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Educational Technology as a Communication Approach and Its Role in the Effectiveness of the Teaching–Learning Process': A socio-educational study.

Dr. Ourida Khouni[1], Dr. Halim Azzaz[2]
[1]Lecturer A, Specialization: Sociology of Education, Department: Department of Sociology, Echahid Cheikh Larbi Tebessi University of Tebessa, Algeria. Email: **ourida.khouni@univ-tebessa.dz**
[2]Specialization: General Sociology, Echahid Cheikh Larbi Tebessi University of Tebessa, Algeria. Email: **halim.azzaz.socio@gmail.com**

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Abstract:
Introducing the concept of communication into the field of education has played a significant role in clarifying the theoretical basis of educational technology. In this context, the focus has shifted towards the process of transmitting information from sender to receiver. Communication models have significantly contributed to identifying the elements of communication and the relationships between them. Communication is therefore considered an important and necessary aspect for individuals working in education, with the aim of achieving the institution's educational objectives.
The use of modern instructional methods based on well-considered foundations and research whose validity has been confirmed through experimentation is known as educational technology. In its broadest sense, educational technology encompasses the methods, tools, materials, devices and organisational structures employed within a given educational system to achieve clearly defined instructional goals. This demonstrates that educational technology encompasses more than just the use of modern machines and equipment; at the most fundamental level, it involves adopting a systems approach. This involves following an organised method and work approach that proceeds through systematic steps and makes use of all the capabilities offered by technology in accordance with teaching and learning theories.. This approach emphasises an integrated view of the role of educational media and its interconnectedness with the other components of these systems in a reciprocal relationship.
Accordingly, educational systems can no longer afford to view educational technology as a luxury; it has become essential for ensuring the success of these systems and is now an integral part of their organisational structure. Although educational media have long been used in teaching and learning processes, they have nevertheless undergone significant and continuous development in recent times with the emergence of modern educational systems. This paper discusses educational technology as an approach to educational communication and its role in the effectiveness of the teaching–learning process in a socio-educational study. The study aims to determine the impact of educational technology as a

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modern approach to educational communication on the effectiveness and success of the teaching–learning process.
How does educational technology affect the effectiveness of the teaching–learning process?
Keywords: communication, educational communication, educational technology, teaching–learning process.

Introduction

The information and communication technology revolution is a defining feature of our era. It has created a significant rupture between the past and the present, widening the digital divide between countries in the Global North and Global South. This technology has developed rapidly and significantly, and consequently, demand for it has increased. Consequently, it has become an essential resource, surpassing traditional resources.

Therefore, institutions, including educational institutions, are now primarily concerned with information and communication technologies that meet the required conditions, as these technologies represent a source of strength and distinction in an era characterised by informatics and a knowledge-based economy. This economy relies on information and methods of delivering it quickly and cheaply. Moreover, given the tremendous growth of this sector and its contribution to all fields — particularly in light of the use of satellite technologies and the internet — institutions have faced a new challenge: acquiring information and communication technologies.

Educational and training institutions, in particular, urgently need to use such technologies. Information and communication technology is an instructional tool that engages learners and encourages them to become independent. It enables them to access information quickly from a wide range of global sources. ICT also enables successful and effective education and contributes to solving some educational problems.

In this research paper, we will address each element separately, beginning with communication: defining it, identifying its components and discussing its importance. We will then move on to educational communication, before finally addressing information and communication technology, its educational applications and its importance in education. We will also discuss its role in improving the effectiveness of educational communication in the teaching–learning process.

How does educational technology, as an approach to educational communication, affect the effectiveness of the teaching–learning process?

What do we mean by educational communication?

How can educational technology serve as an approach to educational communication?

What is the importance of educational technology as an approach to educational communication?

What are the implications of using educational technology for the effectiveness of educational communication and the success of the teaching–learning process?

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1. Definition of communication

We communicate every time and in every place we meet other people or want to convey information, ideas or matters to them. It is one of the most common human activities—perhaps even more important than eating and drinking. It occurs among children and adults, friends and enemies, men and women, and with other human beings. (Hussein Hamdi Al-Tubiji, 1987, p. 31).

It can also be described as the process of creating and sharing meaning through symbols. It occurs when a person sends or receives information, ideas and feelings with others. This does not only involve spoken or written language; it also includes body language and how a person expresses themselves to others.

It is a process through which a specific idea is conveyed or particular knowledge transferred — such as a concept, experience, direction or skill — from one individual to another or a group of individuals, or vice versa. Transfer may even occur from one society to another. This leads to the sharing of ideas, experiences, information and skills among individuals and groups, resulting in a change in behaviour. This change may be desirable or undesirable. All of this happens through direct or indirect communication between individuals, and communication can also take place via various communication devices, such as television and computers. (Sharif Ahmed Al-Aassi, 2004, p. 58).

Communication can take many different forms and expressions. For example:

Communication is defined as the interaction of two or more parties with one another regarding a specific event or topic, with the aim of exchanging information to achieve a desired effect for one or both parties. (Mahmoud Ftooh Muhammad Saadat, 2016, p. 52).

It is also defined as the exchange of specific messages among more than one party using particular means of communication. It is an intentional process that transfers information from one person to another with the aim of creating understanding and harmony between them. (Adel Saleh & Friedrich Alieksander, 2014, p. 22).

It is the process of sending specific meaningful information from one person to another with the intention of influencing the recipient's behaviour. (Mustafa Rabhi, 2010, p. 72).

Communication is the process by which ideas, information, points of view, values and attitudes are shared between people.

It is a process by which a specific idea or particular knowledge, such as a concept, experience, attitude or skill, is conveyed from one individual to another or a group of individuals, and vice versa. Transfer may even happen from one society to another. This leads to the sharing of ideas, experiences, information and skills among individuals and groups, which can result in a change in behaviour. This change may be desirable or undesirable. All of this occurs through direct or indirect communication, and communication devices such as television and computers may be used. (Sharif Ahmed Al-Aassi, 2004, p. 58).

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Communication is the process of producing and transferring information and exchanging ideas, opinions and feelings from one person to another with the aim of influencing them and producing a response through their ideas.

Communication is the transfer of messages between two or more people and their interpretation.

Communication is also considered a process that occurs between two parties in order to reach a shared understanding of a particular subject.

Communication is the foundation upon which human experiences are transferred from one generation to the next. Through communication, individuals exchange ideas, opinions, feelings and sensations. Furthermore, communication encompasses more than just the exchange of spoken words; it also involves the exchange of images, drawings, and other forms of expression.

Based on these definitions, we can conclude that exchanging information and body language and expressing emotions causes people to engage in a set of activities during communication.

Mental activity: because the speaker (or the person expressing themselves) must recall what the other person said or conveyed.

- Psychological activity: because each participant must understand the meanings of words or gestures, understand themselves, and understand the psychology of others.
- Social activity: because even the exchange of information takes place within a social environment.
- Cultural activity: because language is used to exchange information and is an important element of culture. (Hussein Hamdi Al-Tubiji, p. 64).

The communication process begins when a person decides to use a linguistic symbol (such as a word, gesture or sign) to evoke specific meanings in others. By ‘meanings’, we mean the internal responses triggered in us by words whose meanings we know, such as mental images, interpretations, feelings or concepts. The communication process is completed when the internal responses to the meanings in the receiver somewhat match the intended responses of the person who initiated the communication.

2. Characteristics and conditions of communication

Communication is an interactive process through which ideas and information are exchanged. For this process to be successful, certain conditions must be met. These include:

- Clarity: The content of the communication must be clear.

- Simplicity: Communication should be conveyed in a straightforward manner so that the intended information reaches the recipient in an accessible way.

- Soundness of the medium: The communication medium must be safe, functional and appropriate to the level of the recipient in order to avoid misinterpretation.

- Non-contradiction: when multiple communication methods are used, they should be consistent with each other so that communication fulfils its intended purpose.

- Conciseness: because excessive length and elaboration may distort the meaning and cause the recipient to become discouraged and bored. (Adel Saleh & Friedrich Alieksander, 2014, p. 40).

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- Appropriateness: Communication should be suitable for the purpose, time, and implementation procedure, and appropriate for the recipient, so that the information can be received effectively. (Mustafa Rabhi, 2010, p. 74).

If these conditions and characteristics are present in communication, we can judge its effectiveness and success. Moreover, when these conditions are present in an educational setting, we can evaluate the success of the teaching–learning process.

3. Objectives of the Communication Process and Its Functions

In Democracy and Education, John Dewey explains the importance of the communication process. The main points can be summarised as follows:

- Society and its continuity depend on the transfer of work, thought and emotional habits from one generation to the next. Therefore, social life cannot endure without this comprehensive transfer of ideals, values, aspirations and opinions from one individual to another.

-Society continues to exist through the transmission of experience and communication between individuals. However, these processes are not just important; they are the basis of society's existence. People live together as a group because of what they have in common — goals, beliefs, aspirations and information — while communication is the means by which they acquire these shared elements.

- Social life and communication are interrelated: society and individuals change as a result of changes in shared experiences arising from communication. (Mahmoud Ftooh Muhammad Saadat, p. 60).

We can also study the objectives of communication, or its functions, from the perspectives of both the sender and the receiver.

From the sender's perspective, the communication objectives are:

- transferring a particular idea;
- informing;
- teaching;
- persuading;
- entertainment.

From the receiver's perspective, the following objectives can be identified: (Adel Saleh & Friedrich Alieksander, p. 47).

- Understanding the phenomena and events surrounding them.
- Learning new skills.
- Enjoyment and escaping the problems of everyday life.
- Obtaining new information to help them make useful and beneficial decisions.

4. The Importance of Communication

The importance of communication has been evident in human life since ancient times. It is considered a key factor that helps stabilize human life and supports its prosperity. Communication is largely responsible for the growth of human thought and its development, as well as for the advancement of

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nations and human civilizations. Many researchers have regarded communication as an important standard for measuring the level of progress and civilization, and the extent of the development and flourishing a society has achieved.

Throughout history, human beings have used a variety of means and methods to communicate with others, express their ideas and opinions, and share the feelings and emotions that occupy their inner world. As well as spoken words, people have devised other means, such as symbols and signs, turning them into languages and tools for understanding and communicating with others. They have also used images, maps and illustrative drawings to convey their ideas. (Mustafa Rabhi, 2010, p. 76).

Given the importance of communication in human life, efforts have also been made to develop communication tools for everyday use. For instance, humans invented the letters of the modern alphabet, though they underwent many changes before reaching their current form and becoming one of the most important means of communication. Communication and its various forms offer many benefits to people: they contribute to the development of education at all levels of society, improve students' competency and enhance the teaching process itself. Since communication methods are numerous and varied, they can be utilised to promote the progress and development of nations, particularly in education.

For instance, people have capitalised on children's love of animated films and used them as an educational medium. This approach has been shown to increase student achievement because these films convey facts and information that students retain for longer.

5. Elements and components of communication

The sender is the source of the message. They convey the message to others through signals, movements, words or images. The sender may be:

- A human being, such as a teacher in a classroom. In this case, the teacher is the starting point of the educational communication process.
- A machine, such as an educational booklet or a computer with stored information that the learner receives through automated communication. (Mahmoud Ftooh Muhammad Saadat, same reference, p. 100).

However, there is a clear difference between these two types.

When the sender is human, communication between teacher and learner is shaped by prior experience and human characteristics that affect the message and the entire educational situation. Consequently, the message can be adjusted, behaviour can be modified and growth can occur.

When the sender is a machine, the information stored in its memory is fixed and cannot be modified. The machine has no prior experience and lacks human characteristics. Therefore, it is unable to develop or benefit from prior experience.

Receiver: The receiver is the person or entity to whom the message is addressed. They decode its symbols, interpret its content and understand its meaning. The receiver may be an individual or a group

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of individuals. Therefore, we can refer to the receiver as the target group of the communication process, encompassing both individuals and groups simultaneously. (Adel Saleh & Friedrich Alieksander, previous reference, p. 90).

The receiver's behavioural patterns reflect their interpretation of the content and understanding of the message. Therefore, the success of the message is not measured by what the sender provides, but by what the receiver does — specifically, whether they demonstrate desirable behaviour that enables them to face new life situations. It is also important to note that the receiver's understanding of the message's concept depends on their new experiences, their ability to perceive relationships between new and old information, and their psychological and social state. Consequently, the sender's role is not merely to lecture or deliver information, but to create learning opportunities for the receiver and prepare conditions that facilitate learning, enabling experience to be acquired and patterns of behaviour to be modified.

The message: The message is defined as follows: (Mahmoud Foutouh Muhammad Saadat, same reference, p. 102).

The body of knowledge that the sender intends to convey to the receiver.

- The objective that the communication process seeks to achieve.
- A set of arranged symbols whose meanings become clear only through the behaviour exhibited by the receiver.
- Intellectual content that includes various forms of information, whether printed, spoken or visual.

Communication channel: The communication channel between the sender and receiver is the medium through which the message is transmitted. These channels can be verbal, written, visual, or digital, and can include verbal language, print materials, maps, drawings, diagrams, static images, still and moving films, computers, and programmed instruction. (Adel Saleh and Friedrich Alexander, p. 91).

The importance of the communication channel stems from the fact that it is an essential element in the communication process and represents the effective force behind its success or failure. For example, a television programme producer may create a scientific or instructional message that is highly effective and impactful, yet the director may fail to highlight its contents, rendering the message useless.

Environment: The environment is the setting in which communication takes place. In this context, it refers to educational communication inside the classroom. The environment includes the area in which the situation occurs, including seating arrangements, temperature, ventilation, lighting and noise, whether internal or external, as well as odours, the form of the blackboard, the walls of the classroom, the general appearance of the teacher and the appearance and behaviour of the students, and the school administration. Each of these factors plays a fundamental role in the communication process. (Mahmoud Foutouh Muhammad Saadat, same reference, p. 103).

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Most models and forms of the communication process do not give much importance to the environment or setting in which communication takes place, often virtually ignoring it despite its significance in communication between teacher and learner.

Educational communication is defined as: 'Verbal or non-verbal interaction between a sender and a receiver concerning a message with educational content, with the aim of transferring knowledge or achieving specific educational objectives'.

The term 'educational communication' represents one of the subfields of educational communication/interaction. It aims to convey knowledge and develop desirable cognitive, mental, psychomotor, and affective skills in learners.

Educational communication is defined as the process by which teachers simplify learning experiences for students, using all available means to help achieve this and make learners active participants alongside the teacher in the classroom. This is achieved through teaching methods, educational equipment and materials, and educational aids, in order to fulfil educational objectives.

Educational communication media free the teacher from the dominant lecturing role of providing information to a large number of learners.

(G. StanSanfield) specifies four main patterns for the teacher's role in light of the use of educational technology. These patterns are:

If educational media are used to support the teacher's work in the classroom, the teacher's role will be limited to planning, including creating a schedule for using and operating these media. In this case, the teacher becomes a learning manager, as well as a consultant and guide.

If educational machines are used (e.g. programmed instruction models), the teacher's role becomes that of a facilitator and instructor.

If the school has a centre for educational media, the teacher responsible for the centre will be responsible for supervising groups of students working at specified times and helping them to complete their assigned tasks. They will also enable students to use technological equipment. Accordingly, the teacher acts as a coordinator and guide here.

In Computer-Assisted Instruction (CAI), instruction becomes individualised: each student learns at their own level and pace. The teacher's role then focuses on assessing students' needs and learning styles and providing appropriate support. At the same time, the teacher may prepare computer-based instructional programmes.

6. Types of educational communication

Educational communication can be represented in the following ways:

- Human educational communication: pThis type of communication occurs between two people, such as a teacher and a learner, a learner and a teacher, or two teachers. This form of communication is the most common in educational institutions.

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- Semi-human (human–machine) educational communication: This is another form of educational communication in which communication occurs between two parties, one human and one an educational machine. Examples include communication between a teacher and an educational machine, a learner and an educational machine, or between a teacher, learner and educational machine. Interest in this type of communication has recently begun to grow in educational institutions, especially with the development of educational machine technologies and the emergence of computers.

Educational technology (technology of education):

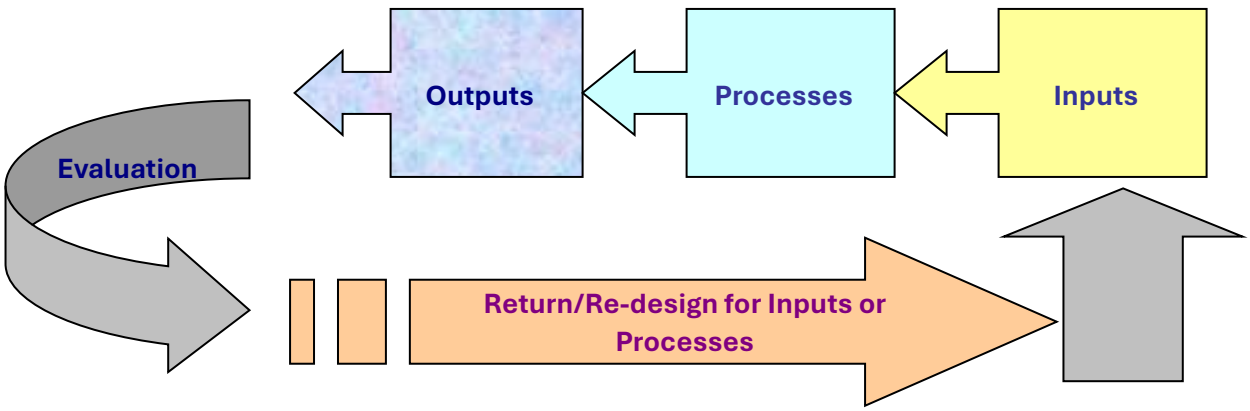
The use of modern educational methods based on well-considered foundations and proven experimental research is known as educational technology. In its broadest sense, it encompasses the methods, tools, materials, devices and organisations employed within a given educational system to achieve its specific educational goals.

Thus, educational technology involves more than merely using modern machines and devices; it primarily involves adopting a systems approach: following a structured method and procedure involving organised steps that make use of all the capabilities provided by technology in accordance with teaching and learning theories. This approach confirms an integrated view of the role of educational media and their interconnection with the other components of these systems as part of a reciprocal relationship.

Definition of educational technology/teaching technologies (e.g. Muhammad Ziyad Hamdan, 1987, p. 53).

Reliance on educational technology is no longer a luxury for educational systems; it has become a necessity for their success and an integral part of their overall structure. Although the use of educational media in teaching and learning processes has deep historical roots, it has evolved significantly in recent times with the emergence of modern educational systems.

Educational technology has evolved significantly, moving through various stages until reaching its current advanced phase, which is linked to modern communication theory and the systems approach.



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It is well known that the word 'technology' is of Greek origin. Consisting of two syllables, the first, "techno", refers to a craft or industry, while the second, "logy", denotes a science. Taken together, the two syllables indicate a science of craft and industry. Here, 'craft' refers to the application of theories and the results of research. Thus, technology — which has been Arabicised as technologies — means the science of skills or arts, i.e. the logical study of skills in order to perform a specific function.

Based on the above, educational technology can be defined as an integrated educational system that includes the processes of selecting, producing and using its various components.

It can also be defined as follows: "An applied formulation of concepts in light of the relationships among the teacher, the learner, and all those concerned with and participating in the educational process." It is embodied in the verbal and non-verbal language of educational communication, as well as the educational tools that facilitate the transmission of instructional content to learners in an accessible manner while minimising the errors of traditional teaching methods."

Steller argues that the word 'technology' is derived from the Latin 'textere', meaning 'to weave'; it then passed into French as 'technique', and subsequently into English as 'technology', before being translated into Arabic as 'taqniyāt'. (Muhammad Ziyad Hamdan, 2008, pp. 28–30).

In general, the word 'technology' is composed of two parts: 'techno', meaning a craft or application, and 'logy', meaning a science. Therefore, technology means the science of application.

The Association for Educational Communications and Technology (AECT) has provided several definitions over time, including the following:

- AECT (1963): Audiovisual communications concerned with designing and using tools that control the teaching process.
- AECT (1967): A field for developing, applying and evaluating systems, approaches and media to enhance human learning.
- Presidential Commission, 1970: Media emerging from forms of communication to achieve educational objectives alongside teachers and textbooks, such as films, videos and optical boards/overhead slides.
- AECT (1972): A field of work aimed at facilitating the human environment by identifying, developing, organising, using and managing educational resources.
- AECT 1977: A complex process involving individuals, procedures, ideas and tools, as well as organisation, for analysing problems and implementing and evaluating solutions related to human education.
- AECT 1994: Theory and practice in designing, developing, using, managing and evaluating processes and resources to facilitate learning.

This definition is characterised by the following: (Hussein Hamdy Al-Tuwaiji, 1987, p. 33).

- The inclusion of theory (concepts, structures, principles and assumptions that contribute to the development of knowledge).
- Application, meaning the employment of that knowledge.

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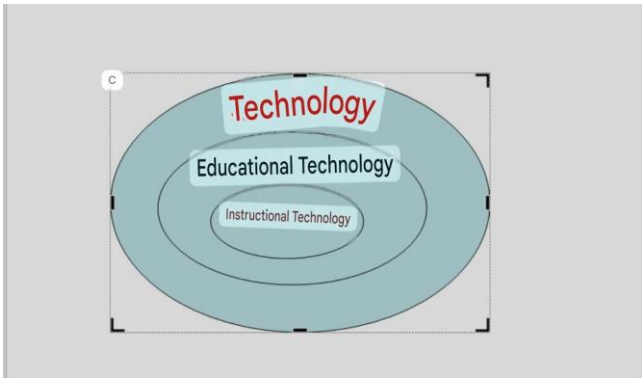
The objective of educational technology is to activate learning, i.e. to emphasise the outcomes of the educational process. Teaching is a means of learning, while learning is the end result.

In general, educational technology can be described as follows: The science of using theories and scientific innovations to effectively achieve educational objectives in a simpler, faster and less costly manner.

The relationship between educational technology and educational pedagogy (teaching technology).



Some scholars argue that the word ‘technology’ is of Greek origin and, in its modern sense, refers to the science of applying knowledge in a systematic way for scientific purposes. When divided into two parts, the first denotes skill, while the second denotes the art of teaching. Thus, taken together, it refers to ‘skill in the art of teaching’ (Muhammad Ziyad Hamdan, 1987, p. 35). (Muhammad Ziyad Hamdan, 1987, p. 35).

Charles Beard defines educational technology as: ‘the totality of what is available in laboratories, machines, and systems that have been developed and tested’ (Hussein Hamdy Al-Tuwaiji, 2008, p. 39). This concept is originally related to the pure sciences, especially mathematics, yet this definition does not address the extent to which educational objectives can be achieved. (Hussein Hamdy Al-Tuwaiji, 2008, p. 39).

Conversely, Henry B. Du defines technology as being greater than scientific development, engineering achievements and mechanical power. It is the aggregate of tools and means that can enhance human life, i.e. a force that can lead to inventions, skills, equipment, and methods.

Some people may assume that educational technology consists only of modern teaching methods or the use of educational equipment. In fact, some teachers may even take pride in having a variety of educational devices in their classrooms. They may even enter the classroom carrying a variety of educational tools. However, educational technology is broader than that. It encompasses the blackboard and chalk, laboratories, educational equipment, closed-circuit television systems, educational machines, computers and satellites, as well as the instructional strategy that determines how to use these resources within various teaching patterns and models.

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7. The development of the concept of educational technology

Given the significant technological advancements in various fields in the current era, which have also impacted the field of education in terms of educational materials, sub-disciplines, teaching methods, approaches and the overarching objective of the educational process, educational media have evolved through different designations until they became a distinct field of study with its own significance and objectives. This field is educational technology. In this section, we will review the historical development of the concept of educational technology.

A. Stage One (Muhammad Ziyad Hamdan, previous reference, p. 37):

Visual Education (Visual Insurrection):

The use of educational aids dates back to ancient Egypt, where they were the first to recognise the importance of using tools to teach literacy and numeracy to young learners. They used pieces of stone and pebbles to teach counting and arithmetic, and they also used engravings on temples and stones to teach writing. They referred to these as "means of perception" because they helped young learners to understand the subjects they were studying.

Furthermore, given that educators believe learning relies more heavily on sight, and that 80–90% of an individual's educational experience is acquired through this sense, they termed these aids 'visual'.

Audio-Visual Instruction:

Despite the emergence of the term 'visual aids', its scope remained limited because instruction under this term is confined to the sense of sight only. Meanwhile, blind people learn through the sense of hearing. Therefore, the term 'audio-visual aids' emerged, relying on both hearing and sight in the learning process.

Learning Through All Senses:

Although attempts were made to address the limitations of the term 'visual aids' and the term 'audio-visual aids' emerged, the latter also has limitations. It restricts learning to the two senses of hearing and sight only, whereas individuals use all their senses when learning, such as smell, touch and taste. For this reason, the term 'educational aids' emerged as a more comprehensive concept: it does not depend on a single sense, but rather on all of the learner's senses. (Muhammad Ziyad Hamdan, p. 39).

B. Stage Two:

At this stage, the concept of educational aids was based on the idea that they were teaching or learning aids. Therefore, they were termed 'visual aids' (i.e. means of clarification), though teachers used them to varying degrees depending on their understanding of these aids and their importance. Some teachers did not use them at all. It could be argued that these labels restrict the scope of such aids.

C. Stage Three:

At this stage, it was agreed that educational aids function as a medium between the teacher (the sender) and the learner (the receiver). Alternatively, they are the channel(s) through which the educational material is transmitted from the sender to the receiver. Accordingly, these aids vary, and their selection

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depends on many factors, including educational objectives, behavioural objectives set by the teacher and characteristics of the learners.

As a result, the term 'multimedia educational media' (multiple educational media) emerged. Within this framework, it encompasses primary, supplementary, additional and enrichment media.

(d) Stage Four: In this stage, educational media and teaching aids began to be viewed within the framework of the Systems Approach, meaning they became an integral and inseparable part of the educational process as a whole. Accordingly, attention shifted to the instructional materials and educational devices as well as the strategy designed by the designer. (Muhammad Ziyad Hamdan, previous reference, p. 40).

This system clarifies how educational aids are used to achieve specified behavioural objectives, taking into account the criteria for selecting the aids and how they are used. In other words, teachers follow a systems-based approach so that educational aids become one of the elements of an integrated system for achieving lesson objectives and solving learning problems. This is what the concept of educational technology accomplishes.

Thus, interest in educational aids has progressed through four stages. Initially, attention was confined to selecting learning materials, then interest began to focus on teaching aids. Subsequently, attention turned to the communication process as a goal in itself, and educational media became an additional component of the educational communication process. Finally, today's emphasis is on educational technology as an approach to work, a way of thinking and a means of problem solving. (Hussein Hamdi Al-Tuwaiji, previous reference, p. 42).

8. Educational Technology and Considering Learner Characteristics:

Many internal processes take place in the student's mind, leading to behavioural changes in the desired direction. These processes can be summarised as follows: attention, perception, thinking and learning. Educational technology plays a key role in presenting academic content in an engaging way with which students interact in a learning situation, resulting in the desired response. This can be explained as follows:

- Attention: Attention is the mental process that activates the learner's senses of hearing, sight, smell, taste and touch. Without the activation of these senses and the state of alertness that accompanies receiving stimuli, thinking cannot occur and learning cannot follow. Focusing attention on an object enables the learner to recognise and interact with it.

Educational technology plays a key role in stimulating learners' senses by engaging with them directly. It captures and holds interest by triggering internal psychological processes that increase learners' activity and enthusiasm for learning, thereby ensuring continued focus on the academic material presented.

- Perception: Perception is the next stage after paying attention to academic content. It is achieved through the use of the senses, via which the learner receives instructional input. This reception process

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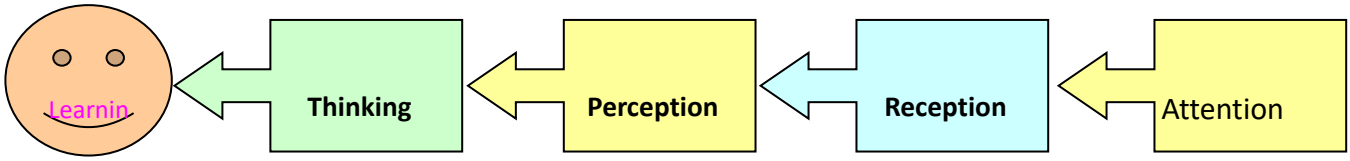
leads to perception — the process of giving meaning to what the learner has received through their senses. This is known as the formation of perceptions (mental representations).

For example, recognising the acidity of foods begins with tasting: the stimulus is received and, based on the learner's prior experiences, the sensation is interpreted and assigned a specific meaning. This is how the perception process takes place. The following section provides an illustration of the processes involved in perception.

From the foregoing, it is clear that perception is a unique mental state for each learner. It varies from one student to another, depending on their prior experiences, how the academic content is presented to them and how their senses interact with it.



- Thinking: Thinking is a mental state involving cognitive activities. It involves mental images, meanings, words, numbers, memories, signs, expressions and attitudes. These mental elements stand in place of the objects, people, situations, and events about which the individual is thinking. The purpose is to understand specific circumstances.

During this process, students use their previous experiences and knowledge to make sense of the academic material presented to them, or to find a solution or reach a final goal. If direct experience is not enough, students use various cognitive activities to help them, such as perceiving relationships within the situation, selecting alternatives, and reorganising the experiences and ideas presented. This is done in order to achieve the final objective.

Educational technology also plays a central role in activating the learner's thought processes. This is because it helps to develop individuals' capabilities through its interactive components, which influence one another. Therefore, it is important to train students in organised scientific thinking using different processes such as interpretation, analysis and evaluation. This enables them to achieve objectives with ease, accuracy and speed.

- Learning: Learning refers to a desirable change in an individual's behaviour in response to practice and interaction with their environment, which affects and is affected by them. Students' prior life experiences play a primary role in perception processes and forming ideas, leading to learning. Learning also persists for longer in the learner. Educational technology can contribute to learning in a wider and more effective manner by engaging multiple senses when learners engage with academic material. This

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provides learners with powerful educational experiences that build on their previous experiences, thereby producing effective, long-lasting learning.

9. The Importance of Educational Technology:

Some people mistakenly believe that educational technology is only important because of the importance of educational aids. However, there is a difference: Educational aids are only one part of educational technology. Therefore, educational technology is broader and more comprehensive. The role and importance of educational technology tools and aids in the educational process can be seen in the following areas:

- Sensory perception: illustrations and diagrams play an important role in clarifying written words for learners and conveying the intended content.

- Understanding: These tools help learners to distinguish and differentiate between things, such as colours.

- Skills: Educational technology tools help children acquire specific skills, such as correct pronunciation or certain mathematical skills, through slow-motion animated films. They also help children to develop their drawing skills and learn to use colours.

- Thinking: Educational aids play a major role in teaching children to think in an organised manner and solve the problems they face.

- Diversifying experiences: By using educational aids, it is possible to vary the experiences presented to students in the classroom, allowing them to observe, listen, practise and reflect. This way, all of the learner's senses participate in the learning process, leading to reinforced and deeper learning.

- Increasing vocabulary: There is no doubt that educational aids expand children's and students' vocabulary by exposing them to new words that may hold personal significance.

- Building correct concepts: Through a variety of educational aids, learners can be guided towards correct generalisations and concepts. For example, a child may think that the word 'stem' applies to every part of a plant above the soil. However, by presenting them with multiple models and images of different types of stems, they learn that there are ground-based, aerial, climbing and modified stems.

- Developing the ability to appreciate beauty: By showing films and images, children can learn to appreciate beauty in nature and the arts from an early age.

- Reducing instructional time: Some educational aids can shorten the time required for teaching and learning, enabling teachers to present large amounts of information in relatively short periods.

- Supporting varied teaching methods: Educational aids help to diversify teaching approaches in order to address the individual differences among students.

- Making learning more lasting: They ensure that what learners acquire remains with them for longer.

- Increasing learners' motivation and improving the educational process overall.

10. The importance of using information and communication technology in education: (Muhammad Al-Sirfi, 2009, p. 304).

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Recent advances in technology and instructional technologies, as well as our growing understanding of learning processes, can contribute significantly to the global spread and improvement of education. This can be achieved through educational approaches and techniques that meet specific educational needs under prevailing conditions and with available resources. Such approaches are not limited to machines and technological devices produced by the communications revolution, such as programmed instruction, distance/open education, virtual education and computers. Rather, they encompass all areas of education. They function as a systematic curriculum and methodological approach to planning, implementing and evaluating the entire learning process in light of clearly defined objectives. They are mainly founded on research into human learning, learning theories, and communication methods.

They also represent new approaches to research and thinking, new technologies for organising and coordinating, and a new attitude towards reading. They involve the optimal use of resources, a new distribution of productive forces and a restructuring of relationships between them. This makes it necessary to carefully study the various educational means and tools in order to select the most appropriate ones from an educational perspective and guide learners to use them optimally.

All of the above requires the development of a plan to adapt to rapid technological and informational developments in order to improve the quality of education. This should be achieved by using modern teaching and learning methods, approaches and tools—approaches that would raise the efficiency of education and enable better programme, curriculum and learning activity planning. As a result, education would move beyond a reliance on rote teaching and shift towards approaches based on thinking. This would enable learners to acquire the mental skills and capabilities needed to deal with the issues of the modern era, particularly the issue of information: how to search for it, collect it, analyse it, interpret it, and apply it appropriately within the educational process. This fosters lifelong self-learning in learners, an aim emphasised by contemporary educational trends to confront the era's challenges and changing conditions. It also contributes to building and advancing society in the future by creating tools for dealing with information and understanding the value of what we learn. This is especially important because technological development is one of the key standards used to measure the progress of any country. (Muhammad Al-Sirfi, 2009, p. 305)

As education is a means of disseminating knowledge and technology, there is a close relationship between the two. Therefore, various efforts must be made to develop education, its philosophy, policy, curricula, teaching methods and system, so that we can increase our influence and control over reality and become creative individuals who can deal with information as producers, not just consumers. This requires us to collect, classify, analyse, synthesise and interpret the information that has become available through the information revolution, extracting new facts from it and continually opening up wider horizons. In this context, effectively using information and communication technology in education (rather than using it superficially or formally) helps learners acquire the knowledge, skills, techniques and methodologies that enable creativity.

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11. The Role of Educational Technology in Addressing Educational Problems: (Source: https://www.abhathna.com)

Educational technology plays an important role in education and in addressing problems that hinder the achievement of its goals across its various fields. From this standpoint, it contributes to responding to rapid social and scientific changes and helps the educational process keep pace with and interact with them. In this section, we will mention some of the problems that educational technology can help to solve. There are many such problems in different educational fields, including:

The Knowledge Explosion:

The rapid growth of knowledge in various fields, both vertically and horizontally, has made it necessary for education to keep pace with the continuous emergence of new theories and extensive research. This rapid growth is also reflected in the increasing number of topics included within a single subject, requiring students to become familiar with them all. Consequently, a new role for educational technology has emerged: to identify, organise and select the most appropriate methods for processing and presenting this knowledge and research to students, and to teach learners how to engage with it in a way that fosters their scientific thinking and mental abilities. This enables them to acquire knowledge quickly and accurately with a specified amount of effort.

*** Assisting in the development of thinking:**

Computers are effective at solving many of the problems faced by learners. Moreover, the continuous development of information technology resulting from computers can improve learners' mental growth. Through computers and associated information technology, learners can make predictions and analyse educational problems in a more advanced manner. Therefore, computers encourage individual learning, which can only be achieved by allocating one to each learner or reducing the number of learners per computer as much as possible.

(Muhammad Mahmoud Al-Hila & Toufik Ahmed Al-Maray, 2004, pp. 120–125).

In summary, computers are an effective means of individual learning when used appropriately, through in-depth study and making full use of all their capabilities in accordance with the surrounding environment.

*** Assisting in the development of self-learning:**

The computer can facilitate self-learning by enabling learners to search for and investigate solutions to various problems using programming. This is reflected in learners' higher achievement in subjects in which the computer was used for study. Additionally, users of educational software programmes demonstrate greater self-learning ability than those who do not actively use such programmes.

*** Assisting in the development of skills:**

The computer helps learners develop many skills, the most important of which are logical skills that enable learners to predict the sequence of computer commands. It also supports 'natural' skills, such as learning to type on a keyboard. Furthermore, computers greatly contribute to the development of

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problem-solving skills by encouraging learners to explore the problem itself and determine how to carry out logical steps to solve it. In this way, computers encourage learners to investigate the natural phenomena that interest them and design inferences and hypotheses about the results.
(Muhammad Mahmoud Al-Hila & toufik Ahmed Al-Maray, 2004, pp. 125–130).

*** The Population Explosion:**

The rapid growth in population size has led to a sharp rise in the number of students in classrooms, despite differences in culture and income levels. This puts a heavy strain on the education system: classrooms are becoming overcrowded, and more schools need to be built each year, as well as more teachers and staff employed, to provide adequate services. At the same time, improving the quality of education is important in order to keep up with rapid scientific and civilisational developments and prepare these students for major industrial changes. Educational technology has helped to address this issue by providing modern educational systems and new forms of learning, such as distance and open education. This has also changed the role of teachers, shifting the focus from being the main source of knowledge to becoming organisers and guides of the educational process.

*** The problem of illiteracy:**

Despite scientific progress and the expansion of knowledge and education, many Arab countries and other developing nations continue to suffer from illiteracy. This problem hinders progress in many areas and undermines successful attempts at scientific and economic development, as well as their applications in various fields, due to a low ability to adapt to change and deal with its variables.

Illiteracy hinders the intellectual development and mental enrichment of individuals. It also reinforces attachment to old ideas and superstitions, and moves people away from scientific thinking. Therefore, it is important to use educational technology to confront this problem using modern techniques, such as educational television, satellites and film programmes, alongside expanding educational programmes aimed at adults and literacy campaigns. The goal is to overcome illiteracy (the inability to read and write) among some members of society, develop their mental abilities, raise their cultural awareness and train them in the scientific method of thinking.

*** Diversifying sources of knowledge:**

Scientific progress is not confined to a single country. Rather, new developments emerge daily in many places. What is needed is greater awareness of where these developments are found, how they can be shared with other countries and transferred to our own country in the best possible way.

This has given rise to new roles for learning technology. These roles do not rely solely on textbooks as a means of transferring scientific knowledge. Instead, there are many other ways to present knowledge to students, enabling them to interact with it in a manner that suits their abilities, interests and needs. Some knowledge is broadcast via satellites in the form of open or direct television programmes, as well as laser discs, computer disks and various audio-visual recordings.

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*** The variety of tools that graduates must deal with:**

It has become essential for graduates to work with modern tools and devices that differ in their specifications and operating methods, and to benefit from them in ways that go beyond what they encountered during their studies. This is not limited to devices and tools directly related to their field of study; rather, they may need to use hundreds of other devices.

This necessitates a change in the philosophy of schools in educating and training graduates, preparing them to deal with modern industrial and cultural changes. As it is difficult to update school curricula and laboratories daily to keep up with every new development, educational technology increasingly plays a key role in helping individuals learn independently and develop self-directed ways of working with modern materials and devices. Educational technology also helps learners develop general work skills and the ability to interact with modern changes. It also plays a role in reshaping the educational system in light of society's need for graduates with the necessary skills and information.

*** Low efficiency of the educational process:**

There have been many complaints about the low standard of graduates and the fact that schools are producing 'half-educated' students. One reason for this is that many schools operate on multiple shifts per day, alongside overcrowded timetables, short class periods, information overload and large class sizes. How, then, can we expect high-achieving graduates?

How can a teacher effectively teach a class of forty students, when each student gets only half a minute of attention? When will the lesson be presented after it has been introduced? When will assessment and evaluation take place? Educational technology can help by enabling large numbers of students to be accommodated.

Consequently, we now see closed-circuit TV systems in universities, an increased reliance on self-learning and video resources. This includes multi-purpose laboratories and educational television programmes that complement what is taught in school and enrich the educational process. (Kemal Abdel Hamid Zaytoun, 2004, p. 180).

- Attracting learners' attention.
- helping learners to understand the learning objectives.
- Providing immediate review of the required skills.
- Producing new information.
- Developing and directing the learning process in a more effective way.
- Improving tests and assessments.
- Improving learners' evaluation of information.
- Shortage of qualified teachers:

Due to the annual increase in the number of schools, which has not been matched by a corresponding increase in the number of teachers who are qualified to deal with students' psychological and physical

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needs, as well as to teach them methods of acquiring and applying knowledge, the Ministry of Education has resorted to assigning people who are not qualified in pedagogy to work as teachers.

This has led to psychological problems for students and the newly appointed teachers, who often leave their original fields of specialisation to avoid teaching work. They also lack the competence to design, prepare, implement and evaluate educational programmes. This shortage of teacher training reduces teachers' abilities and limits learners' ability to interact with educational material and receive support in the classroom.

*** Changing the teacher's role:**

The teacher's role has changed as a result of various cultural and industrial developments in society. Teachers are no longer the sole source of knowledge or the central focus of the educational process. Instead, teachers have become helpers, helping students to improve their level by planning, designing and supervising educational programmes that match their abilities, academic level and interests.

This requires the provision of educational materials, modern tools, and devices to support teachers in performing these new roles.

*** Low level of teacher preparation programmes:**

The limited training programmes offered by educational and pedagogical institutions are no longer effective in improving teachers' professional skills. In many cases, these programmes are mainly used as a way to promote teachers into administrative positions. Consequently, they tend to neglect scientific subject matter, the development and evaluation of educational programmes, teaching methods and the production of teaching aids. Instead, they often concentrate on administrative approaches in schools.

In addition, teachers often do not embrace new ideas because they are usually able to fulfil these requirements. There is also a lack of financial incentives. Furthermore, some programmes do not consider the different subject specialisations of teachers or how to develop them pedagogically and academically. I believe that using educational technology in training, adopting new technologies and showing teachers how to use them as pedagogical tools in their various specialisations, is an urgent necessity and a modern requirement that cannot be ignored.

12.Difficulty in employing information and communication technology in education

*** Financial difficulties**

Implementing it requires significant financial investment. Therefore, limited available resources are a major obstacle to improving the educational process, especially since investment in this sector is long term and requires careful budget planning. (Hussein Hamdy Al-Tawbaji, 2008, p. 101).

*** Technical difficulties**

This requires advanced communication infrastructure and high-quality devices to increase computer speed, networks and related systems. One of the most important challenges is the difficulty of conducting regular maintenance due to continual developments in this field. There is also a shortage of

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qualified technical personnel and specialists, leading to reliance on foreign expertise, which requires significant financial expenditure.

*** Psychological difficulties**

These are related to the human element: teachers may resist or refuse this new technology, clinging to old methods instead. They justify this by arguing that they can control educational content through textbooks.

Conclusion

Educational communication is important because it helps to achieve objectives. Therefore, it is urgent that we pay attention to it by selecting the appropriate type of communication and the suitable tool with which to deliver the message. This improves communication methods and reduces possible obstacles.

This requires a careful study of the different educational tools and methods to select the most appropriate options from an educational perspective. It also requires learners to be guided in using these tools in the best possible way. Furthermore, it is necessary to develop a plan to keep pace with rapid technical and informational developments to ensure educational quality.

Using modern methods, approaches and tools in teaching and learning increases the efficiency of education and improves the planning of curricula, programmes and activities. This will shift education away from a reliance on memorisation and lecturing towards approaches that develop thinking skills and equip learners with the mental abilities needed to deal with modern-day issues, especially the issue of information: how to seek it, collect it, analyse it, interpret it and employ it appropriately in the educational process.

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