

2020 - 2021

B.Tech

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. ✓/A

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

'A bad workman always blames his tools.'

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

See C

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UCS075
UCS111

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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.

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GENERAL AND TECHNICAL COMMUNICATION

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DTPH009

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

A' - CH058, ECO01

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:

- UCE026 • To provide organized information that aids in quick decision-making
 UME056 • To invite corporate joint ventures
 — X — • 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

A' UCS183, UCS143

UME089 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,

A' EC108, UEL118

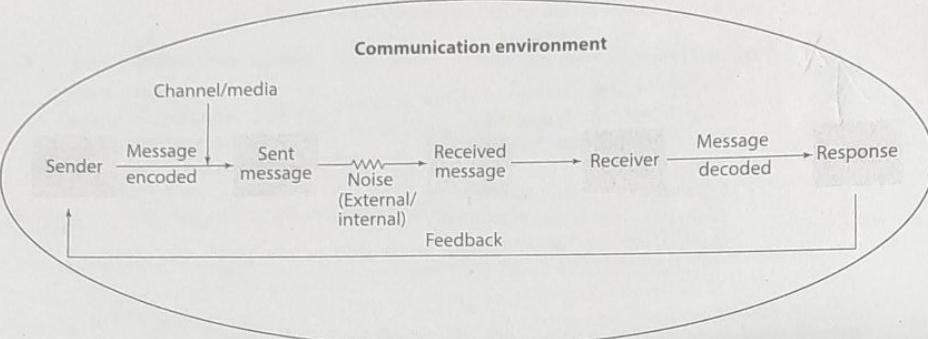


FIGURE 1.1 The process of communication

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.

*(C) → Communication Cycle F) UCH 065, UPE 039, UME 104
 UME 014 UPE 012 UPE 024
 CHO 23 CS 119 PE 058*

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

cubicle - cabin

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

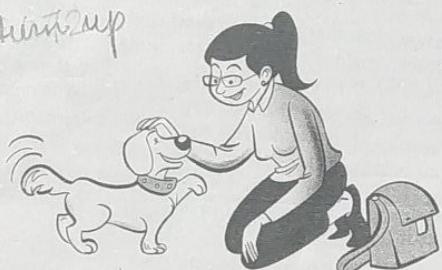
Extrapersonal Communication

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,

Hinking



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.



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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 (F) (not) VEE102, EE059, ✓

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 (F) CS153, UEC077, UEC101

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UE1021
BE044

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

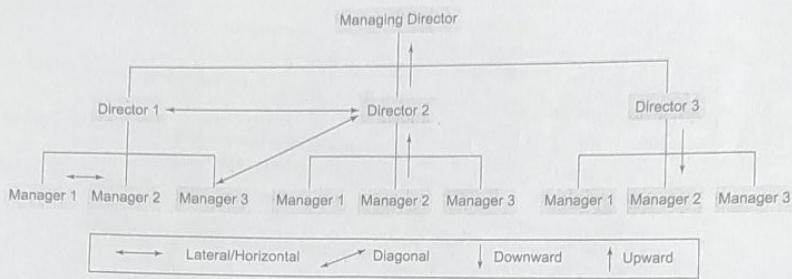


FIGURE 1.2 Flow of communication in an organization

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 informal. 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

Same level

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

higher - lower lower - high

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.

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

'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

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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 'F' UEE 047, ME042, EE018

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EE030
DTPH020
CE066

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

elements in technical writing.

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

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.

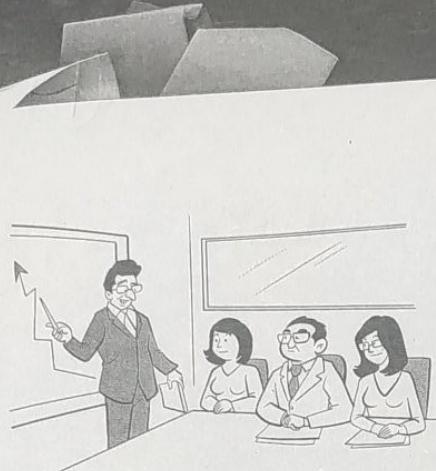
Words

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. Statistical 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 illustrations 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

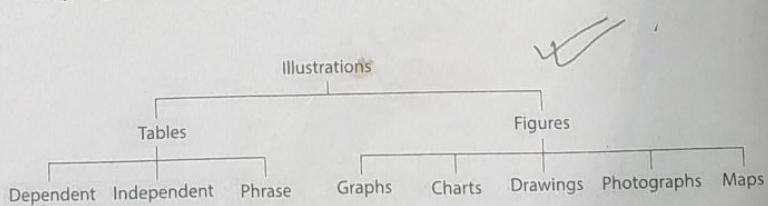


FIGURE 1.3 Types of illustrations

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

This discussion brings us to the introduction of the term 'barrier' in communication. A barrier is defined as something that prevents or controls progress or movement. This definition implies that a barrier is something that comes in the way of the desired outcome. In the example given above, notice that the arrival of your colleagues was an event that prevented your boss from concentrating completely on what you were saying. So, we say that this incident was a barrier to the communication between you and your boss. All of us have come across such situations while communicating with parents, friends, or colleagues. Let us now learn how to avoid such communication failures and make our interactions more effective.

We all know that effective communication is the nerve of all the business activities in an organization. Even a slight break in the communication flow can lead to misunderstandings. Communication is effective only if it creates the desired impact on the receiver.

Communication is effective only if it creates the desired impact on the receiver.

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