answer at a time. Discuss the differences and similarities between their responses and those on the overheads. Ask how many people got all correct, missed five or four, etc. This shows the group a general measure of success.
5. The participants return the paper to the original owner.

CLOSURE

Closure (5 minutes)

1. Ask the participants to tell one of their neighbors two things they might do differently as a result of what they learned. Choose some volunteers to give examples.
2. *Distribute handout 3.17.3, "Readability or Reading Ease." Ask the participants to read this handout. It is the basis for tomorrow's exercise 17.*
3. Make a transition to the last session.

17:00 - 17:30 Feedback on the Day's Activities and PAPA

OBJECTIVES

By the end of this session participants will be able to do the following:

- Provide feedback on the day's activities.
- Consider possible actions they would like to implement in their own organizations.

PROCEDURE

Training technique: individual exercise.

Highlight positive and negative points of the day. Note areas that may need additional attention in the workshop. Participants can write some strengths and weaknesses of this day on handout 2.14.2, and use handout 2.14.3 to facilitate their task. (15 minutes)

PAPA

(application) Ask the participants to take some time to jot down some "action ideas" they may have for themselves as a result of today's activities. They can use handout 2.14.4. (15 minutes)

DAY TWO

Session 14
Summary of Overheads

Objective of
Session 14. Simple, Compound, and Complex Sentences

5. Define sentences and classify them as simple, compound, or complex

2.14.1

Simple, Compound, and Complex Sentences

2.14.2

Exercise 14. Types of English Sentences

Mark *S* for a SIMPLE sentence
Mark *CM* for a COMPOUND sentence
Mark *CX* for a COMPLEX sentence

CX 1. In the last 20 years, there have been four serious floods.

S 2. The rainy season began four weeks late.

CM 3. The experiment was planned carefully, but stray cattle spoiled it.

2.14.3

CM 4. Fertilizers increased crop yields, and families earned more profits.

S 5. All five researchers helped lay out the trial.

S 6. The application of 60 kg/ha of N increased the yield of rice.

CX 7. Although the farmers sprayed the crop, insect damage reduced the yield.

S 8. It was clear to everyone that the experiment failed because of careless application of fertilizer treatments.

2.14.4

CM 9. The trial had been sprayed with the wrong chemical, and it was abandoned.

CX 10. Diseased cattle, which had been found to have food-and-mouth infection, were put in quarantine.

CM 11. Only one of three experiments gave statistically significant results; however, the researcher based a journal article on that one experiment.

S 12. Four replications should be enough in this instance.

CX 13. The trial was indeed planted before the rains set in; the scientist had seen to that.

2.14.5

S 14. The task force of scientists cooperated in a series of complex and sophisticated experiments.

CX 15. He did not consider the research successful, in spite of outstanding results in two of his experiments.

CX 16. Hurrying to finish before dark, the crew completed laying out the trial.

2.14.6

Exercise 14. Types of English sentences
Answers

The letters in front of the sentences mean the following:

S for a SIMPLE, CM for a COMPOUND, and CX for a COMPLEX sentence.

CX 1. In the last 20 years there have been four serious floods.

S 2. The rainy season began four weeks late.

CM 3. The experiment was planned carefully, but stray cattle spoiled it.

CM 4. Fertilizers increased crop yields, and families earned more profits.

S 5. All five researchers helped lay out the trial.

S 6. The application of 60 kg/ha of N increased the yield of rice.

CX 7. Although the farmers sprayed the crop, insect damage reduced the yield.

CM 8. It was clear to everyone that the experiment failed because of careless application of fertilizer treatments.

CX 9. The trial had been sprayed with the wrong chemical, and it was abandoned.

CX 10. Diseased cattle, which had been found to have food-and-mouth infection, were put in quarantine.

CM 11. Only one of three experiments gave statistically significant results; however, the researcher based a journal article on that one experiment.

S 12. Four replications should be enough in this instance.

CX 13. The trial was indeed planted before the rains set in; the scientist had seen to that.

S 14. The task force of 14 scientists cooperated in a series of complex and sophisticated experiments.

CX 15. He did not consider the research successful, in spite of outstanding results in two of his experiments.

CX 16. Hurrying to finish before dark, the crew completed laying out the trial.

Exercise 14. Types of English sentences (individual practice)

Phase 1. Individual work (15 minutes)

1. Read the sentences and mark the following letters in front of the numbers to indicate the different types of sentences: S for a SIMPLE, CM for a COMPOUND, and CX for a COMPLEX sentence.

_____ 1. In the last 20 years there have been four serious floods.

_____ 2. The rainy season began four weeks late.

_____ 3. The experiment was planned carefully, but stray cattle spoiled it.

_____ 4. Fertilizers increased crop yields, and families earned more profits.

_____ 5. All five researchers helped lay out the trial.

_____ 6. The application of 60 kg/ha of N increased the yield of rice.

_____ 7. Although the farmers sprayed the crop, insect damage reduced the yield.

_____ 8. It was clear to everyone that the experiment failed because of careless application of fertilizer treatments.

_____ 9. The trial had been sprayed with the wrong chemical, and it was abandoned.

_____ 10. Diseased cattle, which had been found to have food-and-mouth infection, were put in quarantine.

_____ 11. Only one of three experiments gave statistically significant results, however, the researcher based a journal article on that one experiment.

_____ 12. Four replications should be enough in this instance.

_____ 13. The trial was indeed planted before the rains set in, the scientist had seen to that.

_____ 14. The task force of 14 scientists cooperated in a series of complex and sophisticated experiments.

_____ 15. He did not consider the research successful, in spite of outstanding results in two of his experiments.

_____ 16. Hurrying to finish before dark, the crew completed laying out the trial.

Phase 2. Reporting and discussion (20 minutes)

2. The trainer will ask you to exchange papers with your neighbor, and to correct them.

3. Discuss the differences and similarities between the groups' responses and the key answers.

Strengths and Weaknesses

- **Please list what you consider to be three strengths of day two**

1.
2.
3.

- **Please list what you consider to be three weaknesses of day two**

1.
2.
3.

- **Suggestions for improvements**

Guidelines to Provide Feedback on the Workshop

1. **The Module**

   Content

   - usefulness/relevance
   - amount of information

   Structure

   - sequence
   - duration
   - balance between trainers' and trainees' participation
   - instructions to trainers
   - visual aids
   - handouts
   - extra reading
   - PAPA
   - evaluation

2. **Process: training techniques and direction**

   - usefulness/relevance/effectiveness
   - group interaction
   - clarity of questions/exercises instructions
   - opening and closure of the days

3. **Trainers', facilitators', and trainees' performance**

   - presentation/communication skills
   - interaction/effective participation
   - punctuality/interest/commitment/willingness to facilitate learning/willingness to participate
   - other attitudes

4. **Logistical support**

   - organization
   - accuracy
   - punctuality
   - willingness to assist participants
   - services provided in general

5. **Workshop environment**

- physical (training facilities, training material, hotel facilities in general)
- psychological (personal feelings such as self-motivation, interest, satisfaction, self-achievement)
- social (development of friendship, relaxed, comfortable among participants, etc.)

6. **Workshop results/outputs**

- personal and professional assessment
- recommendations

7. **General comments**

PAPA - FIRST STAGE

Ideas for action items

Date : _____

Workshop title : SADC/ESAMI/ISNAR Workshop on Scientific Writing and Presentation

Date/Venue : _____

Name : _____

Organization : _____

Ideas I would like to try when I return to work at my research institute, based on what I learned in this training workshop.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Note: You can use the workshop objectives, what you learn during the workshop, handouts, conversations with participants and trainers, etc., to come up with ideas.

DAY THREE

Scientific Writing and Presentation

DAY THREE — Overview

Objectives

By the end of the day, the participants will be able to do the following:

1. Identify complete, incomplete, and run-on sentences.
2. Identify active and passive sentences.
3. Measure readability using the FLESCH formula.
4. Identify and discuss several ways in which the use of the computer eases editing.
5. Apply knowledge and skills to appropriately edit scientific papers.

Handouts

3.15.1 Overview
3.15.2 Tentative Schedule
3.15.3 Complete, Incomplete, and Run-on Sentences (summary of presentation)
3.15.4 Exercise 15. Complete, Incomplete, and Run-on Sentences
3.15.5 Exercise 15. Worksheet
3.16.1 Active and Passive (summary of presentation)
3.16.2 Exercise 16. Active and Passive Sentences
3.16.3 Exercise 16. Worksheet
3.17.1 Exercise 17. Measuring Readability
3.17.2 Exercise 17. Worksheet
3.17.3 Readability or Reading Ease (text)
3.18.1 Exercise 18. Strengths and Weaknesses of Using a Computer
3.18.2 Exercise 18. Worksheet, Phase 1
3.18.3 Exercise 18. Worksheet, Phase 2
3.18.4 Making Use of the Computer (text)
3.19.1 Editing (summary of presentation)
3.19.2 Exercise 19. Editing
3.19.3 Exercise 19. Worksheet
3.19.4 Exercise 19. Extra Editing
3.19.5 Strengths and Weaknesses of Day Three
3.19.6 Guidelines to Provide Feedback on the Workshop
3.19.7 PAPA Form — First Stage

Scientific Writing and Presentation

DAY THREE — Tentative Schedule

08:30 – 09:00	**Opening of the Day's Activities**
09:00 – 10:00	**Session 15. Complete, Incomplete, and Run-on Sentences** (Presentation and exercise 15)
10:00 – 10:30	**Session 16. Active and Passive Sentences** (Presentation and exercise 16)
10:30 – 10:45	Tea/Coffee Break
10:45 – 11:30	**Session 16. (Continued)**
11:30 – 13:00	**Session 17. Measure Readability** (Exercise 17)

13:00 – 14:00 Lunch

14:00 – 15:30	**Session 18. Strengths and Weaknesses of Using the Computer** (Exercise 18)
15:30 – 15:45	Tea/Coffee Break
15:45 – 17:00	**Session 19. Editing** (Presentation and exercise 19)
17:00 – 17:30	**Feedback on the Day's Activities and PAPA**

Scientific Writing and Presentation

DAY THREE — Checklist for Trainers

Handouts

		Yes ✔	No ✔
3.15.1	Overview	❐	❐
3.15.2	Tentative Schedule	❐	❐
3.15.3	Complete, Incomplete, and Run-on Sentences (summary of presentation)	❐	❐
3.15.4	Exercise 15. Complete, Incomplete, and Run-on Sentences	❐	❐
3.15.5	Exercise 15. Worksheet	❐	❐
3.16.1	Active and Passive (summary of presentation)	❐	❐
3.16.2	Exercise 16. Active and Passive Sentences	❐	❐
3.16.3	Exercise 16. Worksheet	❐	❐
3.17.1	Exercise 17. Measuring Readability	❐	❐
3.17.2	Exercise 17. Worksheet	❐	❐
3.17.3	Readability or Reading Ease (text)	❐	❐
3.18.1	Exercise 18. Strengths and Weaknesses of Using a Computer	❐	❐
3.18.2	Exercise 18. Worksheet, Phase 1	❐	❐
3.18.3	Exercise 18. Worksheet, Phase 2	❐	❐
3.18.4	Making Use of the Computer (text)	❐	❐
3.19.1	Editing (summary of presentation)	❐	❐
3.19.2	Exercise 19. Editing	❐	❐
3.19.3	Exercise 19. Worksheet	❐	❐
3.19.4	Exercise 19. Extra Editing	❐	❐
3.19.5	Strengths and Weaknesses of Day Three	❐	❐
3.19.6	Guidelines to Provide Feedback on the Workshop	❐	❐
3.19.7	PAPA Form — First Stage	❐	❐

Overheads

3.15.1	Objectives of Day Three	❐	❐
3.15.2	Schedule of Day Three	❐	❐
3.15.3	Objective of Session 15	❐	❐
3.15.4	Complete, Incomplete, and Run-on Sentences	❐	❐
3.15.5	A Complete Sentence	❐	❐
3.15.6	An Incomplete Sentence	❐	❐
3.15.7	A Run-on Sentence	❐	❐
3.15.8	Exercise 15. Results	❐	❐
3.15.9	Exercise 15. Results	❐	❐
3.15.10	Exercise 15. Results	❐	❐
3.16.1	Objective of Session 16	❐	❐
3.16.2	Active and Passive Sentences	❐	❐
3.16.3	An Active Sentence	❐	❐

		Yes	No
3.16.4	A Passive Sentence	❒	❒
3.16.5	White's Advice on Sentences	❒	❒
3.16.6	Exercise 16. Results	❒	❒
3.16.7	Exercise 16. Results	❒	❒
3.16.8	Exercise 16. Results	❒	❒
3.17.1	Objective of Session 17	❒	❒
3.17.2	Measuring Readability	❒	❒
3.17.3	Exercise 17. Results	❒	❒
3.17.4	Exercise 17. Results	❒	❒
3.18.1	Objective of Session 18	❒	❒
3.18.2	Making Use of the Computer	❒	❒
3.19.1	Objective of Session 19	❒	❒
3.19.2	Editing	❒	❒
3.19.3	Why Edit a Manuscript?	❒	❒
3.19.4	Two Types of Editing	❒	❒
3.19.5	Editorial Proofing Marks	❒	❒
3.19.6	Editorial Proofing Marks	❒	❒
3.19.7	Editorial Proofing Marks	❒	❒
3.19.8	Exercise 19. Results	❒	❒
3.19.9	Exercise 19. Results	❒	❒

Materials

• Overhead projector	❒	❒
• Projector screen	❒	❒
• Flip-chart stands (minimum 2)	❒	❒
• Flip-chart paper/pads (about 10 per day)	❒	❒
• Markers for writing on newsprint	❒	❒
• Markers for writing on transparencies	❒	❒
• Blank transparencies	❒	❒
• Stapler	❒	❒
• Tape (strong masking tape and regular tape)	❒	❒
• Push pins	❒	❒
• Glue	❒	❒
• Pencils/note pads/pens	❒	❒
• Pencil sharpeners	❒	❒
• Extension cords	❒	❒
• Photocopying facilities	❒	❒
• Spare bulbs for overhead projector	❒	❒
• Extra notepads and pens	❒	❒
• Scissors	❒	❒

Additional references

1. Editorial Review of Manuscripts from CBE Style Manual	❒	❒
2. Elements of Style: Conciseness by Colodner and Kaye	❒	❒

DAY THREE

Session 15
Complete, Incomplete, and Run-on Sentences

Instructions to Trainers

PRE-SESSION

08:30 – 09:00 Opening of the Day's Activities
– Review of the previous day's activities.
– Summary of the evaluation of the previous day.
– Overview of the day's activities.

OBJECTIVES

By the end of the pre-session the participants will be able to do the following:

- Assess the progress of the workshop.
- List the objectives and describe the agenda for the day's activities.

OPENING

Invite a volunteer to review the previous day's activities. (10 minutes)

Summarize the evaluation of the previous day. (10 minutes)

Distribute the overview and the schedule for day three (handouts 3.15.1 and 3.15.2) to the participants. Review the objectives and schedule (overheads 3.15.1 and 3.15.2). Ask if clarifications are needed. (10 minutes)

SESSION 15

09:00 – 10:00 Session 15. Complete, Incomplete, and Run-on Sentences

OBJECTIVES

By the end of this session, the participants will be able to do the following:

- Identify complete, incomplete, and run-on sentences.

Use overhead 3.15.3 to present the objective.

PROCEDURE

Training techniques: presentation, individual practice, discussion.

PRESENTATION

(experience) Give a brief presentation on complete, incomplete, and run-on sentences. Key points are summarized in handout 3.15.3. Overheads 3.15.4 through 3.15.7 support the presentation. At the end of the presentation distribute handout 3.15.3 and be sure to ask the participants if they have any comments or questions, or if they need clarification. (10 minutes)

EXERCISE 15

Exercise 15. Complete, incomplete, and run-on sentences. (45 minutes)

1. Distribute handouts 3.15.4 and 3.15.5. Handout 3.15.4 gives clear instructions for the exercise. Go over the instructions with the participants step by step. Ask if clarifications are needed. (5 minutes)

Phase 1. Individual work (10 minutes)

2. *(experience)* Ask the participants to work on the exercise. As they work, circulate around the group and check progress. Clarify any concerns the participants may have while they are working. Be sure to remind the group of the time remaining.

Phase 2. Results and discussion (30 minutes)

3. *(experience, process)* Ask the participants to exchange their papers with their neighbors.
4. Display overheads 3.15.8, 3.15.9, and 3.15.10 showing the answers. Display only one answer at a time. Ask the participants to correct their partner's paper.
5. Provide feedback on the answers. Discuss the differences and similarities between their responses and those on the overheads.
6. Ask how many people got all correct (participants show hands), how many missed five, or four, etc. This will show the group a general measure of success.
7. Ask each person to return the paper to its owner.
8. (*process, generalize*) At the end of the exercise review the key points of this session. Ask the participants to provide feedback on the exercise.

CLOSURE

Closure (5 minutes)

1. (*application*) Ask the participants to tell one of their neighbors two things they might do differently as a result of what they learned. Choose some volunteers to give examples.
2. Make a transition to the next session.

DAY THREE

Session 15
Summary of Overheads

Objectives of Day Three

1. Identify complete, incomplete, and run-on sentences
2. Identify active and passive sentences.
3. Measure readability using the FLESCH formula
4. Identify and discuss several ways in which the use of the computer eases editing
5. Apply knowledge and skills to appropriately edit scientific papers

3.15.1

Schedule of Day Three

08:30 – 09:00 Opening of the Day's Activities
09:00 – 10:00 Session 15. Complete, Incomplete, and Run-on Sentences
10:00 – 10:30 Session 16. Active and Passive Sentences
Tea/Coffee Break
10:45 – 11:15 Session 16. (Continued)
11:15 – 13:00 Session 17. Measure Readability
Lunch
14:00 – 15:30 Session 18. Strengths and Weaknesses of Using the Computer
Tea/Coffee Break
15:45 – 17:00 Session 19. Editing
17:00 – 17:30 Feedback on the Day's Activities and PAPA

3.15.2

Objective of Session 15. Complete, Incomplete, and Run-on Sentences

1. Identify complete, incomplete, and run-on sentences

3.15.3

Complete, Incomplete, and Run-on Sentences

3.15.4

A Complete Sentence

A *sentence* is a series of words that convey meaning

A *complete sentence* has a subject and verb and perhaps and object

Examples:

- *The dog walked along the road.*
- *The technician planted the experimental plots.*

3.15.5

An Incomplete Sentence

An *incomplete sentence* is one that lacks a subject, verb, or often, an object

Examples:

- *Walked along the road.*
- *The dog along the road.*
- *Dog walked.*
- *Planted the experimental plots.*
- *The technician planted.*

3.15.6

A Run-on Sentence

A *run-on sentence* includes two or more thoughts connected only by a comma

Example:

The dog walked along the road, a long dusty road, a puppy followed

3.15.7

Results of Exercise 15

C 1. The researcher worked diligently to plan the trial.

I 2. In spite of all his efforts [, the experiment failed].

RO 3. The workmen got little done. [They] arrived late. [They] worked slowly. [They] stopped early for lunch.

I 4. [The crew began] when the time was right for laying out the complicated trial.

C 5. He was the kind of writer whose sentences contained many clauses.

3.15.8

RO 6. He was a good writer. [H]e was not careful in editing or proof-reading his material.

C 7. Most of the errors in the manunacript were made by the typist.

C 8. He took his advanced studies in a British university. [I]t seems usual for writers [at that British university] to make sentences that go on clause after clause.

C 9. He liked to write sentences that went on and on and on and on.

I 10. [We found] five grammatical mistakes in the first 50 words of text.

C 11. The writer was proud of his composition. [However, his peers criticized it.]

3.15.9

RO 12. My professor gives good lectures. [H]e speaks slowly and distinctly.

C 13. The new rice variety was noted most for its tolerance to brown leafhopper.

C 14. [T]he new rice variety was popular with farmers in the delta. [It was] tolerant to brown leafhopper.

I 15. Its genetically derived tolerance to brown leafhopper [assured its popularity].

RO 16. The researcher was applauded for his results. [He had] found a line of papaya that resisted diseases and continued to bear over a long period.

3.15.10

Exercise 15. Complete, incomplete, and run-on sentences (answers)

Mark C for COMPLETE sentence.
Mark I for INCOMPLETE sentence.
Mark RO for RUN-ON sentence.

C 1. The researcher worked diligently to plan the trial.

I 2. In spite of all his efforts[, the experiment failed].

RO 3. The workmen got little done. [They] arrived late. [They] worked slowly. [They] stopped early for lunch.

I 4. [The crew began] when the time was right for laying out the complicated trial.

C 5. He was the kind of writer whose sentences contained many clauses.

RO 6. He was a good writer. [H]e was not careful in editing or proof-reading his material.

C 7. Most of the errors in the manuscript were made by the typist.

C 8. He took his advanced studies in a British university. [I]t seems usual for writers [at that British university] to make sentences that go on clause after clause.

C 9. He liked to write sentences that went on and on and on and on.

I 10. [We found] five grammatical mistakes in the first 50 words of text.

C 11. The writer was proud of his composition. [However, his peers criticized it].

RO 12. My professor gives good lectures. [H]e speaks slowly and distinctly.

C 13. The new rice variety was noted most for its tolerance to brown leafhopper.

C 14. [T]he new rice variety was popular with farmers in the delta. [It was] tolerant to brown leafhopper.

I 15. Its genetically derived tolerance to brown leafhopper [assured its popularity].

RO 16. The researcher was applauded for his results. [He had] found a line of papaya that resisted diseases and continued to bear over a long period.

Handout—Overview of Day Three

Scientific Writing and Presentation

Objectives

By the end of the day, the participants will be able to do the following:

1. Identify complete, incomplete, and run-on sentences.
2. Identify active and passive sentences.
3. Measure readability using the FLESCH formula.
4. Identify and discuss several ways in which the use of the computer eases editing.
5. Apply knowledge and skills to appropriately edit scientific papers.

Handouts

3.15.1 Overview
3.15.2 Tentative Schedule
3.15.3 Complete, Incomplete, and Run-on Sentences (summary of presentation)
3.15.4 Exercise 15. Complete, Incomplete, and Run-on Sentences
3.15.5 Exercise 15. Worksheet
3.16.1 Active and Passive (summary of presentation)
3.16.2 Exercise 16. Active and Passive Sentences
3.16.3 Exercise 16. Worksheet
3.17.1 Exercise 17. Measuring Readability
3.17.2 Exercise 17. Worksheet
3.17.3 Readability or Reading Ease (text)
3.18.1 Exercise 18. Strengths and Weaknesses of Using a Computer
3.18.2 Exercise 18. Worksheet, Phase 1
3.18.3 Exercise 18. Worksheet, Phase 2
3.18.4 Making Use of the Computer (text)
3.19.1 Editing (summary of presentation)
3.19.2 Exercise 19. Editing
3.19.3 Exercise 19. Worksheet
3.19.4 Exercise 19. Extra Editing
3.19.5 Strengths and Weaknesses of Day Three
3.19.6 Guidelines to Provide Feedback on the Workshop
3.19.7 PAPA Form — First Stage

Handout—Tentative Schedule Day Three

Scientific Writing and Presentation

08:30 – 09:00	**Opening of the Day's Activities**
09:00 – 10:00	**Session 15. Complete, Incomplete, and Run-on Sentences** (Presentation and exercise 15)
10:00 – 10:30	**Session 16. Active and Passive Sentences** (Presentation and exercise 16)
10:30 – 10:45	Tea/Coffee Break
10:45 – 11:30	**Session 16. (Continued)**
11:30 – 13:00	**Session 17. Measure Readability** (Exercise 17)

13:00 – 14:00 Lunch

14:00 – 15:30	**Session 18. Strengths and Weaknesses of Using the Computer** (Exercise 18)
15:30 – 15:45	Tea/Coffee Break
15:45 – 17:00	**Session 19. Editing** (Presentation and exercise 19)
17:00 – 17:30	**Feedback on the Day's Activities and PAPA**

Complete, Incomplete, and Run-on Sentences (summary of presentation)

A sentence is a series of words that convey meaning.

A complete sentence has a subject and predicate (and perhaps an object).

Examples:
- The dog walked along the road.
- The technician planted the experimental plots.

An incomplete sentence is one that lacks a subject or predicate.

Examples:
- Walked along the road
- The dog along the road
- Planted the experimental plots
- The technician the experiment plots

A run-on sentence includes two or more thoughts connected only by a comma.

Example:
- It was a hot day, the dog walked along the road, the technician planted experimental plots, they were very tired and thirsty.

Exercise 15. Complete, incomplete, and run-on sentences (individual practice)

Phase 1. Individual work (10 minutes)

1. Read the sentences and mark in front of the numbers one of the following letters: C for COMPLETE sentence, I for INCOMPLETE sentence, and RO for RUN-ON sentence.

_____ 1. The researcher worked diligently to plan the trial.

_____ 2. In spite of all his efforts.

_____ 3. The workmen got little done, arriving late, working slowly, and stopping early for lunch.

_____ 4. When the time was right for laying out the complicated trial.

_____ 5. He was the kind of writer whose sentences contained many clauses.

_____ 6. He was a good writer, he was not careful in editing or proof-reading his material.

_____ 7. Most of the errors in the manuscript were made by the typist.

_____ 8. He took his advanced studies in a British university where it seems usual for writers to make sentences that go on clause after clause.

_____ 9. He liked to write sentences that went on and on and on and on.

_____ 10. Five grammatical mistakes in the first 50 words of text.

_____ 11. The writer was proud of his composition in spite of criticism by his peers.

_____ 12. My professor gives good lectures, he speaks slowly and distinctly.

_____ 13. The new rice variety was noted most for its tolerance to brown leafhopper.

_____ 14. Being tolerant to brown leafhopper, the new rice variety was popular with farmers in the delta.

_____ 15. Its genetically derived tolerance to brown leafhopper.

_____ 16. The researcher was applauded for his results, finding a line of papaya that resisted diseases, bearing over a long period.

Phase 2. Results and discussion (30 minutes)

2. The trainer will ask you to exchange papers with you neighbor, and to correct them.
3. Discuss the differences and similarities between the groups' responses and the key answers.

Exercise 15. Worksheet

DAY THREE

Session 16
Active and Passive Sentences

Instructions to Trainers

SESSION 16

10:00 – 10:30 Session 16. Active and Passive Sentences

10:30 – 10:45 Tea/Coffee Break

10:45 – 11:30 Session 16. (Continued)

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Identify active and passive sentences.

Use overhead 3.16.1 to present the objective.

PROCEDURE

Training techniques: presentation, individual practice, discussion.

PRESENTATION

(experience) Give a brief presentation on active and passive sentences. At the end of the presentation distribute handout 3.16.1 and be sure to ask the participants if they have any comments or questions, or if they need clarifications. Overheads 3.16.2 through 3.16.5 support the presentation. (15 minutes)

EXERCISE 16

Exercise 16. Active and passive sentences. (55 minutes)

1. Distribute handouts 3.16.2 and 3.16.3. Go over the instructions with the participants step by step. Ask if clarifications are needed. (5 minutes)

Phase 1. Individual work (20 minutes)

2. *(experience)* Ask participants to complete the exercise. When they are working, circulate to check progress.

Phase 2. Results and Discussion (30 minutes)

3. *(experience, process)* Ask the participants to exchange their papers with their neighbors.
4. Display overheads 3.16.6, 3.16.7, and 3.16.8 with the answers. Display only one answer at a time. Ask the participants to correct their partner's paper. Discuss the differences and similarities between their responses and those on the overheads.
5. Ask how many people got all correct (participants show hands), how many missed five, or four, etc. This will show the group a general measure of success.

6. Have each person return the paper to its owner. If time permits, ask the participants to give a few examples of active and passive sentences.

7. *(process, generalize)* Provide feedback on the content of the exercise. Also, ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" (10 minutes)

CLOSURE

Closure (5 minutes)

1. *(application)* Tell the participants to write something new they would tell their colleagues as a result of what they learned. Ask for some volunteers to give examples.

2. Make a transition to the next session.

DAY THREE

Session 16
Summary of Overheads

Objective of Session 16. Active and Passive Sentences

2. Identify active and passive sentences

3.16.1

Active and Passive Sentences

3.16.2

An Active Sentence

An *active sentence* is one in which a subject takes direct action.

Examples:
- *The technician planted the experimental plots.*
- *The dog walked on the road.*
- *The animals gained 0.25 kg daily.*

3.16.3

A Passive Sentence

A *passive sentence* is one in which a subject is acted upon.

Examples:
- *The experimental plots were planted by the technician.*
- *The road was walked on by the dog.*
- *Counts on plants were taken 50 days after planting (DAP).*

3.16.4

Recall White's Advice on Sentences

- Use the active voice as much as possible
- Put statements in positive form
- Use definite, specific, concrete language
- Omit needless words
- Avoid a succession of loose sentences
- Keep related words together

3.16.5

Results of Exercise 16

A 1. The clock showed the time as 13:00 hours.

P 2. Hands of the clock were seen to show the time to be 13:00 hours.

P 3. Consideration will be given to all viewpoints by the chairman.

P 4. Daily gains were found to be 0.5 kg.

P 5. Measurements were recorded each day.

P 6. Expect to respond within three minutes.

3.16.6

P 7. Counts of plants in the plot were made 45 days after the crop was sown.

A 8. The chairman will consider all viewpoints.

A 9. After they had reported their findings, students were released for holidays.

P 10. You will be expected to respond within three minutes.

A 11. Experimenters counted plants in the plots 45 days after sowing.

A 12. Animals gained 0.5 kg daily.

3.16.7

A 13. Students reported their findings and left for holidays.

P 14. His actions were to make sure the association was operating on a sound fiscal basis.

A 15. He hypothesized that others would see his actions as weak.

A 16. He made sure the association operated on a sound fiscal basis.

P 17. It was reported that measurements were recorded each day.

P 18. His hypothesis was that his actions would be seen as weak.

3.16.8

Exercise 16. Active and passive sentences (answers)

Mark A for ACTIVE sentence.
Mark P for PASSIVE sentence.

A 1. The clock showed the time as 13:00 hours.

P 2. Hands of the clock were seen to show the time to be 13:00 hours.

P 3. Consideration will be given to all viewpoints by the chairman.

P 4. Daily gains were found to be 0.5 kg.

P 5. Measurements were recorded each day.

A 6. Expect to respond within three minutes.

P 7. Counts of plants in the plot were made 45 days after the crop was sown.

A 8. The chairman will consider all viewpoints.

P 9. After they had reported their findings, students were released for holidays.

P 10. You will be expected to respond within three minutes.

A 11. Experimenters counted plants in the plots 45 days after sowing.

A 12. Animals gained 0.5 kg daily.

A 13. Students reported their findings and left for holidays.

P 14. His actions were to make sure the association was operating on a sound fiscal basis.

A 15. He hypothesized that others would see his actions as weak.

A 16. He made sure the association operated on a sound fiscal basis.

P 17. It was reported that measurements were recorded each day.

P 18. His hypothesis was that his actions would be seen as weak.

Active and Passive Sentences (summary of presentation)

An *active sentence* is one in which a subject takes direct action. The following are examples of active sentences:

- The technician planted the experimental plots.
- The dog walked on the road.
- The animals gained 0.25 kg daily.

A *passive sentence* is one in which a subject is acted upon. The following are examples of passive sentences:

- The experimental plots were planted by the technician.
- The road was walked on by the dog.
- Counts on plants were taken 50 days after planting (DAP).

Recall White's advice on sentences:

- Use the active voice as much as possible
- Put statements in positive form
- Use definite, specific, and concrete language
- Omit needless words
- Avoid a succession of loose sentences
- Keep related words together

Exercise 16. Active and passive sentences (individual practice)

Phase 1. Individual work (20 minutes)

1. Read the sentences and mark in front of the numbers one of the following letters:

A for ACTIVE, or P for PASSIVE sentences.

_____ 1. The clock showed the time as 13:00 hours.

_____ 2. Hands of the clock were seen to show the time to be 13:00 hours.

_____ 3. Consideration will be given to all viewpoints by the chairman.

_____ 4. Daily gains were found to be 0.5 kg.

_____ 5. Measurements were recorded each day.

_____ 6. Expect to respond within three minutes.

_____ 7. Counts of plants in the plot were made 45 days after the crop was sown.

_____ 8. The chairman will consider all viewpoints.

_____ 9. After they had reported their findings, students were released for holidays.

_____ 10. You will be expected to respond within three minutes.

_____ 11. Experimenters counted plants in the plots 45 days after sowing.

_____ 12. Animals gained 0.5 kg daily.

_____ 13. Students reported their findings and left for holidays.

_____ 14. His actions were to make sure the association was operating on a sound fiscal basis.

_____ 15. He hypothesized that others would see his actions as weak.

_____ 16. He made sure the association operated on a sound fiscal basis.

_____ 17. It was reported that measurements were recorded each day.

_____ 18. His hypothesis was that his actions would be seen as weak.

Phase 2. Results and discussion (30 minutes)

2. The trainer will ask you to exchange papers with your neighbor, and to correct them.

3. Discuss the differences and similarities between the groups' responses and the key answers.

Exercise 16. Worksheet

DAY THREE

Session 17
Measuring Readability

Instructions to Trainers

SESSION 17

11:30 – 13:00 Session 17. Measuring Readability

OBJECTIVE

After this session, the participants will be able to do the following:

- Measure readability using the FLESCH formula.

Use overhead 3.17.1 to present the objective.

PROCEDURE

Training technique: group exercise.

EXERCISE 17

Exercise 17. Measuring readability. (1 hour 25 minutes)

1. Distribute handouts 3.17.1 and 3.17.2. Handout 3.17.1 gives clear instructions for the exercise. It is important that you go over the instructions with the participants step by step. Handout 3.17.3, which was distributed yesterday, is the basis of the exercise. Ask if clarifications are needed. (10 minutes)

Phase 1. Group work (35 minutes)

2. Divide the participants into four groups. Ask them to elect a rapporteur.
3. The groups work on the task and prepare their presentations. As they work, circulate from group to group to check progress. Clarify any concerns the groups may have while they are working. Be sure to remind them of the time remaining.

Phase 2. Reporting and presentation (40 minutes)

4. *(experience, process)* Invite the rapporteurs to present their group's results. Five minutes are available for each group. Remain on time.
5. Display overheads 3.17.3 and 3.17.4 and discuss the answers to the exercise. Facilitate some discussion on how participants arrived at the number, difficulties, constraints, etc.
6. At the end of the exercise provide feedback on the discussion and summarize the main points of using the FLESCH method. Also, ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" in order to allow discussion of the process.

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants "What might you do differently as a result of what you learned?"
2. Make a transition to the next session.

13:00 – 14:00 Lunch

DAY THREE

Session 17
Summary of Overheads

Objective of Session 17. Measure Readability

3. Measure readability using the FLESCH formula

3.17.1

Measuring Readability

3.17.2

Results of Exercise 17: Example # 1

- 73 words in 2 sentences: 36.5 average words per sentence.
- 140 syllables in 73 words: 1.92 average syllables per word.

Plugging them into the formula:

1.015 x 36.5 = 37.0
84.6 x 1.92 = 162.4
Sum 199.4

206.8 - 199.4 = 7.4 very difficult

3.17.3

Results of Exercise 17: Example # 2

- 57 words in 4 sentences: 14.3 average words per sentence.
- 99 syllables in 57 words: 1.74 average syllables per word.

Plugging them into the formula:

1.015 x 14.3 = 14.5
84.6 x 1.74 = 147.2
Sum 161.7

206.8 - 161.7 = 45.1 difficult

3.17.4

Exercise 17. Measuring readability (answers)

Example 1 (first passage)

73 words in two sentences:
average words per sentence: 73 ÷ 2 = 36. 5
140 syllables in 73 words:
average syllables per word: 140 ÷ 73 = 1.92

Plugging them into the formula
1.015 x 36.5 = 37.0
84.6 x 1.92 = 162.4
Sum = 199.4
206.8 - 199.4 = 7.4 very difficult

Example 2 (second passage)

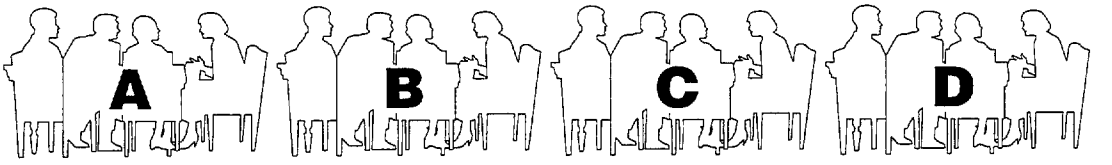
57 words in four sentences: 14.3 average words per sentence.
99 syllables in 57 words: 1.74 average syllables per word.

Plugging them into the formula
1.015 x 14.3 = 14.5
84.6 x 1.74 = 147.2
Sum = 161.7
206.8 - 161.7 = 45.1 difficult

Exercise 17. Measuring readability (group exercise)

Phase 1. Group work (35 minutes)

1. Form four groups.



2. Elect a rapporteur.
3. Review handout 3.17.3 on readability or reading ease. (10 minutes)

   Remember the following definitions.

   A *word* is one or more characters with blank space before and after (a, two-step, 3, 1992, sequentially). A *sentence* is a group of words starting with the first letter capitalized and ending with a full stop (or period). Commas, semi-colons, colons, and dashes are only partial stops; they don't end a sentence. *Syllables* are the breaking points in the way we pronounce words. "Through" has one syllable, "ever" has two (ev-er), "however" has three (how-ev-er). "Constitutionality" has seven (con-sti-tu-tion-al-i-ty).

4. Groups A and B work on the first passage (example 1) and groups C and D on the second passage (example 2). (25 minutes)

   Example 1 (groups A and B)

   The process ideally is iterative; i.e., one echelon feeding information to the other sequentially and in both directions until a final decision is reached. However, basically there is a dominant top-down flow from national authorities to the research system in terms of national policies and directions; and a strong bottom-up flow from the implementing cadres to the policymakers in terms of which realistic and feasible activities can contribute towards those national goals.

   Example 2 (groups C and D)

   In the process, one level feeds information to the other. Information moves both ways, continuing until a decision is reached. There is a flow top-down from the national level of policies and directions to the research system. There is a strong flow upward from researchers to policymakers on which activities, realistically, can contribute towards national goals.

5. Follow the instructions.

   - Count the number of words in each sentence.
   - Divide the total number of words by the number of sentences to find the average number of words per sentence.total number of words

$$\frac{\text{total number of words}}{\text{number of sentences}} = \text{average words per sentence}$$

   - Count the number of syllables in all the words.
   - Divide the total number of syllables by the number of words to find the average number of syllables per word.

$$\frac{\text{total number of syllables}}{\text{number of words}} = \text{average syllables per word}$$

   - Put these data, as follows, into the FLESCH formula to compute the score.

     a) multiply the factor 1.015 by the average number of words per sentence
     b) multiply the factor 84.6 by the average number of syllables per word
     c) sum the products of a) and b) above
     d) subtract from the factor 206.8 the sum of c above
     e) the remainder is the FLESCH reading ease score.

6. The rapporteurs write the results on a flip chart, and prepare their presentation.

Phase 2. Reporting and discussion (40 minutes)

7. The rapporteurs present their group's results to the audience. Five minutes are available for each presentation.

8. The trainer will discuss the answers, and you will be invited to give feedback on the exercise.

Exercise 17. Worksheet

Readability or Reading Ease[1]

One aspect of a reader's understanding is readability or the reading ease of the material.

Example No. 1

In its service function, on-farm research plays a support role which supplements experiment station research. It is a passive role with experiment station research programs determining priorities and "pushing out" selected technologies to be tested on-farm.

The adaptive research function involves the adjustment or adaptation of existing technology to a particular set of environmental conditions — either agro-ecological or socio-economic — through on-farm research. Through farm-level research, OFCOR identifies problems or opportunities and then "pulls down" technologies or knowledge from experiment station research as the basis for designing potential solutions. In this function, OFCOR has an active research role. OFCOR researchers take the lead in identifying research problems or opportunities, setting priorities, and designing potential solutions.

The feedback function involves providing relevant information from farm-level characterization, diagnosis, and/or adaptive research to the priority-setting, planning, and programming process of station-based research. As the case study experiences demonstrate, this function, although critical, has proved to be the most difficult to institutionalize.

Example No. 2

The principal strategic choices concern the degree of unification of the system, the more or less autonomous character of research institutions (which could even go as far as privatization), and the degree of centralization geographically, of the system.

Reorganization of a NARS must remain with limits fixed by the political environment and by the capacity for evolution of existing structures; therefore, there are no universally valid reference models. However, the science of management has advanced past the stage of pure empiricism, compared evaluations, in time and space, or organizational systems of research have resulted in conclusions of sufficiently general applicability to be usable for research adapted to individual situations. But it also known today that there is no 'perfect' solution to solve all the structural and organizational problems in every particular case. Experience shows that various solutions can always be considered in a given context, all having advantages and disadvantages. If this point of view is correct, the right approach consists in considering various alternatives available to reorganize a NARS, to study their advantages and disadvantages, and then to make the most appropriate choice for the desired objectives, within available means. The progressiveness of the decided changes should be carefully considered.

A reader knows intuitively that both of these passages are difficult to read — even for a person whose native language is English.

Which of the two would you consider the more difficult? How difficult do you think each is?

1. Extracted from: Kern, R., R. Obura and T. A. Taylor, *Writing and Presenting Scientific Information.* A trainer's handbook based upon ISNAR-KARI workshops (1990, 1991, 1993) ISNAR Training Series, 1994.

Here are the empirical data on level of education needed:

- The OFCOR item would require a bit more than the baccalaureate years.
- The NARS piece would require education through the doctoral years.

Take the first sentence of the NARS piece:

> **The principal strategic choices concern the degree of unification of the system, the more or less autonomous character of research institutions (which could even go so far as privatization), and the degree of centralization geographically of the system.**

That's pretty heavy going, isn't it? It's one sentence with 37 words. And those words average two syllables each. In the FLESCH Test of Reading Ease, that has a score of zero. That's where the scale begins—and goes up to 100.

The first sentence of the OFCOR piece isn't as obscure.

> **In its service function, on-farm research plays a support role which supplements experiment station research. It is a passive role with experiment station research programs determining priorities and "pushing out" selected technologies to be tested on-farm.**

It has a FLESCH Test Reading Ease score of 28, which looks better—but on a scale to 100, there's room for improvement. It has sentences that average 18.5 words, the syllable count averages almost 1.9. This still falls within the VERY DIFFICULT category, requiring more than 16 years of English education.

Not really easy. Besides complex words, even with several readings, I'm not sure what the writer means by the "passive role of on-farm research." (Usually obscure writers argue that they just have to use complex words to be certain of accuracy. Of course they do! Besides, it's much harder to write pieces that are easy to read. Anyone with a college education can write material that very difficult to read.)

We've been referring to FLESCH tests.

What is this FLESCH thing?

The FLESCH test measures the reading ease of a passage of English text. Some people speak of reading ease as understandability. Some evidence suggests that to be the case, but it isn't overwhelming. Dr. FLESCH, who devised the test, doesn't claim that. He estimates the ease with which persons educated in the English language will be able to read material.

Dr. Rudolf FLESCH started his education in Austria, the land of his birth. He is one of many academic people who immigrated to the United States to get out of the reach of the Third Reich in the 1930s. He undertook doctoral studies at Columbia University. Although his native tongue was German, Dr. FLESCH took up study of readability of English.

Building on several decades of work by others, his original contribution—back in the late 1940s—brought a simpler formula to measure readability. And it was much easier to apply. The reading ease formula was not the whole of his work, but it is the most influential and widely used. Even now, Dr. FLESCH continues as a reading-ease critic, consultant, and trainer. Many corporations and units of government have turned to him for help in making their legalese and gobbledygook into understandable English. With modest success.

The FLESCH formula concentrates on two measures on the continuum from simple to complex. Let me demonstrate how the formula can be used to help reading ease.

Here we'll see a paragraph taken from an ISNAR consultant's report.

> In the Indian sub-continent, the leadership that was given by the agricultural research administrators during the mid fifties and the political will that was evident in the Indian government, together with the interaction of external peers in agricultural research and management were historical changes for agricultural research, in that the foundations were established to organize and structure the NARS in India, which in retrospect could be viewed as the catalytic event that triggered similar changes in many countries in Asia as well as in the rest of the developing world.

Here is a revision of the passage by a trained journalist:

> The mid-1950s saw historic changes in agricultural research on the Indian subcontinent. Strong leadership by research administrators, political will on the part of the Indian government, and the interaction of external peers in agricultural research and management laid the foundations for an Indian NARS. In retrospect, it could be argued that these events triggered similar changes in many Asian countries and, indeed, in the rest of the developing world.

Here is a third treatment, using principles of writing for reading ease.

> The founding of the Indian NARS in the mid-1950s brought historic changes in agricultural research there. Three factors laid the foundation of the system in India: (1) political will within the government and (2) strong leadership by research administrators, together with (3) influences from external peers. Looking back now, one sees effects of the Indian experience. Many countries of the developing world have since made similar changes.

Using the FLESCH test of reading ease

The following steps identify the elements in the FLESCH test and tell how the data for each is obtained.

1. **Calculate average number of words per sentence: WPS**

   (Count total number of words in the passage and divide by the number of sentences.)

2. **Calculate average number of syllables per word: SPW**

   (Count number of syllables in all words of the passage and divide by the number of words.)

3. **Compute the test score in these steps:**

   a. WPS x 1.015
   b. SYL x 84.6
   c. Sum the two items
   d. From the factor 206.8
      Subtract c. above from d.
   e. FLESCH Reading Ease Score

Interpreting the FLESCH Reading Ease Score

Range of test score	Reading ease descriptor	Grade level to read material with ease	Example reading material
90–100	Very easy	4	Comic books
80–90	Easy	5	Pulp fiction
70–80	Fairly easy	6	Movie Magazines
60–70	Standard	7–8	Readers' Digest
50–60	Fairly difficult	9–10	Time, Newsweek
30–50	Difficult	11–16	New York Times;
0–30	Very difficult		Textbooks
		16	Scholarly journals

Measuring readability (the hand method)

It's a good thing that computer programmers have given us electronic means of measuring readability. The earliest workers did it by hand. It's important that any writer know the hand method because a computer might not always be at hand.

DAY THREE

Session 18
Strengths and Weaknesses of Using a Computer

Instructions to Trainers

SESSION 18

14:00 – 15:30 Session 18. Strengths and Weaknesses of Using a Computer

OBJECTIVE

By the end of this session the participants will be able to do the following:

- Identify and discuss several ways in which the use of the computer eases editing.

Use overhead 3.18.1 to present the objective.

PROCEDURE

Training techniques: group work, "take three for better reflection."

EXERCISE 18

Exercise 18. Strengths and weaknesses of using a computer. (1 hour 25 minutes)

1. Distribute handouts 3.18.1 through 3.18.4. Handout 3.18.1 gives clear instructions for the exercise. Go over the instructions with the participants step by step. Ask if clarifications are needed. (5 minutes)

Phase 1. Individual work (10 minutes)

2. Ask the participants to work on the questions.

Phase 2. Group work (35 minutes)

3. Divide the participants into the same four groups that they worked in earlier today. Ask the groups to elect a rapporteur.
4. Ask them to discuss the answers and to prepare a report to be presented to the audience. As the groups work, circulate from group to group to check progress. Clarify concerns the groups may have while working. Be sure to remind them of the time remaining.

Phase 3. Reporting and discussion (35 minutes)

5. *(experience, process)* Invite the rapporteurs to report on their groups' results. Each rapporteur has five minutes to present.
6. *(process, generalize)* Discuss the results. Invite the participants to provide feedback on this exercise. Ask the participants questions such as "How did you feel

doing this exercise?" and "What did you learn?" (15 minutes)

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants "What might you do differently as a result of what you learned?"
2. Make a transition to the next session.

15:30 – 15:45 Tea/Coffee Break

DAY THREE

Session 18
Summary of Overheads

Objective of Session 18. Strengths and Weaknesses of Using the Computer

4. Identify and discuss several ways in which the use of the computer eases editing

3.18.1

Making Use of the Computer

3.18.2

Exercise 18. Strengths and weaknesses of using a computer ("take three for better reflection" technique)

Phase 1. Individual work (10 minutes)

1. Think about questions 1 and 2 on handout 3.18.2, and write your answers in the space provided.
2. Write also how you suggest to overcome the stated weaknesses.

Phase 2. Group work (35 minutes)

3. Form the same four groups as you worked in during the last session.
4. Elect a rapporteur who composes a long list of the individual responses.
5. Discuss the long list and decide on the three major answers as a group and write these answers on handout 3.18.3 and on the flip chart.
6. Read example 1 on handout 3.18.4. This includes a computer printout using Right-WRITER, a grammar critique program.
7. Select and incorporate three computer suggestions to improve the manuscript and write some of the improvements on handout 3.18.3. The rapporteurs copy the results to the flip chart and prepare the presentation.

Phase 3. Reporting and discussion (35 minutes)

8. The rapporteurs present the results to the audience.
9. The trainer will invite all participants to discuss this exercise.

Exercise 18. Worksheet

Phase 1. Individual work

1) Name two major strengths of using the computer when writing a scientific paper.

2. Two major weaknesses: Recommendations to overcome the weaknesses:

Exercise 18. Strengths and weaknesses of using a computer

Phase 2. Group work

1) Name three major strengths of using the computer when writing a scientific paper.

2. Three major weaknesses Recommendations to overcome the weaknesses:

3) Three suggestions from RightWRITER	Improved manuscript

Making Use of the Computer[1] (Theoretical Background)

Most writers will have written their paper on a computer word processor. But even the confirmed pencil-pusher should get the manuscript into the computer by the second-draft stage.

For one thing, use of the computer makes editing faster and easier. But the computer can do more: **if you have the software!**

Here we're talking about grammar programs. Two leaders in the field are Grammatik and RightWRITER. Both are available in either DOS or Windows (and probably MacIntosh) version.

Here are two examples of printouts from computer grammatic critique by RightWRITER.

Example No. 1 — as originally written

In its service function, on-farm research plays a support role which supplements experiment station research. It is a passive role with experiment station research programs determining priorities and "pushing out" selected technologies to be tested on-farm.

The adaptive research function involves the adjustment or adaptation of existing technology to a particular set of environmental conditions — either agro-ecological or socio-economic — through on-farm research. Through farm-level research, OFCOR identifies problems or opportunities and then "pulls down" technologies or knowledge from experiment station research as the basis for designing potential solutions. In this function, OFCOR has an active research role. OFCOR researchers take the lead in identifying research problems or opportunities, setting priorities, and designing potential solutions.

The feedback function involves providing relevant information from farm-level characterization, diagnosis, and/or adaptive research to the priority-setting, planning, and programming process of station-based research. As the case study experiences demonstrate, this function, although critical, has proved to be the most difficult to institutionalize.

This is what RightWRITER does with the text

In its service function, on-farm research plays a support role which<*_ **Consider replacing "role which" with "role that."** *> supplements experiment station research. It is a passive role with experiment station research programs determining priorities and "pushing out" selected technologies to be tested<*_ **"be tested" is passive voice. Consider using the active voice.** *> on-farm.

The adaptive research function involves the adjustment or adaptation of existing technology to a particular set of environmental conditions — either agro-ecological<*_ **Will your reader understand the word "agro-ecological?"** *> or socio-economic — through on-farm re-

1. Adapted from: Kern, R., R. Obura, T.A. Taylor. *Writing and Presenting Scientific Information.* A trainer's handbook based upon ISNAR-KARI Workshops (1990, 1991, 1993) ISNAR Training Series, 1994.

problems or opportunities and then "pulls down" technologies or knowledge from experiment station research as the basis for designing potential solutions.<*_ **Would this sentence be clearer if it were split into two or more sentences?** *> In this function, OFCOR has an active research role. OFCOR researchers take the lead in identifying research problems or opportunities, setting priorities, and designing potential solutions.

The feedback function involves providing relevant<*_ **Consider replacing the overused "relevant" with more original wording.** *> information from farm-level characterization<*_ **Will your reader understand the word "characterization?"** *>, diagnosis, and/or<*_ **Is the legal word "and/or" appropriate here?** *> adaptive research to the priority-setting, planning, and programming process of station-based research. As the case study experiences demonstrate<*_ **Consider replacing "demonstrate" with the simpler "show or prove"** *>, this function, although critical, has proved to be<*_ **Consider using "is" instead of the wordier "has proved to be"** *> the most difficult to institutionalize.

< SUMMARY **>**

READABILITY INDEX: 16.44
4th 6th 8th 10th 12th 14th
|****|****|****|****|****|****|****|****|****|****|****|****
SIMPLE |——— **GOOD** ———- | **COMPLEX**
The writing is complex and may be difficult to read.
Number of Words in Document: 160
Number of Words within Sentences: 159
Average Number of Syllables/Word: 2.13
Average Number of Words/Sentence: 17.66
STRENGTH INDEX: 0.51
0.0 0.5 1.0
|****|****|****|****|****
WEAK STRONG
You can make the writing more direct by using:
– the active voice
– shorter sentences
– less wordy phrases
– fewer cliches
DESCRIPTIVE INDEX: 0.38
0.0 0.5 1.0
|****|****|****|***
TERSE |———— **NORMAL** ————| **WORDY**
SENTENCE STRUCTURE RECOMMENDATIONS:
14. No Recommendations.

< END OF SUMMARY **>**

Example No. 2 — as originally written

The principal strategic choices concern the degree of unification of the system, the more or less autonomous character of research institutions (which could even go as far as privatization), and the degree of centralization geographically, of the system.

Reorganization of a NARS must remain with limits fixed by the political environment and by the capacity for evolution of existing structures; therefore, there are no universally valid reference models. However, the science of management has advanced past the stage of pure empiricism, compared evaluations, in time and space, or organizational systems of research have resulted in conclusions of sufficiently general applicability to be usable for research adapted to individual situations, But it also known today that there is no 'perfect' solution to solve all the structural and organizational problems in every particular case. Experience shows that various solutions can always be considered in a given context, all having advantages and disadvantages. If this point of view is correct, the right approach consists in considering various alternatives available to reorganize a NARS, to study their advantages and disadvantages, and then to make the most appropriate choice for the desired objectives, within available means. The progressiveness of the decided changes should be carefully considered.

This is what RightWRITER does with the text

The principal strategic choices concern the degree of unification of the system, the more or less<*_ **"more or less" is colloquial or slang. Replace with more formal wording.** *> autonomous<*_ **Consider replacing "autonomous" with the simpler "independent"** *> character of research institutions (which could even go as far as privatization), and the degree of centralization geographically<*_ **Will your reader understand the word "geographically?"** *>, of the system.<*_ **Is this sentence too complex to read easily.** *><*_ **Would simpler terms be easier for your reader to understand?** *>

Reorganization of a NARS must remain with limits fixed by the political environment and by the capacity for evolution of existing structures<*_ **Only use semicolons to separate independent clauses.** *>; therefore, there are no universally valid<*_ **Is "valid" explained and justified by the surrounding text?** *> reference models.<*_ **Is this sentence too complex to read easily.** *> However, the science of management has advanced past the stage of pure empiricism, compared evaluations, in time and space, or organizational systems of research have resulted in conclusions of sufficiently general applicability<*_ **Will your reader understand the word "applicability?"** *> to be usable<*_ **Consider replacing "usable" with the simpler "easy to use"** *> for research adapted to individual situations, But it also known today that there<*_ **Consider replacing "that there" with "there or that"** *> is no 'perfect' solution to solve all the structural and organizational problems in every particular case.<*_ **Would this sentence be clearer if it were split into two or more sentences?** *> Experience shows that various solutions can always be considered<*_ **"be considered" is passive voice. Consider using the active voice.** *> in a given context, all having advantages and disadvantages. If this point of view is correct, the right approach consists in considering various alternatives available to reorganize a NARS, to study their advantages and disadvantages, and then to make the most appropriate choice for the desired objectives<*_ **Consider replacing "objectives" with the correct form of the simpler "aim or goal"** *>, within available means.<*_ **Is this sentence too long?** *> The progressiveness of the decided changes should be carefully considered<*_ **"be carefully considered" is passive voice. Consider using the active voice.** *>.<*_ **Does this long paragraph discuss a single topic?** *>

<** SUMMARY **>

READABILITY INDEX: 19.61
4th 6th 8th 10th 12th 14th
|****|****|****|****|****|****|****|****|****|****|****|****
SIMPLE |——— GOOD ———- | COMPLEX
The writing is complex and may be difficult to read.
Number of Words in Document: 201
Average Number of Syllables/Word: 2.03
Average Number of Words/Sentence: 33.50
STRENGTH INDEX: 0.11
0.0 0.5 1.0
|****
WEAK STRONG
You can make the writing more direct by using:
- **the active voice**
- **shorter sentences**
- **less wordy phrases**
- **more common words**
- **more positive wording**
- **less slang**

DESCRIPTIVE INDEX: 0.70
0.0 0.5 1.0
|****|****|****|****|****|****|****
TERSE |———— NORMAL ————| WORDY
SENTENCE STRUCTURE RECOMMENDATIONS:
13. Many prepositional phrases are used.
Try to use fewer prepositional phrases. This will make your writing easier to read and understand.

<** END OF SUMMARY **>

DAY THREE

Session 19
Editing

Instructions to Trainers

SESSION 19

15:45 – 17:00 Session 19. Editing

OBJECTIVE

By the end of this session the participants will be able to do the following:

- Apply knowledge and skills to appropriately edit scientific papers.

Use overhead 3.19.1 to present the objective.

PROCEDURE

Training techniques: presentation, individual work, work in pairs, group work.

PRESENTATION

(experience) Give a brief presentation on editing. Overheads 3.19.2 through 3.19.7 support the presentation. At the end of the presentation distribute handout 3.19.1 and be sure to ask the participants if they have any comments or questions, or if they need clarifications. (15 minutes)

EXERCISE 19

Exercise 19. Editing. (55 minutes)

1. Distribute handouts 3.19.2 and 3.19.3. Handout 3.19.2 gives clear instructions for the exercise. Go over the instructions with the participants step by step. Ask if clarifications are needed. (5 minutes)

Phase 1. Individual work (20 minutes)

2. Ask the participants to work on the exercise using the proofing marks given in handout 3.19.1 and to write the revised versions on handout 3.19.3.

Phase 2. Group work (15 minutes)

3. Ask the participants to pair up with a partner to discuss the edited version and to write three things they learned during the exercise on handout 3.19.3. (10 minutes).
4. Divide the participants into the same groups they worked in earlier today, and ask them to elect a rapporteur. The groups discuss the problems they found during this editing exercise.
5. The rapporteur writes on a flip chart three things the group learned and prepares for a presentation. (5 minutes)

Phase 3. Reporting and discussion (15 minutes)

6. The rapporteurs report their group's results to the audience. Each group has only 2½ minutes. (10 minutes).
7. *(process, generalize)* Provide feedback on the presentations, summarize the main points and discuss the results using overheads 3.19.8 and 3.19.9. Ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" (5 minutes)

CLOSURE

Closure (5 minutes)

1. *(application)* Distribute handout 3.19.4. Ask the participants to complete this exercise during the evening and bring the results tomorrow.
2. Make a transition to the last session.

17:00 – 17:30 Feedback on the Day's Activities and PAPA

OBJECTIVES

By the end of this session participants will be able to do the following:

- Provide feedback on the day's activities.
- Consider possible actions they would like to implement in their own organizations.

PROCEDURE

Training technique: individual exercise.

Highlight positive and negative points of the day. Note areas that may need additional attention in the workshop. Participants can write some strengths and weaknesses of this day on handout 3.19.5, and use handout 3.19.6 to facilitate their task. (15 minutes)

PAPA

(application) Ask the participants to take some time to jot down some "action ideas" they may have for themselves as a result of today's activities. They can use handout 3.19.7. (15 minutes)

DAY THREE

Session 19
Summary of Overheads

Objective of Session 19. Editing

5. Apply knowledge and skills to appropriately edit scientific papers

3.19.1

Editing

3.19.2

Why Edit a Manuscript?

- An editor can look upon your manuscript with an objective eye
- Authors are not expected to know everything, so an editor can make sure that your manuscript is:
  - consistent in style
  - making sense
  - correctly spelled and punctuated

3.19.3

Two Types of Editing

1. *Mechanical Editing*

   editing for details of style

2. *Substantive Editing*

   editing for content and readability

3.19.4

Editorial Proofing Marks

This means delete.

This means delete and close up.

This means insert a space.

This means delete and insert a space.

STET This means ignore the editing marks (the editor got carried away).

This means close up a space.

This means make a new paragraph.

This means include this in the text above it — no paragraph.

3.19.5

This means line this up with the rest.

This means indent this so that it lines up with the text above it.

This means transpose piece of text this.

This means spell this out: 2 % etc.
OR abbreviate it (or put it in numerals): seventy-five hundred percent etc.

this means capitalize this letter.

This means make these lower-case

3.19.6

This means insert a comma here.

This means put a period here.

This means put in a colon:

And this means put in a semicolon;

This shouldn't be without an apostrophe.

This needs quotes (single or double).

This should be a superscript and a subscript.

Compound modifiers like run-on should be hyphenated.

3.19.7

Results of Exercise 19. Revised Version A

Normal cultural practices were carried out, including weeding, mulching, and irrigation. Data were collected on flowering, fruiting, maturity, and yield. Yield was taken on the basis of individual plants. Statistical significance of differences in means was based on Duncan's Multiple Range Test.

3.19.8

Results of Exercise 19. Revised Version B

Significant differences on plant-growth characters were found among the lines tested. That was true for line length, measured 30 days after planting, and for days till opening of both male and female flowers. Table 1 displays the data, with indications of significant differences.

3.19.9

Exercise 19. Editing (answers)

A Revised Version - No. 1

Normal cultural practices were carried out, including weeding, mulching, and irrigation. Data were collected on flowering, fruiting, maturity, and yield. Yield was taken on the basis of individual plants. Statistical significance of differences in means was based on Duncan's Multiple Range Test.

A Revised Version - No. 2

Significant differences on plant-growth characters were found among the lines tested. That was true for line length, measured 30 days after planting, and for days till opening of both male and female flowers. Table 1 displays the data, with indications of significant differences.

Editing[1]
(summary of presentation)

After you have worked closely on a manuscript—writing it, revising it, reorganizing it—you may not notice that a word is misspelled or missing or that a section is incomplete. You know what it is supposed to say, and when you read it over, your brain fills in the missing pieces. That is one reason editors exist. An editor can look upon your manuscript with an objective eye and can read it for continuity and coherence because s/he is looking at it for the first time. If there is a sentence that doesn't make sense, the editor will notice it because s/he doesn't know what you intended to say.

The other main reason that editors exist is because authors are not expected to know everything. You may be at the top of your field in statistical analysis, but your spelling may be terrible, or you may always get confused by to, too, and two. Or you may not be a native speaker of the language you're writing in, and you may get gendered pronouns mixed up or use the wrong prepositions. The editor's job is to find things like that and to make sure that your manuscript is consistent in style, that it makes sense, and that spelling and punctuation are correct.

There are basically two things that occur when a manuscript is edited:

1. Mechanical editing—What the Chicago Manual calls "mechanical editing" refers to editing for details of style. The editor reads the manuscript closely and checks for consistency in spelling, capitalization, use of headings, citations, punctuation, and other elements of style.

2. Substantive editing—this involves editing for content and readability. It may also include rewriting or reorganizing text, and the editor may suggest other ways of presenting the material.

Generally, editors will do the minimum amount necessary to produce a readable, consistent document. Editing is a time-consuming process, and the more that is done to a manuscript, the longer it takes.

Example[2]

Here is the kind of material that confronts an editor of agricultural research reports. This one came from a young, field researcher in a farming systems program in Bangladesh.

> Five micronutrients viz zinc, copper, manganese, boron and molybdenum at the rate of 5 kg/ha for the first four nutrients and at two rates, i.e. 2.5 kg/ha and 5 kg/ha for the molybdenum along with NPKS were tested against the check only NPKS.

1. *ISNAR Style Manual.* Draft June 1996. The Hague: ISNAR.
2. Kern, R., R.K. Obura, T.A. Talyor. *Writing and Presenting Scientific Information* (draft). ISNAR Training Series, March 1994.

Consider all the information a reader would have to carry along to understand what the writer actually found in these field tests:

Five micronutrients	zinc	5 kg/ha
	copper	5 kg/ha
	manganese	5 kg/ha
	boron	5 kg/ha
	molybdenum	5 kg/ha and 2.5 kg/ha

with NPKS were tested against the check only NPKS.

While it may be possible for the reader to carry all of that information, we may doubt that he or she will take the trouble unless there is strong need to understand. To get the information clearly in mind, nearly every reader must go back and study it out for himself or herself. Would it not be easier to understand if it read:

> Four micronutrients were tested at a rate of 5 kg/ha. A fifth, molybdenum, was tested at both 5 kg/ha and 2.5 kg/ha. All test areas received the same NPKS applications. The check treatment received only the NPKS.

Editorial Proofing Marks[1]

This means ~~means~~ delete.

This means delete and close up.

This means insert a space.

This means delete and insert a space.

STET This means ignore the editing marks (the editor got carried away).

This means close up a space.

This means make a new paragraph.

This means include

this in the text above it — no paragraph.

This means line
this up with
the rest.

This means indent
this so that it lines up
with the text above it.

This means transpose piece of text this.

This means spell this out: 2 % etc.
OR abbreviate it (or put it in numerals):
seventy–five hundred percent etc.

this means capitalize this letter.

THIS means make these lower–case

This means insert a comma here.

This means put a period here.

This means put in a colon:

And this means put in a semicolon;

This shoudnt be without an apostrophe.

This needs quotes (single or double).

This should be a superscript 1 and a subscript 2.

Compound modifiers like run on should be hyphenated.

1. Manual of Style. The Essential Guide for Writers, Editors, and Publishers. 14th edition.

Exercise 19. Editing

Phase 1. Individual work

1. Read the two texts A and B below.
2. Edit the texts using the proofing marks shown in handout 3.19.1, and write the edited version on handout 3.19.3. (20 minutes)

A. Materials and Methods

Intercultural operations like weeding, mulching and irrigation, were done as and when necessary. Data were recorded on vine characters, flowering, fruiting, maturity and yield. The yield (t/ha) was calculated on the basis of yield of the individual plant. Data were analyzed as per standard statistical procedures and means were separated by DMRT.

B. Results and Discussion

The results revealed significant variations among the lines in respect of different characters. Vine length (after 30 days of sowing) in both the years exhibited a wide variations. The lines AG0005 and AG0004 produced maximum vine length consistently in both the years and AG0001, AG0003 and AG0008 had minimum vine length while the other lines had medium vine growth (Table-1).

In plants of all the lines, male flower opened within 41–59 and 50–66 days where female flowers opened within 51–70 and 60–75 days in 1st and 2nd year respectively. Minimum time required to open both female and male flowers in AG0005 followed by AG0007 but maximum time required in AG0009 in both the years (Table–1).

Phase 2. Group work

3. Pair up with a partner and discuss the changes you made to the texts. Write three items you learned during this editing exercise. (10 minutes)
4. Form the same four groups of participants you worked in earlier today and elect a rapporteur.
5. Share the items you listed.The rapporteur writes three of the items on the flip chart to present them to the larger group. (5 minutes)

Phase 3. Reporting and discussion

6. The rapporteurs present their group's lists to the audience in only 2½ minutes. (10 minutes)
7. The trainer will discuss the results and will invite you to provide feedback on the exercise.

Exercise 19. Worksheet

Homework — Exercise 19. Extra editing

Improve the sentences given below using the proofing marks given in handout 3.19.1.

1. Crop yields were low due to the fact that the final completion of the weeding operation was not on times.
2. A careful examination of Table I reveals that liveweight means responded to supplementation.
3. New innovations have facilitated classification of soils into groups much more faster.
4. Meteorology is rather abstract, it is not very easy to tell when the rains first began.

Strengths and Weaknesses

- **Please list what you consider to be three strengths of day three**

1.
2.
3.

- **Please list what you consider to be three weaknesses of day three**

1.
2.
3.

- **Suggestions for improvements**

Guidelines to Provide Feedback on the Workshop

1. **The Module**

   Content

   - usefulness/relevance
   - amount of information

   Structure

   - sequence
   - duration
   - balance between trainers' and trainees' participation
   - instructions to trainers
   - visual aids
   - handouts
   - extra reading
   - PAPA
   - evaluation

2. **Process: training techniques and direction**

   - usefulness/relevance/effectiveness
   - group interaction
   - clarity of questions/exercises instructions
   - opening and closure of the days

3. **Trainers', facilitators', and trainees' performance**

   - presentation/communication skills
   - interaction/effective participation
   - punctuality/interest/commitment/willingness to facilitate; learning/willingness to participate
   - other attitudes

4. **Logistical support**

   - organization
   - accuracy
   - punctuality
   - willingness to assist participants
   - services provided in general

5. **Workshop environment**

- physical (training facilities, training material, hotel facilities in general)
- psychological (personal feelings such as self-motivation, interest, satisfaction, self-achievement)
- social (development of friendship, relaxed, comfortable among participants, etc.)

6. **Workshop results/outputs**

- personal and professional assessment
- recommendations

7. **General comments**

PAPA - FIRST STAGE

Ideas for action items

Date : _____

Workshop title : SADC/ESAMI/ISNAR Workshop on Scientific Writing and Presentation

Date/Venue : _____

Name : _____

Organization : _____

Ideas I would like to try when I return to work at my research institute, based on what I learned in this training workshop.

_____

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_____

Note: You can use the workshop objectives, what you learn during the workshop, handouts, conversations with participants and trainers, etc., to come up with ideas.

DAY FOUR

Scientific Writing and Presentation

DAY FOUR — Overview

Objectives

By the end of the day, the participants will be able to do the following:

1. Identify misplaced modifiers in text and correct them.
2. Apply knowledge and skills to edit a sample of writing.
3. Identify some differences between scientific writing and report writing.
4. Plan and prepare an oral presentation using visual aids.

Handouts

4.20.1 Overview
4.20.2 Tentative Schedule
4.20.3 Exercise 20. First Aid for Sentences—Misplaced Modifiers
4.20.4 Exercise 20. Worksheet
4.21.1 Exercise 21. Editing Report
4.21.2 Exercise 21. Worksheet
4.22.1 Exercise 22. Application—Editing One of Your Colleague's Papers
4.22.2 Exercise 22. Worksheet
4.22.3 (text)
4.23.1 Exercise 23. Report Writing
4.23.2 Report Writing (summary of presentation)
4.24.1 Oral Presentation (summary of presentation)
4.24.2 Exercise 24. How to Plan, Prepare, and Deliver an Oral Presentation
4.24.3 Exercise 24. Worksheet
4.24.4 Guidelines to Effective Communication (text)
4.24.5 Visual Aids for an Oral Presentation (text)
4.24.6 Strengths and Weaknesses of Day Four
4.24.7 Guidelines to Provide Feedback on the Workshop
4.24.8 PAPA Form — First Stage

Scientific Writing and Presentation

DAY FOUR — Tentative Schedule

08:30 – 09:00	**Opening of the Day's Activities**
09:00 – 10:00	**Session 20. Editing—First Aid for Sentences** (Exercise 20)
10:00 – 10:30	**Session 21. Applying What You Have Learned** (Exercise 21)
10:30 – 10:45	Tea/Coffee Break
10:45 –11:15	**Session 21. (Continued)**
11:15 – 13:00	**Session 22. Application—Editing One of Your Colleague's Papers** (Exercise 22)

13:00 – 14:00 Lunch

14:00 – 15:30	**Session 22. (Continued)**
15:30 – 15:45	Tea/Coffee Break
15:45 – 16:15	**Session 23. Report Writing** (Presentation and exercise 23)
16:15 – 17:30	**Session 24. Oral Presentation** (Presentation and exercise 24)
17:30 – 18:00	**Feedback on the Day's Activities and PAPA**

Scientific Writing and Presentation

DAY FOUR — Checklist for Trainers

Note:

In the workshop prospectus, the participants are asked to bring with them a scientific paper that they have written themselves. By this time you should have chosen two papers to be used in session 22. Be sure that enough photocopies are available. If the participants have not brought papers with them, use handout 4.22.3 for exercise 22.

Handouts

		Yes ✔	No ✔
4.20.1	Overview	❒	❒
4.20.2	Tentative Schedule	❒	❒
4.20.3	Exercise 20. First Aid for Sentences—Misplaced Modifiers	❒	❒
4.20.4	Exercise 20. Worksheet	❒	❒
4.21.1	Exercise 21. Editing Report	❒	❒
4.21.2	Exercise 21. Worksheet	❒	❒
4.22.1	Exercise 22. Application—Editing One of Your Colleague's Papers	❒	❒
4.22.2	Exercise 22. Worksheet	❒	❒
4.22.3	(text)	❒	❒
4.23.1	Exercise 23. Report Writing	❒	❒
4.23.2	Report Writing (summary of presentation)	❒	❒
4.24.1	Oral Presentation (summary of presentation)	❒	❒
4.24.2	Exercise 24. How to Plan, Prepare, and Deliver an Oral Presentation	❒	❒
4.24.3	Exercise 24. Worksheet	❒	❒
4.24.4	Guidelines to Effective Communication (text)	❒	❒
4.24.5	Visual Aids for an Oral Presentation (text)	❒	❒
4.24.6	Strengths and Weaknesses of Day Four	❒	❒
4.24.7	Guidelines to Provide Feedback on the Workshop	❒	❒
4.24.8	PAPA Form — First Stage	❒	❒

Overheads

4.20.1	Objectives of Day Four	❒	❒
4.20.2	Schedule of Day Four	❒	❒
4.20.3	Objective of Session 20	❒	❒
4.20.4	Editing First Aid for Sentences—Misplaced Modifiers	❒	❒
4.20.5	Results of Exercise 19	❒	❒
4.20.6	Results of Exercise 19	❒	❒
4.20.7	Results of Exercise 20	❒	❒
4.20.8	Results of Exercise 20	❒	❒
4.20.9	Results of Exercise 20	❒	❒

		Yes	No
4.21.1	Objective of Session 21	❒	❒
4.21.2	Editorial Proofing Marks	❒	❒
4.21.3	Editorial Proofing Marks	❒	❒
4.21.4	Editorial Proofing Marks	❒	❒
4.22.1	Objective of Session 22	❒	❒
4.23.1	Objective of Session 23	❒	❒
4.23.2	Report Writing	❒	❒
4.23.3	Outline	❒	❒
4.23.4	Technical Writing Requires	❒	❒
4.23.5	Preliminary to Writing	❒	❒
4.23.6	Planning a Report	❒	❒
4.23.7	Structure of Report	❒	❒
4.23.8	Logical Sequence of Report	❒	❒
4.23.9	Chronological	❒	❒
4.23.10	Problem/solution Approach	❒	❒
4.23.11	Do's and Don'ts	❒	❒
4.23.12	Internal Structure	❒	❒
4.23.13	Check the Following	❒	❒
4.24.1	Objective of Session 24	❒	❒
4.24.2	Oral Presentation	❒	❒
4.24.3	What Is an Oral Presentation?	❒	❒
4.24.4	Why are Presentation Skills Important?	❒	❒
4.24.5	Audience and Purpose(s)	❒	❒
4.24.6	Objectives	❒	❒
4.24.7	Barriers to Communication	❒	❒
4.24.8	Barriers to Communication	❒	❒
4.24.9	Barriers to Communication	❒	❒
4.24.10	Planning the Oral Presentation	❒	❒
4.24.11	Introduction	❒	❒
4.24.12	Body	❒	❒
4.24.13	Body	❒	❒
4.24.14	Body	❒	❒
4.24.15	Conclusion	❒	❒
4.24.16	Conclusion	❒	❒
4.24.17	Computers to Prepare Visuals	❒	❒
4.24.18	Organizing Your Thinking	❒	❒
4.24.19	Start the Planning Process	❒	❒
4.24.20	Reasons for Poor Use of Visuals	❒	❒
4.24.21	Design and Preparation of Visuals	❒	❒
4.24.22	Overhead Projector	❒	❒
4.24.23	Visual Aids for Oral Presentation	❒	❒
4.24.24	Types of Visuals	❒	❒
4.24.25	Purpose of Visuals	❒	❒
4.24.26	Tips on Presenting Overheads	❒	❒
4.24.27	Tips on Presenting Overheads	❒	❒
4.24.28	Making Graphs	❒	❒
4.24.29	Tips on Designing Overheads	❒	❒

	Yes	No
4.24.30 Tips on Designing Overheads	❒	❒

Materials

• Overhead projector	❒	❒
• Projector screen	❒	❒
• Flip-chart stands (minimum 2)	❒	❒
• Flip-chart paper/pads (about 10 per day	❒	❒
• Markers for writing on newsprint	❒	❒
• Markers for writing on transparencies	❒	❒
• Blank transparencies	❒	❒
• Stapler	❒	❒
• Tape (strong masking tape and regular tape)	❒	❒
• Push pins	❒	❒
• Glue	❒	❒
• Pencils/note pads/pens	❒	❒
• Pencil sharpeners	❒	❒
• Extension cords	❒	❒
• Photocopying facilities	❒	❒
• Spare bulbs for overhead projector	❒	❒
• Extra notepads and pens	❒	❒
• Scissors	❒	❒

DAY FOUR

Session 20
Editing—First Aid for Sentences

Instructions to Trainers

PRE-SESSION

08:30 – 09:00 Opening of the Day's Activities
– Review of the previous day's activities.
– Summary of the evaluation of the previous day.
– Overview of the day's activities.

OBJECTIVES

By the end of the pre-session the participants will be able to do the following:

- Assess the progress of the workshop.
- List the objectives and describe the agenda for the day's activities.

OPENING

Invite a volunteer to review the previous day's activities. (10 minutes)

Summarize the evaluation of the previous day. (10 minutes)

Distribute the overview and the schedule for day four (handouts 4.20.1 and 4.20.2) to the participants. Review the objectives and schedule (overheads 4.20.1 and 4.20.2). Ask if clarifications are needed. (10 minutes)

SESSION 20

09:00 – 10:00 Session 20. Editing—First Aid for Sentences

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Identify misplaced modifiers in the text and correct them.

Use overhead 4.20.3 to present the objective.

PROCEDURE

Training techniques: individual work, working in pairs.

Review the homework part of exercise 19. Display overheads 4.20.5 and 4.20.6 and ask the participants to check their own papers. Answer some questions, but note that if they have anything they would like to discuss with you regarding the exercise, you will work with them in the evening. Do not spend more than 10 minutes of class time on the review of this exercise.

EXERCISE 20

Exercise 20. First aid for sentences—misplaced modifiers. (45 minutes)

1. Distribute handouts 4.20.3 and 4.20.4. Explain the meaning of modifiers. (5 minutes)

Phase 1. Individual work (15 minutes)

2. Ask the participants to complete the exercise individually. They can change or add words if necessary.

3. *(experience)* As the participants work, circulate to check progress. Ask if clarifications are needed.

Phase 2. Work in pairs (10 minutes)

4. *(experience, process)* Ask the participants to pair up with a neighbor to discuss their answers.

Phase 3. Reporting and discussion (15 minutes)

5. *(experience, process)* Display overheads 4.20.7, 4.20.8, and 4.20.9 showing the answers to the exercise. Display only one answer at a time. Discuss the differences and similarities between participants' responses and those on the overheads. Ask how many people got all the answers correct (participants show hands), how many missed five, or four, etc. This will show the group a general measure of success.

6. *(process, generalize)* At the end of the exercise provide feedback on the exercise. Also, ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" (5 minutes)

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants to tell their neighbor two things they might do differently as a result of what they learned. Ask for some volunteers to give examples.

2. Make a transition to the next session.

DAY FOUR

Session 20
Summary of Overheads

Objectives of Day Four

1. Identify misplaced modifiers in text and correct them
2. Apply knowledge and skills to edit a sample of writing
3. Identify some differences between scientific writing and report writing
4. Plan and prepare an oral presentation using visual aids

4.20.1

Schedule of Day Four

08:30 – 09:00	Opening of the Day's Activities
09:00 – 10:00	Session 20. Editing— First Aid for Sentences
10:00 – 10:30	Session 21. Applying What You Have Learned
	Tea/Coffee Break
10:45 – 11:15	Session 21. (Continued)
11:15 – 13:00	Session 22. Application—Editing One of Your Colleague's Papers
	Lunch
14:00 – 15:30	Session 22. (Continued)
	Tea/Coffee Break
15:45 – 16:15	Session 23. Report Writing
16:15 – 17:30	Session 24. Oral Presentation
17:30 – 18:00	Feedback on the Day's Activities and PAPA

4.20.2

Objective of Session 20. Editing—First Aid for Sentences

1. Identify misplaced modifiers in text and correct them

4.20.3

Editing:
First Aid for Sentences—Misplaced Modifiers

4.20.4

Results of Exercise 19

1. Maize yields were low due to the fact that the final completion of the weeding operation was not on times.

   Maize yields were low, because the final weeding was delayed.

2. A careful examination of table 1 reveals that liveweight means responded to supplementation.

   Table 1 shows significant differences (p ⊗ 0.05) in liveweight means due to supplementation.

4.20.5

3. New innovations have facilitated classification of soils into groups much more faster.

   New techniques have facilitated soil classification.

4. Meteorology is a rather abstract, it is not very easy to tell when the rains first began.

   Meteorology is abstract, so it is difficult to predict the onset of rains.

4.20.6

Results of Exercise 20

1. While flying over the river, two whales were seen.

   While flying over the river, we saw two whales.

2. I met a man with a wooden leg named Smith.

   I met a man named Smith, who had a wooden leg.

3. Having become swollen by damp weather, the workmen could not remove the bracing.

   The workmen could not remove the bracing, which had become swollen by damp weather.

4.20.7

4. When attached properly to the electrical outlet, you will see colorful images.

   When the TV set is attached properly to the electrical outlet, you will see colorful images.

5. An autopsy was performed on a goat following a large meal.

   Following a large meal, the pathologist performed an autopsy on a goat.

4.20.8

6. A large butterfly was brought to the museum by a biologist in a moribund condition.

   A biologist brought a large dead butterfly to the museum.

7. The milk here is mostly from mixed breeds of cattle ranging in butterfat from 3% to 5%.

   The milk here, ranging from 3% to 5% in butterfat, is mostly from mixed breeds of cattle.

4.20.9

Exercise 19. Extra editing exercise (answers)

1. Maize yields were low due to the fact that the final completion of the weeding operation was not on times.

   Maize yields were low because the final weeding was delayed.

2. A careful examination of table I reveals that liveweight means responded to supplementation.

   Table I shows significant differences (p_ 0.05) in liveweight means due to supplementation.

3. New innovations have facilitated classification of soils into groups much more faster.

   New techniques have facilitated soil classification.

4. Meteorology is rather abstract, it is not very easy to tell when the rains first began.

   Meteorology is abstract, so it is difficult to predict the onset of rains.

Exercise 20. First aid for sentences—misplaced modifiers (answers)

1. While flying over the river, two whales were seen.

   While flying over the river, we saw two whales.

2. I met a man with a wooden leg named Smith.

   I met a man named Smith, who had a wooden leg.

3. Having become swollen by damp weather, the workmen could not remove the bracing.

   The workmen could not remove the bracing, which had become swollen by damp weather.

4. When attached properly to the electrical outlet, you will see colorful images.

   When the TV set is attached properly to the electrical outlet, you will see colorful images.

5. An autopsy was performed on a goat following a large meal.

   Following a large meal, the pathologist performed an autopsy on a goat.

6. A large butterfly was brought to the museum by a biologist in a moribund condition.

   A biologist brought a large dead butterfly to the museum.

7. The milk here is mostly from mixed breeds of cattle ranging in butterfat from 3% to 5%.

   The milk here, ranging from 3% to 5% in butterfat, is mostly from mixed breeds of cattle.

Handout—Overview of Day Four

Scientific Writing and Presentation

Objectives

By the end of the day, the participants will be able to do the following:

1. Identify misplaced modifiers in text and correct them.
2. Apply knowledge and skills to edit a sample of writing.
3. Identify some differences between scientific writing and report writing.
4. Plan and prepare an oral presentation using visual aids.

Handouts

4.20.1 Overview
4.20.2 Tentative Schedule
4.20.3 Exercise 20. First Aid for Sentences—Misplaced Modifiers
4.20.4 Exercise 20. Worksheet
4.21.1 Exercise 21. Editing Report
4.21.2 Exercise 21. Worksheet
4.22.1 Exercise 22. Application—Editing One of Your Colleague's Papers
4.22.2 Exercise 22. Worksheet
4.22.3 (text)
4.23.1 Exercise 23. Report Writing
4.23.2 Report Writing (summary of presentation)
4.24.1 Oral Presentation (summary of presentation)
4.24.2 Exercise 24. How to Plan, Prepare, and Deliver an Oral Presentation
4.24.3 Exercise 24. Worksheet
4.24.4 Guidelines to Effective Communication (text)
4.24.5 Visual Aids for an Oral Presentation (text)
4.24.6 Strengths and Weaknesses of Day Four
4.24.7 Guidelines to Provide Feedback on the Workshop
4.24.8 PAPA Form — First Stage

Handout—Tentative Schedule of Day Four

Scientific Writing and Presentation

08:30 – 09:00	**Opening of the Day's Activities**
09:00 – 10:00	**Session 20. Editing—First Aid for Sentences** (Exercise 20)
10:00 – 10:30	**Session 21. Applying What You Have Learned** (Exercise 21)
10:30 – 10:45	Tea/Coffee Break
10:45 –11:15	**Session 21. (Continued)**
11:15 – 13:00	**Session 22. Application—Editing One of Your Colleague's Papers** (Exercise 22)

13:00 – 14:00 Lunch

14:00 – 15:30	**Session 22. (Continued)**
15:30 – 15:45	Tea/Coffee Break
15:45 – 16:15	**Session 23. Report Writing** (Presentation and exercise 23)
16:15 – 17:30	**Session 24. Oral Presentation** (Presentation and exercise 24)
17:30 – 18:00	**Feedback on the Day's Activities and PAPA**

Exercise 20. First aid for sentences—misplaced modifiers (individual work – working in pairs)

Phase 1. Individual work (15 minutes)

1. The sentences on the next page have words that are out of place. Rewrite the sentences so that the modifiers are placed correctly and the sentences convey the intended meaning.

Phase 2. Work in pairs (10 minutes)

2. Select a partner and discuss your responses together.

Phase 3. Reporting and discussion (15 minutes)

3. Answers are shown on overheads, the trainer will invite you to discuss the results.

Exercise 20. Worksheet

The following sentences have words out of place. Rewrite them so the modifiers are placed correctly and the sentences convey the intended meaning.

1. While flying over the river, two whales were seen.

_____

_____

2. I met a man with a wooden leg named Smith.

_____

_____

3. Having become swollen by damp weather, the workmen could not remove the bracing.

_____

_____

4. When attached properly to the electrical outlet, you will see colorful images.

_____

_____

5. An autopsy was performed on a goat following a large meal.

_____

_____

6. A large butterfly was brought to the museum by a biologist in a moribund condition.

_____

_____

7. The milk here is mostly from mixed breeds of cattle ranging in butterfat from 3% to 5%.

_____

_____

DAY FOUR

Session 21
Applying What You Have Learned

Instructions to Trainers

SESSION 21

10:00 – 10:30 Session 21. Applying What You Have Learned

10:30 – 10:45 Tea/Coffee Break

10:45 – 11:15 Session 21. (Continued)

OBJECTIVE

By the end of this session the participants will be able to do the following:

- Apply knowledge and skills to edit a sample of writing.

Use overhead 4.21.1 to present the objective.

PROCEDURE

Training technique: working in pairs.

EXERCISE 21

Exercise 21. Editing a report. (55 minutes)

1. Distribute handouts 4.21.1 and 4.21.2. Handout 4.21.1 gives clear instructions for the exercise. Go over the instructions step by step. Show overheads 4.21.2, 4.21.3, and 4.21.4 to remind the participants of the editorial proofing marks (handout 3.19.1) learned on day three. Ask if clarifications are needed. (5 minutes)

Phase 1. Work in pairs

2. *(experience)* The participants work in pairs on the examples. As they work, circulate from group to group to check progress. Ask if clarifications are needed. (30 minutes)

Phase 2. Reporting and discussion

3. *(process)* Pairs briefly report their results. (15 minutes)

4. *(process, generalize)* Provide feedback on the content of the presentations. Discuss the results. Also, ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" (5 minutes)

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants to tell their neighbor one thing they might do differently when editing as a result of what they learned. Ask for some volunteers to give examples.

2. Make a transition to the next session.

DAY FOUR

Session 21
Summary of Overheads

Objective of Session 21. Applying What You Have Learned

2. Apply knowledge and skills to edit a sample of writing

4.21.1

Editorial Proofing Marks

This means delete.

This means delete and close up.

This means insert a space.

This means delete and insert a space.

STET This means ignore the editing marks (the editor got carried away).

This means close up a space.

This means make a new paragraph.

This means include

this in the text above it — no paragraph.

4.21.2

This means line this up with the rest.

This means indent so that it lines up with the text above it.

This means transpose piece of text this.

This means spell this out: 3 % etc.
OR abbreviate it (or put it in numerals): seventy-five hundred percent etc.

this means capitalize this letter.

This means make these lower-case

4.21.3

This means insert a comma here.

This means put a period here.

This means put in a colon.

And this means put in a semicolon.

This shouldn't be without an apostrophe.

This needs quotes (single or double).

This should be a superscript and a subscript.

Compound modifiers like run-on should be hyphenated.

4.21.4

Exercise 21. Editing a report (working in pairs)

Phase 1. Working in pairs (30 minutes)

1. Pair up with a colleague.

2. Work together on the extracts from a human resources development report (handout 4.21.2). The four paragraphs contain statements covering laboratories, budget provisions, scientists, and scientists' outputs. They are presented in a very unconnected form. Edit and rewrite the extracts keeping in mind the following:

   - each paragraph should deal with one topic only
   - ideally, the topic should be introduced in the opening "topic" sentence
   - the remaining sentences in the paragraph should amplify the topic

3. Assume that the four paragraphs are part of a report on human resources in your organization. The preceding sections of the report dealt with genesis of the training program, the development of infrastructure, and the programs of research. It now aims to cover the deployment, operations, and performance of the trained staff.

Phase 2. Reporting and discussion (15 minutes)

4. Some pairs are asked to present their revised text to the audience and give reasons for editing it the way they did.

Exercise 21. Worksheet

Extracts from a Human Resources Development Report

1. The new laboratories are 60 meters by 40 meters and have working space for twelve scientists. The current number of scientists per laboratory is 8. During the last 4 years scientists returned from training and together they produced 12 publications.

2. Socialization of the scientists and the analysis of the current work load indicates that output would continue to be at an acceptable level. One of the laboratories will be expanded slightly although no major increases in returnees are envisaged. The design of the laboratory will remain essentially the same as the present ones which have proved satisfactory.

3. Budget provisions indicate that the operating costs per scientist will drop by about 10% in the next year. This is likely to affect production of new varieties, publications. technical reports, etc. The average rate of publications per scientist was 3 per year.

4. Substantial increases in capital and recurrent budget will be needed in the next three years to maintain the productivity of our scientists. The new laboratories will need to be equipped. The next significant effort will be on the generation and testing of new technologies for farmers and the publication of results. Government has agreed to grant progressive increases in budget in the next few years.

Exercise 21. Worksheet (Continued)

DAY FOUR

Session 22
Application—Editing One of Your Colleague's Papers

Instructions to Trainers

SESSION 22

11:15 – 13:00 Session 22. Application—Editing One of Your Colleague's Papers

13:00 – 14:00 Lunch

14:00 – 15:30 Session 22. (Continued)

OBJECTIVE

By the end of this session the participants will be able to do the following:

- Apply knowledge and skills to edit a sample of scientific writing.

Use overhead 4.22.1 to present the objective.

PROCEDURE

Training techniques: group work, working in pairs.

EXERCISE 22

Exercise 22. Application: editing one of your colleague's papers.

1. Distribute handouts 4.22.1 and 4.22.2, and two papers written by participants, that you choose for this exercise. If none of the participants brought a research paper, use handout 4.22.3. (5 minutes)

Phase 1. Group work (1 hour 15 minutes)

2. Divide the participants into four groups, and ask each group to elect a rapporteur.
3. Indicate which group works on which section of the text. Ask them to edit this section and to list on handout 4.22.2 its major weaknesses.
4. As the groups work, circulate from group to group to check progress. Clarify any concerns the groups may have while they are working. Be sure to remind the groups of the time remaining.

Phase 2. Reporting and discussion (1 hour 50 minutes)

5. The rapporteurs have five minutes each to present their group's results. (20 minutes)

6. Provide feedback on the groups' results and invite all participants to join in a discussion on this exercise. (1 hour 20 minutes)
7. *(process, generalize)* At the end of the exercise provide feedback on the content of the presentations. Also, ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" (10 minutes)

CLOSURE

Closure (15 minutes)

1. *(application)* Ask the participants to tell their neighbor two things they might do differently as a result of what they learned. Ask some volunteers to give examples.
2. Make a transition to the next session

15:30 – 15:45 Tea/Coffee Break

DAY FOUR

Session 22
Summary of Overheads

Objective of Session 22. Application—Editing One of Your Colleague's Papers

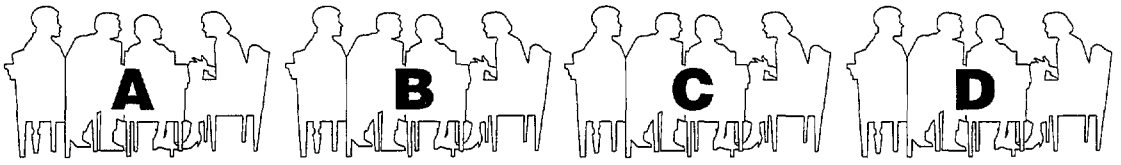
3. Apply knowledge and skills to edit a sample of writing

4.22.1

Exercise 22. Application—Editing one of your colleague's papers (group work)

Phase 1. Group work (1 hour 15 minutes)

1. Form four groups, and elect a rapporteur.



2. Edit the sections of the text assigned to your group, and list on handout 4.22.2 the major weaknesses you found in this section.

Phase 2. Reporting and discussion (1 hour 50 minutes)

3. The rapporteurs have five minutes each to present their group's results.
4. The trainer will provide feedback on the results, and invite all participants to join in the discussion.

Exercise 22. Worksheet

In the event that the participants have not brought their own paper, you find in the annex two texts you may want to use for exercise 22.

DAY FOUR

Session 23
Report Writing

Instructions to Trainers

SESSION 23

15:45 – 16:15 Session 23. Report Writing

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Identify some differences between scientific writing and report writing.

Use overhead 4.23.1 to present the objective.

PROCEDURE

Training techniques: presentation, discussion.

PRESENTATION

(experience) Distribute handout 4.23.1. Give a brief presentation on the key differences between scientific writing and report writing. Overheads 4.23.2 through 4.23.13 support this presentation. Ask if the participants need any clarification. Distribute handout 4.23.2. (15 minutes)

EXERCISE 23

Exercise 23. Discussion. (10 minutes)

1. After the presentation, ask the participants to formulate their comments and enter into a discussion.

CLOSURE

Closure (5 minutes)

1. *(application)* Ask the participants to tell one of their neighbors two things they might do differently in their writing as a result of what they learned. Ask volunteers to give examples.
2. Make a transition to the next session.

DAY FOUR

Session 23
Summary of Overheads

Objective of Session 23. Report Writing

4. Identify some differences between scientific writing and report writing

4.23.1

Report Writing

4.23.2

Outline

- Title
- Summary
- Introduction
- Main report
- Conclusions
- Recommendations
- Appendices

4.23.3

Technical Writing Requires

- Facts
- Logical sequence of facts and arguments
- Use of plain English
- Supporting information and illustrations

4.23.4

Preliminary to Writing

- Why?
- Terms of reference?
- Information required?
  - factual
  - conclusions
  - recommendations
- Achievements?
- Readers' knowledge?
- Information available?
  - how much to include
- Confidentiality
- Financial implications

4.23.5

Planning a Report

- Title
- Lines of enquiry for reliable information
- Balanced picture
- Pertinent information
- Logical arrangement
- Suitable format
- Style and method adapted to reader

4.23.6

Structure of Report

Two stages:

- List all subjects to be covered
- Rewrite the list in logical sequence

4.23.7

Logical Sequence of Report

- Chronologically
- By major topics
- Simple ⟶ complex
- Problem/solution approach

4.23.8

Chronological

- Origin of the project
- Initial planning
- Feasibility study
- Detailed design
- Implementation
- Results
  - expectations met?
  - what went wrong?
  - why?
- Lessons learned

4.23.9

Problem/Solution Approach

- State problem
- Consider options
- Consider disadvantages and advantages
- Recommend solutions

4.23.10

Do's and Don'ts

- Avoid generalizations
- Use only technical language familiar to the reader
- Use explanatory keys
- Use graphic or images where appropriate
- Use an index in a long report
- Include description of standards and methods
- Make length commensurate with importance of topic
- Make it simple and easy to read

4.23.11

Internal Structure

The use of:

- words
- paragraphs
- annexes
- figures

4.23.12

Check the Following:

- Conclusions match terms of reference
- Conclusions follow logically from introduction and discussion
- Wider significance of conclusion is pointed out
- Minority view is reflected
- Conclusions, comments, and recommendations are distinguished
- Report is fully checked before presentation

4.23.13

Exercise 23. Report writing (plenary discussion)

1. Take notes of major issues presented by the trainer.
2. Formulate questions and comments to discuss in plenary. Use examples from your personal experience and knowledge.

Report Writing[1]
(summary of presentation)

The outline of the report should include the following sections:

title
summary
introduction
main report
conclusions
recommendations
appendices

Technical writing requires the following:

the facts
logical sequencing of facts and arguments
statement of facts in plain English (grammar, punctuation)
supporting information and illustration

Preliminary to writing, think about some of these points:

1. Why write the report?
2. Understand the "terms of reference"
3. What information required: I) factual, II) conclusions, III) recommendations
4. What do you hope to achieve?
5. What is readers prior knowledge?
6. How much information is available? I) How much should you include?

Others:

confidentiality
financial implications

Planning of report

1. Title - identify the subject matter
2. Lines of enquiry for reliable information
3. Balanced picture
4. Information collected and used should be pertinent

1. By T. A. Taylor, ISNAR Manuscript.

5. Logical arrangement
   (I) to present basic message
   (II) topics to emerge progressively

6. Use of a suitable format such as the following:
   - introduction
   - summary
   - information (main report)
   - conclusion
   - supplementary evidence (annex)

7. Style and method of analysis should be suited to the subject matter and to the reader

Structure of report

1. List all subjects to be covered

2. Rewrite the list in some logical sequence

Logical sequencing of a report can be done in a number of ways:

1. Chronologically

2. By major topics; list the topics and address in order

3. Simple to the complex

4. Problem/solution approach

Chronological:

- origin of the project
- initial planning
- feasibility study
- detailed design
- implementation
- results
- did it meet expectations
- what went wrong and why
- lessons to be learnt

Problem/solution approach:

- state problem
- consider options
- consider advantages and disadvantages
- recommend solutions

Repeat for each problem

Do's and Don'ts:

1. Avoid any use of generalizations
2. Use only technical language familiar to the reader
3. Use explanatory keys for specialized terminology
4. Use graphics or illustrations where appropriate
5. If a report is long, use an appendix
6. A scientific research report should include description of standards and methods
7. Length commensurate with importance of topic
8. Make it simple and easy to read

Internal structure:

1. Use of words; passive/active
2. Use of paragraphs: subdivisions
3. Use of annex: supporting calculations or tables in annex
4. Use of figures
   - accuracy
   - precision
   - avoid pedantic use of decimal points

Check:

1. That conclusions match the terms of reference
2. That conclusions follow logically from information and discussion
   - incorporated information
   - outside evidence
3. That wider significance of conclusion is pointed out
4. That minority view is reflected, e.g., in appendix
5. That conclusions, comments, and recommendations are distinguished
6. That report must be fully checked before presentation

DAY FOUR

Session 24
Oral Presentation

Instructions to Trainers

SESSION 24

16:15 – 17:30 Session 24. Oral Presentation

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Plan and prepare an oral presentation using visual aids.

Use overhead 4.24.1 to present the objective.

PROCEDURE

Training techniques: presentation, group work, group presentation, videotape feedback.

PRESENTATION

(experience) Give a presentation focusing on how to plan, prepare, and deliver an oral presentation. Remember that you will be providing overall information on oral presentation. Participants will read and discuss the handouts. Then do not elaborate much during your presentation. Use about two minutes presenting each overhead. This presentation is longer that the previous one and the participants should be informed about it. This session prepares participants to carry out exercise 24 which will last 5 hours 15 minutes. Overheads 4.24.1 through 4.24.30 support the presentation. Ask if clarifications are needed. Distribute handout 4.24.1. (30 minutes)

EXERCISE 24

Exercise 24. How to plan, prepare, and deliver an oral presentation. (30 minutes)

1. Distribute handouts 4.24.2 and 4.24.3. Go over the instructions in handout 4.24.2 step by step. Ask if any clarifications are needed. Note that this exercise will continue throughout the day tomorrow. It is important that you set the stage now and be sure that everyone understands the instructions so they can work on their own to develop their presentations. (5 minutes)

Phase 1. Group work (25 minutes)

2. *(experience)* Ask the participants to form four groups. The groups should be different from those of the previous day.

3. Groups A and B work on handout 4.24.4 and groups C and D work on handout 4.24.5. Distribute the handouts to the respective groups.

4. Tell the participants that the 25 minutes allotted today clearly is not enough time to complete their presentation. They may need to work together in the evening and will be able to work the first part of tomorrow on the preparation. While the participants are working, circulate from group to group to check progress, and offer clarification if needed.
5. After 25 minutes ask the participants to stop working and to make arrangements to continue work on the presentation in the evening.
6. Make a transition to the last session.

17:30 – 18:00 Feedback on the Day's Activities and PAPA

OBJECTIVES

By the end of this session participants will be able to do the following:

- Provide feedback on the day's activities.
- Consider possible actions they would like to implement in their own organizations.

PROCEDURE

Training technique: individual exercise.

Highlight positive and negative points of the day. Note areas that may need additional attention in the workshop. Participants can write some strengths and weaknesses of this day on handout 4.24.6 and use handout 4.24.7 to facilitate their task. (15 minutes)

PAPA

(application) Ask the participants to take some time to jot down some "action ideas" they may have for themselves as a result of today's activities. They can use handout 4.24.8. (15 minutes)

DAY FOUR

Session 24
Summary of Overheads

Objective of Session 24. Oral Presentation

5. Plan and prepare an oral presentation using visual aids

4.24.1

Oral Presentation

4.24.2

What is an Oral Presentation?

- Face-to-face contact with audience members
- Audience uses two senses: sight and hearing
- Appearance
- Materials (visual aids) shown
- Two-way interchange possible with audience

4.24.3

Why are Presentation Skills Important?

- It communicates the power of the presenter
- It puts two senses in play by the audience:
  - hearing
  - seeing
- It establishes a two-way interchange on topics that you choose

4.24.4

Audience and Purpose(s)

- Identify the audience
- Your purpose in presenting
- The audience's purpose in listening to you
- Consider the purposes — What is the common purpose?

4.24.5

Objectives

- What do you want to communicate?
- Decide on your main purpose
  - inform
  - entertain
  - persuade
  - move to action
- Keep it simple — not more than four main points

4.24.6

Barriers to Communication

- The audience fails to give full attention and effort:
  - *can't see or can't hear*
- Fails to comprehend:
  - *due to language*
  - *words*
  - *concepts*

4.24.7

- Thinks of other things because they are:
  - *hungry or thirsty*
  - *cold or hot*
  - *tired or overworked*
  - *worried*
  - *concerned about time*
- Perceives with own ears and eyes:
  - *lack of interest in your topic*
  - *cultural differences or expectations*
  - *form or style not familiar*

4.24.8

- Rejects message on technical grounds:
  - *unsuitable*
  - *considered incorrect*
  - *economically not viable*
- The communicator may fail to hold interest because of:
  - *personal appearance*
  - *attitude*
  - *unsuitable message*
  - *poorly presented message*
  - *poorly prepared message*

4.24.9

Planning the Oral Presentation

- Develop structure and content
- Basic structure is three main points:
  - introduction
  - body
  - conclusion

4.24.10

Introduction

- Create the desired atmosphere
- Present speaker effectively from the start
- Catch the interest of the audience
- Lay out the subject and the structure ~~the~~ presentation

4.24.11

Body

- Develop each main heading
  — *remember that few people will remember three or four main points*
- State each point in terms the audience knows
- Back each key point with facts, examples
- Make smooth transitions between main points
- A caution about the word "finally:" Don't use it until you are ready to end the presentation

4.24.12

If you want to do the best you possibly can:

- Write out the full introduction. Read aloud what you have written
- Read it aloud several times, until you have on your tongue both what you want to say and how you want to say it

But don't read it to your audience!

4.24.13

- How much time should you devote to planning and presentation?

  The oral part — the spoken word — is the heart of the presentation and requires planning and preparation

One of the most common errors in oral presentation is lack of preparation. Too often a person makes overheads of a few tables or charts, or selects a few color slides, and thinks: "Now I am ready to speak on this subject"

That's seldom true!

4.24.14

Conclusion

- Stick to the topics discussed. This is not the place to give new evidence, this is where you "make the sale"
- Summarize, briefly
- Close with a story, a quotation, a case — but only if it fits

4.24.15

- If you want the audience to take action, ask for it here. Make clear what that action should be
- Plan how you will end the presentation, and make the ending definite and strong

4.24.16

Computers to Prepare Visuals

- Spreadsheet programs
  - Lotus 1-2-3
  - Quattro Pro
- Database programs
  - Paradox
- Graphics program/drawing programs
  - Harvard Graphics
  - Freelance

4.24.17

Organizing Your Thinking

Main points	Key factor points	How to illustrate

4.24.18

Start the Planning Process

Decide on the main points
↓
which facts to visualize
↓
how to visualize them

4.24.19

Reasons for Poor Use of Visuals

- Too much data or details
- Unreadable
- Visual doesn't fit the point made

Visuals are *aids* in presentations.
They don't substitute for the speech

4.24.20

Design and Preparation of Visuals

- Depends on subject and taste
- Computer packages for high-quality overheads
- Use readable letters and colors
- Labels should be straight, if used
- Use a xerox if available

4.24.21

Overhead Projector

- Versatile and convenient
- For any size audience
- Ideally overheads should be made in advance
- Allow writing / drawing during presentation
- Overheads can be stacked for complex diagrams

4.24.22

Visual Aids for Oral Presentations

- Introduction
- Instruments designed to help presentations
- If not used well may become a hindrance
- Effective usage calls for:
  - familiarity with instruments
  - good practice
  - calmness

4.24.23

Types of Visuals

Projected:
- Overheads
- Slides

Nonprojected:
- Flip chart
- Wall picture and charts
- Chalkboard or wall (black, green)

4.24.24

Purpose of Visuals

When used effectively, visuals can:

- capture and focus attention
- reinforce a speakers' words
- illustrate difficult points
- hold viewers' attention
- emphasize points

4.24.25

Tips on Presenting Overheads

1. Number transparencies
2. Eliminate unnecessary overheads
3. Two or three minutes per transparency
4. Remove overheads when not needed
5. Stand near and to the side of the projector and screen
6. The visual should speak for itself
7. Point to the projector not to the screen

4.24.26

Tips on Presenting Overheads

8. Speak to the audience, not to the visual
9. Don't stand in the light stream of the projector
10. Don't turn the projector on without overhead
11. Don't speak while changing overheads
12. Transfer smoothly between visuals
13. Turn off the projector, before final remarks
14. Plan a fall-back solution

4.24.27

Making Graphs

- Main purpose is to show simple relationships
- Simplify titles and identifying tags
- Laser print direct onto transparencies
- Photocopy onto transparencies

4.24.28

Tips on Designing Overheads

1. Per overhead:
   one idea, six to eight lines, six words per line
2. Maximum two types of letter
3. Use style systematically
4. Legible labels
5. Be consistent in use of abbreviations

4.24.29

Tips on Designing Overheads

6. Give key for abbreviations
7. Title indicates main topic
8. Highlight significant figures
9. Use symbols and diagrams rather than straight text
10. Use images

4.24.30

Oral Presentation
(summary of presentation)

What is an oral presentation?

- Face-to-face contact with audience members
- Audience uses two senses: sight and hearing
- Appearance
- Materials (visual aids) shown
- Two-way interchange possible with the audience

Why are oral presentation skills important?

- It communicates the power of the presenter
- It puts two senses in play by the audience — hearing and seeing
- It establishes a two-way interchange on topics that you choose

Audience and purposes

- Identify the audience
- Consider the purposes
- Your purpose in presenting
- The audience's purpose in listening to you
- What is the common purpose?

Objectives

- What do you want to communicate?
- Deciding on your main purpose
  - Inform
  - Entertain
  - Persuade
  - Move to action
- Keep it simple — not more than four main points

Barriers to communication

- The audience fails to give full attention and effort: perhaps they can't see or can't hear
- Fails to comprehend: due to language, words, concepts
- Thinks of other things because they are hungry or thirsty, cold or hot, tired or overworked, worried, concerned about time

The audience perceives with its own ears and eyes; perhaps they have a lack of interest in your topic, cultural differences or expectations, or are not familiar with the form or style used.

The audience may reject the message on technical grounds:

- Unsuitable
- Considered incorrect
- Economically not viable

The communicator may fail to hold the interest of the audience for reasons such as:

- Personal appearance
- Attitude
- Unsuitable message
- Poorly presented message
- Poorly prepared message

Planning the oral presentation

- Develop the structure and content
- Basic structure is three main points: introduction, body, and conclusion

The introduction

- Create the desired atmosphere
- Present speaker effectively from the start
- Catch the interest of the audience
- Lay out the subject and the structure of the presentation

The body

- Develop each main heading — remember that few people will remember more than three or four main points
- State each point in terms the audience knows
- Back each key point with facts and examples
- Make transition between main points
- A caution about the word "finally": don't use it until you are ready to end the presentation

If you want to do the best you possibly can:

- Write out the full introduction. Read aloud what you have written.
- Read it aloud several times, until you have on your tongue both what you want to say and how you want to say it.

!! But don't read it to your audience !!

How much time should you devote to planning and preparation? The oral part — the spoken word — is the heart of the presentation and requires planning and preparation.

One of the most common errors in oral presentation is lack of preparation. Too often a person makes overheads of a few tables or charts, or selects a few color slides, and thinks to herself/himself "Now I am ready to talk on this subject." That is seldom true!

The conclusion

- Stick to the topics discussed. This is not the place to give new evidence; this is where you "make the sale"
- Summarize — briefly
- Close with a story, a quotation, a case — but only if it fits
- If you want the audience to take action, ask for it here. Make clear what that action should be
- Plan how you will end the presentation, and make the ending definite and strong

Use of a Computer to prepare visuals

- Spreadsheet programs
  - Lotus 1-2-3
  - Quattro pro
  - Excel
- Computer graphics programs
  - Harvard graphics
  - Freelance

One advantage of a graphics program is that it can show several alternative ways to present data.

Organizing your thinking

MAIN POINTS	KEY FACTOR POINTS	HOW TO ILLUSTRATE

To start the planning process

- Decide on the main points you want the audience to understand and remember
- For each main point decide what fact should be visualized
- Decide how to illustrate that fact

Reasons for poor use of visuals

- Too many data or details
- Viewers find the visual not readable
- Visual does not fit the point being made
- Other reasons ...

NOTE: Visuals are aids in presentation, not substitutes to what the speaker has to say

Design and preparation

- Depends on the subject and individual taste
- Computer packages currently available for high-quality overheads
- Use readable letters and colors
- When using labels make them straight, not upside down, not slanting
- Use a Xerox where available

Overhead projector

- Versatile and convenient
- Can be used for any size of audience
- Ideally overheads should be made in advance
- Allow writing/drawing during presentation
- Overheads can be stacked for complex diagrams

Visual aids for oral presentations

The decision of the type of visuals to use lies with speakers; it depends on the material to be displayed and style.

- Introduction
- Instruments designed to help presentations
- If not used properly may become a hindrance
- Effective usage calls for the following:
  - familiarity with instruments
  - good practice prior to presentations
  - calmness (no stage fright please!)

Common types of visuals

- Projected
  - overhead projector
  - slide projector
- Nonprojected
  - flip chart
  - wall pictures and charts
  - chalkboard or wall (black, green)

Purpose of visuals

When used effectively, visuals can help

- Capture and focus attention
- Reinforce a speaker's words
- Illustrate difficult points
- Hold viewers' attention
- Emphasize points

Tips on presenting overheads

1. Number transparencies — if they are knocked to the floor or shuffled, they can be put back in proper order. (Many speakers put transparency numbers in their speaking notes to be sure to use the right overhead at the right time.)
2. Analyze the transparencies and decide which could be eliminated if necessary. Put a mark in the corner of each "expendable" one and mark each in presentation notes.
3. Use one overhead per two or three minutes, on average.
4. When you finish with the content of an overhead, turn off the light or cover the light table so the old transparency does not distract the audience.
5. Stand near and to the side of the projector and screen.
6. Let the visual speak for itself (that is, do not read the text of the visual).
7. Use a pencil on the transparency to draw attention to certain points, rather than using a long pointer to touch the image on the screen.
8. Speak to the audience, not to the image on the screen.
9. Avoid getting into the light stream of the projector.
10. Do not turn on the projector without a transparency on the light table.
11. Do not speak while changing overheads. Once the next transparency is in place, you are ready to resume speaking.
12. Use both hands when removing a transparency and replacing it with another. Make the change smoothly or turn off the machine while making the change.
13. Wait until you finish speaking before starting to pick up your transparencies. It is a good technique to turn off the projector before you end, then step forward to make your final remarks. You can be sure you will have the audience's attention for your final statement.
14. Plan a fall-back solution in case you cannot use the visual aids you planned: power may go off, projector bulbs burn out, sometimes not all the expected equipment is provided by the organizers.

Making graphics

- Main purpose is to show simple relationships
- Simplify titles and identifying tags
- Laser print direct on transparencies
- Photocopy onto a transparency

Tips on designing overheads

1. Design each transparency to reflect one idea, expressed in a maximum of six to eight lines, with no more than six words per line.
2. Use a maximum of two types of letter and not more than three colors on one transparency.
3. Use lettering and colors systematically and consistently, and be sure that the print is large enough.
4. Make labels legible (horizontal, not vertical or slanting). Special pens are available for drawing on transparencies (it is also possible to photocopy from paper to transparencies) and stencils, or use press-on letters, kroy-type lettering machines, or computer word processing to make text clear.
5. Use abbreviations consistently, using standard abbreviations where possible.
6. Give a key for any nonstandard abbreviations.
7. Indicate the main topic by title.
8. Highlight, perhaps with color or distinctive type, the most significant figures.
9. Use symbols and diagrams rather than straight text.
10. Clip art, accents, and attention-getting designs, pre-printed borders, and cartoon characters can be used to create professional looking transparencies

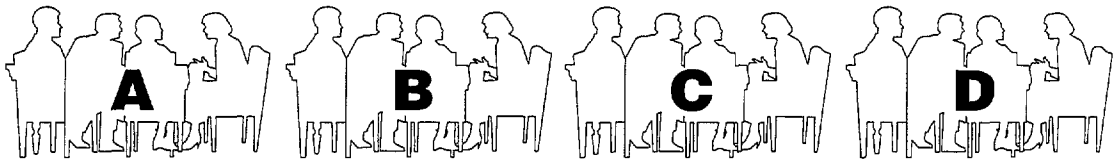
Stack overheads for an unusual effect.

- To start the planning process
- Decide what main points you want the audience to understand and remember.
- For each main point decide what fact should be visualized.
- Decide how to illustrate each fact.

Exercise 24. How to plan, prepare, and deliver an oral presentation (group exercise)

Phase 1. Group work (2 hours 15 minutes)

1. Form four groups.



2. Groups A and B work on handout 4.24.4, and groups C and D work on handout 4.24.5. Read the text and prepare a presentation. More than one person can give the presentation tomorrow.
   Make sure that your presentation preparation includes:
   - presentation design (introduction, body with main heading, conclusions)
   - presentation delivery (time, audience should hear the speaker, eye contact, face the audience)
   - design of visuals (visuals easy to read by the audience, titles)
   - use of visuals (presenter talks to the audience, proceeds smoothly from one visual to the next)

Phase 2. Presentation, evaluation, and discussion (3 hours)

3. Each group gives its presentation. The presenters will be videotaped in order to facilitate the evaluation of their oral presentation skills. (10 minutes)

4. Use handout 5.24.11 as a guide to evaluate the presentations. Answer the questions on the forms.

5. After each presentation, the trainer will show a few minutes of the videotape, and will provide feedback. You will be invited to join in the discussion.

Exercise 24. Worksheet

Guidelines to Effective Communication[1]

Introduction

In contrast to the face-to-face group discussion when participants play alternate roles as speakers-listeners, the public-address situation is essentially one in which an individual speaks directly to a number of auditors (audience) who maintain a relatively fixed focus of attention upon the speaker. The listeners form a co-acting group, responding primarily to a common stimulus, rather than to each other. Typically, this solo communicative performance is by a lecturer or a scientist whose aim is to inform his hearers.

Common to all public-address communication is the use of two basic codes, audible and visible. In other words, organized sound and light waves are deliberately projected by the speaker. It is important to recognize, however, that visible speech behavior (the gesture, facial expression, or pantomime that accompanies spoken words) is also a significant element of communication. Indeed the so-called "gesture theory" explanation of how man developed vocal speech assumes that visible gestures preceded audible words. Some people regard gestures as verbal though non-vocal behavior. Others who study kinesics (meaningful body movements) such as pointing, headshaking, laughing, sneering, and eyebrow raising have confirmed that those convey specific meanings.

For our purpose, the speaker is concerned with response, the tangible evidence of his or her influence upon the behavior of his audience. Some of these responses may be *immediate* and *overt* while others may be delayed and covert.

The audience

There are two types of audience. The first type, informal, is made up of an unorganized group lacking any overall orientation and having no common focus of attention. It is a very fragile group and can cease to exist any time unless some guiding pattern of orientation develops. The second type, formal, has the following characteristics:

a) it is information-seeking, such as an audience in a classroom or at a popular lecture/scientific presentation. This is a form of "institutionalized crowd."

b) assembles with a definite purpose and is prepared to be *affected* and *directed.*

c) gathers at a predetermined time and place.

d) displays a fairly standard pattern of interaction.

Interaction in the audience situation

There are three significant concepts of the behavior of audiences.

- polarization
- social facilitation
- circular response

1. By Dr. R.K. Obura

Polarization

This is what makes a group of persons into an audience. It introduces structure into a unorganized group. This term has been used to mean the "all-to-one" relationship or "shoulder-to-shoulder configuration" of a group, facilitating a single channel of communication (in contrast to the face-to-face discussion group where many and various channels are opened). A polarized audience is an established entity, separate from the entity of the speaker, but paying attention to him or her, and linked to the speaker by communication in such a way that interaction is possible.

Five major factors contribute to polarization:

1. **auditorium** – creates not only a *physical closeness* but also suggests a *social* and *purposeful* unity.
2. **seating arrangement** – leads the audience to face the platform and the speaker in a unified group.
3. **lighting** – may be arranged to attract attention to the platform or the speaker's lectern or podium.
4. **platform** – usually elevated above the level of the audience, providing a position of social command for the speaker.
5. **others** – certain elements of ritual and the speech itself may intensify audience polarization.

Social Facilitation

This is a term frequently used to describe the reinforcement effect of the responses of one individual upon the behavior of others in the same audience. The observed effect is an increase in response merely from the sight or sound of others making the same movement (response). Imitation is one of the factors promoting social facilitation: exposure to Similar stimuli tends to result in similar motor response. Some examples follow:

- those around us are attending we are likely to do the same.
- if we don't get the point of a joke, we are likely to laugh when those around us laugh.

Hired applauders – common in opera, theater, political rallies, and religious meetings to facilitate the social response, which soon will be followed by others responding in the same way.

Circular Response

This is the third phenomenon of interaction among audience members. In its operation on speaker-audience relationships it is analogous to social facilitation within the audience. The term describes the effect of the speaker on the response of the listeners. Sometimes this response by hearers is called a feedback, that symbolizes the flow of communication by overt physical response back to the speaker. As the listeners respond to a speaker they may *frown* their disapproval, *smile* or *nod* their moderate approval, or vigorously applaud or shout their enthusiastic approval. The speaker is generally rewarded by learning that he has communicated successfully, and is stimulated to release new energy. This in turn elicits new responses from the audience and the cycle continues.

Audience Analysis

The first series of audience-analysis questions relates to the audience and the subject; the second series relates to the speaker. *Not all* of these questions are of equal importance in every speaking situation, and it will not always be possible to answer them all.

Audience and the subject

1. What is the significance of the subject for the audience?
2. What does the audience know about the subject?
3. What beliefs or prejudices does the audience have about the subject?
4. What is the attitude of the audience towards the subject?
5. What is the speaker's specific purpose in discussing the subject?
6. What time is available for discussing the subject?

Audience and the speaker

1. What general social group does the audience represent?
2. What specific group or organization does the audience represent?
3. What are the general characteristics of the audience?
4. What are the specific characteristics of the audience?
5. What are the probable potent motivators of the audience?
6. What is the attitude of the audience towards the speaker?

Some characteristics of listeners in audiences

1. Listeners tend to believe what they want to believe.
2. Listeners tend to believe and do as they are told.
3. Listeners tend to act in accordance with their dominant attitudes.
4. Listeners tend to make stereotyped responses to stereotyped stimuli.
5. Listeners tend to respond to the emotional connotations of words.
6. Listeners tend to yield to the repetition of stimuli.
7. Listeners tend to accept ideas from those who have prestige.
8. Listeners tend to conform to the beliefs and actions of fellow listeners.
9. Listeners tend to respond in terms of overt actions.
10. Listeners tend to want to be rational.

Focusing attention

When a speaker faces his audience, it is important to utilize all possible resources to gain her attention. The speaker must work to find some common ground of agreement with the audience and then focus attention upon it. This becomes especially crucial when one faces a hostile or

critical audience. For effective communication, the speaker should aim to capture the total loyalty of the audience. This can be achieved through the following:

The content of the speech must be impressive. What the speaker says should have definiteness of form, clearly presenting an easily grasped pattern of information or course of action.

The organization of the speech (paper) *must* be clear. A well organized speech personifies definiteness of form, ordering information or argument in some order (chronological, topical, logical, or some pattern).

The style of the speech must be varied. A *change* in word stimuli will add variety and speakers need to be wary of overusing *stock* phrases to the point of redundancy.

The delivery of a speech must be compelling. A monotonous voice and a static body seldom gain audience attention.

Maintaining interest in the audience

"Thanks, anyway, but I'm just not interested", is a terminating statement that sends salesmen away from the front door frustrated. A scientist standing in front of his audience is a salesman of sorts, peddling his ware of *facts* and *opinions*, arguments and propositions. The very act of listening depends upon the listeners' interest in what is being said. Three important factors (among many) significantly influence listening comprehension:

- real *interest* in the subject discussed
- ability to see *significance* in the subject discusses
- *curiosity* about the subject discussed

Stage Fright

When the chairman of a session announces that "our next paper entitled 'Influence of VA-Mycorrhizae Fungi on Resistance of Tomato to Bacterial Blight' is to be given by R.K. Obura" everybody becomes attentive and whoever is giving the paper often notices an increase of adrenalin in his body. This is accompanied by an increased heartbeat and blood pressure. Physiologists indicate that these processes prepare the body to face some stressful moments. The scientist on stage may get a shaking voice and trembling hands. Instead of giving an organized speech (as was laid out), the speaker may get muddled, frustrated, and confused. This is stage fright.

Speakers who have stage fright are both attracted to and repelled by the same stimulus (the audience) in an approach-avoidance conflict. Stage fright occurs most often in situations where the audience's response appears to the speaker as unpredictable. This can lead the speaker to behave in a way that is both observable and distracting to the audience. More formally, stage fright can be defined as the speaker's behavior, which is disintegrated, poorly adjusted to the situation, and an interference to efficient and effective communication.

Whom does stage fright affect?

1. Some degree of psychological and physiological arousal appears to be common in most speakers, whether experienced or inexperienced.

2. The disruption in communicative behavior caused by stage fright appears to be less apparent to observers than it is to the speakers.

3. Stage fright affects both men and women. Men are more likely to have their stage fright observed, while women are more likely to be aware of it themselves.
4. There is no apparent connection between stage fright and *intelligence, reasoning ability*, or the more important phases of personality.
5. A reduction in stage fright appears to be correlated to an increase in self-confidence, and this seems to come with improved speaking ability, greater experience in speaking, and age.

Thus effective speakers focus on the task of gaining desired responses from their listeners. They concentrate on talking with not at or merely in front of their audience. There is ample evidence to suggest that stage fright seldom attacks speakers who focus upon task rather than upon self.

Some physical tension is normal; until the speech is well under way, or perhaps even completed, the speaker naturally feels concern about meeting his own and the audience's expectations. This concern will undoubtedly manifest itself in ways that are common to *acute stage fright,* such as a dry mouth or trembling hands. But the speaker who focuses upon his talk may find a source of energy in his tension; and he will not be disconcerted by modest automatic responses if he recognizes them as normal.

Visual Aids for an Oral Presentation[1]

In conferences of scientists in many parts of the world, speakers use some kind of visual aid. Often the visual aid is an overhead projector, which is typically used by the speaker to show a table or graph copied directly from a paper. Some may use a chalkboard or big pad of paper on which to draw or write certain items. Some may use photographic slides, either to show scenes or to project word slides.

Such use of visual aids may not hurt a presentation, but seldom do they help the audience as much as the speaker thinks. That is usually because the speaker doesn't use visual aids well. Here are some reasons for poor use:

- The speaker uses the visual to present more data and details than the viewers are able to follow or remember.
- The visual is not quickly readable by the viewers. Letters are too small or too dim, or the graph is too complicated to understand at a glance.
- The visual doesn't exactly fit the point the speaker is making, or it has more information than the speaker wants to cover.
- The speaker gets so involved in using the visual that he or she loses the main stream of the presentation. The speaker starts to describe the visual rather than use it to illustrate the main thrust of the presentation.

Visuals are **aids** in presentation. They **support** what the speaker says in words. They don't substitute for what the speaker has to say. The oral presentation is the starting point in planning visual aids. **First,** understand what visual aids can do for a presentation:

1. Visuals can capture and focus the attention of the audience. The audience's eyes follow any visual aid a speaker offers, especially when the visual is projected as a slide or overhead. (When a speaker turns on an overhead projector, all eyes go to the lighted screen. When a speaker turns off an overhead projector, all eyes go back to the speaker.)

2. Visuals reinforce a speaker's words by using a second receptor sense, the eyes: the viewers **see** as well as **hear**.

3. Visuals can illustrate points that are hard to grasp from spoken words alone.

4. Visuals help hold viewers' attention, or recapture attention if viewers have let their minds wander off the presentation.

5. Visuals give emphasis to the points they illustrate.

Second, plan the visuals as carefully as you plan the oral presentation. One writer gives six rules of thumb to consider when planning visual aids:

1. Use visual aids sparingly. One of the biggest problems is the overuse of visual aids. A useful rule is one visual aid for every two minutes of presentation time.

1. Based on materials compiled by Robert Kern.

2. Use visual aids pictorially. Graphs, pictures, flow charts, etc., give the viewer insights that would take many words or columns of numbers to convey. (Illustrations usually make stronger impact on viewers than do printed words.)

3. Present one key point per visual. Focus on the simple and clear. More than one main idea per visual can detract from its impact.

4. Make visuals big enough to see from the farthest point where viewers will be seated.

5. Make visuals attractive. Use color. Work for simplicity and clarity. Avoid clutter.

6. Avoid miscellaneous visuals. There is no need for a visual on a point that can be made simply with words such as the title of the presentation.

To start the planning process:

- Decide what main points you want the audience to understand and remember from your presentation. There will be probably no more than **three** main points in all. There may need to be more than one visual aid for each key point, but limit the number of main points.
- Decide for each main point just what fact or element should be visualized – what can be shown to the eye that will reinforce the speaker's words on that point?
- Decide how to illustrate each fact or element. Think in graphic terms. Settle for printed words only when you can not think of a way to show the idea graphically.

The following paper can be illustrated by the overhead transparencies attached. Some alternatives are presented.

Yield Response of Potatoes of Potassium Fertilization

ABSTRACT

Farmers tend to apply costly imported potassium fertilizer only on their major crop, usually rice. The residual potassium may not be adequate for potatoes following rice. This experiment compared three rates of K20 (75, 150, and 225) with 0 potassium on potatoes grown on medium- to moderately fine-textured flood plain soil. All rates of potassium produced higher yields of tubers per hill and overall yield. The study gave no conclusive evidence on an optimum rate of potassium fertilizer for potatoes under these conditions.

INTRODUCTION

Farmers have been found to apply N, P, and K fertilizers to their major crop, and then not to use K_2O on crops that follow (Ahmed, 1988). Potassium fertilizer is imported, requiring scarce foreign currency. It is important to know the best economic use of potash fertilizer on different crops and different soils. This study looks into the effects of potash fertilizer on potatoes. It will be continued to measure effects of residual potassium on T. aus and T. aman rice crops.

Applied ahead of the potato crop, three rates of potash fertilizer gave yields significantly higher than a treatment with no added potash.

MATERIALS AND METHODS

The irrigated trial was conducted at Keshanpar, Laksam during rabi 1986-87. The soils were medium- to moderately fine-textured alluvium (low land Tippera series) on the old Meghna estuarine flood plain soil. The design was a randomized complete block with four replications.

Four fertilizer treatments were: 0 potash and three rates of K20: 75, 150, and 225 kg/ha. All plots also received the same basal fertilization (in kg/ha): 150 N, 80 P205, 20 S, 4 B, 20 Ca, and 5 ZN. Half the N and all other nutrients were applied before planting; the rest of the N was topdressed when the crop was earthed up at 31 days after planting. Tubers of size 28 cm to 35 cm were planted on December 13, 1987, at a rate of 1,500 kg/ha in hills spaced at 60 cm by 25 cm. Plots were irrigated at 32 and 56 days after planting. All were harvested on February 29, 1988.

RESULTS AND DISCUSSION

In Table 1, data show that potash had a significant effect. It increased the weight of tubers per hill and overall yield. However, differences between effects of the three levels of potash were not significant. Haque et al. (1985) reported finding addition of a larger dose of K20 actually reduced potato yield significantly compared to a lower rate of potash.

Table 1. Effect of potash fertilization on potato under irrigated condition at Keshanpar, Laksam

Levels of Potash	Wt. of tuber per hill (g)	Yield ((t/ha)
0	107.7b[1]	6.90b[1]
75	234.0a	14.99a
150	261.6a	16.71a
225	251.5a	16.10a
LSD 0.1	124	8.04

1. Within a column, means followed by the same letter are not significantly different.

To plan the visuals for an oral presentation on the above paper, we follow the planning outline below:

Main points	Key fact or element	How to illustrate
Main methods of the experiment	Design and soil type	Word chart
	Fertilizers applied	Word chart
	Planting data	Word chart
Results	Effect on tuber weight	Bar graph
	Effect on yield	Bar graph
	Effect of potatoes	Line graph
Findings	Summary of results	Word chart
	Conclusion	Word chart

The present study supports a conclusion that potash has significantly increased the yield of potatoes. However, data are not conclusive as to the optimum dosage nor on the point at which additional potash may cause yield to decline.

On the basis of these plans, we can produce the following word charts and bar graphs. The several charts and graphs could be as follows:

Materials and methods (4.24.33)

Materials and Methods

Randomized complete block design

Fine-textured alluvium flood plain

Materials and methods (4.24.34)

Materials and Methods

Randomized complete block design

Fine-textured alluvium flood plain

Ferilizer: 150N 80P 20S 20Ca
Half N topdressed at 31 days

Muriate of Potash: 0 75 150 225

Materials and methods (4.24.35)

Materials and Methods

Randomized complete block design

Fine-textured alluvium flood plain

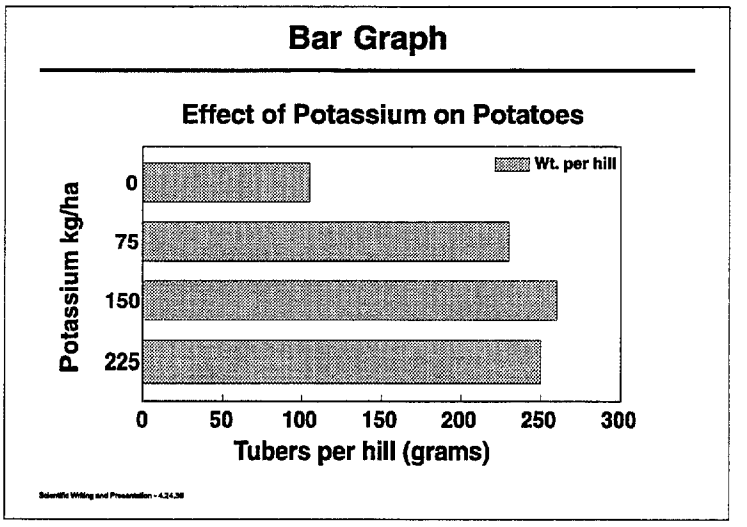
Ferilizer: 150N 80P 20S 20Ca
Half N topdressed at 31 days

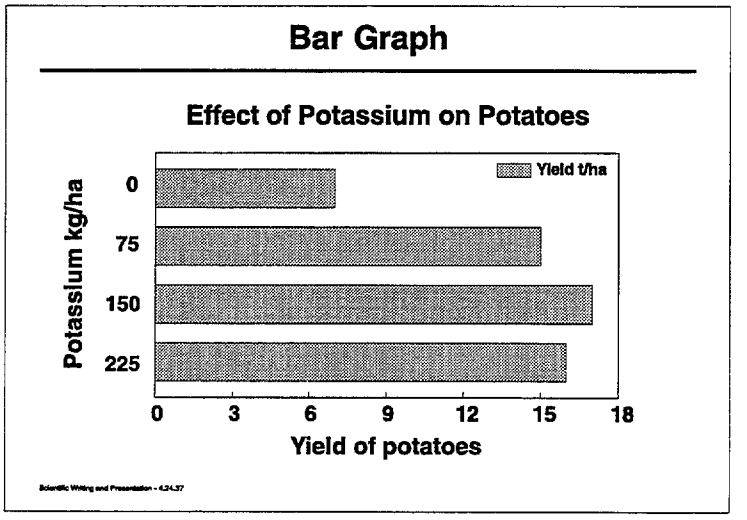
Muriate of Potash: 0 75 150 225

Planted 13 Dec in 60 x 25 cm hills
28-35 cm tubers at 1500 kg/ha

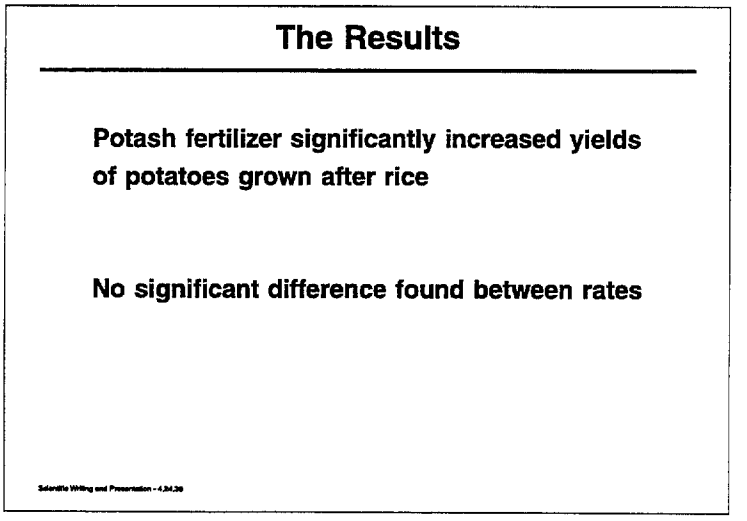
Harvested 29 Feb

Two bargraphs (4.24.36 and 4.24.37)

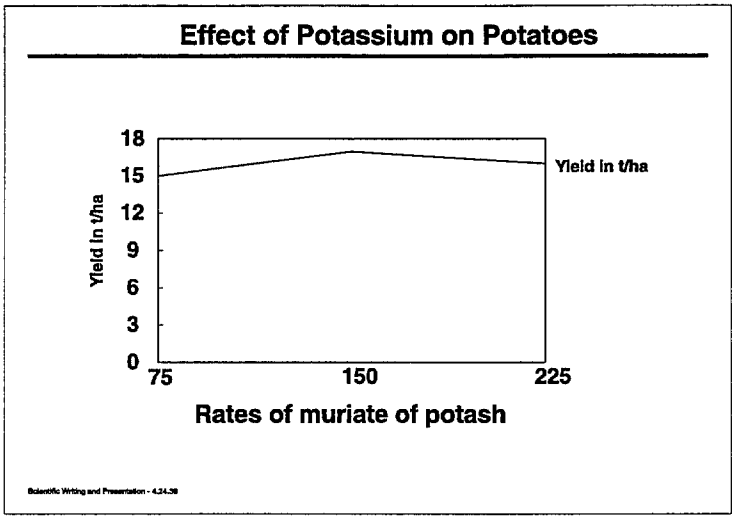




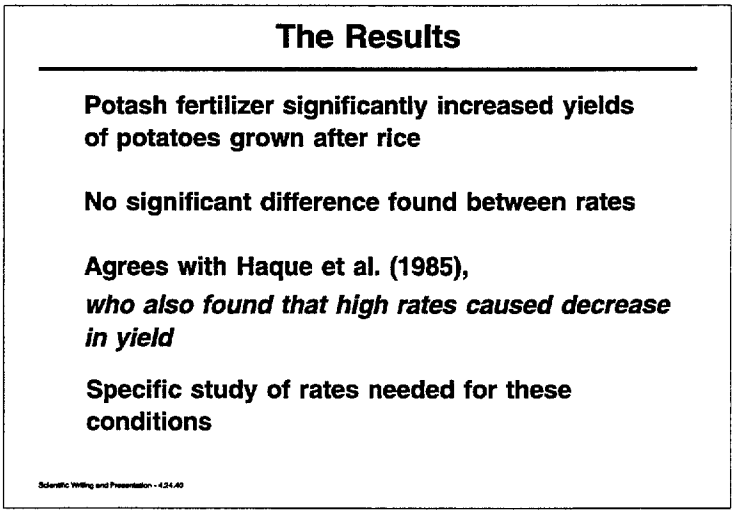
The results (4.24.38)



One line graph (4.24.39)



The results (4.24.40)



Planning visuals for most effective use

Some speakers put a lot of work into preparing a visual aid, such as one for overhead projection. They put a lot of material on a single frame. If they were using the visuals from the example on potassium, they might use only 4.24.35. That one has all of the information about materials and methods.

However, when shown a complex single-frame visual, some listeners-viewers will miss the first comments of the speaker because their eyes and minds are concentrating on the frame. By the time they finish looking and reading, and turn their attention back to the speaker, the speaker may be half through his or her comments and the readers will have missed much of the oral content.

We have made three frames to present that information on materials and methods (4.24.33 through 4.24.35). They make it easier to keep the audience's attention where we are in the presentation. 4.24.33 gives the title, and two points that have to do with the experimental

"environment"—the design and the type of soil. When we have finished comments on those points, we will replace that frame with 4.24.34. Here we add the facts on the fertilizer program—the basal and the potash treatments. When we finish comments on that phase, we replace 4.24.34 with 4.24.35. This adds the cultural data. The audience can now quickly run his or her eyes (and thoughts) over all the key facts of materials and methods.

This material could have been done as a series of transparent overlays. The first would have the title and first two points. The second would not repeat those words, instead it would add the next two points, and be carefully placed to line up precisely with the first transparency. The third would have only the last two items. When **all** three are in place, the full-word chart (as in 4.24.35) would be on the screen as the speaker finishes talking about materials and methods.

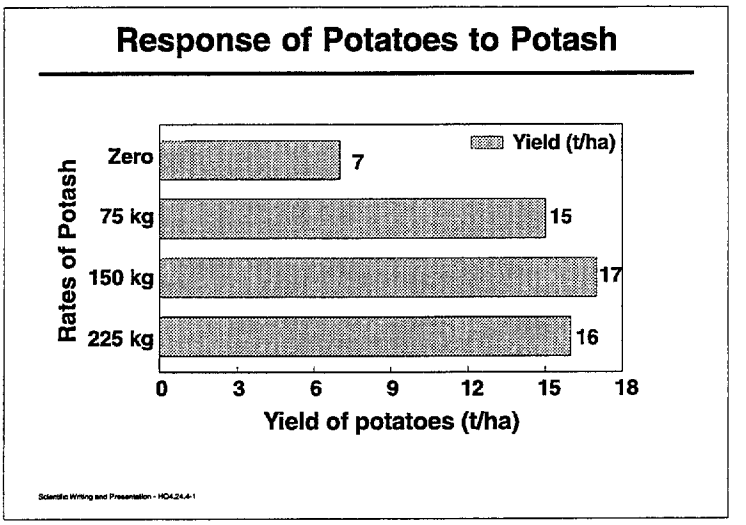
This same material could be presented in still another way by making a single transparency and uncovering only the parts as the speaker talks of each. Some audience members don't like the sliding paper, especially when the speaker has trouble getting it placed correctly. When the speaker uncovers too much and then shifts the paper to recover parts, it distracts the audience. The person who wants to use this "strip-tease" technique might do better to cut masks exactly the size to cover various parts and hinge them so each can be removed at the right time.

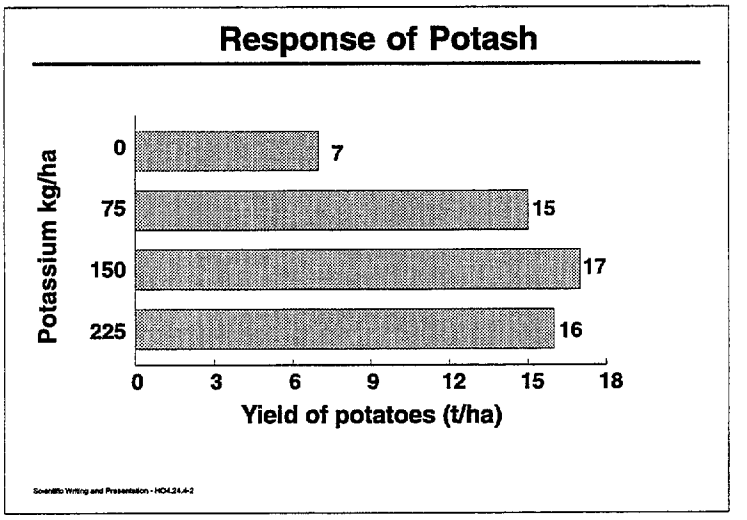
In most cases, the speaker works more smoothly and is less likely to confuse himself or herself or the audience by choosing either to use overlays or replacement frames.

Using the computer to prepare visuals

Many computer programs offer ways to chart data based on number tables. This can be done in a number of spreadsheet programs (such as Lotus 1-2-3, Quattro Pro, etc.). Also there are computer-graphics programs, such as Harvard Graphics, Freelance, and many others. Many graphs in these programs appear to have been designed for print rather than as presentation visuals. However, most can be adapted for effective visual presentation by simplifying the data and by careful use of captions and titles.

Here is an example, using data from the potato experiment. The first bar graph, shown is as the computer program produced it in routine fashion. The second, was modified to be more readily understandable to the person who sees it only when projected on the screen.



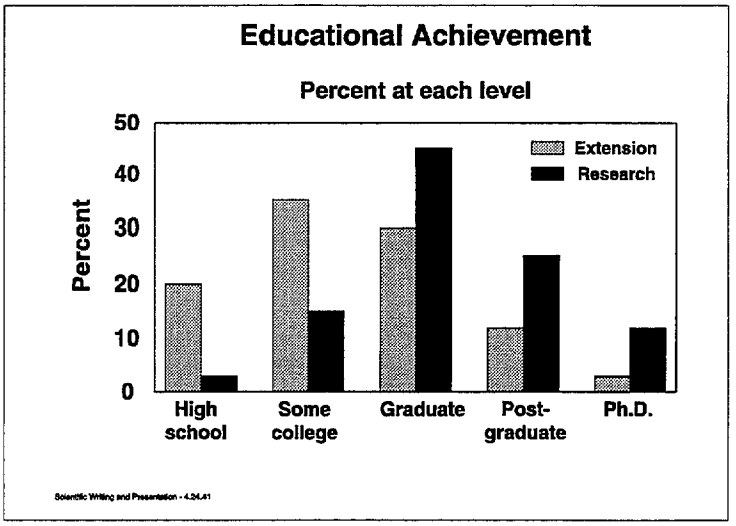


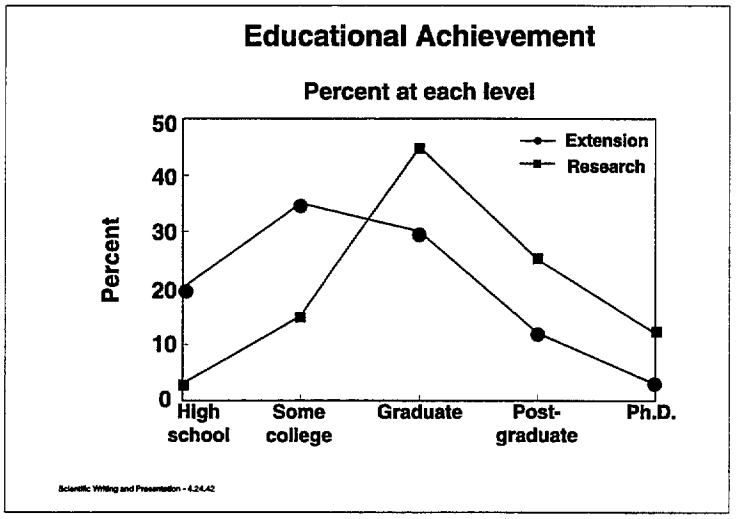
A graphics program typically gives several alternatives for graphing a set of data

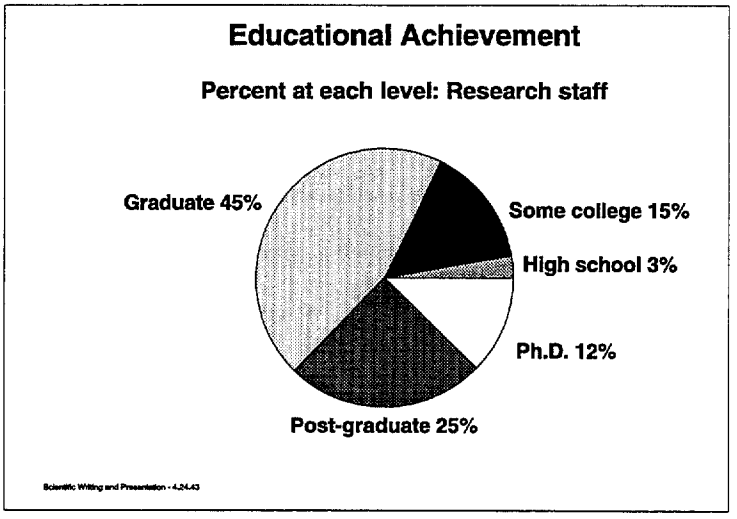
Several points are worth keeping in mind while producing the graphics:

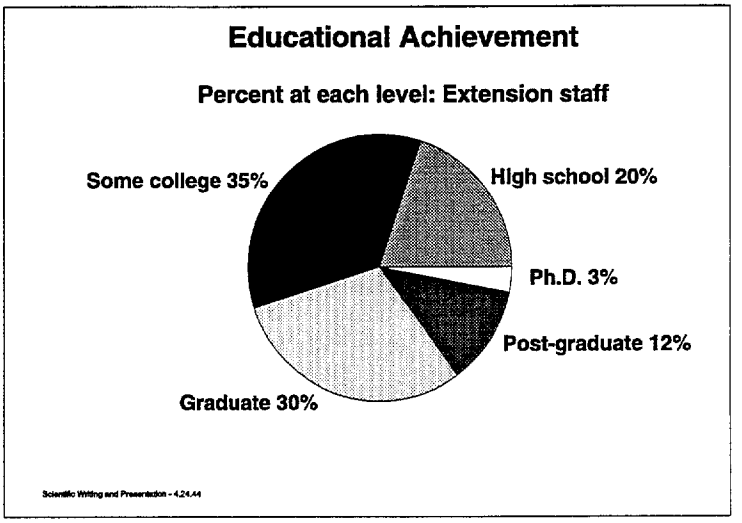
1. The main purpose of a presentation graphic is to show simple relationships; it is not a good way to present complex data. We should not expect the viewers to draw their own conclusions.
2. Simplify titles and identifying tags. Make words large enough to be readable. The viewer will grasp the meaning more quickly from short words or phrases.
3. Pie charts show relationships between a few factors (more than five may be too many).
4. Bar graphs illustrate quantitative relationships between two or three factors.
5. Line graphs effectively show time trends of two or three factors.

6. If actual numbers are important, as well as the visual relationship, include values with the points on the chart. Round numbers to not more than two digits, and avoid decimal numbers. Some laser printers will print the graphic directly onto a transparency. In other cases, the print on paper can be reproduced as a transparency through a photocopier.









Most scientists who use visual aids choose either overhead transparencies or photographic slides. Some use both. Since the two are so widely used, they deserve some specific attention. In the first KARI-ISNAR presentation workshops, ISNAR's Robert Raab prepared tips for design, preparation, and presentation.

Raab's tips on designing overheads

1. Design each transparency to reflect one idea, expressed in a maximum of six to eight lines, with not more than six words per line.
2. Use a maximum of two types of letters and not more than three colors on one transparency.
3. Use lettering and colors systematically and consistently, and be sure that the printing is large enough.
4. Make labels readable (horizontal, not vertical or slanting). Special pens are available for drawing on transparencies (it is also possible to photocopy from paper to transparencies) and stencils, press-on letters, or Kroy-type lettering machines, and computer word processing to make text clear.
5. Use abbreviations consistently, using standard abbreviations where possible.
6. Give a key for any nonstandard abbreviations.
7. Indicate the main topic by title.
8. Highlight, perhaps with color or distinctive type, the most significant figures.
9. Use symbols or diagrams rather than straight text.
10. Use where appropriate clip art, accents, and attention-getting designs, preprinted borders, and cartoon characters to create professional-looking transparencies.

Raab's tips on presenting overheads

1. Number transparencies—if they are knocked to the floor or shuffled, they can be put back in proper order. (Many speakers put transparency numbers in their speaking notes to be sure to use the right overhead at the right time.)

2. Analyze the transparencies and decide which could be eliminated if necessary. Put a mark in the corner of each "expendable" one and mark each in presentation notes.
3. Use one chart per two to three minutes, on average.
4. When you finish with the content of an overhead, turn off the light or cover the light table so the old transparency doesn't distract the audience.
5. Stand near and to the side of the projector and screen.
6. Let the visual "speak" for itself (that is, don't read the text of the visual).
7. Use a pencil on the transparency to draw attention to certain points on the overhead, rather than using a long pointer to touch the image on the screen.
8. Speak to the audience, not to the image on the screen.
9. Avoid getting yourself into the light stream of the projector.
10. Don't turn on the projector with no transparency on the light table.
11. Don't speak while changing overheads. Once the next transparency is in place, you are ready to resume the oral content.
12. Use both hands to remove one transparency and replace it with another. Make the change smoothly or turn off the machine while you make the change. (Some speakers turn off the machine between slides. Some audience members find this distracting; however, it does allow the speaker more control of the audience attention.)
13. Wait until you finish speaking before starting to pick up your transparencies. It's good technique to turn off the projector before you end, then step forward to make your final remarks. You can be sure to have audience attention for your final statement.
14. Plan a fall-back solution in case you can't use the visual aids you planned: power may go off, projector bulbs burn out, sometimes the logistics person fails to bring all the equipment that was expected.

Using photographic slides

If a room can be darkened, projected photographic slides can be seen by nearly any size of audience. They tend to make the ideas more authentic and immediate to the viewer. When you can't bring the real things into the meeting room, slides can be an excellent second-best. To be effective, however, slides must be appropriately made and used. Most of the points above on design and use of transparencies also apply to slides. However, there are some added points to consider when using this type of visual aid.

1. Simplicity is even more important in a slide than in a transparency: each slide should present one piece of evidence that supports one point. (Effective speakers seldom leave one slide on the screen for more that 30 seconds—it is harder to hold audience attention for longer periods in a darkened room then when using overheads in a bright room.)
2. For text slides, produce the copy specifically to be photographed as a slide. Almost any printed page has type too small to be read at a distance, and often there is too much unnecessary data. A table printed on paper generally has to be self-explanatory, and the

reader can take all the time needed to understand it. The projected table or graph has to be explained by the speaker.

3. Graphs and histograms are usually easier to read than are tables.
4. For lines on graphs, add labels to the lines instead of using symbol codes.
5. Color enhances effectiveness of a slide. A yellow background for black type gives the most readable combination of colors for text.
6. Plan and prepare slides far enough in advance to be sure they are ready when needed, and arrange to have functioning equipment for the presentation.
7. Mark the slides and arrange them in the projector tray to be sure that none comes on the screen sideways, upside down, or backwards.
8. Run the slides through the available projector to be sure they work.
9. Arrange for a helper to handle the projector (turning it on and off as needed) and advancing slides if a remote is not available.
10. Avoid switching the lights on and off. But don't leave the room in darkness long enough for viewers to loose their attention. Group slides that will be used together so lights can be left off, then turn lights on for period before the next group.
11. If possible, obtain a flashlight-type pointer that will put an brightly lighted arrow on the screen to point out specific items.
12. Add visual interest to a technical presentation by including live-action scenes that illustrate your subject. Move through these slides fairly rapidly so a scenic (non-data) slide isn't on screen too long (ideal is about 10 seconds average; 30 seconds would seem long to a viewer).

Practice using the visuals in a presentation

We have emphasized practicing a presentation to make it the best you can do. The same is true in using visuals. It is at least as important to practice handling the visuals so you know how to use each correctly. Practice sessions should include both oral content and visual. Practice in front of an audience (only one person if that is all that is available). Only in this way do you test the quality of the visuals to support your material and also test yourself on handling the visuals as you present your oral material.

Raab also prepared an evaluation sheet for scientific presentations. It provides a way for a viewer to evaluate another's presentation. In addition, it can serve as a kind of scorecard for a presenter to review his or her own preparation and delivery in practice.

(Raab, Robert T. 1991. ISNAR Training Series: Scientific Writing and Presentation: Focus on Illustrations. ISNAR Training Series Training the Trainer No. 3. The Hague: ISNAR: 32-33).

Strengths and Weaknesses

- **Please list what you consider to be three strengths of day four**

1.
2.
3.

- **Please list what you consider to be three weaknesses of day four**

1.
2.
3.

- **Suggestions for improvements**

Guidelines to Provide Feedback on the Workshop

1. **The Module**

   Content

   - usefulness/relevance
   - amount of information

   Structure

   - sequency
   - duration
   - balance between trainers' and trainees' participation
   - instruction to trainers
   - visual aids
   - handouts
   - extra readings
   - PAPA
   - evaluation

2. **Process: training techniques and direction**

   - usefulness/relevance/effectiveness
   - group interaction
   - clarity of questions/exercises instructions
   - opening and closure of the days

3. **Trainers', facilitators', and trainees' performance**

   - presentation/communication skills
   - interaction/effective participation
   - punctuality/interest/commitment/willingness to facilitate learning/willingness to participate
   - other attitudes

4. **Logistical support**

   - organization
   - accuracy
   - punctuality
   - willingness to assist participants
   - services provided in general

5. Workshop environment

- physical (training facilities, training material, hotel facilities in general)
- psychological (personal feelings such as self-motivation, itnerest, satisfaction, self-achievement)
- social (development of friendship, relaxed, comfortable among participants, etc.)

6. Workshop results/outputs

personal and professional assessment

recommendations

7. General comments

DAY FIVE

Scientific Writing and Presentation

DAY FIVE — Overview

Objectives

By the end of the day, the participants will be able to do the following:

1. Demonstrate improved skills in planning, preparing, and delivering information to an audience using visual support.
2. Plan future activities in scientific writing and presentation.
3. Evaluate and provide feedback on the five-day workshop.

Handouts

5.24.9 Objectives
5.24.10 Tentative Schedule
5.24.11 Evaluation Sheet for Scientific Presentations
5.25.1 PAPA Form — Second Stage
5.25.2 Evaluation Form for the Five-Day Workshop
5.25.3 Guidelines to Provide Feedback on the Workshop

Scientific Writing and Presentation

DAY FIVE — Tentative Schedule

08:30 – 09:00	**Opening of the Day's Activities**
09:00 – 10:30	**Session 24. (Continued)**
10:30 – 10:45	Tea/Coffee Break
10:45 – 13:00	**Session 24. (Continued)**
13:00 – 14:00 Lunch	
14:00 – 15:30	**Session 24. (Continued)**
15:30 – 15:45	Tea/Coffee Break
15:45 – 16:45	**Session 25. Participant Action Plan Approach (PAPA) and Workshop Evaluation**
16:45 – 17:00	**Final Remarks and Closing**

Scientific Writing and Presentation

DAY FIVE — Checklist for Trainers

Actions needed

1. Make sure that you have enough copies of the evaluation forms (handout 5.24.11). Count two pages per participant.
2. Video equipment is needed.

Handouts

		Yes ✔	No ✔
5.24.9	Objectives	❒	❒
5.24.10	Tentative Schedule	❒	❒
5.24.11	Evaluation Sheet for Scientific Presentations	❒	❒
5.25.1	PAPA Form — Second Stage	❒	❒
5.25.2	Evaluation Form for the Five-Day Workshop	❒	❒
5.25.3	Guidelines to Provide Feedback on the Workshop	❒	❒

Overheads

5.24.31	Overview of Day Five	❒	❒
5.24.32	Schedule of Day Five	❒	❒
5.25.1	Objectives of Session 25	❒	❒
5.25.2	Steps in PAPA	❒	❒
5.25.3	Step 2: In-course Activities	❒	❒

Materials

• Video equipment	❒	❒
• Overhead projector	❒	❒
• Projector screen	❒	❒
• Flip chart stands (minimum 2)	❒	❒
• Flip chart paper/pads (about 10 per day)	❒	❒
• Markers for writing on newsprint	❒	❒
• Markers for writing on transparencies	❒	❒
• Blank transparencies	❒	❒
• Stapler	❒	❒
• Tape (strong masking tape and regular tape)	❒	❒
• Push pins	❒	❒
• Glue	❒	❒
• Pencils/note pads/pens	❒	❒

	Yes	No
• Pencil sharpeners	❒	❒
• Extension cords	❒	❒
• Certificates	❒	❒
• Photocopying facilities	❒	❒
• Spare bulbs for overhead projector	❒	❒
• Extra notepads and pens	❒	❒
• Scissors	❒	❒

DAY FIVE

Session 24
Oral Presentation (continuation)

Instructions to Trainers

PRE-SESSION

08:30 – 09:00 Opening of the Day's Activities
– Review of the previous day's activities.
– Summary of the evaluation of the previous day.
– Overview of the day's activities.

OBJECTIVES

By the end of the pre-session the participants will be able to do the following:

- Assess the progress of the workshop.
- List the objectives and describe the agenda for the day's activities.

OPENING

Invite a volunteer to review the previous day's activities. (10 minutes)

Summarize the evaluation of the previous day. (10 minutes)

Distribute the overview and the schedule for day five (handouts 5.24.9 and 5.24.10) to the participants. Review the objectives and schedule (overheads 5.24.31 and 5.24.32). Ask if clarifications are needed. (10 minutes)

SESSION 24

09:00 – 10:30 Session 24. (Continued)

10:30 – 10:45 Tea/Coffee Break

10:45 – 13:00 Session 24. (Continued)

13:00 – 14:00 Lunch

14:00 – 15:30 Session 24. (Continued)

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Demonstrate improved skills in planning, preparing, and delivering information to an audience using visual aids.

PROCEDURE

Training techniques: group work/presentation, video-tape feedback.

EXERCISE 24

Exercise 24. (Continued).

Phase 1. Group work (2 hours 15 minutes)

1. *(experience)* The participants continue to work in groups to prepare their presentations. While they are working, circulate from group to group to check pro-

gress. Ask if any clarifications are needed. (2 hours 15 minutes)

Phase 2. Presentation, evaluation, and discussion (3 hours)

2. Before each presentation distribute handout 5.24.11 to a few participants randomly. Ask these participants to use this as a guide to evaluate the presentations and to give feedback to the speaker.
3. Each group has 10 minutes to present. Videotape the presentations. Immediately after each presentation, give feedback on each presentation. Show parts of the tape, Ask the participants for comments. Stop and start the videotape to encourage discussion. Only show parts of the video since many comments will begin to be repetitive. (2 hours 45 minutes)
4. *(process, generalize)* At the end of the exercise provide feedback on the presentations. Also, ask the participants questions such as "How did you feel doing this exercise?" and "What did you learn?" in order to allow discussion of the process. (15 minutes)

CLOSURE

Closure (30 minutes)

1. *(application)* Summarize the workshop objectives and review all the activities of the workshop to refresh the participants memory.
2. Make a transition to the final session.

15:30 – 15:45 Tea/Coffee Break

DAY FIVE

Session 24
Summary of Overheads

Objectives of Day Five

1. Demonstrate improved skills in planning, preparing, and delivering information to an audience using visual support
2. Plan future activities in scientific writing and presentation
3. Evaluate and provide feedback on the five-day workshop

5.24.31

Schedule of Day Five

08:30 – 09:00	Opening of the Day's Activities
09:00 – 10:30	Session 24. (Continued)
Tea/Coffee Break	
10:45 – 13:00	Session 24. (Continued)
Lunch	
14:00 – 15:30	Session 24. (Continued)
Tea/Coffee Break	
15:45 – 16:45	Session 25. Participant Action Plan Approach and Workshop Evaluation
16:45 – 17:00	Final Remarks and Closing

5.24.32

Handout—Overview Day Five

Scientific Writing and Presentation

Objectives

By the end of the day, the participants will be able to do the following:

1. Demonstrate improved skills in planning, preparing, and delivering information to an audience using visual support.
2. Plan future activities in scientific writing and presentation.
3. Evaluate and provide feedback on the five-day workshop.

Handouts

5.24.9 Objectives
5.24.10 Tentative Schedule
5.24.11 Evaluation Sheet for Scientific Presentations
5.25.1 PAPA Form — Second Stage
5.25.2 Evaluation Form for the Five-Day Workshop
5.25.3 Guidelines to Provide Feedback on the Workshop

Handout—Tentative Schedule Day Five

Scientific Writing and Presentation

08:30 – 09:00	**Opening of the Day's Activities**
09:00 – 10:30	**Session 24. (Continued)**
10:30 – 10:45	Tea/Coffee Break
10:45 – 13:00	**Session 24. (Continued)**

13:00 – 14:00 Lunch

14:00 – 15:30	**Session 24. (Continued)**
15:30 – 15:45	Tea/Coffee Break
15:45 – 16:45	**Session 25. Participant Action Plan Approach (PAPA) and Workshop Evaluation**
16:45 – 17:00	**Final Remarks and Closing**

Evaluation Sheet for Scientific Presentations

Presenter's Name: _____ Date: _____

General:

What were the best points of the presentation?

1. _____
2. _____
3. _____

What were the worst points of the presentation?

1. _____
2. _____
3. _____

Presentation Design:

Yes	Partially	No		
☐	☐	☐	1.	Did the presentation fit the intended audience (their interest, knowledge, experience)?
☐	☐	☐	2.	Was the purpose clear (to inform, convince, get action)?
☐	☐	☐	3.	Were the objectives clear?
☐	☐	☐	4.	Were an easily absorbed number of objectives covered (2–4) maximum?
☐	☐	☐	5.	Was there an obvious structure to the presentation (introduction, body with main headings, conclusions)?
☐	☐	☐	6.	Did the opening catch your attention?

☐	☐	☐	7.	Were the main points and objectives well developed in the body?
☐	☐	☐	8.	Did the conclusion reinforce the material presented in the body?

Presentation Delivery:

Yes	Partially	No		
☐	☐	☐	9.	Did the presenter stay within the alloted time?
☐	☐	☐	10.	Could all members of the audience hear the talk?
☐	☐	☐	11.	Did the presenter maintain eye contact with the audience?
☐	☐	☐	12.	Did the presenter face the audience at all times?
☐	☐	☐	13.	Did the presenter speak with conviction and enthusiasm?
☐	☐	☐	14.	Did the presenter speak without distracting mannerisms? (If you observed any distracting mannerisms, please describe below)

_____

_____

_____

Design of Visuals:

Yes	Partially	No		
☐	☐	☐	15.	Did each visual express only one idea?
☐	☐	☐	16.	Was there a maximum of eight lines on each visual?
☐	☐	☐	17.	Was there a maximum of six words on each line?
☐	☐	☐	18.	Were visuals easily read by all members of the audience?
☐	☐	☐	19.	Were main topics and visuals identified with a title?
☐	☐	☐	20.	Did the visuals make any use of symbols and diagrams where appropriate?

Use of Visuals:

Yes	Partially	No	
☐	☐	☐	21. Did the presenter talk to the audience and not the visual aid?
☐	☐	☐	22. Was enough time allotted to each visual (approx. 3 minutes per visual)?
☐	☐	☐	23. Did the presenter know how to operate the equipment?
☐	☐	☐	24. Were visuals removed when not needed?
☐	☐	☐	25. Did the presenter stop talking when changing visuals?
☐	☐	☐	26. Did the presenter transfer smoothly from one visual to the next?
☐	☐	☐	27. Did the presenter wait until the talk was finished before packing the visuals used?

Which visuals did you like best? _____

_____

Why? _____

_____

Which visual did you like least? _____

_____

Why? _____

Additional Comments

Please write down any additional comments, suggestions, and observations that might help the presenter to improve future presentations.

_____

_____

_____

_____

_____

_____

_____

DAY FIVE

Session 25
Participant Action Plan Approach (PAPA) and Workshop Evaluation

Instructions to Trainers

SESSION 25

15:45 – 16:45 Session 25. Participant Action Plan Approach (PAPA) and Workshop Evaluation

OBJECTIVE

By the end of this session, the participants will be able to do the following:

- Prepare a list of action items for future activities in scientific writing and presentation.

PROCEDURE

Training techniques: presentation, individual work, group sharing, PAPA.

PRESENTATION

(experience) Give a brief presentation reinforcing the use of the PAPA during this workshop. Remind the participants of the information you presented on the PAPA at the beginning of the workshop. You may want to use overheads 5.25.2 and 5.25.3 to review the PAPA. Note that the participants have been jotting down possible action items throughout the workshop. Now is time for them to focus on finalizing their specific action items for when they return to their jobs. Be sure to ask the participants if they have any comments, questions, or need clarification. (5 minutes)

PAPA EXERCISE

PAPA Exercise — Second stage. (40 minutes)

1. Distribute handout 5.25.1 (2 forms). These are the forms for the second stage of the PAPA.
2. Individual work: Ask the participants to review the work they have done over the last five days and to refer to the PAPA notes they made throughout the workshop. They should formulate specific action items and write them on the handout. Tell them to refer to the questions about their action items in order to be sure they are written as specifically as possible. (15 minutes)
3. Group sharing and discussion: Go around the room and ask each person to tell you their action items. List each item on flip charts. If some people have similar items, just indicate with a check by the first-mentioned item. Do not rewrite. This will give a good idea of the range of action items people are interested in undertaking. (25 minutes)

4. Collect the completed forms from the participants. (Make photocopies to return to the participants before they leave.) Remind the participants that you will be following up with them after several months to see how they have progressed toward their action items.

16:30 – 16:45 Workshop Evaluation

OBJECTIVE

- Evaluate and provide feedback on the workshop.

Distribute handouts 5.25.2 and 5.25.3. Have the participants complete the evaluation before they leave the session. Give them about 15 minutes for this task. As soon as the participants return the evaluation forms, invite them to make oral comments regarding the evaluation of the workshop. Facilitate a brief discussion.

Note: A diskette with the text of the evaluation form in WordPerfect 5.1 is included and, if necessary, may be adjusted to meet your needs.

16:45 – 17:00 Final Remarks, Closing, and Delivery of Certificates

DAY FIVE

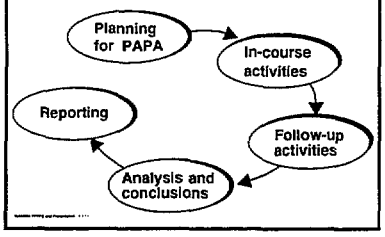
Session 25
Summary of Overheads

Objectives of Session 25.
PAPA and Workshop Evaluation

2. Plan future activities in scientific writing and presentation
3. Evaluate and provide feedback on the workshop.

5.25.1

Steps in PAPA



5.25.2

Step 2: In-course Activities

Stage 2

Objectives:
- develop action plan

Procedure:
- prepare preliminary list of action items
- confer with partner
- finalize and prioritize list of action items
- report individual action plans
- make copy and submit to trainer

5.25.3

SECOND STAGE

ACTION PLAN

Date: _____

Workshop Title: SADC/ESAMI/ISNAR Workshop on Scientific Writing and Presentation

Name: _____

Organization: _____

Action Items	Start to implement action plan (check if known)		
I plan to:	Within 2 months	After 2 months	As arises

PARTICIPANT ACTION PLAN APPROACH

Supervisor's Contact Address

Name: _____

Organization/Center: _____

Name of Immediate Superior: _____

Title of Immediate Superior: _____

Address: _____

_____

_____

_____

Tel. No.: _____

Fax No.: _____

Telex No.: _____

Email: _____

QUESTIONS ABOUT YOUR ACTION ITEMS

1. *Preliminary nature of plan*
   - Were you specific in writing the action item?
   - What will you need to do when you return to work in order to find out which actions are possible?
2. *Resources*
   - Who would be carrying out the proposed action, or helping with it (formally or informally)?
   - Are the skills for carrying it out available?
   - How much time will this take?
   - Are there special materials or equipment required?
   - What is involved in obtaining them?
   - Will you be using a tool or system or aid from this training workshop?
   - How much adaptation is required?
   - Is continual monitoring or follow through required?
   - Who will do it?
3. *Implementation*
   - Do you have the authority to implement the action?
   - If not, who does?
   - How do you think you can go about getting approval?
   - What do you think the degree of support is for your idea?
   - Will you need to sell people on it?
   - Who?
4. *Effects*
   - Whom will this action affect?
   - How will it affect them?
   - Will anyone be the worse for the results?
   - Anyone improved?
   - What will be affected?
5. *Environment*
   - What in the organizational environment might interfere with your doing this?

Workshop on Scientific Writing and Presentation

Evaluation Form

Your co-operation in completing this questionnaire will be greatly appreciated. The information you provide will be useful in planning future events and will help resource persons to improve their materials and presentation.

A. General Reactions

In general, I would rate the workshop as:
- ☐ Excellent
- ☐ Good
- ☐ Average
- ☐ Fair
- ☐ Poor

On balance, would you say that the workshop objectives were achieved?
- ☐ Yes
- ☐ Partially
- ☐ No

(If no, please explain briefly in section G)

B. Objectives

The objectives of this workshop are listed below. Please mark on a scale of 1 to 5 if, in your opinion, the objectives have been achieved. *The scale ranges from 1(the objective has not been achieved), to 5 (the objective has been fully achieved).*

• Discuss scientists' responsibilities in reporting on research.	1	2	3	4	5
• Discuss some principles of planning and writing a reader-friendly report.	1	2	3	4	5
• Identify and list the components of a scientific paper.	1	2	3	4	5
• Define and edit abstracts.	1	2	3	4	5
• Write acknowledgements and references.	1	2	3	4	5
• Measure readability using the Flesch formula.	1	2	3	4	5
• Identify and discuss several ways in which the use of the computer eases editing.	1	2	3	4	5
• Apply knowledge and skills to appropriately edit scientific papers.	1	2	3	4	5
• Plan and prepare an oral presentation using visual aids.	1	2	3	4	5
• Plan future activities in scientific writing and presentation.	1	2	3	4	5

C.
Strengths and Weaknesses

- **Please list what you consider to be three strengths of the workshop**

1.
2.
3.

- **Please list what you consider to be three weaknesses of the workshop**

1.
2.
3.

- **Suggestions for improvements**

D. Features

	Very Good	Good	Fair	Poor
Accommodation	☐	☐	☐	☐
Meals	☐	☐	☐	☐
Lectures	☐	☐	☐	☐
Discussions	☐	☐	☐	☐
Papers/Handouts	☐	☐	☐	☐
Organization and Management	☐	☐	☐	☐
Quality of visual aids	☐	☐	☐	☐
Quantity of visual aids	☐	☐	☐	☐

E. Additional Topics

What additional topics would you have liked included in this activity?

F. Management Topics

On what other management topics would you like to receive training in future events?

G. Comments

Please use the space below to write down any additional comments or suggestions you might have.

Guidelines to Provide Feedback on the Workshop

1. **The Module**

   Content

   - usefulness/relevance
   - amount of information

   Structure

   - sequence
   - duration
   - balance between trainers' and trainees' participation
   - instruction to trainers
   - visual aids
   - handouts, exercises
   - extra readings
   - PAPA
   - evaluation

2. **Process: training techniques and direction**

   - usefulness/relevance/effectiveness
   - group interaction
   - clarity of questions/exercises instructions
   - opening and closure of the days

3. **Trainers', facilitators', and trainees' performance**

   - presentation/communication skills
   - interaction/effective participation
   - punctuality/interest/commitment/willingness to facilitate learning/willingness to participate
   - other attitudes

4. **Logistical support**

   - organization
   - accuracy
   - punctuality
   - willingness to assist participants
   - services provided in general

5. **Workshop environment**

- physical (training facilities, training material, hotel facilities in general)
- psychological (personal feelings such as self-motivation, interest, satisfaction, self-achievement)
- social (development of friendship, relaxed, comfortable among participants, etc.)

6. **Workshop results/outputs**

- personal and professional assessment
- recommendations

7. **General comments**

Scientific Writing and Presentation

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Annex 1: Support reference material

Glossary of Terms

Abstract A noncritical, informative digest of the significant content and conclusions of the primary source material. It is intended to be intelligible in itself, without reference to the paper, but not a substitute for the paper. It is best to place it between the title and the text of the manuscript. It contains about 250 words. (day 1/session 5/handout 1)

Active sentence A sentence in which a subject takes direct action. (day 1/session 2/handout 1)

Annotation A brief comment or explanation about a document or its contents, usually added as a note after the bibliographic citation of the document. (day 1/session 5/handout 1)

Clause A series of words containing a subject and predicate and functioning as a member of a complex or compound sentence. (day 2/session 13/handout 1)

Complex sentence A sentence that contains one complete thought plus one or more depended clauses. (day 2/session 13/handout 1)

Compound sentence A sentence that contains two or more complete thoughts joined by a connecting word, such as and, but, or others. (day 2/session 13/handout 1)

Easy reading level Text with sentences averaging about 12 to 15 words each and under 1.6 syllables per word, calculated according the FLESCH test.

Extract One or more portions of a document selected to represent the whole. (day 1/session 5/handout 1)

FLESCH test A method to measure the reading ease of a text, by calculating the average number of words per sentence and the average number of syllables per word and putting the results into a formula. (day 1/session 2/handout 1, day 3/session 17/handout 2)

Grammatik A computer program to check the grammar of a text. (day 3/session 18/handout 2)

IMRAD A scientific paper has four main parts: introduction, materials and methods, results and discussion sections. (day 1/session 3/handout 1)

Incomplete sentence A sentence that lacks a subject, verb, and perhaps, an object (day 2/session 13/handout 1)

Kinesics A systematic study of the relationship between nonvocal body motions (such as blushes, headshaking, laughing, eye movement) and communication. (day 4/session 24/handout 3)

PAPA Participant action plan approach. A method for determining how job behavior changed as a result of attending a training course or program. (day 1, session 1)

Paragraph A subdivision of a text, that consists of one or more sentences. It deals with one point or gives the words of one speaker, and begins on a new line. (day 2/session 8)

Passive sentence A sentence in which a subject is acted upon. (day 1/session 2/handout 1)

RightWRITER A computer program to check the grammar of a text. (day 3/session 18/handout 2)

Run-on sentence A sentence that includes two or more thoughts connected only by a comma. It is an incorrect sentence. (day 2/session 13/handout 1)

Sentence A group of words that convey a meaning. It begins with an initial capital letter and ends with a full stop. (day 2/session 13, day 3/session 17/handout 1)

Simple sentence A sentence that expresses one complete thought. (day 2/session 13/handout 1)

SPW Average syllables per word (day 1/session 2/handout 1)

Squid technique a writer is unsure of his facts or reasoning, so he or she retreats behind a protective cloud of ink. (day 1/session 3/handout 1)

Summary A brief restatement within the document (usually at the end) of salient findings and conclusions. It is intended to complete the orientation of a reader who has studied the preceding text. (day 1/session 5/handout 1)

Synoptic A concise first publication in a directly usable form of key results selected from an available but previously unpublished paper. It differs from an abstract (which it contains) in that it is often a combination of text, tables, and figures, and may contain 2000 words. (day 1/session 5/handout 1)

Title A label that uses the fewest possible words that adequately describe the contents of the paper. (day 1/session 4)

Visual speech behavior Body movements accompanying spoken words, for examples, gestures, facial expressions, or pantomime. (day 4/session 24/handout 3)

Word One or more characters with conveying a meaning blank space before and after. (day 3/session 17/handout 1)

WPS Average words per sentence (day 1/session 2/handout 1)

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UNIT I: Editing the Scientific Research Paper Focus on Training of Future Editors and Supervisors[1]

Introduction

Having undergone training on effective communication in scientific writing, one sits back and ponders whether she\he can edit a given paper. It is often not easy to embark on editing because the beginning and the ending is not always clear. All the sections that form any scientific paper are not easy to master. Maybe one is good in one but not the other, for example, in introduction, but not in materials and methods or results and discussion, not to mention abstracts. If one is capable of writing a good research proposal, he\she may reconcile the paper with the intended research. But the most difficult part of editing is that not all the words on paper convey the writers' intention. Sometimes writers mean exactly the opposite of what they write. This will be more clear in practice and editing. Choice of words by the writer may loose interest of the editor; the reading may be boring. At times the discipline may bar the editor from effective participation on the paper. To this end, one should stick to their own discipline for effective editing.

However, successful editing can be achieved by dedication and willingness to learn. There are some commonalities which form the basics of good editing. A good editor may in the long run help as a supervisor to old and young, upcoming scientists as long as there is cooperation. Editing and supervision is therefore a two-way avenue, and mutual understanding from the writer and the editor or supervisor is vital for its success.

Editing scientific writing, is often difficult due to a number of problems. Those who are called upon to supervise have no training or experience in editing. Some may be qualified or experienced in one area and not the rest, while others may be poor writers themselves. The problem is compounded by the fact that writers are more sensitive about editing, most of them are shy of being corrected. Some writers tend to look at correction and criticisms as personal attacks on their personalities. Such writers are difficult to mold and see constructive criticism as a factor that may ruin the paper or thesis instead of improving it.

Problems of Writers and Editors

As an editor, one must be prepared to cope with disappointments and annoyance which surface during the discussion or correction of a paper. This becomes a major problem when the writer sees the editor as a stumbling block or an intruder on a "well-written" paper, which in the writer's opinion is "perfect" and therefore does not need correction. Sometimes the problem of the writer has a lot to do with job satisfaction and rewards. A writer who regularly promoted may reluctantly accept the editor's suggestions on improvement of the paper because he or she believes that no matter how good the paper comes out, there will be no rewards.

Another problem which often goes unnoticed is the over confidence of some writers. The attitude of "I am better than other writers," "Nobody writes better than me," "The editor is my junior," often ruins a would-be good writer. For the editor faced with such a writer, patience should be the guiding principle. Often "pride goes before a fall" or experience is the best teacher, hence as time passes such a writer will learn from his or her mistakes.

1. *Scientific Writing and Presentation, Focus on Training of Trainers* by R. Obura. Egerton University. April 1994.

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The list of problems is endless and the editor and/or supervisor will come across them with time. It's only through experience that the editor will build experience and capacity to deal with them.

One important therapy is for the editor to be positive and offer complimentary remarks about the paper. A complimentary remark at the start of the discussion with the writer will create a positive and agreeable atmosphere. But false compliments are worse than harsh truth. A good editor will summarize the paper with the writer and call for the corrected and uncorrected paper to avoid see-saw kind of correction, i.e. correcting A to B in first draft and B to A in second draft, etc. Such is common and should be avoided at all costs. When not sure refer back and consult where necessary.

Personality in Writing

Style of writing is often equated with the personality of the writer. The style makes a single impact which can be either good or bad with most of the characteristics blending with those of the person. Thus the style can be described by such adjectives as weak, clumsy, elegant, strong, and so on. More than 200 years ago, George Louis Leclerc de Buffon of the French Academy said: "The style is the man himself." People still say "style is the man," though very superficially. They expect people who appear sloppy and careless to write carelessly and visa versa. This is not always the case. Some people use an inner invisible personality to write and so people get shocked to see good writers who are usually very untidy and clumsy.

How to Get Organized

The first step in good writing is effective organization. This can be achieved only by a careful plan. The plan offers foundation and control on the writer. Without the plan the writer will get lost in the middle or at some other stage which will then result in an incoherent article.

With scientific writing, the plan is paramount. Even the use of *IMRAD* as discussed, is of little use without a plan. For example in the *INTRODUCTION* one may find that the writer mixes ideas such that the ending sentence could ideally have been the first or opening one. Lack of organization comes out clearly in the results and discussion sections, especially where the writer attempts to have the two together.

Sometimes the results and discussion section come out well organized when dealt with separately. However, different journals have their own styles.

Wide reading of different scientific journals is an excellent training for editing. There are many agricultural journals locally and overseas with different styles. A trainer who familiarizes himself or herself with them will be open and broad minded in the assessment of writing, while narrow readers tend to be biased and single track.

Use of Technical Language

The use of technical language is desirable when conveying ideas to readers in the same discipline or a related one. But care should be exercised to use it wisely and only where necessary. Terms from other professions should not be borrowed. Use of legal terms or expressions can distort the paper, for example, expressions like above-mentioned, fore-mentioned, versus, etc.

One major problem with technical language is that it might seem like jargon. This should be avoided if and where possible. Some examples follow:

- Maximization and minimization of linear function subject to linear constraints.

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- Liquid-liquid extraction
- Clay, silt, and sand separates were fractionated

But where specific meaning is conveyed, technical language should be retained.

Fancy Words

Use of fancy words in scientific paper does not add any credit to it. The editor must be aware of them. They are generally used by those writers who display language verbosity. In the following examples, the word on the left can usually be substituted with the word on the right:

- Compensation for PAY
- Comprises for IS
- Initiate for BEGIN
- Activate for START
- Proceed for GO

Wordiness: A Major Writer Problem

Many writers attempt to impress their readers by using words they believe are impressive or what scholars call "false elegance." Some writers think that these add to the quality of the paper. (Remember those old days when you started participating in debating societies - using dictionary words as opposed to regular known or common words!!) The writers' syndrome is similar.

As editor/trainer one must learn to eliminate these words and use simple accurate substitutes. Below some of these words are listed with their suggested substitutes.

Wordiness	Appropriate substitute
aggregate	total
a great deal of	much
an example of this is the fact that	for example
a number of	some
approximately	about
above mentioned	those
as of now	now
by means of	by
based on the fact that	because, due to
in connection with	about or of
in the proximity of	near, about
is defined as	is
it was noted that if	if
not withstanding the fact that	although
terminate	end

Dilute Verbs

Editors should also watch out for dilute verbs. These make the paper unnecessarily long. So they should be replaced.

Dilute verbs	Suggested improvement
applicable	applies
are found to be in	are
agreement	agree
bring to a conclusion	conclude
is indicative of	indicate
are known to be	are
is known to be	is
make a study of	study
was seen, was noted	report in affirmative
is suggestive of	suggest
take into consideration	consider

How to Avoid Wordiness: Use of Illustrations

Textual language-based communication may not deliver all that is needed in order for a reader to understand the textual article. All human beings have various senses to perceive ideas. Perception can be through sight (eyes), hearing (ears) and touch (hand). Most human beings perceive information in all these areas. A combination of the listed senses makes a message much easier to understand than one sent through only one channel.

By being wordy, a writer tries to reach his/her audience by text only. This is not always the case. So to reach more audience and gain more appreciation, the use of illustrations help to sink in the intended message. When illustrations are used, they are supposed to reduce the text and offer appreciation of the message put through.

Illustrations

Introduction

Illustration can be helpful and destructive at the same time. If used appropriately, illustrations can help the reader perceive the message and build a pictorial interpretation of the message in the brain. Thus illustration under this circumstance, serves as an aid to the reader. However, when wrongly used, and when used out of context, illustration can be more destructive than helpful in the text.

The governing factors are the type of illustration used, and where and when it is used. If these factors are accounted for then the illustration will, to a large extent, help the reader to comprehend the text. Illustration clarifies messages which are too complicated to be conveyed by conventional sentences.

Trainers, editors, and/or supervisors have a major task in helping writers organize papers such that illustrations conform with the sentences they are to support and in making sure that they are in appropriate places within the paper. When this is done appropriately, illustrations reduce the complexity of most scientific papers. If illustrations are over used or wrongly placed, they may reduce the quality of the paper.

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Types of Illustration

Tables and figures are the two major types of illustration. Tables comprise numbers and description arranged in rows and columns while figures include drawings, graphs, photographs and diagrams. Tables can have statistical data or descriptive values of quantitative and qualitative nature. In all cases trainers, editors and/or supervisors should ensure that no single table have both. It is better to have statistical tables separate from descriptive types for clarity.

One important thing that should be borne in mind is that "good writing does not necessarily mean good presentation." The two are communication avenues which demand different skills. In a similar manner, whoever judges and/or grades on oral presentation should be aware of certain criteria. These are outlined in the next section.

UNIT II: How to Judge and Grade An Oral Presentation

Enabling Environment

Ensure that the room for the presentation is well set-up and suitable for an oral presentation. The room should have appropriate seating design and a well-set stage for the speaker. The lighting should be ideal and easily controlled. The podium should be well set and positioned in view of the audience. The visual aids (slide projector, overhead transparencies projector, flip chart, etc.) must be in place and in working condition before the start of the presentation. A lighted pointer of appropriate type for the screen should be provided. If the room is large, then a public address (PA) systems my be necessary. In this case there should be a stationery microphone on the podium and a FM mobile microphone (where possible) to be pinned on the tie or coat lapel or on shirt or dress of the speaker. The latter type of microphone will help the presenter maintain voice contact even when he/she moves away from the podium to the screen.

It is the duty of those holding an oral presentation to make sure that all they need is in place, to familiarize themselves with the equipment, and where possible, to hold a practice session. If this is not done, then the presenter may be heading for some very disappointing moments. Although the presenters are duty bound to ensure all the arrangements are in place, the trainers should supervise and make sure all is well. The equipment should be tested by the trainer prior to allowing the presentation to proceed.

Tips on How to Grade an Oral Presentation: Introduction

Nobody can become an expert in the first attempt. One needs to practice several times to master the technique. So you may find that the more seminars you hold in your station, the more accurate your assessment will become and visa versa. The training received in this workshop simply acts as a baseline and reference point.

Position of the Assessor

The oral presentation can be affected if the presenter is not comfortable with the assessor. So in the first instance the assessor should not stand out, but rather mingle with the rest of the audience, preferably somewhere from the middle to the back of the room. Being at the front may not give accurate assessment of the audibility (especially where no pubic address system is used). It is recommended that abstracts of the papers be circulated earlier. As part of the assessment the trainer should have read the abstract to know the theme, important results, and the implications of the research and next line of action. The assessor should have all the necessary paper work.

Some people have a prepared proforma on which to write the required information; others use plain paper. In either case be ready to start assessment three to five minutes after the start of the presentation. Within that time the presenter would have been able to finish the introductory part.

What to Look For

Like a paper, an oral presentation has the sections of a scientific paper. Thus there will be the *introduction, objectives, materials & method, results and discussion*, and finally, the conclusions. Some presenters do include their next line of action based on the conclusion, this should be seen as a step forward and in most cases where seen as an important part of the presentation, can earn extra credit. A competent trainer should assess all the above-listed parts and make comments for each of them. It is important to look at what factors to consider in each of them.

Introduction

A good introduction is often considered as a good climate setting which serves to calm the presenter from "*stage fright.*" It also prepares listeners to be in tune with what is being discussed. The following are some of the factors which should be included in this section.

- Background information
- Problem statement
- What has/has not been done (solution if any)
- Need for doing it
- Objective(s) (and goals if any)
  - major objective(s)
  - minor objective(s)
- Maintenance of eye contact with audience

Materials and Methods

Although only a few minutes is allocated to these sections, the presenter has to show clearly what was used, why it was used and how it was used. Thus the following should be assessed:

- Comprehensive list of materials and quick explanation on each
- Where live animals or other material was used it should be reflected
- The methodology must be stated exhaustively experimental designs including:
  - data types to be collected (& why?)
  - data analysis (types to be included)
  - other forms other than statistical
- Maintenance of eye contact with audience

Results and Discussion

Depending on the organization of the paper, and for which journal it is intended, this section can be discussed as one or separately. No matter which approach is taken, the aim is to know what was found in the experiment and an explanation as to why the results were what they were. This is the core of the presentation and the assessment should concentrate on the following:

- Illustrations used for data presented (choice)
- Clarity of the illustrations (figures & tables)
- Character population in illustrations

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- Discussions on the illustrations
- Lack of illustrations
- Projection of points of emphasis on slides and/or overheads
- Linking of results and discussions to the objectives set earlier
- Are results putting an end to the research or opening new areas of possible research?
- Maintenance of eye contact with audience

As has been indicated earlier, sentences and words alone do not explain the comparisons or projections. Hence, the trainers ought to emphasize on the use of illustrations to help in more understanding of the results under review.

Conclusion

The conclusion should be based on the results and discussions and not on new materials. The following areas should be observed closely:

- Relevance of the conclusions
- Implications of the conclusions on future research
- Implications of the conclusions on the country's scientific development.
- Contributions to scientific community in general
- Maintenance of eye contact with audience

UNIT III: Abstract

Importance

A scientific paper requires an abstract. The abstract should be written as the last task of the paper. (Never try to write an abstract before the completion of the paper. The results in the abstract and the views expressed may not tally with those in the main paper). As a trainer of supervisor you must be careful in scrutinizing the abstract. Always make sure that an abstract has all the components of the important aspects of the paper.

The following points should be checked for in any abstract:

- The abstract informs the readers on the value of the scientific paper
- It is from the abstract that readers are able to go through the entire report in a summary form
  - guides the reader through sections of interest
  - helps the reader on the decision as to whether to read the entire paper or not
- Abstracts are read by more people than the complete paper itself
- A well-written abstract attracts more people than a poorly written one
- Abstracts are good for busy executives who do not have all the time to read the entire paper
- Wording in the abstract should be consistent with those of the main paper
- All should be well explained
- Only significant outstanding results should be included in any abstract. The minor and supporting results should be reserved for the main paper
- Specifics rather than the generalities should be used
- Avoid most of the ambiguous words like "discussed" "described" or "generally"
- Scientific names should be given especially for crops, insects, soils, etc.

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- Long words should be abbreviated then used throughout the abstract, e.g., In vitro Dry Matter Digestibility (IDMD)
- The major controlling factor in any abstract is that "it should be as short as possible" BUT VERY INFORMATIVE. The shortening should not compromise the information

During your training on scientific writing, the guidelines for writing an abstract were discussed fully. However, as trainers and/or supervisors the following information will be useful in assessing or guiding a fellow scientist in writing the abstract.

- Abstracts are as varied as the scientific papers themselves
- The rules are more of generality than a rule of thumb
- Each abstract is as unique as the papers themselves

Guidelines of How to Write and Abstract

A well written abstract should have the following sections blended into the body.

- A brief reason, rationale and/or justification of carrying out the research
- Statement summary on methodology (care should be taken not to reproduce the paper methodology).
- A summary of significant results both negative and positive. (Trainers should watch out for this section carefully as most writers only want the positive part of their work forgetting that the negative part may equally be of significant nature or contributions)
- A summary of conclusions
- Recommendations and future plan

No Paragraphing in Abstracts

Trainers should emphasize that even though there are subsections discussed above, NO ATTEMPTS should be made to put them in paragraphs.

During the scientific-writing training sessions, there were a number of abstracts with paragraphs covering two pages. However, after going through all of them they were reduced to half a page and/or one page. (Refer to earlier notes).

Length of Abstract

- Different journals have their limits. However, most of the abstracts should be 100-150 words.
- Most common is between 250-350 words depending on the size of the main paper.
- Normal length abstracts are more of INFORMATIVE.
- Shorter length abstracts are more of INDICATIVE.

Criteria

Regardless of the length, one should follow a number of criteria:

- Short, clear and informative
- Use straight forward English not jargon
- Be consistent with report (paper)
- No illustrations or paragraphing

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- Must be accurate with respect to figures quoted in the main text
- Allow peer group to give first critique.

WRITE AN ABSTRACT AFTER THE PAPER IS COMPLETE AND NOT BEFORE.

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Abstracts[1]

A. Indicative and Informative

Indicative

CHEMICAL WEED CONTROL IN CHRISTMAS TREE PLANTATIONS
Kirch, J.H. *et al.*, "Weed and Brush Control in Christmas Tree and Forest Plantations," *The Hormology,* 3(2):1215, November 1961

Figures are given for acreage and percentage of stocking of Christmas trees on privately owned land and commercial forest areas in the U.S. Included are lists of species desirable for planting in Christmas tree plantations. The major problems encountered in managing these plantations and results to be expected from poor management are discussed.

Explained are methods of removing unwanted vegetation with the percentage of control to be expected from each. Reasons are give for the increasing popularity of chemical weeding. Chemical herbicides and the applications in the removal of undesirable woody plants and herbaceous weeds are analyzed. Amitrole-Simazine compounds are discussed separately to include application techniques, quantities to be used, and species toleration. Tables list weeds, grasses, woody shrubs, and their susceptibilities and resistances to Amitrole-Simazine compounds.

Informative

CHEMICAL WEED CONTROL IN CHRISTMAS TREE PLANTATIONS
Kirch, J.H. *et al.*, "Weed and Brush Control in Christmas Tree and Forest Plantations," *The Hormology,* 3(2):1215, November 1961

In the U.S., 625.000 acres of privately owned land is devoted to Christmas tree growing. The control of competing weeds and brush is the major problem in these plantations. This competition can mean poor survival, stunted growth, and malformed trees. Methods used to remove this competition are mowing, dishing, burning. and bulldozing, but none gives 100 percent control at reasonable cost. Recent developments in application techniques and the used of selective chemicals have made chemical weeding more popular.

The use of 2,4-dichlorophenoxy acetic acid (2,4-D) and 2,4,5-tricholophenoxy acetic acid (2,4,5-T), both selective herbicides, controls woody plants through applications to the foliage, stem, or base of the plant. Simazine (2-choloro-4,6 bis-s-triazine) is effective on annual and grassy weeds as a pre-emergence treatment if used at the rate of 2-4 lb/25-30 gal water. It has little effect on the foliage of weeds and consequently should be applied only to cleanly cultivated soil. Amitrole (3-amino-1,2,4-triazole) applied at 4-8 lb/50 gal water is effective for controlling all common herbaceous weeds. At present, the most effective weed-control combination is 3:1 ratio of Simazine and Amitrole. This combination can be expected to give good knockdown and long residual control of most species when applied before, during, or just after planting.

1. Taken from Scientific Writing Course: Handbook by A. Colodner & M. Kaye.

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UNIT II: Outlining a Research Paper[1]

Introduction

Since the research paper is usually one of the longest and most complex papers written, it nearly always requires a careful outline. Indeed, the writing of a detailed outline is a critical stage in the preparation of the paper. In general a good researcher would want somebody else to read and (if or where possible) have it approved before the writing is started.

A paper developing a thesis nearly always needs a sentence outline because it is working out a single idea through a sequence of sub-ideas and the rigor of sentence outline helps to establish a logical relation among the parts. The outline of a problem-solving paper may be either a sentence or a topic outline, although usually a topic outline is more convenient.

Shaping and Testing an Outline

For many papers written, the nature of the material and the purpose will determine the organization. When the purpose requires explanation or illustrations, a general statement of details or examples will be used in the outline. Other kinds of materials lead to organization by comparison or contrast, analogy, classification, or process. The type of organization used for any unit of materials is determined by the nature of the material and what the writer plans to do with it.

For short papers, a clearly-stated thesis and a few notes many provide all the written plan needed. But for longer papers, especially critical and research papers, the writer may be asked to present an extensive outline at the end of pre-writing stage so that somebody experienced can check the plan before the researcher begins to write the paper.

General Outline

A general format followed in most of the research/scientific papers involves four sections: introduction, materials and methods, results, discussion (and conclusion). Each section *MUST be* well developed and tested for its authenticity and conformity to the THESIS. For clarity, deal with each section separately.

1. *Introduction.* Should be brief and to the point. Gives a historical background of the problem, the scope what may have been done, what may have been achieved, what remains to be done and what is expected to be achieved and the beneficiaries
2. *Materials and Methods.* Should state clearly WHAT was used, HOW it was used, WHERE and WHEN it was used. This section should include all materials and the experimental procedures including the DESIGN
3. *Results.* This section will report the outcome of the research. It is very delicate section. Report the results as they appear, NOT as you would LIKE THEM TO BE! Report both BAD and GOOD results, then offer explanation.
4. *Discussion.* Offer an opportunity to explain why the RESULTS are what they are. Give intelligent reasons for or against the results. Link them to the literature review findings.

1. Taken from a publication on Communications by Dr. R.K. Obura of Egerton University. April 1994. The initial part of this text is handout 4.24.5.

5. *Conclusion.* Have conclusions based on observed results (both in the field and lab). This is the last section and can be well done only if sections 1, 2, 3, and 4 are properly done.

Topic and Sentence Outlines

In *a topic outline* the entries are not complete sentences but headings consisting of single words or phrases which identify the topic to be discussed under each heading.

In a *sentence outline* each entry is a complete sentence. It not only identifies the topic to be dealt with; it states what is to be said about the topic.

TOPIC ENTRY: Population growth

SENTENCE ENTRY: Population growth is a consequence of two main factors: increasing birth rate and decreasing death rate.

The topic outline is important in setting down stages in a process. It allows the writer to *block* out his subject matter.

The sentence outline is the better form when the content is not a label but an idea. It is more restricting than the topics form, and this restriction helps the writer by controlling him.

The decision on which form to use depends on what the paper is to accomplish. If it is going be a research paper or a thesis, the sentence outline will be safer. Otherwise, the topic outline is more convenient. In practice, most sentence outline emerge from preliminary topic outlines. The first step is usually to block out the area of subject matter.

1. POPULATION GROWTH
   A: BIRTH RATE
   B: DEATH RATE

Such headings are useful but they are a long way from saying anything specific about the topics. The writer then asks what he wants to say about these topics, and his answers convert the headings into sentences.

1. The growth of human population is a function of two main factors.
   A. The birth rate has been steadily increasing over the past century.
   B. The death rate has been steadily decreasing over a much longer time.

Each of these sentences can become the topic sentence of a paragraph or the thesis of a series of paragraphs comprising a larger unit of composition. The writer then develops each unit.

Shaping the Outline

If a writer begins to outline before he or she has clearly established the purpose of the essay, he/she will have to experiment with trial outlines in order to find out how the material should be shaped. As long as the writer understands that he/she is groping for a plan, these trial outlines will help to discover what the essay should do. The danger is that the writer may settle too soon for an inefficient plan. It is always safe to postpone the formal outlining until the controlling decision about purpose firmly has been made. If tentative or trial outlines are necessary, the final plan should be *carefully checked* before the writing is begun.

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The following sequence shows an outline emerging through successive stages. It is assumed that the writer has already made a thorough study of the influence of heredity and environment on the individual and has concluded that *neither* can be proved to be more important than the other. This conclusion is the THESIS of his essay.

STAGE I: SIMPLE TOPIC OUTLINE ESTABLISHES OVERALL ORGANIZATION BY IDENTIFYING MAJOR TOPICS TO BE DISCUSSED

THESIS: It is not possible to prove that either heredity or environment is the more important influence on the individual.

I. Difficulties of defining "heredity" and "environment"
II. Difficulties of studying cases of the past.
III. Difficulties of experimental studies.

STAGE II: MAJOR TOPICS OF EARLIER OUTLINE ARE FURTHER SUBDIVIDED AND ENTRIES BEGIN TO TAKE SHAPE AS SENTENCES. THESE ARE NOT ALWAYS FINISHED SENTENCES, BUT THEY BEGIN TO CONVERT TOPICS INTO STATEMENTS OF IDEAS THUS *INDICATES WHAT IS TO BE SAID ABOUT TOPICS.*

THESIS: It is not possible to prove that either heredity or environment is the more important influence on the individual.

I. TERMS "heredity" and "environment" not definable.
   A. Heredity and environment not definable.
   B. "Environment" too vague a term.
II. STUDIES of famous and infamous people are not decisive.
   A. Famous people: Shakespeare, Newton, Lincoln.
   B. Infamous people: the Green's family.
III. HEREDITY AND ENVIRONMENT cannot be isolated in studies of children.
   A. Newborn babies have already had nine months of pre-natal environment.
   B. Fraternal twins have different inheritances, and may or may not have significantly different environments.
   C. Identical twins do have same inheritance, but we can not be sure they have same environment.

STAGE III: THIS FINAL STAGE INCLUDES THE FOLLOWING REVISIONS:

1. The subdivision of previous entries is completed.
2. All entries are expressed as finished sentences and these are raised, if necessary, so that all sentences are as parallel in forms as they can be made.
3. As a result of these revisions, each entry becomes a potential topic sentence for one or more paragraphs of the essay, and the outline also serves as a paragraph summary of the whole.

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Heredity vs. Environment

THESIS: It is not possible to prove that either heredity or environment is the more important influence on the individual.

I. In practice we are not able to define *"heredity" or "environment"* with precision.
   A. We are not able to define *"heredity"* except in terms of characteristics which may have been influenced by environment.
      1. Some inherited characteristics of fruit flies appear only when the environment encourages their appearance.
      2. An acorn will never grow into anything but an okra tree, but whether it becomes an okra tree or not depends on environmental conditions.
   B. We are not able to define *"environment"* with precision.
      1. The environment of individuals in a society is so complex that we cannot define it vigorously.
      2. Except in very limited conditions (for example, lab experiments) the word "environment" is so vague that it is useless for serious discussion.

II. We cannot reach any trustworthy conclusions about the relative influence of heredity and environment by studying the histories of famous and infamous people.
   A. A study of Shakespeare, Newton, and Lincoln provides us no answer.
      1. If their greatness was due to inheritance, why were other members of their families not distinguished?
      2. If their greatness was due to environment, why did others in the same environment not achieve greatness?
   B. Study of the notorious Green's family provides no conclusive answer.
      1. We know that Green's family had a bad inheritance and a record of delinquency, but we cannot be sure that the inheritance caused the delinquency.
      2. The Green's family members have had each other as part of their environment, and it is probable that any child brought up in that environment would have become a delinquent.

III. We cannot experimentally study heredity or environment apart from each other.
   A. We cannot do it by studying new born babies.
      1. They have had nine months of prenatal environment.
      2. They may or may not later display characteristics which are assumed to be inherited.
   B. We cannot do it by studying *fraternal* twins.
      1. Such twins come from different eggs and have different inheritances.
      2. Such twins may have quite different environments; e.g. a boy twin has a different environment from girl twin, even when brought up in the same family.
   C. We cannot even do it by studying *identical* twins because, although they have the same inheritance, we cannot be sure that they have the same environment.

In planning such an outline (as above), it is wise to lay out the main divisions before worrying about subdivisions. Establish all roman-numeral headings first; then breakdown each numeral heading into capital-letter entries, and so on, following the principle of completing one level of division before starting the next lower level. This way you remain in control of your outline, and proper indentations should be observed.

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When a careful outline is required, keep the *thesis and main heading* in your mind and reconsider them at convenient intervals. Avoid finishing the outline at a single sitting. Second thoughts are often better than first, and you want to be sure about the overall structure of your ideas before you begin to develop them in detail.

Testing the Outline

As a check of the structure, it is usually wise to test the outline by asking the following questions:

1. Is the thesis satisfactory?
2. Is the relation among the parts clear and consistent?
3. Does the order of the parts (sequence) provide a logical progression from the thesis?
4. Is the outline complete?
5. Can each entry be developed in detail?

Details of Testing Questions

1. Is the thesis satisfactory?

Since the thesis controls the whole outline, a faulty statement invites trouble all along the way. The thesis should be restricted, unified, and precise. A poorly-stated thesis can lead to a badly organized or a pointless paper. Therefore a vigorous checking of the thesis is paramount.

An example of an unsatisfactory thesis.

THE PURPOSE OF THIS PAPER IS TO PROVIDE A BETTER UNDERSTANDING OF THE AMERICAN INDIAN BY REVEALING A FEW FACTS ABOUT HIS EVERYDAY LIFE AND CUSTOMS.

NOTE: The author of the statement has not restricted the topic or clarified his purpose.

The resulting paper will be scattered on superficial "Few facts" - what kind of facts? What are the criteria for using some facts and omitting others?

"Life and customs" - too broad - need to narrow down.

2. Is the relation among the parts clear and consistent?

In a good outline one can see how each main unit brings out an important aspect of the thesis and how each subdivision helps to develop its main heading. If there is any doubt about the relation of any heading to the thesis, that heading is either poorly stated or is a potential trouble spot in the outline. Whatever the reason, the difficulty should be removed before writing is begun.

3. Does the order of parts provide a logical progression?

Just as the sentences within a paragraph must follow a logical order, so must the parts of an *outline.* If any of the parts are out of order, the disorder will be magnified in the essay, and a reader or presenter will be confused or irritated.

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4. Is the outline complete?

There are two questions in this:

1. Are all major units of the subject presented?
2. Is each major unit subdivided far enough to guide the development of the paper? If YES to both then proceed or else correct as necessary.

5. Can each entry be developed in detail?

Each entry in the outline should be fully developed when the paper is written. When one constructs outlines containing entries for which they have no material, it will be clear that all they have to say about these entries will be what they have already said in the outline. Therefore all entries must be developed and no entry should appear unless the author has the material to develop it, e.g. for inexperienced writers, a useful rule of thumb is that EACH ENTRY WILL USUALLY BE DEVELOPED INTO AT LEAST ONE PARAGRAPH.

UNIT III: Titles

Introduction

The title serves to identify the paper, therefore, for a good identification, the title must be specific and represent the article's content. In any case if the paper covers more than one area of subject matter then the title must identify both MAJOR and SUB-MAJOR fields covered in the paper. Many scientists window shop for their areas of interest by using the titles, and only when they identify interesting topics will they move to retrieve abstracts for further details. It should also be remembered that it is the titles which facilitate retrieval in indexes developed by secondary literature services. Consider a title like this.

Application to Forestry

- The title is incomplete it lacks identity
- No subject or subject area indicated
- Major question is "application of what" (fertilizer, herbicide, manure or some technology of some sort)
- Such a title cannot serve the purpose discussed above
- Secondary literature services may not know under what subject matter the research fell.

Thus a good title is usually built from three basic principles:

- Brief and to the subject
- Indicate the purpose of the study
- Give important high-impact words early.

Length of the Title

The authors aim is to make the title as descriptive as possible, however, it should be short and clear. The exact number of words will depend on the organization/ journal accepting the paper. The usual range is between 10-15 words. Any title having five words would probably need some revision, while those above 12 words would probably need to be cut back except under special

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and unusual circumstances. It should be noted that these recommendations are guidelines and not rules.

Examples:

- ECOLOGY OF VARIOUS COMPETITORS FROM AN EXPERIMENTAL PLOT OF PINUS PINASTER INOCULATED WITH STILUS GRADULATUS AND LACTARUS DELICIOSUS. (18 words-probably could be shorter and still convey the same meaning).
- INCIDENCE OF PECTOLYTIC ENZYMES IN THE VA MYCORRHIZAL INFECTION OF ALFALFA. (12 words-author was able to relay the subject message).
- AGROFORESTRY SYSTEMS INVENTORY (3 words - short but clear title)
- APPLICATION TO FOREST (3 words - short and not clear, therefore will need major rewording)
- EFFECT OF NITROGEN FERTILIZATION ON DWARF WHEAT (7 words - short but has good message on the subject matter)

Title as a Source of Information

When deciding on a title for a paper, the scientist should pay special attention to the meaning of the words that are used and the order in which they occur. It is important to use standard terminologies and avoid jargon. Where acronyms appear in titles they should be spelt out. It should also be remembered that libraries store information under the *word* in the title that *best describes* the subject matter or field of study. General terms not closely related to the title should be reserved as additional indexing words.

Many readers do not have time for the whole paper. However, it has been observed that all scientists peruse the titles in a table of content first in order to decide whether or not to turn to a given ABSTRACT. Therefore in order to attract someone to read your abstract the title must be informative. Some flexibility in choice of words often pays. Being too specific and the use of tough terminologies known only to specialists will make titles less informative. Such titles will be passed unnoticed even by those doing a literature search.

It has been further recommended (ASA 1984) that titles should never contain abbreviations, chemical formulae, proprietary names, and unusual outdated terminologies. For economy of space common names of chemicals, crops and to some extent soil should be used. Where these are not readily available, the scientific name (genus and species) should be used.

UNIT IV: Abstracts

Introduction

A research paper regardless of the size is never complete without an abstract. After completing the writing (introduction; materials and methods; results; discussion) comes the complicated task of writing an abstract. It is at this stage that the writers tend to be tired and do not want to spend as much time on abstracting as may be required. It should be noted that the abstract forms the most important section of any research paper. Although abstracts are written last, they usually precede the main body of the paper. Indeed in scientific meetings and seminars abstracts are sent out first (to assess the quality of the paper) then are compiled and given to participants prior to the beginning of the sessions. These are given to impart information on what will be discussed. In general, abstracts serve as eye openers to any scientist window shopping for articles of interest.

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Importance of Abstracts

The abstract or summary (that which closes the report) of any scientific paper will quickly inform the reader of the value of the report. It is also from the abstract that the reader will decide whether to read the entire report closely or simply to skim through the sections of particular interest. Abstracts are read by many more people than those reading the entire report. Others believe that the number of people reading a particular abstract is closely related to the skill and style with which the abstract is written. Good, well-constructed abstracts with necessary (relevant) information tend to attract more readers than the carelessly done abstracts. Abstracts can therefore be considered to supply information to those who will not read any further but need to know something about the topic; and to those who would like to read the whole report. Thus for a specialist in a given field, it is the abstract that will give some information about the research and indicate if there is any reason to proceed further. A generalist's interests may be fully satisfied by reading the abstract. For an executive who does not have enough time to go through all the reports in various fields, abstracts provide enough information on the progress or stagnation of the various projects.

As indicated above, abstracts should be written after the main article, and the wording should be consistent with those in the main report. They must be completely self-explanatory and intelligible by themselves. Otherwise they will defeat their purpose. Only important and outstanding results (positive and negative or both) need to be pointed out. Those of less importance will be found in further reading of the main article. Specifics rather than general statements should be used (avoid ambiguous words like "is discussed or described, generally")

For example, reporting herbicide or fertilizer rates, one needs to quote the figures on rates used (100 kg of N/ha or 100 ml of 2.4 D). Scientific names of plants and insects should be given and where a long name of a process is used it should be spelled out first followed by an abbreviation, which is then used subsequently (e.g., Invitor Dry Matter Digestibility (IDMD) or Leaf Area Index (LAI).

The main aim is to have the abstract short but as informative as is possible. Believe it or not many people get more information from ABSTRACTS than from the main lengthy TECHNICAL PAPERS or even from ORAL PRESENTATIONS. So aim at producing a "detailed informative" abstract any time a research paper is written.

Guidelines on Writing of Abstracts

Abstracts are as varied as fields of research. It is therefore impossible to lay down a fast rule on how to write a good abstract. Each abstract will depend on the nature of the article and the research to be reported. In other words, each abstract is unique. Despite their uniqueness, there are general guidelines which if studied and adopted, may make the abstract stand out. An old saying "PRACTICE MAKES PERFECT" still stands when it comes to writing an abstract, especially if practiced conscientiously and applied conservatively.

A well-written abstract should have the following subsections (though no paragraphing is allowed):

- A brief reason for carrying out the research (i.e., justification or rationale).
- An objective or objectives of the research.
- Brief indication of the topics covered.
- A brief description of methodology. Where a paper is dealing with methods then give basic principles, range, and degree of accuracy.

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- A summary of results, highlighting only those that are outstanding.
- Conclusions from the results whether positive or negative.
- Any recommendations(s) along with a future plan of action.

Length of Abstracts

The details and emphasis one should include in a given abstract will determine its length. Generally abstracts should be between 100 and 500 words, with 250 to 300 words being common limits for most scientific journals and conferences. Shorter abstracts usually concentrate more on the problem and on the results than on the method. Although these abstracts may be brief, they give information to a specialist to read a paper or to keep track of future research.

Normal-length abstracts tend to be more informative. Regardless of the length of an abstract, the scientist should aim to include the following criteria:

- Abstracts should be short, clear and informative (or indicative as the case may be).
- Use straight forward English and avoid jargon, ambiguous words and generalization.
- An abstract should be consistent with the technical report in all aspects. If there is variation then something is wrong.
- Abstracts should not have illustrations like graphs, tables, or photos.
- Abstracts must be accurate with respect to figures quoted from the text. If necessary, re-check and correct any errors.
- Abstracts should be devoid of redundancies. There is no need to give sample dates or numbers collected.
- When possible give your abstract to peer groups first to comment and finally to a professional to skim through it before submitting. Take comments seriously and revise as may be needed.

Even though these abstracts were brief, they still served the purpose, i.e. giving adequate information enough to stimulate the desire of a specialist to check on their papers or to keep track of future research in those areas.

Normal length abstracts tend to be more informative (even though in some special cases abstracts of similar lengths may be only indicative) e.g.,

FURTHER STUDIES ON GENETICS OF NONNODULATION IN PEANUT

M. Dutta and L.J. Reddy

ABSTRACT

In the peanut *(Arachis hypogaea L.)* nonnodulation has been reported to be controlled by both duplicate recessive genes as an single recessive gene. In the present study genetics of peanut nonodulation was investigated in four crosses from data on F_2 population and F_3 progenies from nonnodulating F_2 plants. The F_2 data of all the four crosses studied showed a better fit for a trigenic ratio of 61 nodulating to three nonnodulating plants compared to the previously reported duplicate disgenic ratio 15 nodulating to one nonnodulating F_2 plants. Further, the segregation of F_3 progenies from nonnodulating F_2 plant indicated the inadequacy of the duplicate factor model. Am new genetic model involving three genes in the inheritance of nonnodulation is proposed. Two genes produce nodulation while the third gene inhibits nodulation only when it is dominant and the former two genes are in recessive homozygous condition. By assuming differentials heterozygosity at the three loci of the parents involved in various crosses, the duplicate factor and monogenic ratios reported by previous workers on nonnodulation could be explained by the new model. Although the occurrence or non-occurrence of nodules is governed by a few major genes, the intensity of nodulation appears to be controlled quantitatively

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Additional index words: Groundnut, *Arachis hypogaea L.*, Trigenic inheritance

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COTTON MAIN-STEM LEAVES IN RELATION TO VEGETATIVE DEVELOPMENT AND YIELD

D.M. Oosterhuis and M.J. Urwiler

ABSTRACT

Understanding the relative contribution of specific leaves to structural growth and yield development is critical in improving the management of cotton (*Gossypium hirsutum L.*) crops. Studies were conducted to investigate the role of main-stem leaves in the growth and development of field-grown cotton. A range of leaf removal treatments was compared to a control with no leaf removal in two field trials in differing localities. Removal of main-stem leaves as they appeared had a dramatic effect on plant growth and yield. When main-stem leaves were removed after they had expanded there was a less severe influence on yield but still a large influence on height. Leaf removal had no significant effect on either plant height or yields if the sympodial branch was allowed to develop before the main-stem leaf was removed. Removal of monopodia branches had no effect on yield or plant height. These results indicate that main-stem leaves are involved in the structural development of the plant necessary to provide an adequate framework with sufficient leaf area and fruiting points for optimum yields. The earlier the main-stem leaf removal, the more drastic the resulting effect on plant growth and yield. Once the main-stem leaves had contributed to structural development, their contribution to plant productivity appeared to diminish rapidly.

Additional index words: Gossypium hirsutum L., Cotton boll, Leaf area, Sympodil leaf

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SENSITIVITY OF SORGHUM GRAIN YIELD TO ONTOGENETIC CHANGES IN RESPIRATION COEFFICIENT

Keith J. McCree

ABSTRACT

Only about 60% of the C taken up daily by crop photosynthesis contributes to yields. The remainder is lost during synthesis and maintenance. Previous estimates of losses have been based on the assumption that the synthesis efficiency (Y_g) and the maintenance requirement per unit biomass (m) are constant. Recent controlled environment studies with sorghum (*Sorghum bicolor L.* Moench) have shown that after anthesis, the value of m decreases rapidly, while the value of Y_g increases slowly. The consequences for grain yield are explored in this paper, using a new simulation model, McSorgSim. The model was first calibrated against field growth analysis data, then used to demonstrate possible advantages of selecting for high yield Y_g and low m. To stimulate the ontogenetic decrease in m for the plant as a whole, we assumed that the value of m for structural and storage tissue (stalk and panicle, including grain) was negligible in comparison with the value for metabolically active tissue (leaves and roots), and that the value od Y_g for the storage and structural tissue wa 18% higher than that of active tissue. Using these assumptions, simulations of daily C balance, standing biomass, and grain yield closely matched field data for sorghum growing in a warm, sunny, humid environment. The model indicated that reducing the night temperature by 10$C would increase the yield by only 4%. An assumption that values of m were uniform across plant organs led to a 35% underestimation of yield, while assuming that Y_g also was uniform led to an additional decrease of 4%. If m for the panicle is already as low as these studies indicate, then it might not be possible to increase sorghum yield appreciably by selecting for a lower value.

Additional index words: Crop growth models, Carbon balance, Synthesis, Maintenance, Night temperature, *Sorghum bicolor (L.)* Moench

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Elements of Style[1]

G. Conciseness

D. By reducing clauses

Reducing clauses: You often can and often should reduce relative clauses to participial phrases or to appositive constructions:

Clause:	...	the latch which is used on these doors
Participial Phrase:	...	the latch used on these doors
Clause:	...	the company that owns this patent
Participial Phrase:	...	the company owing this patent
Clause:	...	pulping, which is the process for removing lignin from wood
Appositive:	...	pulping, the process for removing ....
Clause:	...	Dr. Hipple, who is a well-known physicist....
Appositive:	...	Dr. Hipple, a well-known physicist ....

E. By eliminating unnecessary qualification

Do not qualify words need no qualification:

maximum possible	maximum
minimum possible	minimum
complete monopoly	monopoly
entirely completed	completed
absolutely essential	essential
most unique	unique
most correct	correct
most exact	exact

Also be frugal in using *very*, *most* or other superlatives in expressions already indicating extremes.

Use of infinitive of purpose; reduce predication; avoid weak words

Use the infinitive of purpose (especially to avoid the passive)

for the purpose of learning	to learn
advisable that a study be made	advisable to study
in order that sufficient information be obtained	to obtain sufficient information

Reduce prediction; that is, reduce grammatical rank or complexity by changing clauses to phrases, phrases to single words.

1. Taken from Scientific Writing Course: Handbook by A. Colodner & M. KIaye.

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Reducing phrases: Many phrases, particularly adverbial and pre-positional phrases, have single-word equivalents:

in a satisfactory manner	satisfactorily
without making a noise	noiselessly
most of the time	usually

Weak Word Choice

There are many ways in which faulty word choice can result in wordy sentences. Choice of weak verbs is particularly productive of wordiness. The weak verbs whose improper use should be avoided are those such as **is, has, does, is going to, and seems** when they are substituted for more powerful verbs. An example of such misuse occurs in:

The amplifier *has the capability of being monitored* at all times.

The weak verb in this sentence can be replaced by a much stronger verb with a resultant saving in space:

The amplifier *can be monitored* at all times

So versus Therefore. It is understandable that the technician will be interested in cause and effect. But why should the link in his chain of reasoning so constantly be **therefore** -or, for that matter **consequently, hence, ergo, thus, accordingly**? The little word **so** - only half as long as a four-letter word - is usually just as serviceable, and less pontifical.

True, it can be worked to death. The fact that an architect builds four **ergos** into one paragraph does not justify a train of **so's** that remind you of a girl relating events of the night before: "So I told him ... so he answered ... so we went" and so on. Common sense and literacy cannot be ignored. Moreover, there are several **so's**. The word can mean **consequently, in that degree, in like manner**.

H. Specificity

Other types of vague or meaningless qualifiers found in technical writing are:

aggreat many	considerably	very
more or less	mainly	rather
to some degree	reasonably	little
by and large	nearly	largely
a number of	appreciably	generally

Exercise — "very, rather, little" — criticize the following

a **very thorough** investigation	a **rather deadly** poison
a **very timely** occurrence	a **little more** difficult
a **rather dangerous** experiment	a **little less** frequent

Consider:

a. **It is believed that engineering colleges should hire more scientists as teachers.**

This statement is both vague and dishonest. Who believes it? The impersonal "it" construction takes in the whole technical and academic community!

b. **The literature shows that** rain in Spain falls mainly in the plain.

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Undoubtedly **certain** source show this, but the reader is not helped if you casually cite all the literature as your authority. To him, you are taking unfair refuge behind a professional cliche.

And finally, here is a list of approaches, any one of which might easily destroy reader confidence:

> **The vast majority** of scientists feel that...
> (a vague, wordy cliche)
>
> These figures, **all from reliable sources**, indicate...
> (a political runaround)
>
> **A number of people** have asked why
> (any number is "a number"; also, what people?)

1. **Etc.**

Don't use "etc." to cover up laziness or lack of information or to mislead the reader into thinking that there are more items than there actually are. Reserve it for those instances in which spelling out the series would involve the reader unnecessarily:

Match the pairs as follows: No.1 with No.7, No.2 with No.8, No.3 with No.9, etc.

"Etc." is meaningless if the reader cannot complete the missing items of a series:

> To build the component, we shall need a rag, a bone, a hank of hair, etc.

Use "etc." only when you know what it stands for and you are sure your reader will know too. Too often we throw "etc." into a list as a hedge against omitting something we might have overlooked.

Exercise: Try to complete the sentence above!

2. **The floating comparative**

The floating comparative is the qualifier without a reference. We say that something is "faster" or "longer-lasting" or "more economical", but forget to complete the comparison. Thus we can have a legitimate referent in mind, but the reader may think he is being given a sales pitch. Tie down the comparative and you will avoid this embarrassment.

3. **Meaningless qualifiers**

The adverb **relatively** is another troublemaker. It is commonly used in such expressions as:

> a **relatively** high temperature or **relatively** expensive equipment

The word is meaningless if the reader does not have a standard on which to base the qualification. It therefore must be defined for anyone not versed in the conventions of the subject being reported. "A relatively high temperature", for example, means one thing to someone working in pyrogenic; another thing to someone in cryogenics.

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Editing[2]

Writing gains quality from careful rewriting and editing. Rewriting means making changes in the arrangement of ideas and major revisions of sentences and paragraphs. Editing means making lesser changes, but still important ones to the reader.

"Whether you're using a pencil or a machine to edit, you need to have reasons to make editing changes."

—Don Ranly, University of Missouri, USA

Seven Cs Of Editing

Edit to make material

- Correct
- Consistent
- Clear
- Concise
- Complete
- Coherent
- Creative

Correct *All of the treatment produced higher yield.*

The objective of the treatments were to test the affect of two nutriments.

Consistent *The seeds were sown 24 November and harvested during March 12-20.*

The rates were 20-40-60 kg NPK/ha... N, P and K were put on at rates of 20-40-60.

Clear *Optimum sowing of wheat that governs the residual soil moisture under rainfed condition is a prerequisite.*

Concise *Although naturally pollinated heads gave 10% lower yield than hand pollinated ones yet they failed to achieve the desired level of significance 5%.*

Complete *A negative trend in between 500 seed weight and number of seeds/head, confirming observation of Singh et al. (1985)*

Coherent *Randomized complete block design and plot size of 5m x 5m with four replications and 50 kg/ha planting rate for one improved and two local varieties and NPK at 60-40-40 kg/ha NPK from urea, triple superphosphate and muriate of potash.*

2. Kern, R., R.K. Obura, T.A. Ajibola Taylor. *Writing and Presenting Scientific Information.* A trainer's handbook based upon ISNAR-KARI workshops (1990,1991, 1993) ISNAR Training Series, 1994.

Here is the kind of material that confronts an editor of agricultural research reports. This one came from a young, field researcher in a farming systems program in Bangladesh.

> Five micronutrients viz zinc, copper, manganese, boron and molybdenum at the rate of 5 kg/ha for the first four nutrients and at two rates, i.e. 2.5 kg/ha and 5 kg/ha for the molybdenum along with NPKS were tested against the check only NPKS.

Consider all the information a reader would have to carry along to understand what the writer actually found in these field tests:

Five micronutrients	zinc	5 kg ha
	copper	5 kg ha
	manganese	5 kg ha
	boron	5 kg ha
	molybdenum	5 kg ha and 2.5 kg ha

with NPKS were tested against the check only NPKS.

While it may be possible for the reader to carry all of that information, we may doubt that he or she will take the trouble unless there is strong need to understand. To get the information clearly in mind, nearly every reader must go back and study it out for himself or herself. Would it not be easier to understand if it read:

> Four micronutrients were tested at a rate of 5 kg/ha. A fifth, molybdenum, was tested at both 5 kg/ha and 2.5 kg/ha. All test areas received the same NPKS applications. The check treatment received only the NPKS.

Teaching Scientific Writing[1]

The following account of methods I have chosen to teach in this course may provide insight into choosing your own. I started to teach scientific writing in 1970. I had then two basic pedagogical principles and, almost twenty years later, I still see them as fundamental to the mode of teaching this topic.

One principle was that I intended to teach only a limited number of people in any one course, because I believe in a personal mode of communication. I did not want to teach people how to surmount the problems I thought they "ought to have" – I wanted to help them with the problems they actually *did* have, individually. This meant teaching relatively small groups – not more than 20 participants each.

It followed from this that I did not favor a "frontal" approach – a classroom, a "teacher" lecturing to students. What I wanted was more in the nature of a guided exchange of ideas in which the instructor and the students together engaged in problem-solving, in a workshop situation. In line with this, not only were points and ideas to be explained, but practice in handling these ideas and absorbing their message had to be an integral part of the course, and time for joint and individual exercises was a *sine qua non.*

My second basic principle was that it would be mistaken, and even impolite, to teach scientists the techniques of scientific writing, without presenting a well-supported thesis of why and how this technique evolved; after all, it is not immediately clear why we have a special language for science.

One would not take a scientist who wished to learn to conduct a nuclear magnetic resonance experiment over to the machine and say, "You put your specimen in there, then you press these buttons, then you measure the peaks that appear on the video screen." This would almost certainly be considered offensive. Rather, you would explain how the parameter he wishes to measure can be obtained by nuclear magnetic resonance spectroscopy, what is measured, and how it is related to the information he is seeking. In short, you would explain what the technique is based upon and how it works. Only after all this is clarified, would you turn to the actual operation of the instrument.

I feel strongly that this is as true for scientific writing as for any other technique. Therefore, I spend a good proportion of time in considering the how and the why. Only then do I feel I can start explaining the technique itself, with due respect to the listeners.

All the rest of the pedagogy involved can either be found in the literature or grew out of experience in presenting more than twenty-five courses to scientists, physicians and engineers across all the disciplines.

I will not attempt to distinguish what I learned from books and articles from what I learned from experience, but will simply present the features of my presentation that now come to me naturally, but that at some time had to be learned, and that I apply because I think they work.

Teaching anything in any way – whether by computer, in a large class, or person-to-person, must be user-friendly. This means that you, the teacher, must like teaching, like the subject you are

1. Extract from: Colodner, A. and Kaye, M. *Scientific Writing Course: Handbook.*

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teaching, and like the person you teach. Disinterest stimulates disinterest; lack of involvement stimulates lack of involvement; and so on. If you have no interest in the subject you teach; or do not like sharing knowledge; or you don't like people much in general – then teaching is not for you.

Teaching, in the way I prefer is a mutual experience. This means care is needed to "assess" the participants in the course – their level of understanding and their response. Teaching must be at the right level and pace, this can be gauged only by learning who are your students, what is their level of knowledge, what do they need to know, and how are they responding to the teaching level – the pace of the course – you think is just right. Are there blank unresponsive faces? When the exercise appears on the screen, do pencils start writing almost immediately, or is there a long agonized pause? This is the kind of feedback that must be automatically recorded throughout a course, so that the instructor can adjust from time to time his pace accordingly.

Humor has a profound value in teaching. It not only sharpens the point you are trying to make and makes it more memorable, but it helps the group bond together in a friendly fashion. It breaks the gulf between teacher and student, and perhaps most importantly, it creates an atmosphere which encourages students to participate, without worrying that their comments or proposed solutions are inapt or incorrect, or even funny, since "funny" has become a positive value.

If learning is fun, people will enjoy learning and will learn; if it is not, only the most strongly motivated will persevere.

As a teacher, I have tried to solve the difficult problem of using the positive aspects of competition, without introducing its negative side.

This can be done by supporting weak groups in group work and by discussing openly the participants' individual solutions to problems, pointing out where they are successful and where they are not. This matter-of-fact objectivity and openness allows participants to offer what they know are only partially effective solutions, or wrong solutions, without a sense of stigma. All mistakes are "our" mistakes, that is, mistakes people make, rather than a lack of knowledge of a specific person.

Teaching scientific writing language has its own special difficulties. One of the major ones is that answers to problems do not have a single value measure, they are not right or wrong, but cover a spectrum from unacceptable to just right, and a number of solutions can be *equally* acceptable. This of course, makes nonsense of teaching by precept and actually dictates a problem-solving approach.

Another problem is that the amount and kind of knowledge needed to teach this single subject is very wide and differs in kind – from a feel for elegant and economic solutions to problems of language, to considerable technical knowledge in the field of technical writing, editing, and presenting data, as well as understanding the special sub-language of the various disciplines.

Ideally, two people should teach a course, each teaching different aspects. This not only spreads the work load, but it also gives each the opportunity of observing the other's presentation and supplying feedback. The trainers must be able to work together harmoniously, but it is not important for them to have the same approaches, attitudes, judgements and preferences. That would be manifestly impossible. Nor is it necessary for them to hide their disagreements for the students. On the contrary, because of the "multi-solution" situation, controversy is healthy and should be shared, provided it is kept within the bounds of the time available.

A minor point – if I do not know the answer to a question, I believe in saying so. No one can know everything, nor is expected to. Sharing ignorance forms a bond. However, after saying

that one does not know, it is very important to attempt, during some leisure time, to find the answer and return to the question in some subsequent session. The question may be unimportant and the answer trivial; but the example of going after knowledge that is lacking is an indispensable one.

In the language part of the course, a certain "schizophrenia" is demanded of the students. "Writing" is seen as putting down edited thoughts on paper. "Editing" is seen as putting changes to these thoughts now on paper.

Writing and editing are essentially the same process, and students must learn to switch from regarding a piece of text as if they were the writer or the editor, interchangeably and without much distinction. What they are really learning is how to manipulate language quickly and easily to bring it to a clear precise, economic expression of the information it is intended to carry, in the simplest way possible.

Some Notes on Teaching Scientific Presentations[1]

by K. Robert Kern

The teaching outline and materials on scientific presentations include two parts. The first deals with planning and preparing the oral presentation. The second takes up planning and preparation of visual support for the presentation. Both offer only the rudiments of the processes put forward in a step-by-step manner. The materials offer a sequence of activities and content. The trainer must develop his or her approach to using them.

The trainer should gather examples and lead discussion on key points and principles. Actually, participants in such training represent a pool of knowledge that the trainer can use.

Scientific presentation—as any mode of human communication—must be seen as a receiver-oriented process. Regardless of the intent of the presenter of a message, the response of the audience members determines whether the presentation succeeds or falls short. Most people in audiences for scientific presentations have listened to (received) many such presentations. Through their experiences, they have gained a lot of knowledge about what they like and don't like about scientific presentations. The trainer should tap into that mass of knowledge. The trainer can bring that knowledge to bear on the subject by asking the participants to talk about and evaluate each of the pieces of advice set out as principles for scientific presentation.

Oral Presentation

One approach to training in oral presentation begins with showing videotapes of presentations by persons who participated in earlier KARI-ISNAR workshops. Choose up to three tapes: at least one that is especially strong in oral presentation, without concern for the visual, and at least one that is weak in the oral part of the presentation. The group views several of these presentations at the beginning of the training session. This sensitizes participants to the subject of the training. Then the trainer proceeds with either of two training sequences:

Sequence No. 1

Give participants the first page of Raab's **Evaluation Sheet for Scientific Presentations**. Simply run through the items on that sheet.

Repeat the first of the videotapes shown previously, instructing trainees that they will be expected to evaluate the oral presentation (only the oral presentation). Allow about 10 minutes to complete the evaluation. Show another videotape and allow time for an evaluation of that presentation. Two such showings and evaluations may be enough.

Sequence No. 2

After showing the videotapes, move into a presentation of the material set down for the oral presentation content. Encourage discussion of all the points, especially asking participants to cite strong and weak points they noticed in the tapes.

1. By: K. Robert Kern. ISNAR manuscript.

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Now distribute the first page of Raab's **Evaluation Sheet for Scientific Presentations.** Run a tape and allow about 10 minutes for participants to score the presentation according to that evaluation sheet. Run another tape and evaluate it.

Now assign each participant the task of preparing an oral presentation of his or her paper written in the writing phase of the workshop. The presentation will be given orally to the entire group. No visual support is permitted in these presentations—oral only.

The time allotted for each presenter is not less than five minutes nor more than seven minutes.

In addition to making the oral presentation, each participant has two other assignments:

Make the formal introduction of another participant's oral presentation (the speaker and the subject). No more than one minute is allowed.

Offer an oral critique of a presentation by another participant. The critique should not be longer than three minutes, using Raab's evaluation sheet as a basis. Also, the same person critiques the presentation by the introducer.

It is useful to videotape each presentation. After the assigned person has given his or her critique, the tape can be played back to the audience. All then have opportunity to make comments.

The exercises suggested above emphasize the importance of the oral part of a presentation. (Too often, a person develops a few visual aids and expects merely to talk about them.) It is realistic to have each person work alone on preparing the oral material.

During these exercises, arrange to have a timekeeper seated near the rear of the audience. The person holds cards with which to signal the speaker of time remaining, of the seven minutes allocated two minutes, one minute, 30 seconds, and zero.

Visual Aids for Oral Presentations

This phase could be started with up to three videotapes showing presentations by trainees in earlier training sessions. The tapes should be chosen to show a range of visual-support methods.

The second page of Raab's evaluation sheet is applied to those presentations, serving as lead-in to the content section on visual support. Evaluation of the tapes should prepare the group to discuss the material on principles of planning and preparing visuals.

Participants next work to develop visual support for the oral presentation prepared in the preceding phase of the workshop. In this instance, it might be productive to use some small-group activity, since this could provide some feedback and advice to each person on ideas before he or she invests the time required to produce the visual material. This could be done in the following fashion:

Divide the participants into teams of four to five persons each. Within each group, the participants individually go through the planning sequence set out in the lesson material and then make rough drafts of their own visual aids. Members of the small group serve as one another's reviewers, offering feedback and suggestions.

Individuals then prepare their visual aids and make trial presentations for the members of the small group. This provides a rehearsal for the eventual presentation to the entire group.

Each participant makes a final scientific presentation based on his or her written paper, with the presentation recorded on videotape. It is good experience for participants to repeat their role as introducer of one of the presenters.

Each presentation is followed by time for all other group members to complete the two-page Raab evaluation sheet. Workshop administrators should quickly tabulate and record the evaluation scores (assigning values of five for yes, three for partially, and one for no). The full set of evaluation sheets is then given to the presenter involved. The tabulated scores are useful if the workshop leaders wish to choose the highest-rated presenters.

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HARVESTER TERMITE RESEARCH

Introduction

Harvester termite Hodotermes mossambicus, are especially common on red soil veld where they are of considerable importance as micro-herbivores following average or below average rainfall. Red soil veld (siallitic red-brown clays) comprises a mosaic of degraded and sound veld, with the degraded component occurring as scattered patches of variable size in a matrix of sound perennial grass veld. These degraded patched are of crucial importance in the ecology of harvester termites and the colonies are concentrated on this component of the mosaic.

Harvester termite populations fluctuate violently from season to season. Population levels attained by the termite during the dry season are inversely related to the rainfall in the preceding rain season. The degraded patches, which are sites of low water infiltration characteristics, provide the habitat

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required by the termites for the successful establishment and maintenance of the hive system which is apparently not stable in soil that is excessively wet. In seasons of high rainfall infiltration does take place on the degraded patches to the extent that disruption of the hive system occurs, with a consequent reduction in the termite population. (Division of Livestock and Pastures Annual Reports, 1973/74, 1974/75).

Evidence has been presented to show that the alates or dispersal stages of harvester termites show a preference for colonizing degraded (bare) areas during the annual dispersal flights. Thus, sites where rainfall infiltration is low are selected for the establishment of new colonies. (Division of Livestock and Pastures Annual Report 1973/74).

Experiments to study the behavioural mechanisms involved in the selection of bate ground areas by the alates for the establishment of new colonies were commenced during November 1973 on a red soil site at Matopos. The progress of the harvester termite research programme has been disrupted by lengthy absences from duty since 1975 and consequently follow up work since 1974 on this aspect of the ecology of harvester termites has been of a fragmentary nature and has not been previously reported.

Three contrasting veld types (10 x 10 m plots) namely, degraded, mown, and sound, were created in a paddock of sound perennial grass veld adjacent to an area heavily infested by harvester termites. Degraded patches (bare soil surface) were created by hoeing and raking, mown areas (50% of area between mowed perennial grass tufts bare and free of litter) by mowing and raking, and sound areas (veld in sound condition with ample litter between perennial grass tufts) were left undisturbed. The experimental design was a 3 x 3 Latin square. Three squares were laid down in the same paddock.

Three methods were employed to estimate the numbers of alates; pitful traps to estimate the numbers of alates moving over the contrasting surface; 2 x 2 m water traps with upright gauze baffles to estimate numbers flying in to settle; and the placement of 50 x 50 cm quadrats to estimate the numbers digging in on each veld category immediately after a swarming flight.

The results obtained from the quadrat counts have been reported previously and demonstrated that bare ground was a very favourable habitat for new colony establishment, mown veld a partially favourable habitat and sound veld very unfavourable. (Division of Livestock and Pastures Annual Report, 1973/74.

Alate sex proportions were determined by collection of the alates as they emerged and took to flight (Post-emergence) or by digging down rapidly immedicately under opened emergence holes prior to commencement of flight and then picking out the alates from the rubble (pre-emergence). Collections were made in the field of groups of de alates digging-in at excavation sites.

Alate Sex Proportions

The sex proportions of H. mossambicus alates as determined by two methods of collection are shown in Table 7. The proportion of males and females determined over all flight seasons and both methods of collection show significant divergence from the 0,5 expectation (X^2, P 0,001). Differences between methods of collection were not significant.

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TABLE 7. Sex proportions of H. mossambicus alates

Collection method	Flight season	Number of flights sampled	Male	Females	Total	Proportion males
Pre-emergence	1975/76	1	59	113	172	0,343
	1977/78	1	20	36	56	0,357
	Total	2	79	149	228	0,346
Post-emergence	1973/74	1	63	196	259	0,243
	1975/76	10	955	1 538	2 493	0,383
	1976/77	1	97	71	168	0,577
	1977/78	8	756	1 113	1 869	0,404
	Total	20	1 871	2 918	4 789	0,391
Pre- and Post-emergence	All	22	1 950	3 067	5 017	0,389

On four occasions, once during each of the 1975/76 and 1976/77 seasons and twoce during the 1977/78 season a higher proportion of males was observed in collections. This and the large variability between proportions in different flights suggested that male and female alates might be emerging at different rates within and between different flight periods. Consequently, sequential timed collections were made on eight different occasions when the beginning of flight periods was determined with a fair degree of accuracy. The results are presented in Table 8 together with the significance of the difference between observed proportions at the

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the beginning and end of flights periods. It is clear that a higher proportion of males emerge at the beginning of flight periods.

Table 8. Emergence proportions of H. mossambicus alates. Proportion of males emerging during different periods within flights. Sample sizes are given in parenthesis. Time intervals within flights and between different flights are not equal, and merely reflect the beginning, approximate middle and end of flight periods.

Date	Flight duration (Min.)	TIME INTERVAL 1	2	3	All Intervals	P (X^2)
28/12/75	85	0,422 (45)	0,391 (46)	0,375 (16)	0,402 (107)	iv3 NS
28/12/75	145	0,555 (36)	0,483 (29)	0,305 (82)	0,401 (147)	iv3 $P \leq 0,05$
31/12/75	110	0,291 (55)	0,314 (51)	0,091 (22)	0,266 (128)	iv2+3 NS
5/2/76	115	0,640 (100)	0,320 (228)	0,434 (129)	0,422 (457)	iv3 $P < 0,01$
2/12/77	50	0,439 (91)	0,262 (103)	0,167 (24)	0,326 (218)	iv2+3 $P < 0,0$
7/12/77	55	0,631 (84)	0,187 (48)		0,470 (132)	iv2 $P < 0,001$
8/12/77	75	0,191 (47)	0,159 (63)		0,173 (110)	iv2 NS
29/12/77	55	0,442 (165)	0,383 (206)	0,180 (61)	0,377 (432)	iv3 $P < 0,001$

A series of three collections made on different days, from a single emergence hole in a crack in a cement pavement surrounding a house, during the 1977/78 flight season indicates that the proportion of the males emerging varies not only within flight periods but between different flight periods but between different flight periods from the same colony. The observed proportions from different flights from the same colony are shown in Table 9 together with

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flight times. The colony staged a minimum of 5 flights. There were no significant differences between the proportions of males emerging during the first two low intensity flights but the difference between these flights and the last sampled were highly significant (X^2, P 0,001). No overall proportion of the sexes can be calculated for this colony since collections were not made on two occasions when flight was observed.

Table 9. Emergence proportions of H. mossambicus alates. Proportion males emerging during different flights from a single colony. Sample sizes are shown in parenthesis.

Date	Flight Time (h)	Proportion males
16/1/78	1725-1845	0.710 (100)
17/1/78	1705-1907	0.767 (103)
18/1/78	-	No flight
19/1/78	-	No flight
20/1/78	-	No flight
21/1/78	Flying at 1500	No collection
22/1/78	1705-1820	0.418 (239)
23/1/78	Flying at 1750	No collection

H. mossambicus stages alate dispersal flights following the first substantial rains of the season under conditions of bright sunshine and high air and soil temperatures. Shielding of the direct rays of the sun results in a decline in the rate of emergence and eventual cessation of emergence due to falling air temperatures. These diurnal alate dispersal flights quickly attract large numbers of predators, in particular birds. In view of this, the preponderance of males emerging first during flight periods

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must be of selective value to the termites. In H. mossambicus the male alate selects excavation sites once the wings have been shed and adopts a static calling position to attract wandering females (see on). The appearance of a preponderance of males on favourable diggin-in sites first will facilitate quicker penetration of the substrate because many of the males would have already selected excavation sites by the time the majority of the females arrive on the substrate, thus minimizing predation. This behaviour pattern may also enable males to minimize predation by birds whilst in flight, as by the time many birds arrive at the flight site a higher proportion of males than females have already emerged, flown and settled on the substrate.

Sex proportions digging-in to establish new colonies

The sex proportions digging-in to establish new colonies are shown in Table 10. Single dealates (always males in the calling position) at excavation sites were not sampled. The majority of the digging-in groups sampled consisted of a heterosexual pair or a single male and two females, both groups occurring in about equal proportions. A smaller proportion of the groups consisted of more than two females and one male while the occurrence of more than one male at an excavation site was very small.

Table 10. Analysis of 88 groups of H. mossambicus dealates digging-in prior to the formation of a nuptial cell

Date	0:2	1:1	1:2	1:3	1:4	1:5	1:6	1:7	1:8	1:10	2:0	2:2	2:4	2:6	3:3	3:7	Total
2/12/75	1	19	18	5	6	2	1	1	-	-	1	-	-	1	-	-	55
9/12/75	-	7	7	3	4	4	-	-	1	1	-	1	2	1	1	1	33
Total	1	26	25	8	10	6	1	1	1	1	1	1	2	2	1	1	88

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Comparison of sex emergence proportions with those sampled by water and pitfall traps

The total number of male and female alates and dealates (alates which have shed the wings) caught in water and pitfall traps and the numbers from emergence collections are shown in Table 11. The proportion of males and females between emergence collections, water and pitfall traps all vary significantly from each other (X^2), P 0,001). The larger proportion of males caught in the traps could be due to selectivity of the traps (e.g. females having a better chance of avoiding or escaping from traps) or to a difference in behaviour between the sexes either during flight (in the case of water traps) or after settling (in the case of pitfall traps). The first hypothesis appears unlikely, limited field observations indicate that alates in flight do not avoid the baffled water traps and that, whatever their sex, alates or dealates cannot escape from pitfalls once they have fallen in.

The baffled water traps should reflect sex emergence proportions for the experimental site. Assuming this is so, the significant difference between the proportions caught in these traps and the pitfalls indicates a behavioural difference between the sexes once they have settled on the substrate. Comparison of the sex proportions from emergence collections were made on the experimental site itself during the experimental period. The significantly greater proportion of males caught in the water traps can, however, be accounted for in one of two ways; either sex proportions on the experimental site were different to those observed in collections made on different sites during different years, or the differences are due to flight behavioural differences between the sexes. There is evidence that behavioural

differences account for the differences in the observed sex proportions between water traps and emergence collections.

The pattern of behaviour of the alates and de-alates leading up to the establishment of incipient colonies is shown diagramatically in Figure 1.

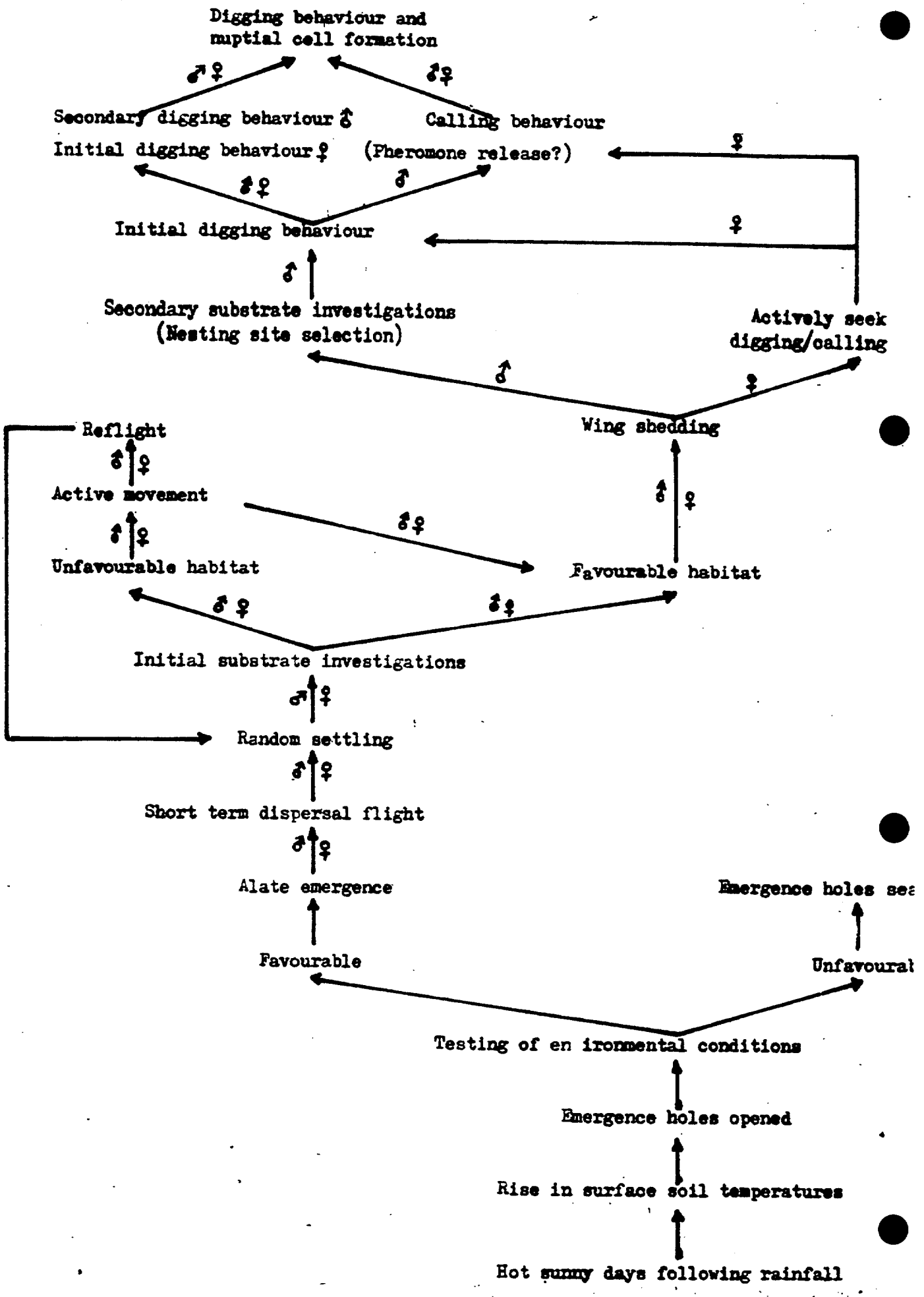
Table 11. Comparison of the proportions of male and female alates and de-alates collected pre- and post-emergence and caught in water and pitfall traps.

Collection method	Males	Females	Total	Proportion Males
Emergence	1 950	3 067	5 017	0,389
Water trap	1 411	1 218	2 629	0,537
Pitfall trap	705	238	943	0,748
Total	4 066	4 523	8 589	0,473

Random settling

The mean number of alates trapped in water traps over all trapping dates on each veld habitat are shown in Table 12. No valid comparison can be made between the sound habitat catches and those on the mown and degraded habitats as it was clear that an appreciable degree of shielding of the water traps by standing grass in the sound habitats occurred. The height of the standing grass in the sound habitat plots was very variable both within and between plots. No measurements of grass height were made but it has been judged to be about 50 cm. This estimation was used to correct the catches on the sound habitats. The alates are weak flyers with limited ability to change direction rapidly and although further data is required, it seems unlikely that the alates show any preference for habitat type during flight but rely

Figure 1 - Behavioural sequence of events of H. mossambicus alates and dealates resulting in the establishment of incipient colonies



on post flight behavioural mechanisms to get them into a favourable habitat.

Table 12. Mean number H. mossambicus alates caught in water traps on the three veld habitats. Numbers caught in sound veld have been corrected for shielding of the traps by standing grass.

Veld habitat	Degraded	Mown	Sound	
			Uncorrected	Corrected
Number of alates	327,6	340,0	208,6	331,0

Initial substrate investigations and wing-shedding behaviour

Field observations have shown that both male and female alates exhibit different behaviour patterns when settling in favourable and unfavourable habitats. Behavioural differences also exist between the sexes within the same habitat type. The alates carry out initial substrate investigations as soon as they have settled. Alates settling in unfavourable habitats (well-grassed veld) do not shed the wings but move actively over the surface and attempt to refly. This behavioural mechanism enables the alates to either locate favourable sites, e.g. bare areas within the unfavourable habitat or to move away completely by reflying. In contrast, alates settling in favourable habitats shed the wings after a brief investigation of the substrate. Pitfall traps provide quantitative data on these behavioural differences. The number of alates retaining or shedding the wings in the three habitats are shown in Table 13. The proportions in the sound habitat were significantly different from the proportions in the degraded and mown habitats (X^2 $P < 0,001$). Proportions in degraded and mown habitats did not differ significantly.

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More females (42%) than males (32%) retained the wings in the sound habitat but the difference was not significant. The factors initiating wing-shedding behaviour after initial substrate investigations have not as yet been determined, but the differences in the quantity of herbage on the contrasting habitats and its effect on surface soil temperatures indicate that either a tactile or thermal response is involved.

Table 13: Wing-shedding behaviour of H. mossambicus alates. Numbers of alates and dealates caught in pitfall traps on each veld habitat.

Veld habitat	Wings	No wings	Total	Proportion with wings
Degraded	7	197	204	0,034
Mown	7	368	375	0,019
Sound	127	237	364	0,349
Total	141	802	943	0,149

The numbers of alates and dealates trapped in pitfall traps in three veld habitats on each of the three experimental sites are shown in Table 14. Due to low replication and high variability, many of the differences between the numbers trapped on each veld habitat were not significant. The numbers of alates trapped on the degraded habitat can be regarded as the normal situation on a very favourable habitat. Alates settling in this habitat, after brief initial substrate investigations, shed the wings and males selected excavation (digging-in) sites in a relatively short period of time, with consequent less movement over the substrate than on partially favourable or unfavourable habitats. The increased numbers trapped in the sound habitat was due to two factors.

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Pitfalls on this habitat were surrounded by a bare patch of soil c . 30 cm in diameter (created during insertion of the traps). Observations showed that these small favourable patches in an expanse of unfavourable habitat were very attractive to randomly moving alates. In the case of males a chance encounter, during active movement over the substrate, with one of these patches immediately initiated wing-shedding behaviour site selection, digging and then calling behaviour. Randomly wandering females were attracted to the digging-in/calling males on these small patches of bare soil surrounding the pitfalls. Thus the increased catches in the sound habitat were due to the small favourable patch surrounding the pitfall traps and also reflect the greater random movement of the alates in this habitat relative to the degraded habitat. The presence of these patches also resulted in the relatively low observed proportions of alates retaining the wings in this habitat (see Table 13), because many of the alates on encountering the bare soil patch shed the wings before falling into the traps. The increased catches in the partially favourable mown habitat relative to favourable degraded habitat reflects not only greater movement over the substrate but also a limited amount of attraction to bare patches surrounding the traps. In the partially favourable habitat the male dealates had greater difficulty in locating and selecting diggin-in sites relative to completely bare areas, and consequently nesting site selection involved more movement than in degraded habitats.

Table 14. Mean number of H. mossambicus alates and dealates caught in pitfall traps in the three veld habitats on each of the three sites

Veld habitat	Site 1	Site 2	Site 3
Degraded	31,0	22,0	15,0
Mown	46,0	32,6	46,6
Sound	48,6	47,0	26,3
LSD 5%	NS	11,5	10,2

Reflight

Field observations have shown that alates settling in an unfavourable habitat, such as sound veld, move actively over the substrate and refly if no favourable habitat is located. Water traps are thus measuring two components of flight; a constant inflight component (which should reflect emergence proportions) and a variable reflight component. The experimental site was set in a well-grassed paddock with virtually no bare areas other than the experimental degraded habitats. Consequently, the water traps on all three veld habitats were measuring a reflight component from the surrounding well-grassed veld. The increased proportion of males caught in water traps relative to emergence collections suggest that males refly more readily than females. This could be expected in view of males being responsible for nesting site selection and the females merely seeking digging or calling males. The water traps on the sound habitats would not only be measuring reflights from the surrounding well-grassed veld but also from the sound plots themselves. If the hypothesis that males refly more readily than females from unfavourable habitats is correct then the water traps on the sound habitat would be expected to catch a higher propor-

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tion of males than the traps in the other two veld habitats. The numbers of male and female alates caught in water traps on each veld habitat are shown in Table 15. Although the differences in proportions are small and non-significant (X^2, $P > 0,05$) (which is to be expected since the sound habitat traps were only measuring reflights from an additional 300 m^2 of unfavourable habitat) the results do support the hypothesis that males refly more readily than females. The evidence is rather weak and this aspect of the behaviour requires further investigation.

Table 15. Numbers of male and female *H. mossambicus* alates caught in water traps in each veld habitat

Veld habitat	♂ ♂	♀ ♀	Total	Proportion ♂ ♂
Degraded	519	464	983	0,528
Mown	539	481	1 020	0,528
Sound	353	273	626	0,564
Total	1 411	1 218	2 629	0,537

Secondary substrate investigations

wing-shedding initiates secondary substrate investigations or nesting site selection in male dealates and "searching" behaviour in female dealates The numbers of male and female alates and dealates caught in pitfall traps on each veld habitat and overall dates are shown in Table 16. The larger number of males trapped in all habitats reflects their nesting-site selection role; the males move actively over the substrate investigating potential excavation sites while the females seek or are attracted to digging/calling males

and frequently dig in at sites occupied by one or more other females (see Table 10). Differences in the proportions on degraded and mown habitats and degraded and sound habitats were not significant (X^2, $P > 0,05$), but the difference between mown and sound was significant (X^2, $P < 0,01$). The slight non-significant increase on mown veld relative to degraded veld reflects the greater movement of male dealates on the partially favourable mown habitat where they have greater difficulty in locating nesting sites than they do on the very favourable degraded veld. The decrease in the proportion of males caught in the unfavourable sound veld reflects the attraction of the females to the males digging/calling on the small bare patches surrounding the pitfall traps on this habitat.

Thigmotactic behaviour appears to be important in nesting-site selection by H. mossambicus male dealates Small holes and cracks in the soil surface and areas adjacent to prone objects, such as stones and twigs, are favoured sites for excavations.

Table 16. Numbers of male and female H. mossambicus alates and dealates caught in pitfall traps on each veld habitat

Veld habitat	♂ ♂	♀ ♀	Total	Proportion
Degraded	155	49	204	0,760
Mown	299	76	375	0,797
Sound	251	113	364	0,689
Total	705	238	943	0,748

Digging/calling behaviour and nuptial cell formation

After selecting a site, digging behaviour is initiated in the male. The males dig down a few centimetres and then adopt the calling position at the entrance to the excavation by holding the abdomen erect in the air and exposing the sternal gland. Leuthold and Bruinsma (1977) have presented evidence to show that a female is attracted to calling male by a volatile chemical stimulus from the male. The origin of the pheromone must be the sternal gland since sex attraction response is strongly correlated with the exposure of the male sternal gland. Once joined by a female the male may or may not lower the abdomen and retract the sternal gland. Males are frequently joined by females prior to completion of initial digging behaviour and adoption of the calling attitude. Both male(s) and female(s) then participate in excavation behaviour. Under conditions of adequate soil moisture, penetration of the substrate is rapid and, shortly after flight, numerous small piles of loose soil mark the sites of excavation. The dealates do not burrow very deep before formation of the nuptial cell and these are commonly situated 10-20 cm below the soil surface.

The frequent formation of nuptial cells by more than one heterosexual pair of dealates is interesting and has been reported in a number of other genera. The sequel to this behaviour in *H. mossambicus* has not, as yet, been investigated.

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* Leuthold, R.H., and Bruinsma, O. 1977. Pairing behaviour in *Hodotermes mossambicus* (Isoptera). Psyche 84: 109-119.

Summary

The following points arise from these data. H. mossambicus alates possess efficient flight and post-flight behavioural mechanisms which enable them to locate favourable nesting sites (bare ground) for new colony establishment within a relatively short period of time. The efficiency of the mechanism is demonstrated by the ability of the alates to locate small bare areas (c .30 cm in diameter) within an expanse of very unfavourable sound veld. It is now apparent that any treatment which causes severe veld deterioration (an increase in the degraded component of the red soil mosaic) will result in an increase in the number of colonies per unit area. Veld degradation also results in increased surface run-off, thus favouring existing harvester termite colonies which become more virile which increase their foraging areas.

STALK BORER RESEARCH

MAIZE STOVER TRIAL - FIRST GENERATION

Stalk borer Assessment

Experimental details are outlined in the 1978/79 report. Treatment dates were however earlier for the 79/80 season i.e. ploughing - 10/8/79, rip/disc - 22/8/79, grazing - 26/7/79, 10/8/79.

A between seasons analysis was undertaken by employing a "split-plot" method of separating between season variation.

A similar pattern of early germination on the zero tillage plots was noted for both seasons.

Results of borer counts are recorded in Table 17 with records of yield tabulated in Table 18, Figs.2a, 2b. Details of the between season analysis is recorded in Table 19a, 19b.

Fig. 2a THE RELATIONSHIP BETWEEN PERCENTAGE BORER ATTACK AND FINAL YIELD OF MAIZE (kg/ha)

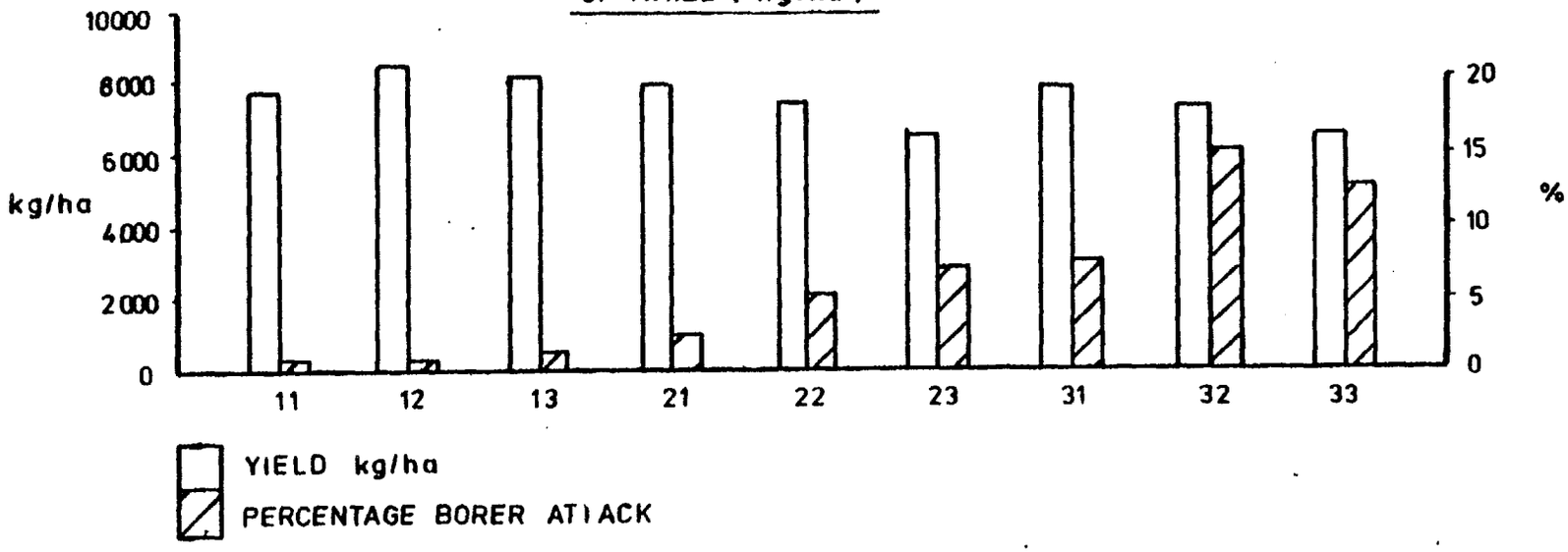
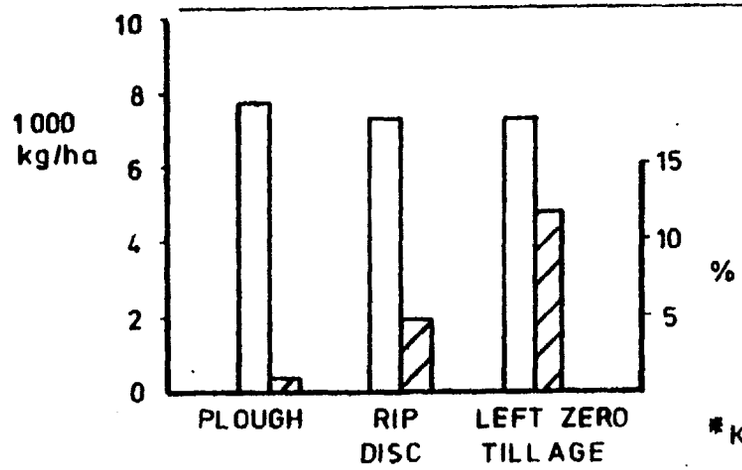


Fig. 2b A COMPARISON BETWEEN TILLAGE MEAN YIELDS AND MEAN BORER INFESTATION (N = 15)



*KEY AS ABOVE

- Considering the trial area as a whole, the degree of maize stalk borer attack was less in the 1979/80 season compared with 1978/79. This may well have been accounted for by the early implementation of various plot treatments, these being undertaken some two months earlier. (see above.)

1979/80 Season Stalkborer Attack

The ploughing treatment was most effective in controlling the population of over wintering borer larvae. Infestation was very light on treatments 11, 12, 13 with the combination of plough/burn being the most effective cultural control.

Borer infestations on the rip/disc treated plots were also relatively small although grazed plots and plots with stover left standing, up until treatment, showed significantly greater infestation of borer highlighting the effectiveness of burning. Highest infestation levels were detected on the zero tillage treated plots. It would appear that there are two important factors which contribute to this :-

1. Early germination of plants may provide first brood moths early hosts on which to lay their eggs.
2. Increased numbers of diapausing larvae survive on these plots from one season to the next, to contribute to the summer population of first brood moths.

The largest infestation was recorded from treatment 32 where grazing does not appear to be as an effective control measure as burning, as indicated by 31 showing lowest level of infestation amongst the zero tillage treatments.

Conclusions

1. Early implementation of burning and ploughing is a highly successful cultural control measure for supressing population build up of Busseola fusca.
2. Early rip/disc is effective, but to a lesser degree than ploughing.

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Table 17 First generation per plot stalk borer infestation

Treatment	Plot No.	Yield
11	5	1,11
	16	1,63
	25	1,38
	30	0,46
	43	0,24
12	7	1,17
	12	1,60
	27	1,15
	32	0,23
	41	0,22
13	4	3,50
	10	0,24
	23	1,54
	35	0,23
	45	0,23
21	1	1,65
	18	0,71
	21	6,18
	28	2,51
	38	1,19
22	9	4,69
	15	10,79
	22	3,56
	34	3,24
	44	4,04
23	8	13,86
	13	4,32
	20	10,61
	31	2,78
	42	3,62
31	2	8,73
	11	9,45
	24	6,66
	33	8,99
	39	4,62

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Table 17 (contd.)

Treatment	Plot No.	Yield
32	6 17 26 29 40	15,21 17,78 20,09 13,92 9,18
33	3 14 19 36 37	12,30 16,18 15,06 6,62 14,78

Total number of plants inspected = 19314

Total number of plants attacked = 1101

Percentage infestation = 5,70

Table 18 : Yield results - kg/ha (means for 9 treatments)

Treatment	11	12	13	21	22	23	31	32	33
Yield	7746	8445	8063	7872	7429	6578	7891	7223	6529
Tillage means	8085			7278			7214		

3. Minimum tillage with the associated lack of stover disposal would appear to favour the survival of overwintering borer larvae.

1979/80 Season - Relationship between Infestation levels and Yield

It is difficult to correlate degree of larval infestation with yield as there are undoubtedly a number of other factors affecting yield e.g. disease, weather, management.

There do however appear to be some trends of interest. Highest yields were obtained from the ploughed treatments with lowest yields on the zero - tillage plots i.e. treatments 11, 12, and 13 showed a mean yield of 8085 kg/ha in comparison with 7215 kg/ha for treatments 31, 32 and 33. It might be assumed therefore that a difference of some 11% in the number of plants attacked between these two tillage methods may have accounted for a loss of some 871 kg/ha of maize grain.

The assessment indicates clearly that stalk borer left unchecked will contribute significantly to yield depression. The real losses caused by the pest cannot be quantified in this assessment hence the study carried out on the adjacent land ("Trial C".)

1978/79 - 1979/80 Comparison

There were highly significant between - season differences in stalk borer infestation. This large difference would appear to be related to the tillage treatments. From Table 19B it is shown clearly that the rip/disc treatment has been most effective in reducing overwintering larvae. Early implementation of this treatment may have been an important factor in the improved efficacy of the treatment.

Notable reductions were detected on the ploughed plots and this is most likely due to excellent destruction and burial of the stover. Levels of infestation on the zero tillage treatments were relatively high in the 1979/80 season

although burning and/or grazing of stover on these minimum tillage plots appears to have had a small effect in reducing the population of overwintering larvae.

Conclusions

1. Deep ploughing and riping and discing are good tillage treatments for disposal of maize stover and go a long way to aid in the destruction of overwintering diapause larvae which might otherwise survive and contribute to the first brood attack on the young maize stand.

2. The above tillage methods combined with burning give excellent control of larvae.

3. Grazing does not appear to provide sufficient control of overwintering larvae to warrant its inclusion as a stover management practise for the control of *Busseola fusca*.

4. Zero - tillage and maize residues left lying on the land favour the survival of overwintering larvae and helps to maintain a viable population of stalk borer which may attack the following summer maize crop.

Table 19a. MAIZE STOVER TRIAL 78/79 COMPARISONS

ANALYSIS OF VARIANCE

SOURCE OF VARIATION	DF	SUMS OF SQUARES	MEAN SQUARE	RATIO
Replicates	4	124.289073	31.0722682	2.08
Tillage	2	1941.32799	970.663996	64.95
Stover	2	517.473301	258.736650	17.31
Tillage+Stover	4	299.300987	74.8352468	5.01
Error A	32	478.225530	14.9445478	1.14
Times	1	633.402508	633.402508	48.13
Times+Tillage	2	336.178573	168.089286	12.77
Times+Stover	2	57.0914633	28.5457316	2.17
Times+Stover+Tillage	4	82.1299515	20.5324879	1.56
Times+Reps	4	76.2745764	19.0686441	1.45
Residual	32	421.134390	13.1604497	
TOTAL CORRECTED	89	4966.82835		
CORRECTION FACTOR	1	6668.10123		

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Table 19b. MAIZE STOVER TRIAL- 78/79 COMPARISONS

TREATMENT MEANS COMPARISONS

TILL	STOV	YEAR	SBIL
1	1	78	2.216
1	1	79	1.008
1	2	78	4.012
1	2	79	0.874
1	3	78	4.380
1	3	79	1.148
2	1	78	7.754
2	1	79	2.356
2	2	78	1.722
2	2	79	5.262
2	3	78	21.496
2	3	79	7.038
3	1	78	10.322
3	1	79	7.684
3	2	78	19.814
3	2	79	15.234
3	3	78	13.628
3	3	79	12.988
SE (N=5)			1.62237

First column = Tillage
1 = Plough
2 = Rip and Disc
3 = Zero Tillage

Second column = Stover
1 = Burn
2 = Graze
3 = Leave

MIGRATION, NATURAL ENEMIES AND FIRST BROOD MAIZE STALK BORER (*Busseola fusca*) POPULATION REGULATION

Introduction

The migratory behaviour of the maize stalk borer *Busseola fusca* (Fuller) has been studied by Mally (1920) and Jack (1917). Overcrowding within a stalk and associated depletion of available food supply is an important factor in the "enforced migration" of first brood larvae.

It is assumed that on exit from maize stalks and with the intra- and inter-plant movement many larvae are destroyed by

natural enemies and unfavourable weather conditions.

A limited field study was carried out to show that migration and parasitism may be density-dependent processes contributing to overall regulation of the first brood larval population.

Materials and Methods

One hundred and twenty field maize plants (Variety SR52) showing signs of early larval attack (Shotgun effect) were marked on the 24/12/79. A sample of ten plants were removed each week for seven weeks. All larvae and pupae recovered from these plants were reared in the laboratory under controlled conditions (23°C and 80% r. h.). Numbers of moths and/or parasites emerging were counted and identified.

Larval and pupal mortality in the laboratory due to causes other than parasitism was recorded. Plant height and time of occurence of migration and emergence holes was monitored and recorded.

Results

A complete record of data collected is shown in Table 20. This data is illustrated in Fig. 3. The relationship between plant height and numbers of larvae plus pupae field collected is shown in Fig. 4.

Two Dipteran parasites (Family Tachinidae) were reared from laboratory cultures. Sturmia parasitica (Curran) has been recorded as a parasite on B. fusca, Smithers (1959). Sturmia instabilis (Curran), Accession No. 15429 would appear to be a new parasite record.

One parasitic nematode, Gordius spp. was recorded from sample four.

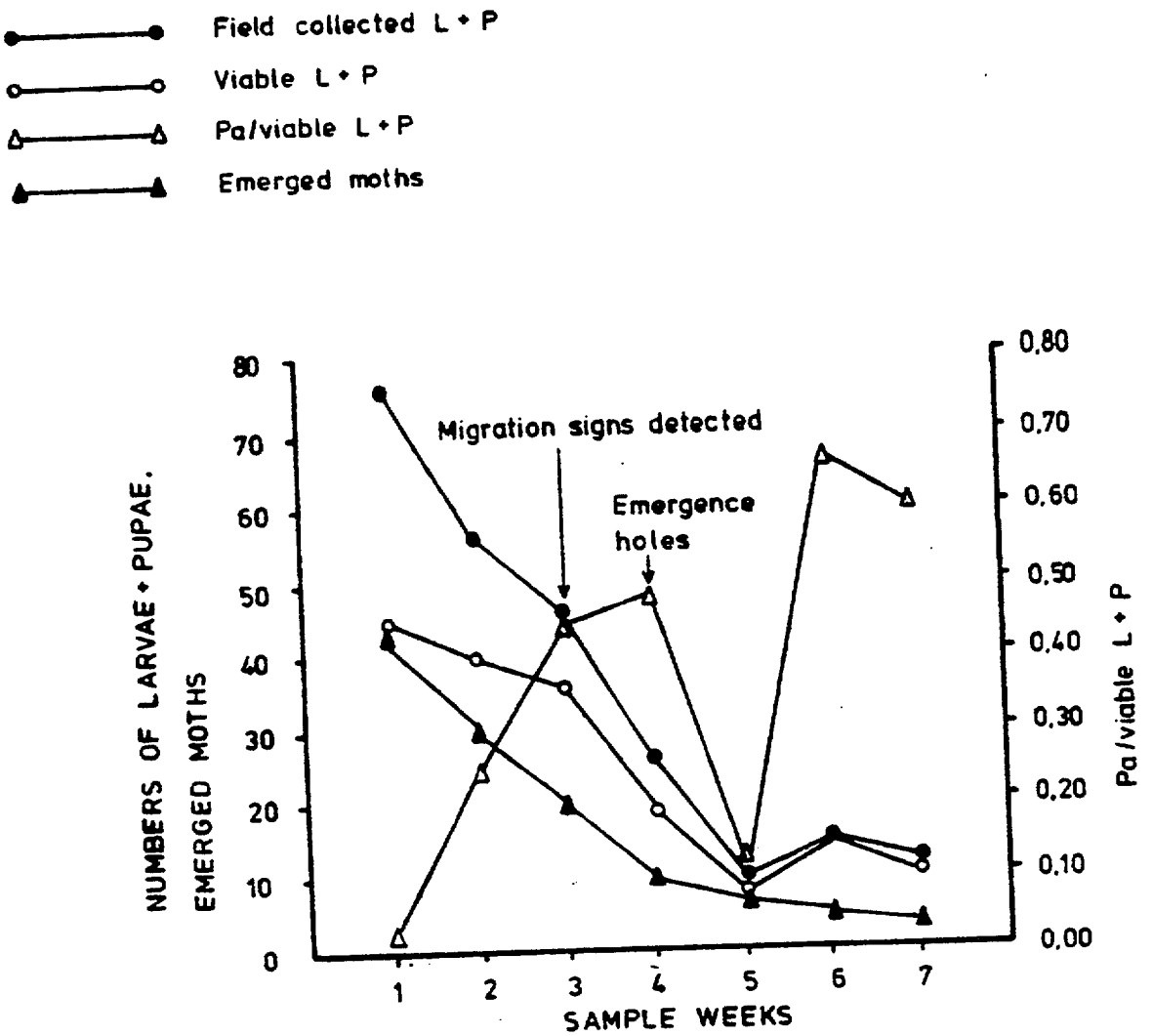

Fig 3. Relationship between numbers of field collected larvae, pupae, parasites/ moth emergence.

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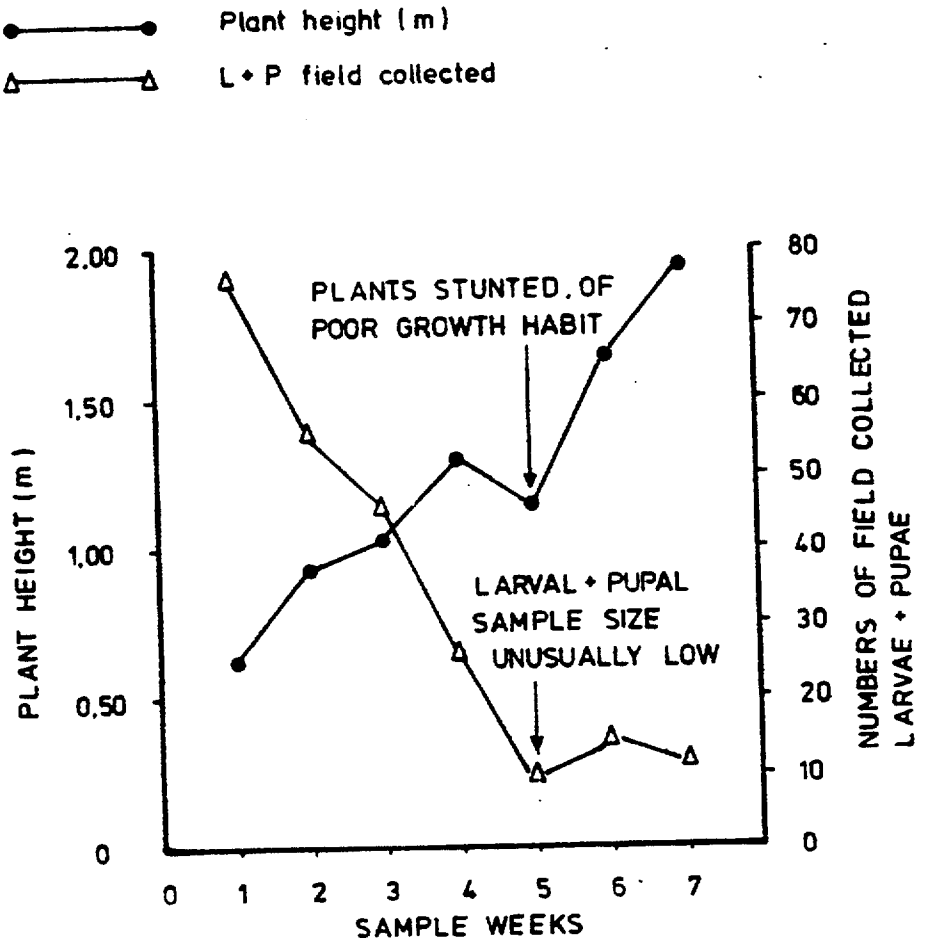


Fig 4. Plant height and numbers of Stalk borer larvae and pupae collected from maize stalks.

Discussion

Results indicate few larvae are attacked and parasitised early in the brood. Although the level of larval infestation per plant is high at this stage, larval size and their enclosed situation within the stalks would appear to provide them with protection from natural enemies, including adult fly parasites.

As the brood matures fewer larvae and pupae are recorded from the stalks, but there is an associated increase in the degree of parasitism. Parasite attack appears to coincide closely with larval movement within and between plants. Migrating larvae at this stage of the brood, because of their increased size and exposed situation, show increased vulnerability to parasite attack. In addition, it might be postulated that exit holes and "re-entry" holes made by migrating larvae provide passages of entry for parasites and predators thus compounding the effect the natural enemies have on the larval population. Plants from sample five were on average of poor quality and records from this sample were excluded.

Identification of the fly Sturmia instabilis (Curran) is of interest as it has not previously been recorded as a parasite on B. fusca.

Conclusions

1. Behaviour changes as the larvae mature lead to much inter and intra plant movement. During this "migratory phase" fly parasites increase their regulatory effect on the larval population.

2. Concealment within stalks favour the survival of larvae, migration and exposure tends to favour the parasite population.

3. It would appear the fly parasites in this field maize are an important biologic factor in the control of B. fusca.

4. S. instabilis is a new parasite record on B. fusca.

Table 20. Numbers of larvae, pupae, moths, parasites and plant height

Sample	Field collected L+P	Mortality during L+P	Viable L+P	M	Pa	Pa viable L+P	Plant ht. (m)
1	76	31	45	44	1	0,02	0,63
2	56	16	40	30	10	0,25	0,94
3*	46	10	36	20	16	0,44	1,06
4+	26	7	19	10	9	0,48	1,30
5	10	2	8	7	1	0,13	1,15
6	15	0	15	5	10	0,66	1,64
7	12	2	10	4	6	0,60	1,94

L=Larvae, P= Pupae, M= Emerged moths, Pa= Parasites

*= Migration symptoms, + = Emergence holes.

Annex 2: Overheads

Scientific Writing and Presentation

Workshop Goal

To equip NARS program leaders and senior scientists with tools to carry out scientific writing and presentation to ensure better results of agricultural research institutes

Major Objectives

1. Discuss scientists' responsibilities in reporting research.
2. Discuss some principles of planning and writing a reader- friendly report.
3. Identify and list the components of a scientific report.
4. Define and edit abstracts.
5. Write acknowledgements and references.
6. Measure readability (using FLESCH formula).
7. Identify and discuss several ways in which the use of the computer eases editing.
8. Apply knowledge and skills to appropriately edit scientific papers.
9. Plan and prepare an oral presentation using visual aids.
10. Plan future activities in scientific writing and presentation.

Expected Outputs

1. Improve scientific writing skills.

2. Action plans to improve skills in scientific writing and presentation.

3. Action plans which include written proposals to set up editorial/writing committees in a research center.

4. Improved commitment from agricultural researchers to work as a team towards establishing, within the institute, a critical level of expertise in scientific writing and presentation.

5. Increased interest by scientists to serve the SADC-NARS in areas related to scientific writing and presentation.

Workshop Duration — Five Days

Objectives of Day One

1. Discuss background, rationale, objectives, and schedule
2. Explain the use of the participant action plan approach (PAPA)
3. Identify trainers and trainees
4. Discuss scientists' responsibilities in reporting on research
5. Identify key factors in choosing an audience
6. Discuss some principles of planning and writing a reader-friendly report
7. Identify and list the components of a scientific paper
8. Identify and correct errors in titles
9. Define and edit abstracts

Schedule of Day One

08:30 – 09:00	Welcome
09:00 – 10:30	Session 1. Introduction to the Workshop
	Tea/Coffee Break
10:45 – 13.00	Session 2. When a Scientist Reports Research
	Lunch
14:00 – 14:30	Session 3. The Layout of a Scientific Paper
14:30 – 15:30	Session 4. Titles
	Tea/Coffee Break
15:45 – 17:00	Session 5. Abstracts
17:00 – 17:30	Feedback on the Day's Activities and PAPA

Participant Action Plan Approach

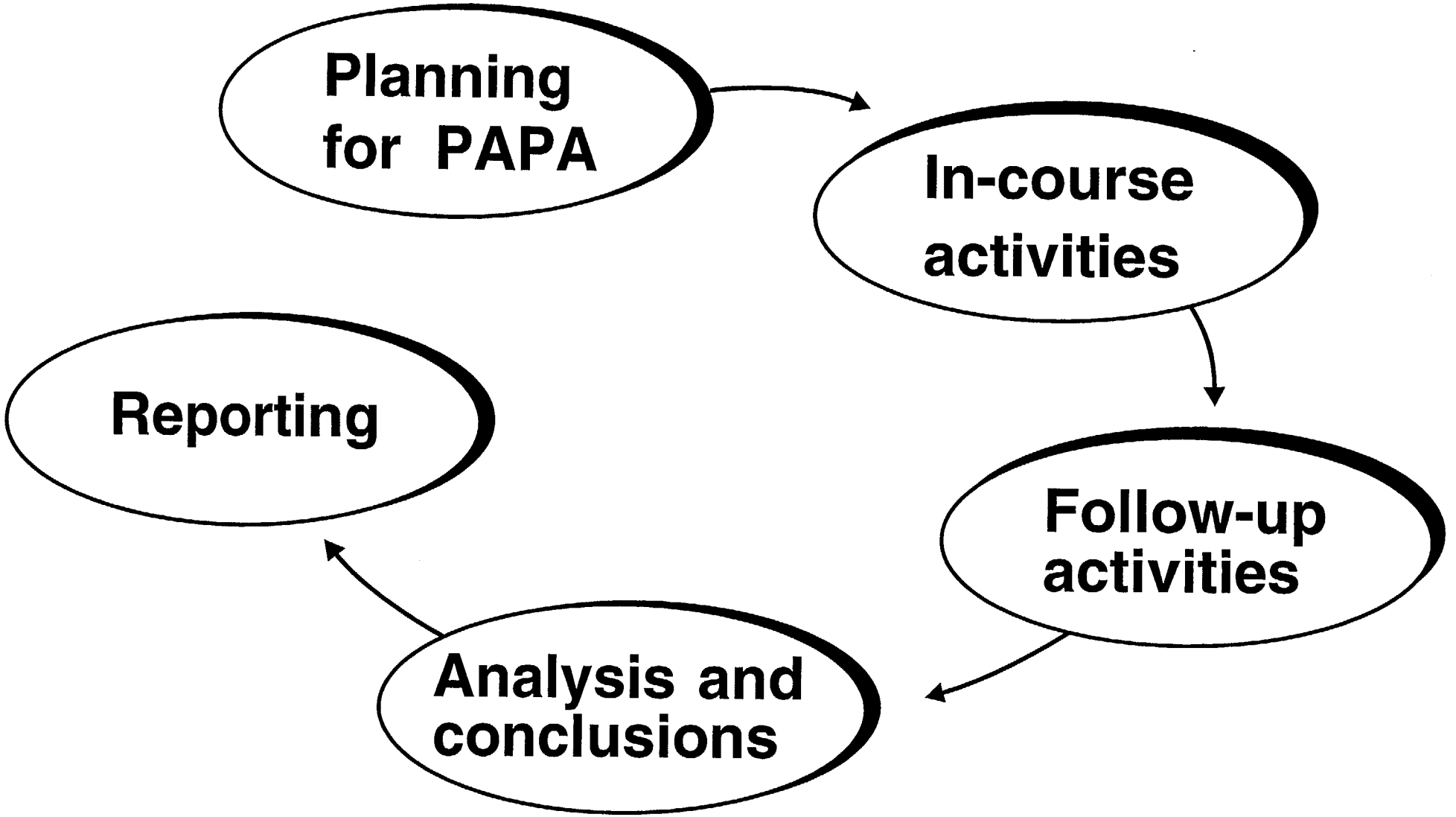
Why PAPA?

- Systematic and continuous planning of future activities by trainees as training evolves
- Formal link between trainees and trainers for follow-up activities: which skills have been used in the job?
- Further involvement of trainee in improving the training material after training event

Uses of PAPA

- Assess the transfer of skill to work place
- Determine the impact of change introduced
- Identify problems of implementation
- Decide how to modify the course
- Evaluate the most useful parts/quality of training

Steps in PAPA



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Step 2: In-course Activities

Stage 1

Objectives:

- introduce PAPA to participants
- identify possible action ideas to be tried on the job

Procedure:

Jot down action ideas during the training

- use format provided (annex 1)
- do it at end of last session each day
- confer with other participants/trainers periodically

Step 2: In-course Activities

Stage 2

Objectives:

- develop action plan

Procedure:

- prepare preliminary list of action items
- confer with partner
- finalize and prioritize list of action items
- report individual action plans
- make copy and submit to trainer

Step 3: Follow-up Activities

Trainers	Participants
• Formulate and send questionnaire →	• Fill out and return questionnaire
• Analyze and interpret data	
• Prepare report →	• Receive report and send feedback
• Modify course content	

PAPA Questionnaire, First Stage
Ideas for action items

Date : _____

Workshop title : _____

Date/Venue : _____

Name : _____

Organization : _____

Ideas I would like to try when I return to work at my research institute, based on what I have learned in this training workshop

_____

_____

_____

_____

_____

Note: **You can use the workshop objectives, what you learn during the workshop, handouts, conversations with participants and trainers, etc, to come up with ideas.**

Objectives of Session 2.
When a Scientists Reports Research

4. Discuss scientists' responsibilities in reporting on research

5. Identify key factors in choosing an audience

6. Discuss some principles of planning and writing a reader-friendly report

When a scientist reports research

by Robert Kern

Kern's article presents:

- Elements in human communication
- Action model of communication
- How readers of science behave
- Importance of readability
- Measuring reading ease
- Analyzing your audience
- Starting to put words on paper
- Some parting thoughts

Objective of Session 3.
The Layout of a Scientific Paper

7. Identify and list the components of a scientific paper

The layout of a scientific paper

A Good Introduction

- Presents clearly the background and scope of a problem
- Reviews pertinent literature
- Presents the investigation method
- Lists principal findings
- Summarizes main conclusions

Materials and Method Section

Materials

- describes exactly materials, quantity, and sources
- makes possible repetition of experiment

Method

- describes clearly the experimental design
- uses past tense
- gives references for unknown methods used, if any

Results Section

- Big picture on *results*
- Impartial presentation
- Representative data
- Uses tables and figures

Discussion Section

- Principles, relationships, generalizations
- Exceptions and unsettled points
- Results compared with previous work
- Implications, applications, beneficiaries
- Clear conclusions
- Evidence summarized for each conclusion
- Possible future research arising, if any

Objectives of Session 4. Titles

8. Categorise titles

9. Identify mistakes in titles

Types of Titles

- Indicative
- Informative
- Question type
- Main subtitle type

Indicative

Effects of differential irrigation on maize growth and yield on a clay soil

Informative

Differential irrigation decreases maize growth and yield on a clay soil

Question Type

Does differential irrigation affect maize growth and yield on a clay soil?

Main/Subtitle Type

Differential irrigation:

effects on maize growth and

yield on a clay soil

DOs

1. Use high impact words early in the title
2. Use short titles ($\leq$ 15 words)
3. Reflect content

DON'Ts

Do not:

1. Use common names and scientific names of the species
2. Use abbreviations
3. Use symbols and jargon
4. Include material that should come under Introduction
5. Be verbose
6. Be so general as to be vague
7. Use dates
8. Use fullstops at the end of titles

Objective of Session 5. Abstracts

10. Categorise and edit abstracts

Kinds of Abstracts

- Indicative
- Informative

Elements of an Informative

- Objectives
- Highlights of materials and methods
- Highlights of results
- (conclusion(s))
- (recommendations)

Objectives of Day Two

1. Write acknowledgements and references
2. List and discuss major elements of a prose style for scientific writing
3. Paragraph text so that it is easy to follow and understand
4. Eliminate or replace unnecessary phrases and words
5. Define sentences and classify them as simple, compound, or complex

Schedule of Day Two

08:30 – 09:00	Opening of the Day's Activities
09:00 – 09:30	Session 6. Acknowledgements and References
09:30 – 10:00	Session 7. Writing and Rewriting
10:00 – 10.30	Session 8. Paragraphing

Tea/Coffee Break

10:45 – 12:05	Session 9. Logical Arrangement of Paragraphs
12:05 – 13:00	Session 10. Use of Definite, Concrete Words

Lunch

14:00 – 14:45	Session 11. Work with Words
14:45 – 15:30	Session 12. Phrases that Say Little

Tea/Coffee Break

15:45 – 16:15	Session 13. Raw Material: Types of English Sentences
16:15 – 17:00	Session 14. Simple, Compound, and Complex Sentences
17:00 – 17:30	Feedback on the Day's Activities and PAPA

Objective of Session 6.
Acknowledgements and References

1. Write acknowledgements and references

Acknowledgements and References

Acknowledgements

Possible ingredients:

- any significant technical help, sources of special equipment, cultures, or other materials

- outside financial assistance, such as grants, contracts, or fellowships

Example:

The author thanks the International Business Machines Corporation for ...

Ways of Citing and Listing References

- Sequential numbering (Vancouver)
- Numbering system
- Harvard (author–year) system

Sequential Numbering

Sequential numbering (Vancouver) system Zachary[1] obtained ...

1. Zachary, N.M. (1990). Nitrogen-water interaction on a Nitisol. *Agron. J. 30(2)*, 41-29.

2. Alfred, O.J. 1974. Wind erosion and bean yields in a semi-arid environment. *Kenya, J. Sc. 4(1)*, 9-14.

Numbering System

Numbering System

– Zachary (2)

– Zachary et al. (2)

– Alfred (1)

(Alphabetical)

Alfred, O.J. 1994. Phenological changes in sorghum. Proceedings of the 4th soil science society in Eat Africa, Kampala, Uganda. pp. 21-27.

Zachary, N.M. 1995. Effect of wind crosion on maize growth in a semi-arid area. In: *Dryland Agriculture* Eds: J.J. Stewart and J.N. Nadar, Oxford Publishers, Nairobi, Kenya. pp. 43-65.

Harvard (author - year) system

Citation

Harvard (author - year) system

- **Zachary (1993); (Zachary, 1993)**
- **Zachary et al. (1990)**
- **Alfred (1995)**

Listing

(Alphabetical)

Alfred, O.J. 1995. Effects of nitrogen on maize growth and field. *E. Afr. Agric. for J. 59(1)*, 24-27.

Zachary, N.M. 1993. *Managing Salin Soils*. Jomo Kenyatta Foundation, Nairobi, Kenya.

Writing and Rewriting

Objective of
Session 7. Writing and Rewriting

2. List and discuss major elements of a prose style for scientific writing

Writing and Rewriting

- Choose a form and stay with it
- Make the paragraph the unit of composition
- Use the active voice
- Put statements in positive form
- Use definite, specific, concrete language
- Omit needless words
- Avoid a succession of loose sentences
- Keep related words together
- In summaries keep to one tense

Objective of Session 8. Paragraphing

3. Paragraph the text so that it is easy to follow and understand

Paragraphing

Results of Exercise 8. Paragraphing

Information management is one of the critical needs of the healthy organization, yet few managers think of information handling as a basic subject of agricultural research management. Not many give it a high priority for their attention as managers. Some people refer to information as the blood of an organization. They say that an organization cannot function without a vigorous flow of information. The organization needs two main types of information flow: inside and outside.

The inside flow carries information throughout the organization, making it possible for managers to disperse resources, monitor use of resources, and evaluate the results of their use. It provides managers with information they need to justify the organization's use of resources and to furnish a base for attempts to get more resources. Also, members of the organization need the flow of information to fit their own activities with those of others.

Results of Exercise 8. Paragraphing

The outside information gives the organization a way to be in touch with its own environment. Outside information can be broken down into two kinds. One is information brought into the organization from the environment, such as literature and ideas that suggest subjects and methods for research. The second is information provided from the organization to others who want and need to know its results. These others include scientists, policymakers, resource providers, users of research results, and others.

Some observers use the terms input, throughput, and output to differentiate the kinds of information significant to an organization. They use throughput to define the flow of information inside. Input refers to information brought into the organization, and output refers to information the organization brings out.

Objective of
Session 9. Logical Arrangement of Paragraphs

3. Paragraph the text so that it is easy to follow and understand

Results of Exercise 9 (possible alternative)

a) Order: 1, 4, 3, 6, 5, 2

b) Headings:
1 – Pigskin as a commercial product
4 – Consumer considerations or stimulation of consumer market
3 – Marketing approach
6 – Costs and profitability
5 – Raw material resources
2 – Processing of skins or processing of raw material

c) Link words: 1-4 Nevertheless; 4-3 none, none needed; 3-6 none, none needed; 6-5 With regard to; 5-2 Usually

d) Topic sentences:
1 – Pigskin is potentially ... a product
4 – Nevertheless, little use ... today
3 – It is suggested that ... campaign be initiated
6 – Costs of ... distribution
5 – This paragraph lacks a topic sentence, it is about conditions for raising pigs. Give it one!
2 – No topic sentence here, either. How about, "Skins intended for eventual sale as leather goods require a number of treatments before they can actually be used in the manufacturing process." Put this as a first sentence. The paragraph then tells you about these procedures.

c) Key words: pigskin/leather/curing/dipping/finishing/commercial product/markets/advertising/custom trade/leather goods/pig-raising/production costs.

Objectives of Day Three

1. Identify complete, incomplete, and run-on sentences
2. Identify active and passive sentences.
3. Measure readability using the FLESCH formula
4. Identify and discuss several ways in which the use of the computer eases editing
5. Apply knowledge and skills to appropriately edit scientific papers

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Schedule of Day Three

08:30 – 09:00	Opening of the Day's Activities
09:00 – 10:00	Session 15. Complete, Incomplete, and Run-on Sentences
10:00 – 10:30	Session 16. Active and Passive Sentences
	Tea/Coffee Break
10:45 – 11:15	Session 16. (Continued)
11:15 – 13:00	Session 17. Measure Readability
	Lunch
14:00 – 15:30	Session 18. Strengths and Weaknesses of Using the Computer
	Tea/Coffee Break
15:45 – 17:00	Session 19. Editing
17:00 – 17:30	Feedback on the Day's Activities and PAPA

Objective of Session 15. Complete, Incomplete, and Run-on Sentences

1. Identify complete, incomplete, and run-on sentences

Complete, Incomplete, and Run-on Sentences

A Complete Sentence

A *sentence* is a series of words that convey meaning

A *complete sentence* has a subject and verb and perhaps and object

Examples:

- *The dog walked along the road.*
- *The technician planted the experimental plots.*

An Incomplete Sentence

An *incomplete sentence* is one that lacks a subject, verb, or often, an object

Examples:

- *Walked along the road.*
- *The dog along the road.*
- *Dog walked.*
- *Planted the experimental plots.*
- *The technician planted.*

A Run-on Sentence

A *run-on sentence* includes two or more thoughts connected only by a comma

Example:

The dog walked along the road, a long dusty road, a puppy followed

Results of Exercise 15

C 1. The researcher worked diligently to plan the trial.

I 2. In spite of all his efforts [, the experiment failed].

RO 3. The workmen got little done. [They] arrived late. [They] worked slowly. [They] stopped early for lunch.

I 4. [The crew began] when the time was right for laying out the complicated trial.

C 5. He was the kind of writer whose sentences contained many clauses.

RO 6. He was a good writer. [H]e was not careful in editing or proof-reading his material.

C 7. Most of the errors in the manunscript were made by the typist.

C 8. He took his advanced studies in a British university. [I]t seems usual for writers [at that British university] to make sentences that go on clause after clause.

C 9. He liked to write sentences that went on and on and on and on.

I 10. [We found] five grammatical mistakes in the first 50 words of text.

C 11. The writer was proud of his composition. [However, his peers criticized it.]

RO 12. My professor gives good lectures. [H]e speaks slowly and distinctly.

C 13. The new rice variety was noted most for its tolerance to brown leafhopper.

C 14. [T]he new rice variety was popular with farmers in the delta. [It was] tolerant to brown leafhopper.

I 15. Its genetically derived tolerance to brown leafhopper [assured its popularity].

RO 16. The researcher was applauded for his results. [He had] found a line of papaya that resisted diseases and continued to bear over a long period.

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Objective of Session 16. Active and Passive Sentences

2. Identify active and passive sentences

Active and Passive Sentences

An Active Sentence

An *active sentence* is one in which a subject takes direct action.

Examples:

- *The technician planted the experimental plots.*
- *The dog walked on the road.*
- *The animals gained 0.25 kg daily.*

A Passive Sentence

A *passive sentence* is one in which a subject is acted upon.

Examples:

- *The experimental plots were planted by the technician.*
- *The road was walked on by the dog.*
- *Counts on plants were taken 50 days after planting (DAP).*

Recall White's Advice on Sentences

- Use the active voice as much as possible
- Put statements in positive form
- Use definite, specific, concrete language
- Omit needless words
- Avoid a succession of loose sentences
- Keep related words together

Results of Exercise 16

A 1. The clock showed the time as 13:00 hours.

P 2. Hands of the clock were seen to show the time to be 13:00 hours.

P 3. Consideration will be given to all viewpoints by the chairman.

P 4. Daily gains were found to be 0.5 kg.

P 5. Measurements were recorded each day.

P 6. Expect to respond within three minutes.

P 7. Counts of plants in the plot were made 45 days after the crop was sown.

A 8. The chairman will consider all viewpoints.

A 9. After they had reported their findings, students were released for holidays.

P 10. You will be expected to respond within three minutes.

A 11. Experimenters counted plants in the plots 45 days after sowing.

A 12. Animals gained 0.5 kg daily.

A 13. Students reported their findings and left for holidays.

P 14. His actions were to make sure the association was operating on a sound fiscal basis.

A 15. He hypothesized that others would see his actions as weak.

A 16. He made sure the association operated on a sound fiscal basis.

P 17. It was reported that measurements were recorded each day.

P 18. His hypothesis was that his actions would be seen as weak.

Objective of Session 17. Measure Readability

3. Measure readability using the FLESCH formula

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Measuring Readability

Results of Exercise 17: Example # 1

- 73 words in 2 sentences: 36.5 average words per sentence.
- 140 syllables in 73 words: 1.92 average syllables per word.

Plugging them into the formula:

$$1.015 \times 36.5 = 37.0$$
$$84.6 \times 1.92 = 162.4$$
$$\text{Sum } 199.4$$

$$206.8 - 199.4 = 7.4$$

very difficult

Results of Exercise 17: Example # 2

- 57 words in 4 sentences: 14.3 average words per sentence.
- 99 syllables in 57 words: 1.74 average syllables per word.

Plugging them into the formula:

$$1.015 \times 14.3 = 14.5$$
$$84.6 \times 1.74 = 147.2$$
$$\text{Sum } 161.7$$

$$206.8 - 161.7 = 45.1$$ difficult

Objective of Session 18. Strengths and Weaknesses of Using the Computer

4. Identify and discuss several ways in which the use of the computer eases editing

Making Use of the Computer

Objective of Session 19. Editing

5. Apply knowledge and skills to appropriately edit scientific papers

Editing

Why Edit a Manuscript?

- An editor can look upon your manuscript with an objective eye
- Authors are not expected to know everything, so an editor can make sure that your manuscript is:
  - consistent in style
  - making sense
  - correctly spelled and punctuated

Two Types of Editing

1. ***Mechanical Editing***

   editing for details of style

2. ***Substantive Editing***

   editing for content and readability

Editorial Proofing Marks

This means ~~means~~ delete.

This means dedelete and close up.

This means insertta space.

This means delete and insert a space.

STET This means ignore ~~the~~ editing marks (the editor got carried away).

This means clos e up a space.

This means make a new paragraph.

This means include

this in the text above it — no paragraph.

6/14

This means line
this up with
the rest.

This means indent
this so that it lines up
with the text above it.

This meas transpose piece of text this.

This means spell this out: 2, %, etc.
OR abbreviate it (or put it in numerals):
seventy–five hundred, percent, etc.

this means capitalize this letter.

THIs means make these lower–case

This means insert a comma here.

This means put a period here.

This means put in a colon:

And this means put in a semicolon;

This shoudnt be without an apostrophe.

This needs quotes (single or double).

This should be a superscript 1 and a subscript 2.

Compound modifiers like run on should be hyphenated.

Results of Exercise 19. Revised Version A

Normal cultural practices were carried out, including weeding, mulching, and irrigation. Data were collected on flowering, fruiting, maturity, and yield. Yield was taken on the basis of individual plants. Statistical significance of differences in means was based on Duncan's Multiple Range Test.

Results of Exercise 19. Revised Version B

Significant differences on plant-growth characters were found among the lines tested. That was true for line length, measured 30 days after planting, and for days till opening of both male and female flowers. Table 1 displays the data, with indications of significant differences.

Objective of
Session 10. Use of Definite, Concrete Words

4. Eliminate or replace unnecessary phrases and words

Use of Definite, Concrete Words

Results of Exercise 10

Use definite, concrete words

Prior to that time _____

An abundance of _____

Frequently _____

In the event that _____

For the purpose of _____

In the majority _____

Make enquiry regarding _____

Utilization _____

At the present time _____

In view of the fact _____

Results of Exercise 10 (continued)

Use definite, concrete words

Terminate _____

Hold a meeting _____

Remunerate _____

Close proximity of _____

Employ _____

Commence _____

Necessitate _____

At this point in time _____

In the initial instance _____

Magnitude _____

Objective of
Sesion 11. Work with Words

4. Eliminate or replace unnecessary phrases and words

Objective of
Sesion 12. Phrases that Say Little

4. Eliminate or replace unnecessary phrases and words

Objective of Session 13.
Raw Material: Types of English Sentences

5. Define sentences and classify them as simple, compound, or complex

Raw Materials: Words and Sentences

A Sentence

A sentence is a series of words that convey meaning.

The series begins with an initial capital letter and ends with a full stop.

Simple Sentence

A simple sentence is one that expresses one complete thought

Example:

The technician planted the experimental plots.

Compound Sentence

A compound sentence is one that contains two or more complete thoughts joined by a connecting word, such as *and, but,* or others

Example:

The technician planted the experimental plots and then the weed scientist applied the pre-emergent herbicide.

Complex Sentence

A complex sentence is one that contains one complete thought plus one or more dependent clauses

A dependent clause is a series of words that cannot stand alone

Example:

With the weed scientist following, the technician planted the experimental plots.

Objective of Session 14. Simple, Compound, and Complex Sentences

5. Define sentences and classify them as simple, compound, or complex

Simple, Compound, and Complex Sentences

Exercise 14. Types of English Sentences

Mark *S* for a SIMPLE sentence
Mark *CM* for a COMPOUND sentence
Mark *CX* for a COMPLEX sentence

CX 1. In the last 20 years, there have been four serious floods.

S 2. The rainy season began four weeks late.

CM 3. The experiment was planned carefully, but stray cattle spoiled it.

CM 4. Fertilizers increased crop yields, and families earned more profits.

S 5. All five researchers helped lay out the trial.

S 6. The application of 60 kg/ha of N increased the yield of rice.

CX 7. Although the farmers sprayed the crop, insect damage reduced the yield.

S 8. It was clear to everyone that the experiment failed because of careless application of fertilizer treatments.

CM 9. **The trial had been sprayed with the wrong chemical, and it was abandoned.**

CX 10. **Diseased cattle, which had been found to have food-and-mouth infection, were put in quarantine.**

CM 11. **Only one of three experiments gave statistically significant results; however, the researcher based a journal article on that one experiment.**

S 12. **Four replications should be enough in this instance.**

CX 13. **The trial was indeed planted before the rains set in; the scientist had seen to that.**

S 14. The task force of scientists cooperated in a series of complex and sophisticated experiments.

CX 15. He did not consider the research successful, in spite of outstanding results in two of his experiments.

CX 16. Hurrying to finish before dark, the crew completed laying out the trial.

Objectives of Day Four

1. Identify misplaced modifiers in text and correct them

2. Apply knowledge and skills to edit a sample of writing

3. Identify some differences between scientific writing and report writing

4. Plan and prepare an oral presentation using visual aids

Schedule of Day Four

08:30 – 09:00	Opening of the Day's Activities
09:00 – 10:00	Session 20. Editing— First Aid for Sentences
10:00 – 10:30	Session 21. Applying What You Have Learned
	Tea/Coffee Break
10:45 – 11:15	Session 21. (Continued)
11:15 – 13:00	Session 22. Application—Editing One of Your Colleague's Papers
	Lunch
14:00 – 15:30	Session 22. (Continued)
	Tea/Coffee Break
15:45 – 16:15	Session 23. Report Writing
16:15 – 17:30	Session 24. Oral Presentation
17:30 – 18:00	Feedback on the Day's Activities and PAPA

Objective of Session 20. Editing—First Aid for Sentences

1. Identify misplaced modifiers in text and correct them

Editing:
First Aid for Sentences—Misplaced Modifiers

Results of Exercise 19

1. **Maize yields were low due to the fact that the final completion of the weeding operation was not on times.**

   Maize yields were low, because the final weeding was delayed.

2. **A careful examination of table 1 reveals that liveweight means responded to supplementation.**

   Table 1 shows significant differences (p ○ 0.05) in liveweight means due to supplementation.

3. New innovations have facilitated classification of soils into groups much more faster.

New techniques have facilitated soil classification.

4. Meteorology is a rather abstract, it is not very easy to tell when the rains first began.

Meteorology is abstract, so it is difficult to predict the onset of rains.

Results of Exercise 20

1. **While flying over the river, two whales were seen.**

   While flying over the river, we saw two whales.

2. **I met a man with a wooden leg named Smith.**

   I met a man named Smith, who had a wooden leg.

3. **Having become swollen by damp weather, the workmen could not remove the bracing.**

   The workmen could not remove the bracing, which had become swollen by damp weather.

4. When attached properly to the electrical outlet, you will see colorful images.

When the TV set is attached properly to the electrical outlet, you will see colorful images.

5. An autopsy was performed on a goat following a large meal.

Following a large meal, the pathologist performed an autopsy on a goat.

6. **A large butterfly was brought to the museum by a biologist in a moribund condition.**

   A biologist brought a large dead butterfly to the museum.

7. **The milk here is mostly from mixed breeds of cattle ranging in butterfat from 3% to 5%.**

   The milk here, ranging from 3% to 5% in butterfat, is mostly from mixed breeds of cattle.

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Objective of Session 21. Applying What You Have Learned

2. Apply knowledge and skills to edit a sample of writing

Editorial Proofing Marks

This means ~~means~~ delete.

This means deelete and close up.

This means inserta space.

This means delete and insert a space.

STET This means ignore ~~the~~ editing marks (the editor got carried away).

This means clos e up a space.

This means make a new paragraph.

This means include

this in the text above it — no paragraph.

This means line
this up with
the rest.

This means indent
this so that it lines up
with the text above it.

This meas transpose piece of text this.

This means spell this out: 2, %, etc.
OR abbreviate it (or put it in numerals):
seventy–five hundred, percent, etc.

this means capitalize this letter.

THIs means make these lower–case

This means insert a comma here.

This means put a period here.

This means put in a colon:

And this means put in a semicolon;

This shoudnt be without an apostrophe.

This needs quotes (single or double).

This should be a superscript 1 and a subscript 2.

Compound modifiers like run on should be hyphenated.

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Objective of Session 22. Application—Editing One of Your Colleague's Papers

3. Apply knowledge and skills to edit a sample of writing

Objective of Session 23

Identify some differences between scientific writing and report writing

Objective of Session 23. Report Writing

4. Identify some differences between scientific writing and report writing

Report Writing

Outline

- Title
- Summary
- Introduction
- Main report
- Conclusions
- Recommendations
- Appendices

Technical Writing Requires

- Facts
- Logical sequence of facts and arguments
- Use of plain English
- Supporting information and illustrations

Preliminary to Writing

- Why?
- Terms of reference?
- Information required?
  - factual
  - conclusions
  - recommendations
- Achievements?
- Readers' knowledge?
- Information available?
  - how much to include
- Confidentiality
- Financial implications

Planning a Report

- Title
- Lines of enquiry for reliable information
- Balanced picture
- Pertinent information
- Logical arrangement
- Suitable format
- Style and method adapted to reader

Structure of Report

Two stages:

- List all subjects to be covered
- Rewrite the list in logical sequence

Logical Sequence of Report

- Chronologically
- By major topics
- Simple ⟶ complex
- Problem/solution approach

Chronological

- Origin of the project
- Initial planning
- Feasibility study
- Detailed design

- Implementation
- Results
  - expectations met?
  - what went wrong?
  - why?
- Lessons learned

Problem/Solution Approach

- State problem
- Consider options
- Consider disadvantages and advantages
- Recommend solutions

Do's and Don'ts

- Avoid generalizations
- Use only technical language familiar to the reader
- Use explanatory keys
- Use graphic or images where appropriate
- Use an index in a long report
- Include description of standards and methods
- Make length commensurate with importance of topic
- Make it simple and easy to read

Internal Structure

The use of:

- words
- paragraphs
- annexes
- figures

Check the Following:

- Conclusions match terms of reference
- Conclusions follow logically from introduction and discussion
- Wider significance of conclusion is pointed out
- Minority view is reflected
- Conclusions, comments, and recommendations are distinguished
- Report is fully checked before presentation

Objective of Session 24. Oral Presentation

5. Plan and prepare an oral presentation using visual aids

Oral Presentation

What is an Oral Presentation?

- Face-to-face contact with audience members
- Audience uses two senses: sight and hearing
- Appearance
- Materials (visual aids) shown
- Two-way interchange possible with audience

Why are Presentation Skills Important?

- It communicates the power of the presenter
- It puts two senses in play by the audience:
  - hearing
  - seeing
- It establishes a two-way interchange on topics that you choose

Audience and Purpose(s)

- Identify the audience
- Your purpose in presenting
- The audience's purpose in listening to you
- Consider the purposes — What is the common purpose?

Objectives

- What do you want to communicate?
- Decide on your main purpose
  - inform
  - entertain
  - persuade
  - move to action
- Keep it simple — not more than four main points

Barriers to Communication

- **The audience fails to give full attention and effort:**
  - *can't see or can't hear*

- **Fails to comprehend:**
  - *due to language*
  - *words*
  - *concepts*

- **Thinks of other things because they are:**
  - *hungry or thirsty*
  - *cold or hot*
  - *tired or overworked*
  - *worried*
  - *concerned about time*

- **Perceives with own ears and eyes:**
  - *lack of interest in your topic*
  - *cultural differences or expectations*
  - *form or style not familiar*

- **Rejects message on technical grounds:**
  - *unsuitable*
  - *considered incorrect*
  - *economically not viable*

- **The communicator may fail to hold interest because of:**
  - *personal appearance*
  - *attitude*
  - *unsuitable message*
  - *poorly presented message*
  - *poorly prepared message*

Planning the Oral Presentation

- Develop structure and content

- Basic structure is three main points:
  - introduction
  - body
  - conclusion

Introduction

- Create the desired atmosphere
- Present speaker effectively from the start
- Catch the interest of the audience
- Lay out the subject and the structure ~~the~~ presentation

Body

- Develop each main heading
  — *remember that few people will remember three or four main points*
- State each point in terms the audience knows
- Back each key point with facts, examples
- Make smooth transitions between main points
- A caution about the word "finally:" Don't use it until you are ready to end the presentation

If you want to do the best you possibly can:

- Write out the full introduction. Read aloud what you have written

- Read it aloud several times, until you have on your tongue both what you want to say and how you want to say it

But don't read it to your audience!

- How much time should you devote to planning and presentation?

  The oral part — the spoken word — is the heart of the presentation and requires planning and preparation

One of the most common errors in oral presentation is lack of preparation. Too often a person makes overheads of a few tables or charts, or selects a few color slides, and thinks: "Now I am ready to speak on this subject"

<u>That's seldom true!</u>

Conclusion

- Stick to the topics discussed. This is not the place to give new evidence, this is where you "make the sale"
- Summarize, briefly
- Close with a story, a quotation, a case — but only if it fits

- If you want the audience to take action, ask for it here. Make clear what that action should be

- Plan how you will end the presentation, and make the ending definite and strong

Computers to Prepare Visuals

- Spreadsheet programs
  - Lotus 1-2-3
  - Quattro Pro
- Database programs
  - Paradox
- Graphics program/drawing programs
  - Harvard Graphics
  - Freelance

Organizing Your Thinking

Main points	Key factor points	How to illustrate

Start the Planning Process

Decide on the main points

↓

which facts to visualize

↓

how to visualize them

Reasons for Poor Use of Visuals

- Too much data or details
- Unreadable
- Visual doesn't fit the point made

Visuals are *aids* in presentations.

They don't substitute for the speech

Design and Preparation of Visuals

- Depends on subject and taste
- Computer packages for high-quality overheads
- Use readable letters and colors
- Labels should be straight, if used
- Use a xerox if available

Overhead Projector

- Versatile and convenient
- For any size audience
- Ideally overheads should be made in advance
- Allow writing / drawing during presentation
- Overheads can be stacked for complex diagrams

Visual Aids for Oral Presentations

- Introduction
- Instruments designed to help presentations
- If not used well may become a hindrance
- Effective usage calls for:
  - familiarity with instruments
  - good practice
  - calmness

Types of Visuals

Projected:

- Overheads
- Slides

Nonprojected:

- Flip chart
- Wall picture and charts
- Chalkboard or wall (black, green)

Purpose of Visuals

When used effectively, visuals can:

- capture and focus attention
- reinforce a speakers' words
- illustrate difficult points
- hold viewers' attention
- emphasize points

Tips on Presenting Overheads

1. Number transparencies
2. Eliminate unnecessary overheads
3. Two or three minutes per transparency
4. Remove overheads when not needed
5. Stand near and to the side of the projector and screen
6. The visual should speak for itself
7. Point to the projector not to the screen

Tips on Presenting Overheads

8. Speak to the audience, not to the visual
9. Don't stand in the light stream of the projector
10. Don't turn the projector on without overhead
11. Don't speak while changing overheads
12. Transfer smoothly between visuals
13. Turn off the projector, before final remarks
14. Plan a fall-back solution

Making Graphs

- Main purpose is to show simple relationships
- Simplify titles and identifying tags
- Laser print direct onto transparencies
- Photocopy onto transparencies

Tips on Designing Overheads

1. Per overhead:

   one idea, six to eight lines, six words per line

2. Maximum two types of letter

3. Use style systematically

4. Legible labels

5. Be consistent in use of abbreviations

Tips on Designing Overheads

6. Give key for abbreviations
7. Title indicates main topic
8. Highlight significant figures
9. Use symbols and diagrams rather than straight text
10. Use images

Objectives of Session 25.
PAPA and Workshop Evaluation

2. Plan future activities in scientific writing and presentation

3. Evaluate and provide feedback on the workshop.

Objectives of Day Five

1. Demonstrate improved skills in planning, preparing, and delivering information to an audience using visual support

2. Plan future activities in scientific writing and presentation

3. Evaluate and provide feedback on the five-day workshop

Schedule of Day Five

08:30 – 09:00	Opening of the Day's Activities
09:00 – 10:30	Session 24. (Continued)
Tea/Coffee Break	
10:45 – 13:00	Session 24. (Continued)
Lunch	
14:00 – 15:30	Session 24. (Continued)
Tea/Coffee Break	
15:45 – 16:45	Session 25. Participant Action Plan Approach and Workshop Evaluation
16:45 – 17:00	Final Remarks and Closing