Technical Communication

Principles and Practice

THIRD EDITION

Meenakshi Raman
Former Professor and Head
Department of Humanities and Social Sciences
BITS, Pilani (K.K. Birla Goa Campus)

Sangeeta Sharma
Associate Professor
Department of Humanities and Social Sciences
BITS, Pilani

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Oxford University Press is a department of the University of Oxford.
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Oxford University Press in the UK and in certain other countries.

Published in India by
Oxford University Press
YMCA Library Building, 1 Jai Singh Road, New Delhi 110001, India

First Edition published in 2004
Third Edition published in 2015

ISBN-13: 978-0-19-945749-6
ISBN-10: 0-19-945749-2

Typeset in Caslon Pro
by Anvi Composers, New Delhi 110063
Printed in India by Magic International (P) Ltd., Greater Noida

Preface to the Third Edition

Communication is the glue that binds together various strata of society and also several levels of workforce in any organization. There are various forms of communication that not only reflect the knowledge and accomplishments of an individual, but also act as the public face for organizations, exhibiting their policies and achievements. Though technology has permeated and has been acting as a dominant force in organizational communication, we still need to follow the basic principles of effective communication irrespective of the channel—listening, speaking, reading, and writing—it uses for the process. Technical communication or communicating technical contents has become immensely important for the students and professionals in order to carry out their assigned tasks successfully. By acquiring the necessary skills in technical communication, students and professionals can communicate with clarity, precision, and accuracy, thereby gaining the ability to convey their ideas and points of view with effectiveness and efficiency.

Today, writing for the web as well as communicating through the social media are on the rise more than ever before. Job-seeking students and professionals are increasingly using the social networking platforms, such as Facebook, LinkedIn, SkillPages, etc., to draw the attention of prospective employers. Moreover, the job providers also try to discover potential candidates through these web forums. For instance, besides preparing their traditional résumés, fresh graduate students can also prepare social résumés, which are different in format, structure, and length from the conventional résumés, and upload them on these forums, thereby publicizing their suitability to a particular job. Similarly, writing wikis, blogs, etc. has also become very popular these days to stay connected to prospective clients or employers.

About the Book

The third edition of *Technical Communication: Principles and Practice* has been designed not only to serve the purpose of being a textbook for courses on technical and professional communication but also to satisfy the requirements of day-to-day communication needs. It introduces the students as well as professionals to the role of four communication skills—listening, speaking, reading, and writing (LSRW)—which enhances their ability to communicate on academic and professional fronts. The ever-increasing importance of social media has also made us focus on honing the skills required to communicate through the web.

New to This Edition

- New sections such as brochures, bulletins, newsletters, writing for the web, and non-traditional résumés
- Concise content with simple and easy-to-understand language
- New multiple-choice questions for practice as well as flash card glossary in the online resource centre

Coverage and Structure

The text is divided into four parts containing 17 chapters.

Part I: Introduction to Technical Communication

Chapter 1 provides an introduction to the basics of technical communication, discussing its importance, process, levels, and flow of communication. *Chapter 2* discusses the various communication barriers and how to overcome them. *Chapter 3* focuses on the non-verbal aspect of communication, including body movements, space, and vocal features.

Part II: Listening and Speaking

Chapter 4 discusses the various types and aspects of active listening. *Chapter 5* presents the fundamentals such as phonemes, accent, and intonation of speaking through numerous examples. The characteristics of voice and the strategies for achieving confidence, clarity, and fluency in speech are also discussed in this chapter. *Chapter 6* explains the two important forms of communication, namely conversations and dialogues, which combine both listening and speaking skills. The nuances of giving an effective presentation are discussed in *Chapter 7*. The strategies to win interviews and the techniques to actively participate in various forms of group communication are discussed in *Chapters 8* and *9*, respectively.

Part III: Reading and Writing

Chapter 10 highlights all the important aspects of reading, including skimming and scanning, and presents reading strategies that help improve comprehension skills. *Chapter 11* covers the building blocks of effective writing, whereas *Chapter 12* discusses the art of précis writing. *Chapter 13* introduces report writing, including its objectives, types, importance, formats, and structure. The types, structure, and style of technical proposal are discussed in *Chapter 14*. *Chapter 15* analyses technical letter writing and gives examples of various types of business letters, including claim, adjustment, and sales letters. It also discusses email writing as also the etiquettes to be followed while communicating through it. Writing effective research papers and technical descriptions are discussed in *Chapter 16*.

Part IV: Review of Grammar

Chapter 17 covers the essentials of grammar and vocabulary including tenses, impersonal passive voice, and concord, and listings of idioms, homophones, homonyms, one-word substitutes, and confusables.

Online Resources

The following resources are available to support the faculty and students using this text.

For Faculty

- PowerPoint Slides

For Students

- Multiple Choice Questions
- Flash card Glossary
- Additional Text Material
- Videos
- Listening and Speaking Practice
- PowerPoint Slides

Acknowledgements

We are grateful to Professor B.N. Jain, Vice Chancellor, Birla Institute of Technology and Science (BITS), Pilani, and Professors G. Raghurama and K.E. Raman, Directors of Pilani and Goa campuses,

respectively, under whose aegis we were provided an environment conducive to complete this edition of the book.

The staff at Oxford University Press, India deserves our special thanks for the tremendous effort put forth to constantly update us on all the review matters throughout the making of this edition.

We appreciate the constructive suggestions given by the reviewers to add new topics and update the second edition so as to suit the needs of the students.

We gratefully acknowledge Raunaq Dhar for providing the sample of a newsletter. Every effort has been made to trace copyright holders and to obtain their permission for the use of copyright material. We apologize for any errors or omissions and would be grateful if notified of any corrections that should be incorporated in future reprints or editions of this book.

At the home front, we sincerely acknowledge the support and the encouragement we got from our family members. Meenakshi Raman is running short of words to express her gratitude to her family members for the unstinting cooperation and affectionate concern extended during the course of the project. Sangeeta Sharma would like to acknowledge her husband Suresh Sharma for being a pillar of support at all times and her children Amrit and Anuj for innocently enquiring about the progress of the book and reminding her to complete the task. Her parents-in-law also need a special mention for never complaining about her deep involvement in the work and taking away their time.

We sincerely hope that this revised edition with its updated, comprehensive coverage of all aspects and types of technical communication will prove to be highly useful to the readers. Any suggestions for improvement are welcome.

Meenakshi Raman
(mraman@goa.bits-pilani.ac.in)

Sangeeta Sharma
(sang@pilani.bits-pilani.ac.in)

Preface to the First Edition

Technical communication is one of those courses that are essential for all students and professionals. With the advent of new technologies, the world is shrinking into a global village. Therefore, the need for effective communication is becoming all the more essential. While students feel the need for communicating successfully through oral and written media in their academic tasks everyday, professionals face the challenges of communicating effectively and efficiently in their workplace.

The main aim of this book is to enable the reader to face the challenges in communication primarily in a technical milieu as communicating formal and technical messages is essential for both students and professionals. This has been accomplished by underscoring the relevance of both oral and written communication in myriad situations. A number of strategies have been provided to enhance the efficiency and effectiveness of communication in varied situations. We have made a sincere attempt to introduce certain techniques to improve confidence and effectiveness both for making presentations and for working in a team. The key strategies have been substantiated with examples from workplace situations. By the amalgamation of theory and practice in this book, we have tried to bring forward the real communication situations in our discussion. The contents, writing style, text organization, and format for various types of technical documents have been elaborately discussed. These discussions, we hope, would enable the reader to take up all writing tasks with ease and confidence.

The main strength of the book is its audience-centred approach, which we hope will make for an enjoyable reading. It directly addresses the students, giving real-life examples and orienting the strategies to practical application.

The contents of this book have been divided into four major parts. *Part I* explains to the readers the *basics of communication*, including the *barriers in communication* and the *use of technology*. *Part II* elaborates on *effective presentation strategies* as also the nuances of *interview* and *group discussion*. One has to have a firm grasp of the fundamentals of effective writing to achieve a commendable style in writing. Realizing this need, we have devoted *Part III* entirely to the *constituents of effective writing*. Finally, a variety of technical documents, namely letters, reports, proposals, research papers, and manuals, which are widely used in academic and professional environments, have been discussed at length in *Part IV* of this book.

The preponderance of communication in the academic and professional arena motivated us to take up this assignment of writing a book on technical communication. We hope that this book, with comprehensive coverage of all aspects and types of technical communication, will prove to be relevant and useful for the reader. Especially, the chapters on interviews, group discussions, effective presentation strategies, business letters, and reports will be of immense help to both students and professionals. This book can serve not only as a textbook for the technical communication course offered by universities, colleges, and polytechnic institutions but also as a reference book for training programmes offered by various businesses and industries.

We would like to extend our sincere gratitude to Prof. S. Venkateswaran, Vice Chancellor, BITS, Pilani, under whose patronage we were able to write this book. We are also indebted to our Director Prof. L.K. Maheshwari and our Deputy Directors, Prof. K.E. Raman, and Prof. V.S. Rao for their constant support and encouragement. Our sincere thanks to Prof. Ashok Sarkar, Dean, Faculty Division I and Instruction Division, and Prof. R.N. Saha, Dean, Educational Development Division and Faculty Division II, for

constantly motivating us. With great pleasure, we acknowledge the compatible environment shared by our colleagues and faculty members of the Languages Group.

We are indebted to Prof. Rajiv Gupta, Dean, Educational Hardware Division, and Mr Anirudh Gautam, Deputy Chief Project Manager, Indian Railways, for providing us the samples of technical proposals. Our students Karkare Vaibhav Pradeep, S. Sarmistha, Jimit Arora, Vikram Sampath, J. Arun, Amit Goyal, and Gaurav Kapoor deserve our special thanks for providing the sample speech and sample reports.

At the home front, from our respective sides, we acknowledge the great support from our loved ones. Meenakshi Raman would like to thank the encouragement received from her husband Prof. K.E. Raman and children Prabhu and Priya, without which the book would not have been possible. Sangeeta Sharma acknowledges the constant motivation received from her husband Suresh and her children Betu and Reshu, who cheerfully bore with her absence.

We would like to thank Mr P.P. Mehta for word-processing the manuscript with speed and efficiency.

Meenakshi Raman

Sangeeta Sharma

Features of

CHAPTER

2

Barriers to Communication

OBJECTIVES

You should study the chapter to know

- what communication barriers are and what causes them
- how to avoid communication failures caused by noise
- how to classify communication barriers

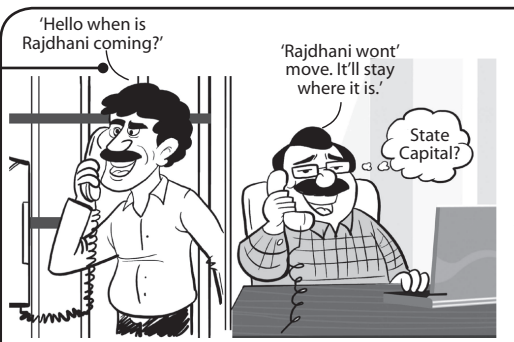
INTRODUCTION

Having studied the basic principles of technical communicati in Chapter 1, we now move on to a very important factor related communication. Imagine you are a junior executive who has just join as a trainee in an automobile company. You go to meet your boss, seek permission for visiting the automobile exhibition being held Delhi. While you are talking, two of your colleagues also arrive to your boss' signature on some bills. You fall silent while he signs t bills. After they leave, you resume talking but you find that your b has not really grasped what you have said earlier. You later analyse t situation, and realize that your colleagues' intervention led to y boss' lack of concentration. As the sender, you had patiently tried express your wish. But because of the interruption by your colleagu the receiver, your boss, could not decode your message fully. Hence t communication process failed.

This discussion brings us to the introduction of the term 'barr in communication. A barrier is defined as something that prevents controls progress or movement. This definition implies that a barr is something that comes in the way of the desired outcome. In t example given above, notice that the arrival of your colleagues w an event that prevented your boss from concentrating completely

Chapter Outline
All chapters in the book begin with a chapter outline that gives an overview of the contents covered in the chapter.

Illustrations
Illustrations, interspersed with the text in the chapters, make the book a more lively and interesting read.



In a telephonic conversation, the two parties cannot see each other's facial expressions and other aspects of body language. This makes it all the more important for them to incorporate the correct tone and articulation in their voices, so that the purpose of the phone call is achieved successfully. For example, when you are corresponding with a new client for the first time, you need to create a desired impression and give the client the correct picture of your operations. If you are doing this over telephone, your conduct assumes huge importance. Therefore, although you cannot see the caller in a telephonic conversation, you need to follow all the etiquettes that

the Book

Exercises
A series of practice exercises highlight the major topics covered in the chapter. The questions enhance learning and can be used for review and classroom discussion.

Reports must be precise, based on facts, relevant, reader-oriented, objective, easy to understand, well formatted, and well illustrated. There are various categories of reports such as informative and analytical, periodic and special, oral and written, formal and informal, and group and individual. They can be presented in manuscript, letter, memo, or pre-printed format.

Identifying the scope and purpose, knowing the audience, identifying the sources of information, organizing the material, interpreting the data collected, and drawing an outline are the prewriting steps that lead to the preparation of an effective, convincing report.

The structure of a report can be broken down into prefatory, main text, and supplementary information segments. Some of the constituents of these segments are optional sections, such as the frontispiece and the copyright.

Once we have understood the characteristics, categories, format, and structure of reports, we choose the most appropriate type of report based on the purpose at hand. Using the material prepared during the prewriting stage, the first draft of the report is prepared. This draft is then edited and refined to create the end product, which is a high-quality technical, business, or professional report.

EXERCISES

1. Indicate the difference between the following reports:
   (a) Oral and written (b) Formal and informal
   (c) Individual and group (d) Long and short
2. Discuss the various types of reports. Give an example of each.
3. What is a project report? Write a project report on the recent project you have done in your college.
4. A company is considering a proposal to establish a new factory in your town. The Managing Director has asked you to write a report on suitability of the place for the establishment of this factory. For this report, an outline is provided below. Study it carefully and rewrite it in accordance with the principles of co-ordination, subordination, phrasing, numbering, ordering, etc.

   Establishment of a New Factory

   Outline

   1. Introduction
   2. Fire fighting and Communication facilities
      (a) Telephone
      (b) Fax
      (c) Films
      (d) Games
   3. Education and Entertainment facilities
   4. How is the market
      A. Potential
      B. General
   5. Labour from Local and other plants
      5.0 Raw materials
      5.1 Cost
   6. Transport facilities
      6.1 Rail, road, air
      6.2 Raw materials
      (a) Building
      (b) Infrastructural
   7. Recommendations
   8. Conclusions
5. Develop the material given below into a formal out-line with appropriate numbers and correct indentation. The outline is not arranged logically. Rework the out-line into its logical form.

   Animals I Have Had As Pets

   I. Members of the cat family
      (a) Baby lion
         1. Three days old
         2. Mother died at local zoo
      (b) House kittens
         1. Five of these
   II. Members of the dog family
      (a) Two young dogs, mixed breed
      (b) A poodle
      (c) German shepherd
      (d) Other dogs
   III. Canaries
      (a) Two males
      (b) Three females
      (c) Parakeet
   IV. Guppies
   V. Members of the reptile family
      (a) Young grass snake
      (b) Green lizard

Brief Contents

Detailed Contents

PART III: READING AND WRITING

PART IV: REVIEW OF GRAMMAR

ONLINE RESOURCES

PART I

INTRODUCTION TO TECHNICAL COMMUNICATION

CHAPTER

1 Basics of Technical Communication

OBJECTIVES

You should study the chapter to know

- the importance of technical communication
- how general-purpose communication is different from technical communication
- the objectives and characteristics of technical communication
- the constituents of the communication process
- the different levels of communication
- how communication flows in an organization
- how and why visual aids are used in technical communication

INTRODUCTION

In the academic environment, we encounter various situations involving speech or writing: conversation with friends, professors, or colleagues to achieve various purposes; seminars, group discussions, written tests, and examinations; and laboratory or project report submissions on diverse topics. Likewise, at the workplace, we interact with superiors and subordinates, converse with them face-to-face or over the telephone, and read and write emails, letters, reports, and proposals.

All these activities have a common denominator—*the sharing of information*. For example, when you request your professor to explain a concept you could not understand very well in class, you transmit the information to him/her that you need some clarification. Now, the professor receives this information, understands it, and responds by giving an explanation which clears your doubt. If you are satisfied with this explanation, you thank the professor and the communication comes to an end. If you are still in doubt, you once again request clarification, and the process continues. This process involving the transmission and interchange of ideas, facts, feelings, or courses of action is known as the *process of communication*. We give, get, or share information with others during this process. Whether the communication is oral or written, this process essentially remains the same.

When one becomes a part of any organization, one needs to communicate, and communicate effectively. No organization can survive without communication. All the activities an organization undertakes have communication at their hub. The better our communication skills, the greater are our chances of quick progress. However skilful one may be in other aspects such as work, knowledge, thoughts, and organization, without proper communication, those are of little use. For instance, though you may have an excellent academic record, you may not be successful in an interview if you are not able to express your ideas clearly to those on the other side of the table. It has been observed that

people who are successful in their careers generally have excellent communication skills, which is one of the very reasons for their success. Most of this is technical *communication*, so let us find out more about what role technical communication plays in an organization.

IMPORTANCE OF TECHNICAL COMMUNICATION

Technical communication plays a pivotal role in any set-up, whether it is a business enterprise, an industry as a whole, or an academic institution. All managerial or administrative activities involve communication, be it planning, organizing, recruiting, coordinating, or decision-making. When you write reports, give instructions, or read brochures and manuals, you are involved in the process of communication. Communication serves as an instrument to measure the success or growth of an organization. For example, papers published by R&D organizations bring to light their progress. When the chief executive officer (CEO) of an organization presents his/her company's achievements in a meeting, each of the participants comes to know of these milestones. The higher one's position is, the greater is their need to communicate. A labourer, for example, may not be as involved in formal communication as a top-level executive. The various types of communication not only help an organization to grow, but also enable the communicators to develop the required skills.

However, though most professionals are well aware of the importance of communication, they do not develop their skills to good effect in their sphere of work. The more people participate in the communication process, the better they develop their skills in collecting and organizing information, analysing and evaluating facts, appreciating the difference between facts and inferences, and communicating effectively. To become an effective communicator, one needs to communicate, communicate, and communicate. There is no other way out.

GENERAL AND TECHNICAL COMMUNICATION

Communication is important not only in an organization but also in one's daily life. It is an integral part of daily activity. When an alarm clock goes off, it is communication through sound, urging one to get out of bed. When one feels loyal towards a particular brand of toothpaste, it is possible that the television (TV) commercials for that brand have been successful in communicating the message. Watching news on TV, saying goodbye to one's family, or calling a cab and giving directions are all different types of communication. At the workplace, all activities revolve around oral or written communication. Interacting with one's boss, reading the newspaper at home, or even dreaming in one's sleep are all examples of communication.

Communication in everyday life

TABLE 1.1 Differences between general and technical communication

General communication	Technical communication
• Contains a general message • Informal in style and approach. • No set pattern of communication. • Mostly oral. • Not always for a specific audience. • Does not involve the use of technical vocabulary or graphics, etc.	• Contains a technical message • Mostly formal • Follows a set pattern • Both oral and written • Always for a specific audience • Frequently involves jargon, graphics, etc.

Messages that are non-technical or informal in nature are categorized as general-purpose communication, whereas messages pertaining to technical, industrial, or business matters belong to the category of technical or business communication. Table 1.1 shows the differences between the two categories.

OBJECTIVES AND CHARACTERISTICS OF TECHNICAL COMMUNICATION

Technical communication takes place when professionals discuss a topic with a specific purpose with a well-defined audience. Technical communication usually has the following objectives:

- To provide organized information that aids in quick decision-making
- To invite corporate joint ventures
- To disseminate knowledge in oral or written form

Let us take an example of a customer who has bought a washing machine and does not know how to use it. The customer reads the instructions in the user manual and gradually learns to operate the washing machine without any assistance. This is an example of successful technical communication. When you are confused about which camera to buy, the salesperson explains all the technical features of each model to you. If that helps in your buying decision, it is successful technical communication again.

Technical communication has to be correct, accurate, clear, appropriate, and to the point. Correct information is objective information. The language should be clear and easy to understand. If the communication is through a user manual for a phone, remember that people will usually never use it unless they are stuck. And if they are stuck, they will look for instant information to solve their problem. The information must be brief and arranged sequentially so that it is easy for a user to find relevant information. It is also vital that the technical information provided in the manual be accurate.

PROCESS OF COMMUNICATION

Communication can be defined as the exchange of information, ideas, and knowledge between a sender and a receiver through an accepted code of symbols.

For sharing information, two parties are required—the sender and the receiver—without whom communication, which is an interactive process, cannot take place. At any given time, one is active and the other is passive. However, this is not sufficient; there should also be cooperation and understanding between them. Through what they have to communicate, the sender and receiver mutually influence each other. They should have a mutually accepted code of signals making up a common language. So,

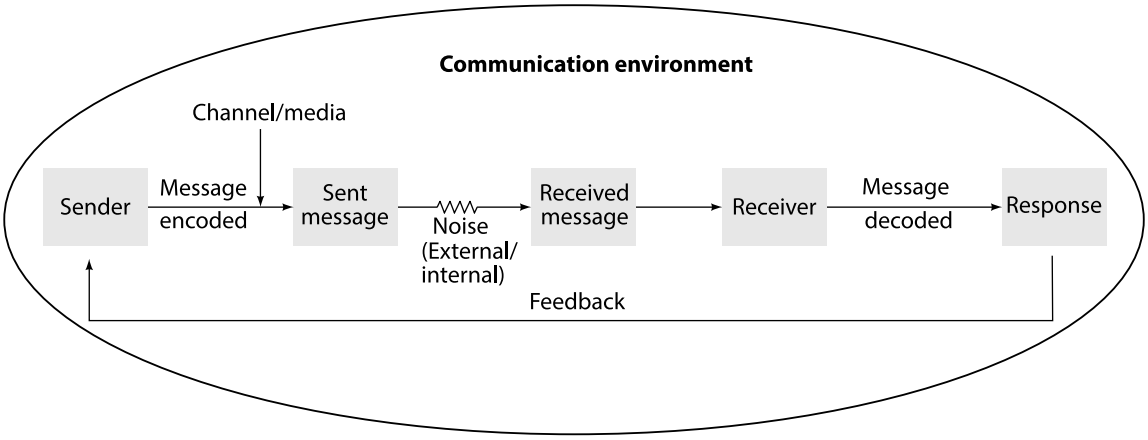


FIGURE 1.1 The process of communication

communication can be defined as the exchange of information, ideas, and knowledge between a sender and a receiver through an accepted code of symbols. It is termed effective only when the receiver receives the message intended by the sender in the same perspective. Otherwise it becomes miscommunication.

Communication Cycle

Consider the communication process shown in Figure 1.1. The communication cycle involves various elements, as discussed in the following paragraphs.

The first step is *formulation*, wherein the sender forms the content of the message to be sent. This formulation depends on the level of experience, intelligence, knowledge, and purpose of the sender. The content, once formed, is called the *message*. The sender *encodes* the message using a basic *tool*. This tool is nothing but the language used—words, actions, signs, objects, or a combination of these. Once encoded using proper language, the message is ready to be delivered. This delivery happens through *channels* or media of communication. It can be face-to-face, on paper, or through electronic or digital media such as the Internet. The *receiver* receives the message, *decodes* it, and acts on it. If the message received is the same as the message sent, there will be an appropriate response; if not, there will still be a response, but probably an inappropriate or unexpected one, as there has been a breakdown or interference in the communication. This may happen because of *noise*, which has been discussed in detail in Chapter 2. *Noise affects the decoding part of the communication process*.

The transmission of the *receiver's response* to the sender is called *feedback*. Feedback is essential, as it measures the effectiveness of communication. When a message is sent, the communication cycle is complete only when there is a response from the recipient of the message. Otherwise, the message needs to be re-sent. When a response is received, the message has been successfully delivered to the other party. For example, you put up a notice asking the members of your student council to attend a meeting on a specified date, at a particular time, at the location mentioned. On the day of the meeting, you find that some of them have come while the others have not turned up. In this case you have obtained both positive and negative responses to your message. However,

'How well we communicate is determined not by how well we say things, but how well we are understood.'
–Andrew Grove

since you have got some feedback, the communication process is complete. You also know that it has been effective, at least from your side. Hence, to know whether the communication has been successful or not, there must be some feedback, which is nothing but an observation of the recipient's response. *The communication is fully effective only when there is a desired response from the receiver*.

Effective communication takes place in a well-defined set-up. This is called the *communication environment*. A classroom is the communication environment when a teacher delivers lectures to students. If such a communication is attempted without a proper environment, it will not have the desired effect. Similarly, a teacher's cubicle becomes the communication environment when a student privately approaches the teacher. Thus, the essentials of *effective communication* are as follows:

- A well-defined communication environment
- Cooperation between the sender and the receiver
- Selection of an appropriate channel
- Correct encoding and decoding of the message
- Feedback

LEVELS OF COMMUNICATION

Having understood the communication process, let us now study the various levels at which human communication takes place:

- Extrapersonal
- Intrapersonal
- Mass
- Interpersonal
- Organizational

Extrapersonal Communication

Communication between human beings and non-human entities is extrapersonal. For example, when your pet dog comes to you wagging its tail as soon as you return home from work, it is an example of extrapersonal communication. A parrot responding to your greeting is another example. More than any other form, this form of communication requires perfect coordination and understanding between the sender and the receiver because at least one of them transmits information or responds in sign language only.

Intrapersonal Communication

Intrapersonal communication takes place within an individual. We know that the brain is linked to all parts of the body by an electrochemical system. For example, when you begin to 'feel hot', this information is sent to the brain and you may decide to 'turn on the cooler', responding to instructions sent from the brain to the hand. In this case, the relevant organ is the sender, the electrochemical impulse is the message, and the brain is the receiver. Next, the brain assumes the role of sender and sends the feedback that you should switch on the cooler. This completes the communication process. This kind of communication pertains to thinking,

which is the basis of information processing. Without such internal dialogue, one cannot proceed to the further levels of communication—interpersonal and organizational. In fact, while we are communicating with another party, our internal dialogue with ourselves continues concurrently—planning, weighing, considering, and processing information. You might have noticed that at times you motivate yourself or consciously resolve to complete a certain task. Self-motivation, self-determination, and the like take place at the intrapersonal level.

Interpersonal Communication

Communication at this level refers to the sharing of information among people. To compare it with other forms of communication, such as intrapersonal, organizational, etc., we need to examine how many people are involved, how close they are to one another physically, how many sensory channels are used, and the feedback provided.

Interpersonal communication differs from other forms of communication in that there are few participants involved, they are in close physical proximity to each other, many sensory channels are used, and feedback is immediate. Also, the roles of the sender and receiver keep alternating. This form of communication is advantageous because direct and immediate feedback is possible. If a doubt occurs, it can be instantly clarified. Note that non-verbal communication plays a major role in the interpretation of a message in this form of communication due to the proximity of the people involved.

Interpersonal communication can be *formal* or *informal*. For example, your interaction with a sales clerk in a store is different from that with your friends and family members; the interaction between the panel members and the candidate appearing at an interview is different from the conversation between two candidates waiting outside. Hence, depending upon the formality of the situation, interpersonal communication takes on different styles.

Moreover, most interpersonal communication situations depend on a variety of factors, such as the psychology of the two parties involved, the relationship between them, the circumstance in which the communication takes place, the surrounding environment, and finally the cultural context.

Organizational Communication

Communication in an organization takes place at different hierarchical levels. As we have learnt, it is extremely necessary for the sustenance of any organization. Since a large number

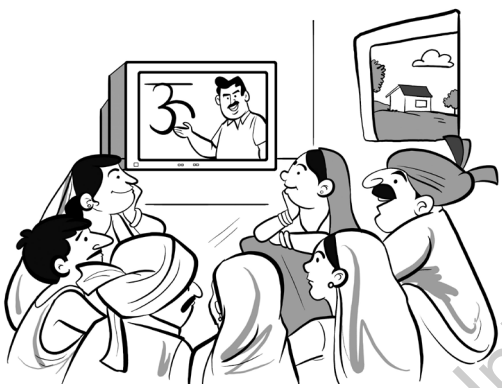
of employees are involved in several different activities, the need to communicate effectively becomes greater in an organization. With a proper networking system, communication in an organization is possible even without direct contact between employees. Organizational communication can be further divided into the following.

Internal-operational All communication that occurs in the process of operations within an organization is classified as internal-operational.

External-operational The work-related communication that an organization has with people outside the organization is called external-operational communication.

Personal All communication in an organization other than that for business or official purposes is called personal communication.

We will learn more about communication in organizations later in this chapter.



Mass Communication

Mass communication is meant for large audiences and requires a medium to transmit information. There are several mass media such as journals, books, television, and newspapers. The audience is heterogeneous and anonymous, and thus the approach is impersonal. Press interviews given by the chairman of a large firm, advertisements for a particular product or service, and the like take place through mass media. This type of communication is more persuasive in nature than any other form, and requires utmost care on the part of the sender while encoding the message. Oral communication through mass media requires equipment such as microphones, amplifiers, etc., and the written form needs print or visual media. The characteristics of mass communication are as follows:

Large reach Mass communication has the capacity to reach audience scattered over a wide geographical area.

Impersonality Mass communication is largely impersonal, as the participants are unknown to each other.

Presence of a gatekeeper Mass communication needs additional persons, institutions, or organizations to convey the message from a sender to a receiver. This 'gatekeeper' or mediator could be a person or an organized group of persons active in transferring or sending information from the source to the target audience through a mass medium. For example, in a newspaper, the editor decides which news makes it to the hands of the reader. The editor is therefore the gatekeeper in this mass communication process.

FLOW OF COMMUNICATION

Information flows in an organization both formally and informally. *Formal communication refers to communication that follows the official hierarchy and is required to do one's job*. In other words, it flows through formal channels—the main lines of organizational communication. Internal-operational and external-operational communication is formal. In fact, the bulk of communication that a business needs for its operations flows through formal channels. For

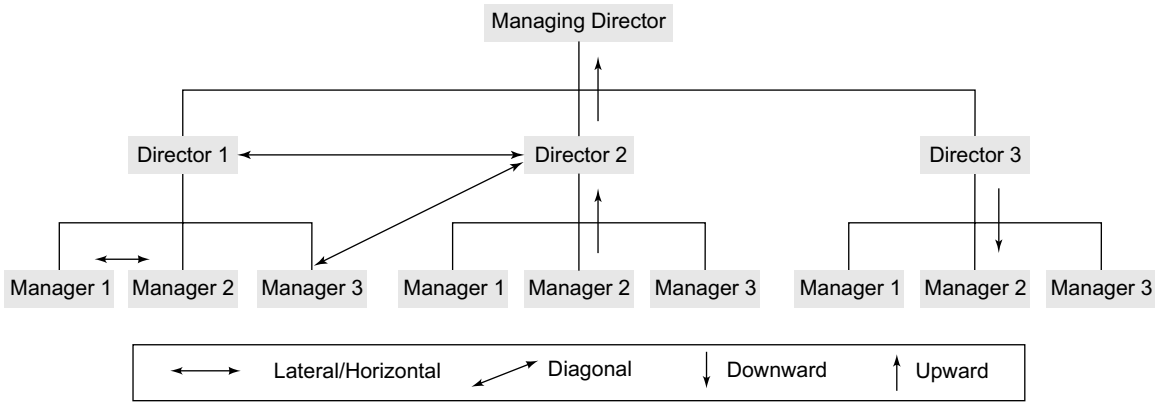


FIGURE 1.2 Flow of communication in an organization

example, when a manager instructs a subordinate on some matter or when an employee brings a problem to a supervisor's attention, the communication is formal. Similarly, when two employees interact to discuss a customer's order, the communication is formal. Information of various kinds flowing through formal channels, such as policy or procedural changes, orders, instructions, and confidential reports, is formal communication. Formal communication can flow in various directions—vertical, lateral, or diagonal—as shown in Figure 1.2.

Vertical Communication

Figure 1.2 shows that communication can flow in any direction in an organization. Vertical communication consists of communication up and down the organization's chain of command. Vertical communication can be classified as downward communication and upward communication according to the direction of its flow.

Downward communication

Downward communication flows from a manager down the chain of command. When managers inform, instruct, advise, or request their subordinates, the communication flows in a downward pattern. This is generally used to convey routine information, new policies or procedures, seek clarification, ask for an analysis, etc. People also send feedback to their subordinates on their actions through this channel. Downward communication can take any form—emails, memos, notices, face-to-face interactions, or telephone conversations. However, it should be adequately balanced by an upward flow of communication.

Upward communication

When subordinates send reports to inform their superiors, or to present their findings and recommendations to their superiors, communication flows upward. Upward communication

keeps managers aware of the business operations as well as of how employees feel about their jobs, colleagues, and the organization in general. Managers also rely on upward communication for making certain decisions or solving problems concerning the organization.

The extent of upward communication, especially that initiated at the lowest level, depends on the organizational culture. In an open culture without too many hierarchical levels, i.e., in a flat structure, managers are able to create a climate of trust and respect, and implement participative decision-making or empowerment. In such an environment, there will be a considerable amount of upward communication. This happens mainly because the employees provide the input for managerial decisions. In a highly authoritative environment, where downward flow dominates, upward communication still takes place but is limited to the managerial ranks. Suggestion boxes, employee attitude surveys, grievance procedures, superior–subordinate decisions (decisions taken for the subordinate by his/her superior), review reports, statistical analyses, etc. provide restricted information to top management.

Horizontal Communication

Horizontal or *lateral* communication takes place among peer groups or hierarchically equivalent employees, i.e., employees at the same seniority level. Such communication is often necessary to facilitate coordination, save time, and bridge the communication gap among various departments. Occasionally, these lateral relationships are formally sanctioned. But generally, they are informally created to bypass the formal hierarchical channels and expedite action.

From the organization's point of view, lateral communication can be either advantageous or disadvantageous. As compared to vertical (downward or upward) communication, which can at times hold up and delay timely and accurate transfer of information, lateral communication can be beneficial. Nevertheless, they can also create conflicts when formal vertical channels are bypassed by employees in order to accomplish their goals, or when superiors find out that they had not been consulted before certain decisions were taken.

Lateral communication enables the sharing of information with a view to apprise the peer group of the activities of a department. The Vice President (Marketing) sending some survey results in the form of a memo to the Vice President (Production) for further action is an example of lateral communication. This type of communication is vital for the growth of an organization as it builds cooperation among the various branches. It plays a greater role in organizations where work is decentralized, because there is a higher probability of communication gaps in such set-ups.

Diagonal Communication

Diagonal or cross-wise communication flows in all directions and cuts across the various functions and levels in an organization. For example, when a sales manager communicates directly with the Vice President (Production), who is not only in a different division, but also at a higher level in the organization, they are engaged in diagonal communication. Though this form of communication deviates from the normal chain of command, there is no doubt that it is quick and efficient.

'A coordinated flock of birds or a shoal of fish maintain their relative positions, or alter direction simultaneously due to lateral communication amongst members; this is achieved due to tiny pressure variations.'
–Wikipedia

In some situations, ignoring vertical and horizontal channels expedites action and prevents other employees from being used merely as messengers between the actual senders and receivers.

The increased use of email also encourages cross-wise communication. Any employee can communicate via email with another employee, regardless of the receiver's function or status. Since there is no specific

line of command, diagonal communication is also referred to as *cross-wise*, *radial*, or *circular* communication, depending upon the structure of the organization. For instance, a managing director could directly call a supervisor and give instructions.

VISUAL AIDS IN TECHNICAL COMMUNICATION

An illustration is a visual representation such as a drawing, painting, photograph, or other work of art that stresses subject more than form.

Visual aids are an important part of written technical communication. You might have observed that most technical reports, whether they are laboratory reports, project reports, or feasibility reports, include illustrations such as tables, graphs, maps, diagrams, charts, or photographs. In fact, text and illustrations are complementary in technical communication. Visual aids are also used extensively in presentations, to support the facts and figures being presented. Graphics can be used to represent the following elements in technical writing.

Concepts

This element depicts non-physical, conceptual things and their relationships. If you want to show how your company is organized, that is, the relationships between the different departments and officials, you could set up an organization chart—boxes and circles connected with lines that show how everything is hierarchically arranged and related. This is an example of a graphic depicting a concept.

Objects

Photographs, drawings, diagrams, and schematics are the types of graphics that show objects. If you are describing a fuel-injection system, you will probably need a drawing or diagram to explain the system properly. If you are explaining how to graft a fruit tree, you will need some illustrations of how it is done.

Numbers

Numbers are used while presenting data and statistics. If you are discussing the rising cost of housing in a particular city, you could use a table, with the columns showing the data for five-year periods since 1995. The rows could be for different types of housing. You could show the same data in the form of bar charts, pie charts, or line graphs.

Words

Graphics are also used to depict words. You have probably noticed how textbooks put key definitions and examples in boxes with words.

To further understand visual aids, let us answer the following questions:

- When to use?
- Why to use?
- How to use?
- What are the types?

When Illustrations are very effective when there is a mass of statistics and complex ideas to be represented. Statis-tical data is best explained through tables, graphs, charts, maps, diagrams, or photographs. As already mentioned, text and illustrations are complementary in technical communication. Hence, whenever the information to be communicated is too complicated or

technical to transmit just through words, we use visual aids. However, they should not be used just for the sake of using them.

Why Visual communication has more impact than verbal communication. Using illustra-tions has many advantages:

- Arouses interest and focuses on essentials
- Leads the reader to quicker comprehension
- Supports and reinforces words
- Saves much time and effort in explaining and interpreting complex ideas
- Explains the data in much lesser space but with greater accuracy
- Simplifies numerical data
- Emphasizes and clarifies certain facts and relationships
- Makes the descriptions vivid and eye-catching
- Renders a professional flavour to the communication

How The following are some guidelines to use illustrations effectively. The illustrations should be

- neat, accurate, and self-contained
- appropriate to the data
- labelled completely
- self-contained
- integrated with the text
- placed as close to the first reference as possible
- sized appropriately so that they are clear even upon reproduction
- such that they create a good balance between the verbal and the visual

Types Figure 1.3 classifies the various types of illustrations. It is clear from this figure that though there are various kinds of visual aids, they can be broadly classified into two main categories, namely tables and figures. All illustrations other than tables are usually categorized under figures.

In the process of selecting and designing illustrations, the question of which type to use always arises. Which type of illustration can be used most effectively to accomplish the desired objective? What type will present the facts more clearly? Before these questions can be answered, and before the actual work of selecting and designing the illustration can begin, the following preliminary steps must be taken. First the material must be arranged in some sort of systematic

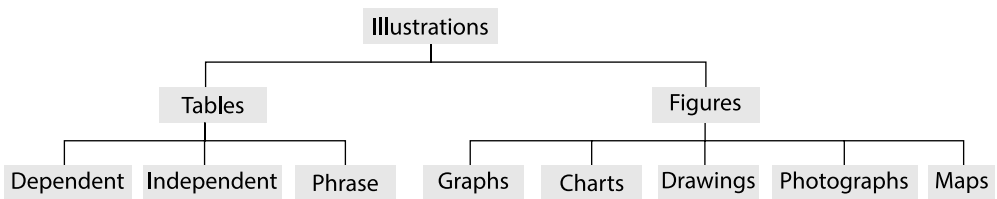


FIGURE 1.3 Types of illustrations

order: a series, a distribution, or some other logical arrangement. Next, we must be thoroughly familiar with the material and be aware of the implications of its use. The final step involves a decision about the type of illustration to be used. Several factors are considered for a decision of this kind, such as the nature of the data, the anticipated use, and the intended audience. These factors are usually interrelated.

The type of data will often aid in the selection of the appropriate type of media. For example, if the data were quantitative in nature, the selection might be from one group of charts; if the data were more qualitative in nature, the selection might be made from another group.

The following pages provide samples of various types of illustrations and also briefly explain the purpose for which each of these types is used.

Tables

A table is a systematic arrangement of numbers, words, or phrases in rows and columns, used to depict original numerical data as well as derived statistics. It permits rapid access to and relatively easy comparison of information. If the data is arranged chronologically (for example, sales figures over a ten-year period), the table can show trends—patterns of rising or falling activity. Of course, tables are not necessarily the most clear or vivid means of showing such trends or relationships between data—that is why we have charts and graphs (discussed later in this chapter).

The most important use of tables is for presenting numerical data. Imagine that you are comparing different models of laser printers in terms of physical characteristics such as height, depth, length, weight, and so on—you can use a table in this case.

Traditionally, the title of a table is placed on top of the table or in the first row of the table. If the contents of the table are obvious and there is no need to cross-reference the table from anywhere else in the communication, the title can be omitted. To avoid complications, tables can be considered as figures (the same as other graphics), and numbered within the same sequence.

As shown in Figure 1.3, there are three types of tables:

- Dependent
- Independent
- Phrase

Dependent tables are those whose contents cannot be understood without going through the text. This type is used for presenting less data (Figure 1.4). Independent tables are the most commonly used ones. Though the text should explain each table, readers need not go through the text to understand the contents of these tables (Figure 1.5). Phrase tables are used when the data is in words or phrases instead of numerical figures (Figure 1.6).

Advantages and disadvantages

The tabular form of presentation, while simple for the communicator, has both advantages and disadvantages. A lot of numerical figures can be depicted through a table. A number of

TABLE I Details of inpatients admitted on 14.11.15

General ward	35
Special ward	15
Maternity ward	10

FIGURE 1.4 Dependent table

Style and Formatting Guidelines for Tables

- In the text just preceding the table, refer to the table. Explain the general significance of the data in the table; do not expect readers to figure it out entirely for themselves.
- Do not overwhelm readers with monster 11-column, 30-row tables. Simplify the table data down to just that amount of data that illustrates your point—without, of course, distorting that data.
- Do not put the word or abbreviation for the unit of measurement in every cell of a column. For example, in a column of measurements all in millimetres, do not put 'mm' after every number. Put the common abbreviation in parentheses along with the column or row heading.
- Right- or decimal-align numbers in columns. If the two entries in a column are 123 and 4, 4 should be right below 3, not below 1.
- When there is some special point you need to make about one or more of the items in the table, use a footnote instead of clogging up the table with the information.
- Most of the advanced word-processing software packages, such as Word and WordPerfect, now have table-generating tools. You do not have to draw the lines and other formatting details.

TABLE II Fatal road accidents 2011–15 (% wise)

Year	Pedestrians	Cyclists	Others	Total	%
2011	2380	830	1310	4520	19.7
2012	2315	850	1615	4780	20.8
2013	2255	805	1750	4810	20.9
2014	2460	750	2060	5270	22.9
2015	2050	735	800	3585	15.7
Total	11460t	3970	7535	22965	100
Percentage	50%	17%	33%	100%	

FIGURE 1.5 Independent table

TABLE III

Goods	Durability	Nature/metal	Availability
Wires	Long lasting	Copper	Freely
Utensils	Long lasting	Steel	Scarce

FIGURE 1.6 Phrase table

combinations are possible in the tabular form; for example, numeric and non-numeric data can be depicted together. However, it also has certain disadvantages: while it is a part of visual depiction, yet, visually, the details are not evident at a glance. Occasionally, the writer might, in

TABLE 1 Sales data for 2000–10

Year	Product A	Product B
2000–01	20000	7000
2001–02	19899	7500
2002–03	20100	11000
2003–04	18500	13000
2004–05	15000	13500
2005–06	15500	13250
2006–07	12000	15000
2007–08	10500	16500
2008–09	8000	19258
2009–10	8500	20136

FIGURE 1.7 (a) Table presenting sales data for a ten-year period

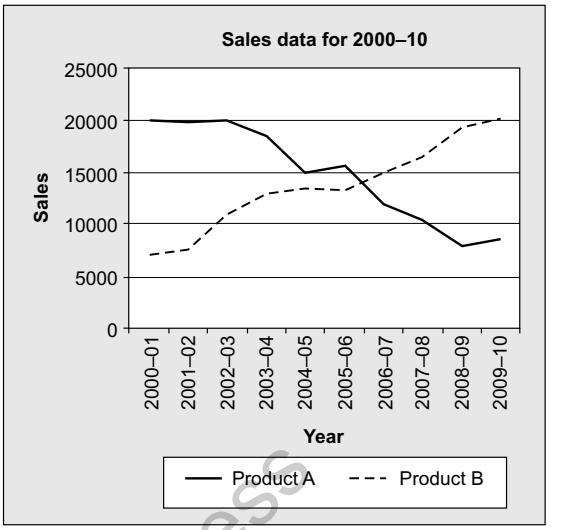


FIGURE 1.7 (b) Line graph showing the same data

the process of putting in too much data, make it too detailed and complicated. Finally, there is very little visual appeal in tables.

Graphs

Graphs are actually just another way of presenting the same data that is presented in tables—in a more impressive and interesting way. At the same time, however, a chart or diagram offers less detail or precision than tables. Figure 1.7 shows the difference between a table [Figure. 1.7(a)] of sales figures for a 10-year period and a *line graph* [Figure. 1.7(b)] for the same data. The graph presents a better sense of the overall trend but not the precise sales figure.

Producing graphs

As with illustrations, the following options are available for creating graphs: photocopying from other sources, generating graphics using special software, and manually drawing original graphics. Many spreadsheet application software packages (such as MS Excel) have fancy features for generating graphs—once the data is fed and the format specified, the application generates the required graph. Several types of graphs can be used. The various types are rectilinear or line graph, bar graph, pie graph, scatter graph, pictorial graph, and surface graph.

Line graphs Line graphs [Figure 1.8(a) and (b)] are used to show continuous change with respect to time. For example, the increase, decrease, or no change in temperature along with time can be depicted through a line graph. If two or three experiments have been conducted, the three different readings can be depicted using three lines.

Several trends (indicated by lines) over a specific period of time can be depicted by the line graph, indicating trends over time and allowing easy comparisons. However, a little caution should be exercised if the lines cross each other at points, as this can confuse the reader. Preferably, if there are criss-crossing lines, only three variables should be plotted, as too many variables would prevent the fine distinctions from being noticed, leading to erroneous conclusions.

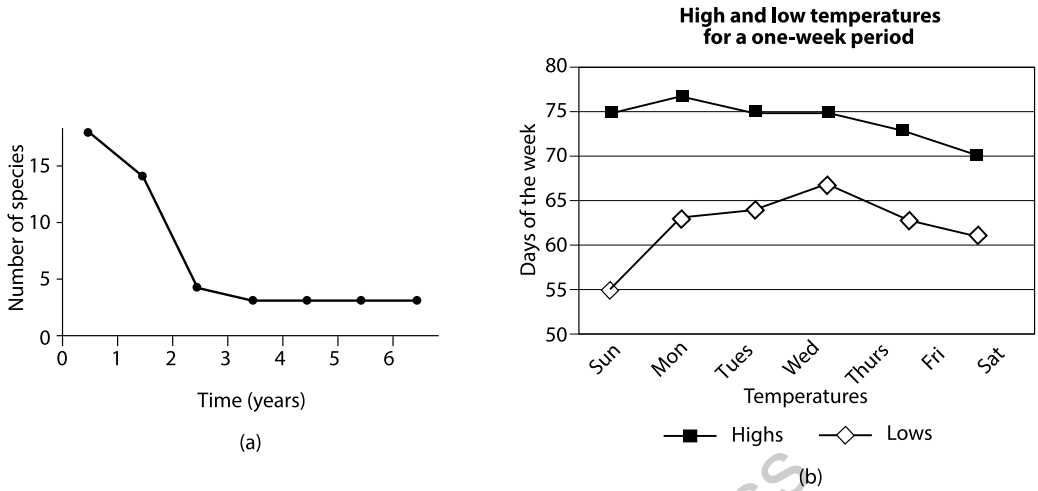


FIGURE 1.8 Line graphs

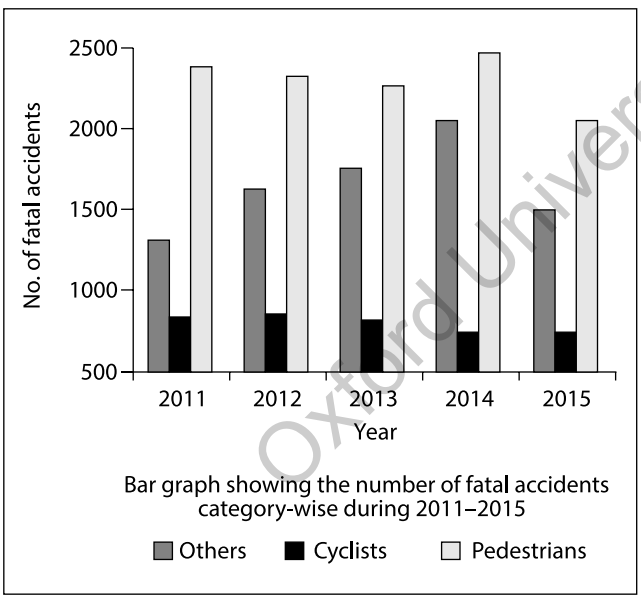


FIGURE 1.9 Bar graph with three variables

Bar graphs Bar graphs are effective in emphasizing the comparison of various data items. They can be used to depict the quantity of different items during the same period or the same item during different periods.

These are the simplest to construct and very easy to understand. They could be of various types: vertical with singular or multiple bars stacked (Figure 1.9) or comparative and horizontal. If these graphs depict more than one variable, two colours or designs are used to highlight the difference between the two variables. These graphs are comparative and if more than two variables in terms of the same time frame are used, a stacked vertical or horizontal bar graph is used. The greatest advantage of these bar diagrams is that they can also be used with a three-dimensional effect.

Presentations in this form are advantageous as they have a convincing impact, and two or more variables can be stacked without leading to difficulties in grasping the details. The colour and schematic designs added to the bars lend visual appeal to these graphs. However, there could be a lack of precision in the presentation of details, as the variables may become too cluttered and the lettering too small.

Pie graphs Alternatively known as a *percentage graph* or *circle graph*, a pie graph is a circular chart divided into sectors, illustrating proportion (Figure 1.10). In such type of graph, the arc length of each sector (and consequently its central angle and area) is proportional to the quantity

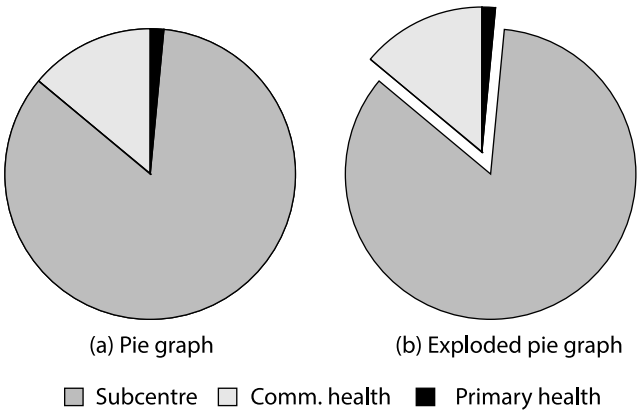


FIGURE 1.10 Pie graph

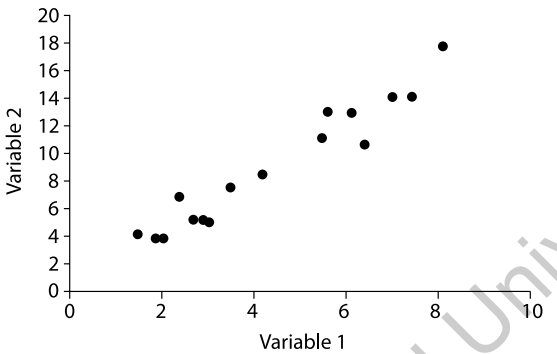


FIGURE 1.11 Scatter graph

it represents. This is one of the most popular forms used to depict the share of various categories making up a certain quantity and their correlations to the whole as a percentage. If there is a need to emphasize a particular segment, it is detached from the pie and referred to as the *floating wedge*. Such a pie is referred to as an *exploded pie*.

The pie graph captures the attention of the reader more effectively than probably any other presentation would. Within one graph itself, the various segments can be highlighted. In addition to the colour pattern used, the categorization of the segments can be given within, outside, or alongside the graph. However, there could be occasions when the difference is very minor and it might get blurred; for example, a segment depicting 0.5% may become too small to notice. Hence, it is not advisable to use pie graphs if the number of variables in your data is more than five, as it becomes difficult for the human eye to detect the relative percentage of too many cluttered items.

Scatter graph A scatter graph is used to show the correlation between two variables. Usually, dots (•) or crosses (×) are used to represent the data. In scatter graphs, the plotted data must lead to clusters. The absence of clustering refers to the absence of correlation between the two items represented on the horizontal and vertical axes. Notice the clustering at various places in the scatter graph given in Figure 1.11.

Pictograms/pictorial graph Pictograms are similar to bar graphs, with figures or small pictures plotted instead of bars. The pictures are chosen in accordance with the variables represented. This graph is self-explanatory; for example, if a graph were to indicate the population boom in the last five years, human figures could be used, thus illustrating the point being made by the writer. In such an example, a cluster of the figures or pictures would indicate an excessive number during that period. This type of graph is not used extensively for business reports.

The advantage of pictograms is that large numbers can be presented by a single cluster of figures. Much time and effort goes into the design of this graph so as to make it truly representative of the situation it seeks to address. However, it is not very useful for business reports, which contain more concrete data that cannot be represented pictorially. As pictograms are eye-catching, they are suitable for magazines (Figure 1.12).

Area graphs Area graphs can be used to show how something changes over time. Usually, the x axis represents the time period and the y axis represents the variable being measured. Area

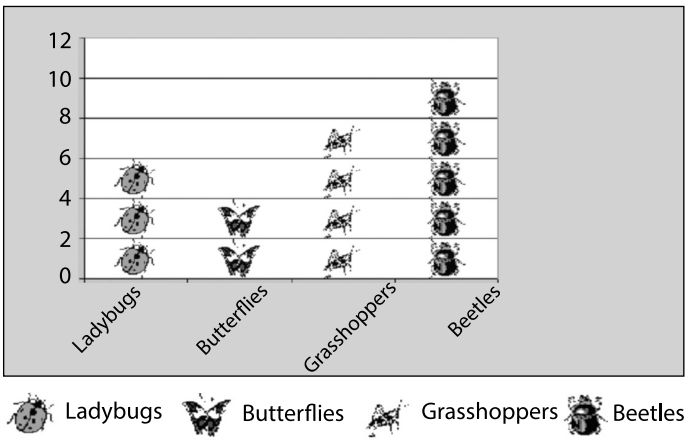


FIGURE 1.12 Pictorial graph

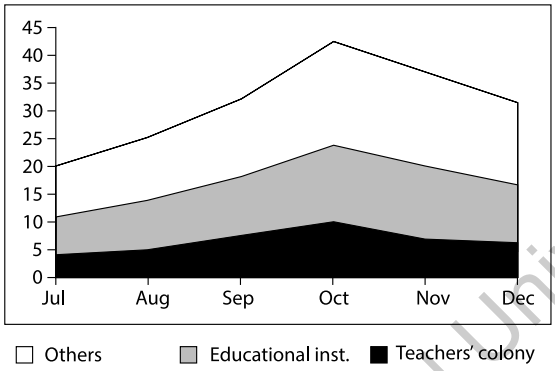


FIGURE 1.13 Area graph

graphs can be used to plot data that has peaks (ups) and valleys (downs), or data that was collected in a short time period.

These graphs also help to compare trends over a period of time. For example, when an area graph is plotted to show the water consumption in a particular educational campus, the total consumption of water in that campus as well as the consumption in individual areas can be shown (see Figure 1.13).

While index lines are predominant in line graphs, the area between the lines is highlighted in an area graph. In addition, shades of colours are also used. A darker shade is used at the bottom, and as the plot goes higher and higher, the shades become lighter. In Figure 1.13, the peak shows the total water consumption in the campus.

Charts

There are two types of charts: organization charts and flow charts.

Organization charts

Organization charts are generally used to illustrate the various positions or functions of an organization. Most of the communication channels in an organization are described through such charts. These charts can also be used to depict the organization of various other ideas such as the different sets of instructions given to subordinates or the different decisions taken for a particular project. Figure 1.14 shows how different options can be organized in the form of an organization chart.

Flow charts

Flow charts present a sequence of activities from start to finish. They are normally used to illustrate processes, procedures, and relationships. The various elements in the chart are generally depicted through geometrical figures (Figure 1.15). Circular or oval boxes are used to indicate the start or stop of the procedure, diamond-shaped boxes represent decision-making steps, and rectangular boxes indicate processing steps. Arrows indicate the process flow.

Charts are often used to make it easier to understand large quantities of data and the relationships between different parts of the data.

Drawings and Diagrams

In technical documents, drawings and diagrams are used to depict the objects, processes, circuits, etc. that are being described. Diagrams can be used to show the normal, sectional, or cut-away view of an object.

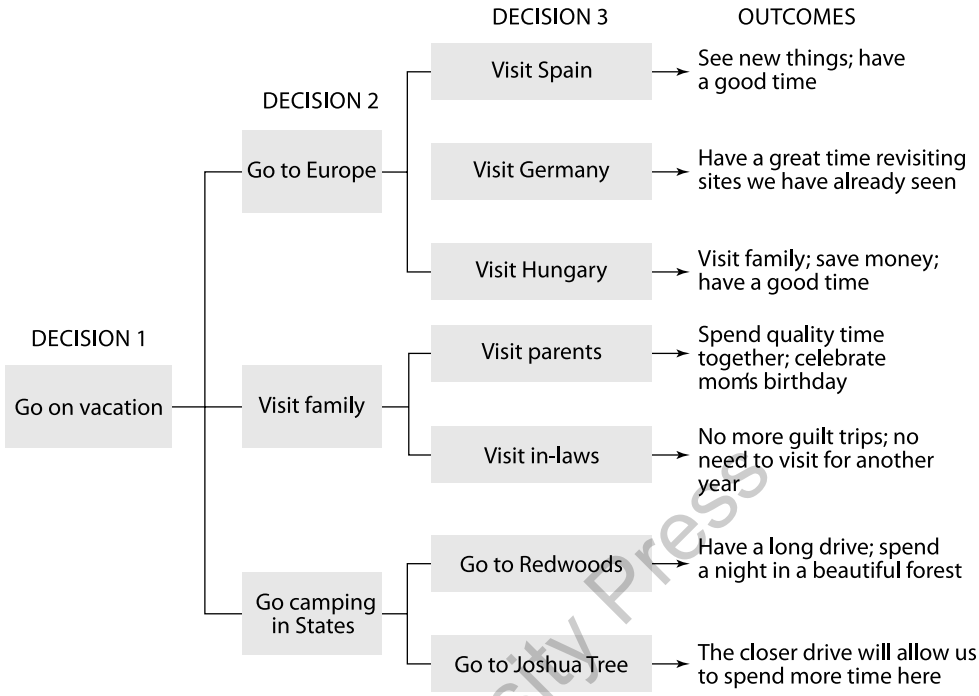


FIGURE 1.14 Organization chart

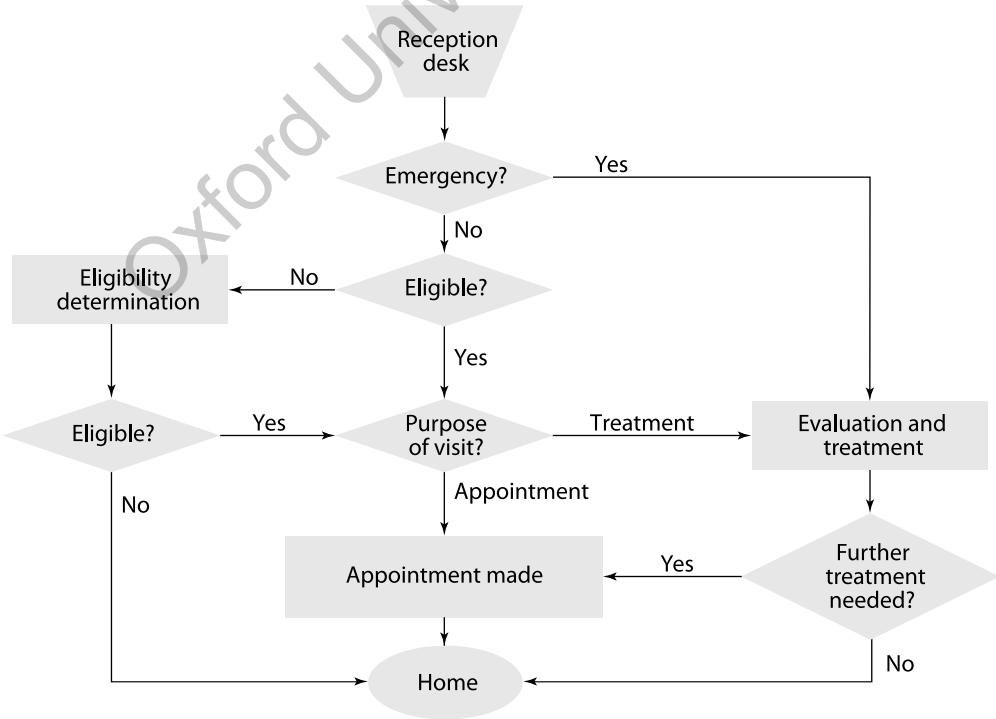


FIGURE 1.15 Flow chart

Drawings and photographs range from those showing minimal detail to those illustrating maximal and minute details. For example, a simple line drawing of how to graft a fruit tree reduces the detail to simple lines representing the hands, the tools, the graft stock, and the graft. On the other hand, there can be complex diagrams showing a schematic view of systems; for example, the wiring diagram of a clock radio, which hardly resembles the actual physical system at all. These graphics with their gradations of detail have varying uses.

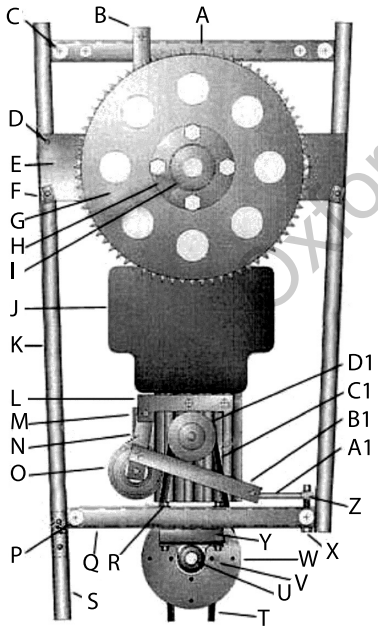
In instructions, simple drawings (often called *line drawings* because they use just lines, without other detail such as shading) are the most common. They simplify the explanations and the objects so that the reader can focus on the key details. In descriptions, detailed drawings are used, including those with shading and depth perspectives. Figures 1.16 and 1.17 show examples of technical drawings.

Several application software programs as well as the Internet provide clip arts, which are pre-made images of fairly common objects such as computers and telephones. These images can be used in technical documents along with suitable labels. Figure 1.18 shows some examples of clip art available in MS Word.

One difference between photography and other forms of graphics is that a photographer, in principle, just records a single moment in reality, with seemingly no interpretation.

Photographs

Photographs are often used in feasibility, recommendation, and evaluation reports. For example, if you are recommending a photocopier, or if you want to compare various cars, automated teller machines, etc., you might want to include photographs to support your report.



A	Upper crossmember front	O	Idler pulley
B	Control rod support	P	Rotor tower tubes
C	Rotor tower tubes	Q	Middle crossmember
D	AN 3 bolts	R	Motor mount spacers
E	Lower main rotor bearing crossmember	S	Tail boom tubes
F	Support tube bracket	T	Tail rotor belt B 210 gates
G	Main rotor sprocket to tooth	U	Jack shaft
H	Main rotor sprocket hub	V	3/4 Pillow block bearings
I	Main rotor shaft	W	Driven pulley
J	503 rotax or larger	X	AN4 bolts
K	Main frame long runs	Y	1 x 3 bolts
L	Idler pulley bracket	Z	Clutch lever
M	Idler pulley engine spacket	A1	MW 4 rod ends
N	Idler pulley swing arms	B1	Engagement arms
C1	Belts (5) super HC 3V280 gates	D1	Drive pulley

FIGURE 1.16 Sample drawing showing a belt drive

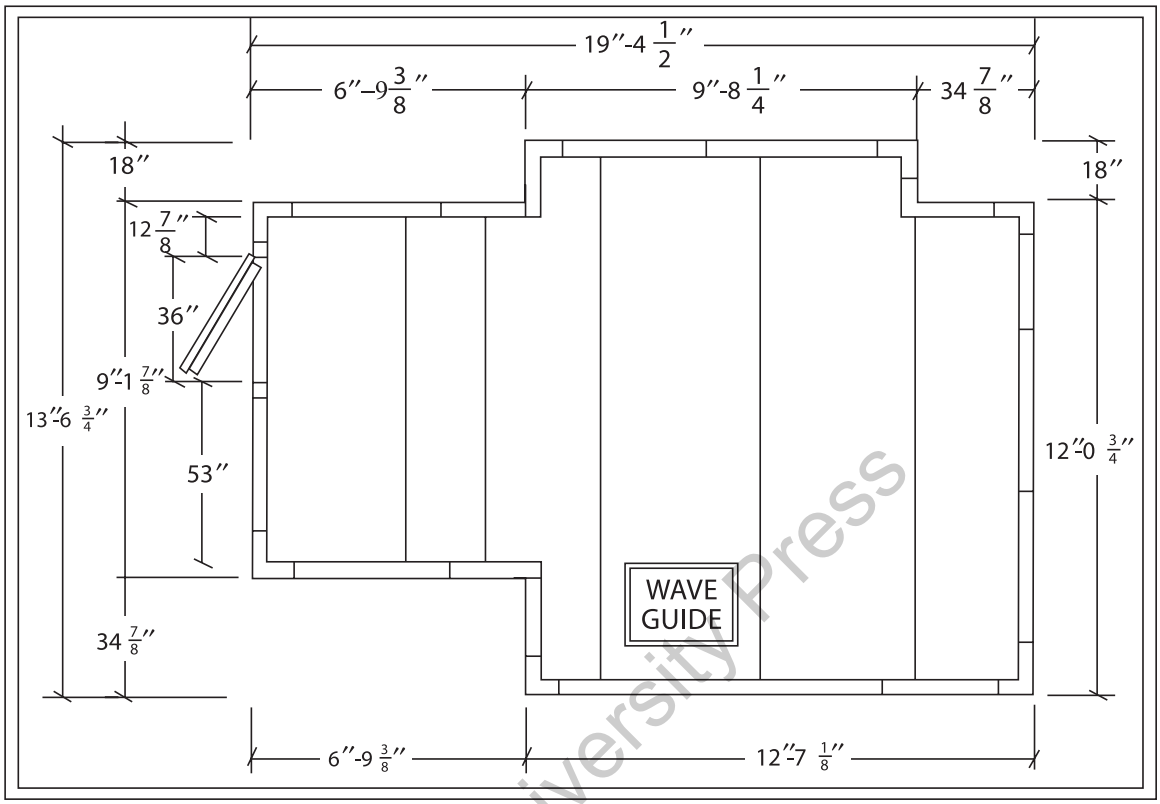


FIGURE 1.17 Sample diagram

FIGURE 1.18 Example of clip art available with MS Word

Photographs give the reader a realistic view of the object. However, they should have a good enough resolution so that they are clear even upon reproduction. Irrelevant details can be removed from photographs by working on the negatives.

Maps

Maps graphically represent spatial relationships on plane surfaces. They are used to establish a frame of reference and to facilitate the understanding of spatial relationships that are difficult to describe in words, especially to serve as navigational aid. They may take different forms, such as the map of a political territory (town, state or country), the layout of a store or a manufacturing plant, or the market area of a business. They are appropriate when discussing or presenting statistical data through geographical indicators or expressing relationships between locations.

The choice of scale for a map depends on its purpose and the amount of detail to be shown. It should be an accurate representation of the geographic details (places, buildings, streets, etc.). Cross-hatching or shading in maps is used to portray absolute amounts, rates, ratios, and percentages of data, such as health statistics, population, employment, traffic flow, and land usage. Colours, symbols, and pictograms may be used to make maps more appealing and attractive.

SUMMARY

Technical communication is process of sharing information through various modes with a specific audi-ence for a specific purpose. The process involves the transmission and interchange of ideas, facts, feelings, or courses of action. Technical communication is different from general communication. The objective of technical communication is to present correct, accurate, concise, clear, and appropriate information.

The communication process includes six main elements—sender, message, channel, receiver, response, and feedback. The success of communication lies in positive feedback. Sometimes the message received is not the same as the message intended by the sender; this is because of the presence of noise.

Communication takes place at different levels: extrap-ersonal, intrapersonal, interpersonal, organizational, and mass communication. In an organization the flow of communication can be vertical, horizontal, or diagonal.

Visual aids are a very important component of written technical communication. These are used extensively in reports, presentations, and proposals, to support the facts and figures being investigated and presented. The various types of visual aids that can be used in technical documents are tables, graphs, charts, drawings and diagrams, photographs, and maps.

EXERCISES

1. Answer the following questions in about 200 words each:
   (a) How is general-purpose communication different from technical communication?
   (b) Communication is the process of sending and receiving information. Explain the communication process in the light of this statement. Draw the communication cycle to support your answer.
   (c) How is feedback important in communication? Give two examples of delayed feedback.
   (d) Explain 'flow of communication'. Illustrate it with examples from the existing communication patterns in your college/institute.
2. What do you understand by the term technical communication? Explain its importance with examples.

3. Human communication takes place at different levels. How can you distinguish between intrapersonal and interpersonal communication?
4. What are the characteristics of mass communication? Explain the term gatekeeper.
5. What are the various modes of communication flow in an organization? What is upward flow and what is the purpose of this mode in an organization?
6. How can visual aids enhance technical communication? What points should be borne in mind while using visual aids?
7. Project: Visit a few organizations (academic institutions/business enterprises/industries) and determine the communication patterns existing there. Classify them into oral and written categories. Also figure out the direction in which these flow. Prepare a two-page report on each of your visits.