

The effectiveness of technological means in achieving the teaching and learning process

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Abstract: The contemporary world is witnessing a great development in technology or what is known as the information revolution that has affected all fields, especially the field of education, in order to enhance effectiveness and efficiency in the teaching and learning process, in addition to creating an interactive space that allows its use within the limits of achieving the goals of teaching and learning.

Accordingly, in this study we try to address the concept of educational technology with its various means and media as a prominent turning point in the educational learning path, and to stand on the extent of its compatibility and application, especially in the Algerian educational system..

Keywords: Means; Technology ; Education; Learning.

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1. Introduction :

Education represents a complex system due to the abundance of its elements and the multiplicity of its aspects, in addition to the interplay of internal and external factors and influences, However the meaning of education get completed by the distinct image accompanying it, which represent the space or place where this system occurs and takes its course, such as schools in their various stages, as well as university campuses, which ultimately form a hierarchical and diversified structure simultaneously. In fact Education has been characterized by numerous theories and methods, such as the connection theory by Edward Thorndike, the classical conditioning theory by Ivan Pavlov, the constructivist theory by Jean Piaget, and many other theories that have created various orientations and methods through which the art of teaching is practiced.

On the other hand, learning at each stage of developmental phases differs in form, content, methods, outcomes, and resulting effects. It occurs consciously, intentionally, and purposefully at times, while at other times, it happens spontaneously and unintentionally. Sometimes it is observable, tangible, sensory, and measurable, while at other times, it is hidden and latent, and its occurrence can only be inferred indirectly to understand its essence and reveal the processes that produced it. And with the technological advancements achieved by humans, schools are just like other societal institutions, have been subject to immense influences imposed by this development in the 20th and early 21st centuries, Where The integration of education and technology has been a factor in the emergence of a new concept called "educational technology."

2. Concept defining

2.1- The concept of the educational process :

" The education process is a systematic, sequential, logical, scientifically based, planned course of action consisting of two major interdependent operations: teaching and learning. This process forms a continuous cycle that also involves two

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interdependent players: the teacher and the learner. Together, they jointly perform teaching and learning activities, the outcome of which leads to mutually desired behavior changes. These changes foster growth in the learner and, it should be acknowledged, growth in the teacher as well. Thus, the education process is a framework for a participatory, shared approach to teaching and learning "¹

Due to the importance of the educational process, several theories have emerged, attempting to establish principles that lay the foundation for the concept of education and encompass all its elements, These theories include :

a- Behaviorism theory: Behaviorism in education, or behavioral learning theory is a branch of psychology that was emerged in the early 20th century ² it focuses on how people learn through their interactions with the environment. It is based on the idea that all behaviors are acquired through conditioning, which is a process of reinforcement and punishment. According to this theory, learning is a change in observable behavior that results from experience. Furthermore the Behaviorism school included three categories:

- **The first category:** Associative theories, including Ivan Pavlov's classical conditioning theory, John Watson's views on association, Edwin Guthrie's theory of pairing, and William Estes' theory. These theories emphasize that learning involves forming associations through pairing environmental stimuli with specific responses. They differ in their interpretation of the nature of these associations and how they are formed³

- **The second category:** Functionalist theories, including Edward Thorndike's theory (trial and error model), Clark Hull's theory (drive theory), and B.F. Skinner's theory (operant

¹- Susan B. Bastable, *Nurse as educator principles of teaching and learning for nursing practice*, Siracuse. New York, 2019. P13.

² - Bryan Danley.Nakita James, *behaviorism theory and it's relation to instructional design*, p4

³ - James A Athanasou (ed), *Adult educational psychology*, sense publisher, 2008

conditioning). These theories emphasize the functions performed by behavior while focusing on the associative processes formed between stimuli and behavior.

- **Cognitive Theories:** The third category of learning theories, including Gestalt psychology, Piaget's cognitive development theory, the information processing model, and Edward Tolman's purposive theory. These theories focus on internal processes such as thinking, planning, decision-making, and expectations more than external aspects of behavior⁴

The behavioral school relies on the principles of reinforcement, reward, and punishment for children in the educational process. It is one of the most widely applied theories in schools by teachers and educational counselors, using reinforcement to encourage students to study and achieve good grades or to shape and display desired behavior while hiding undesired behavior, and using punishment for shortcomings or to change undesirable behavior.

b- Cognitive School: The cognitive school is among the modern educational approaches, influenced by advancements in computer science, leading scientists to develop new concepts of mental processes and their functions. It emerged as a reaction to the behavioral school and its explanations of learning. The term "cognition" refers to mental processes such as perception, memory, and information processing, which individuals use to acquire knowledge, solve problems, and plan for the future. Cognitive psychologists argue that individuals are not more recipients of stimuli passively; rather, the mind actively processes information received efficiently and transforms it into new forms. In the educational process according to this school, the teacher enables learners to connect new acquisitions with previously acquired knowledge. The learner, in this case, is active, receiving, understanding, processing, storing information, and recalling it when needed. Thus, learning, based

⁴ - Clint Grider, *foundations of cognitive theory A concise review . Psychology*; vol. 8 No. 3.

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on cognitive educational theory, occurs by recalling previous information and using it in different or new situations.

C- Constructivist School:

Constructivist learning⁵ is a concept derived from constructivist theory, where individuals create mental models through which they can understand the world around them. However, the meaning of constructivism suggests that learning can be more effectively achieved when individuals are also active in achieving tangible things in the real world. In this case, the teacher assists learners in discovering learning situations and self-understanding by asking appropriate questions. In return, the learner becomes an active interpreter of the information received based on their personal experience. Thus, the educational process here relies on the use of previous knowledge in real-life contexts.

2.2- Concept of Educational Technology:

" According to the Association for Educational Communication and Technology, AECT (1977), 'educational technology is a complex and integrated process, involving people, procedures, ideas, devices and organization, for analysing problems and devising, implementing, evaluating and managing solutions to those problems, involved in all aspects of human learning'." ⁶

Moreover, it is system that designs, evaluates, and directs the educational process to achieve the educational objectives using modern educational research with the available human and non-human resources, to empower it with effectiveness and the desired impact to reach the desired learning objectives. This educational system is based on the most advanced theories and practices in the field of education and information technology. Undoubtedly, educational technology has played a crucial role in the transition to the fourth generation of education

⁵-George E. Hein, *Constructivist learning theory*, 1991, Massachusetts.USA

⁶-ChetnaJathol; SonalChabra. and others authors, *educational technology*. Vikas publishing house. 2015. P6

(Education 4.0). Through the use of technology in education, students can experience a comprehensive, diverse, and adaptable educational experience tailored to their individual needs. This includes the use of smart devices, educational applications, electronic platforms, adaptive learning, and learning through social networks.

3- Theories of Education Post 4th Industrial Revolution:

The four generations of industrial revolutions have played a significant role in the transformations that occurred in education. In the first industrial revolution, education witnessed changes in manufacturing methods from manual to mechanized, leading to increased demand for workers trained in modern technology. Consequently, vocational and technical education systems were developed to equip workers with the necessary skills for these new industries. Similarly, in the second industrial revolution, there was a greater need for skilled labor in advanced sciences, engineering, and technology, leading to the development of higher education systems to provide the workforce with the required skills. In the third industrial revolution, digital and computer technologies were developed, increasing the demand for trained workers in these fields. Thus, educational curricula were revised to include digital education and information and communication technology. Currently, the characteristics of the fourth industrial revolution are emerging, posing new requirements on the education sector and various other sectors. The term "Fourth Industrial Revolution" or "Fourth Generation of Industrial Revolution" refers to a wide range of modern technological concepts or trends, such as smart factories, cyber-physical systems, self-organization, and adaptation to human needs. Among the innovations introduced by the fourth industrial revolution are concepts like distance learning, smart applications, real-time information sharing, and self-controlled digital production systems. However, the most notable technologies that have characterized the fourth industrial revolution are machine learning, artificial intelligence, and cloud computing; and the relationship between education and industry lies on influence and mutual impact; where, Education provides the industry with skilled labor, while

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the industry provides education with funding, support, and guidance to serve industry-oriented education goals. This gave rise to the concept of "industry-oriented education," which aims to qualify students for the job market and meet the specific needs of industries by providing practical skills and experiences aligned with industry requirements.

And among the newly established theories to keep pace with the fourth generation of the industrial revolution, we find :

3.1-"The five minds theory" by Howard Gardner :

Howard Gardner presents in his book "Five Minds for the Future" ⁷ aimed at training and education specialists and those passionate about issues related to developing minds and mental abilities. He envisions the future and presents the types of minds that people will need if they want to achieve prosperity for the world over the coming ages. In this book, he introduces five types of minds and mental abilities that must be acquired and developed, through an explanation of his vision of the mental abilities that should be developed in schools and other institutions. And These five minds are :

- **The Specialist Mind:** It refers to the mind capable of understanding the workings, mechanisms, values, and scope of specialization, not just the information contained within it, which computers can also process. It also involves understanding the specialized profession, its scope, values, and mechanisms.

- The Synthesizing Mind:** This is the mind capable of synthesizing information and maintaining its sequence in a regular and skillful manner, ensuring that there are no interruptions that disrupt the learning process.

- **The Creative Mind:** It is the mind capable of understanding specialization, then synthesizing, and then coming up with new solutions and ideas.

⁷-Howard Gardner, *Five minds for the future*, United States of America, 2006.

- **The Respectful Mind:** This is the mind capable of communicating with others, being flexible, and respecting others' opinions.
- **The Ethical Mind:** It is the mind capable of dealing with the material world with moral values. It is the mind that is concerned with raising generations in the right way.

3.2- Connectivism Theory:

"Connectivism is the integration of principles explored by chaos, network, and complexity and self-organization theories. Learning is a process that occurs within nebulous environments of shifting core elements – not entirely under the control of the individual. Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing."⁸

This is how George Siemens describe the Connectivism theory, where He consider it as a latest theory in the field of education that has emerged in recent years, aiming to overcome the constraints imposed on behavioral, cognitive, and constructivist theories.

" A central tenet of most learning theories is that learning occurs inside a person. Even social constructivist views, which hold that learning is a socially enacted process, promotes the principality of the individual (and her/his physical presence – i.e. brain-based) in learning. These theories do not address learning that occurs outside of people (i.e. learning that is stored and manipulated by technology). They also fail to describe how learning happens within organizations" ⁹

And It does so by integrating prominent elements from the three frameworks (educational, social, technological) to develop new theories for building learning theories in the digital age. It discusses education as a network of personal knowledge

⁸ - George Siemens, *Connectivism : A learning theory for the digital age*, 2004, p4

⁹- *ibid*

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created to engage individuals in learning, building, and reinforcing communication and interaction through the web. It emphasizes the networking principle in digital learning across networks, utilizing computer technology and the internet in education.

The communication theory aims to provide a clear understanding of how learners learn in educational institutions. Where personal knowledge consists of a web of knowledge that nourishes and supplies various institutions with diverse knowledge. Likewise, these institutions engage in feedback loops, facilitating ongoing learning for individuals and From the perspective of communication theory, learning focuses on making connections between information and specialized knowledge.

- Principles of Connectivism Theory:

- Learning and knowledge lie in the diversity of opinions.
- Learning can exist in non-human devices and tools.
- The ability to acquire more knowledge is more important than what is currently known.
- Maintaining connections facilitates continuous learning.
- The ability to see connections between fields, ideas, and concepts is a core skill.
- Detailed knowledge of events is the goal of all communication learning activities.
- Decision-making itself is a learning process, as the correct answer today may be incorrect tomorrow due to changes in the information climate.

- Elements of Connectivism Theory:

- Educational Objectives: Connectivism theory doesn't centralize specific educational objectives in instructional design as other learning theories do. Instead, it focuses on learning as a more complex and comprehensive process. Designers should consider the learning environment, resource availability, and learners' reflective abilities as instructional goals.
- Educational Content: Content analysis is crucial but differs from traditional learning theories. Learners predominantly select content from available sources and networks they engage

with. Course content is viewed as a convergence point among various learning activities within networked learning.

- Learning Environment: The learning environment plays a pivotal role in communicative instructional design, emphasizing continuous learning, communication, engagement, and active participation. Designers must provide space for self-expression, access to updated information, and social networking opportunities.

- Learning activities in the context of communication : Designers under connectivism theory do not impose strict limitations on learning activities. Learners engage in activities they prefer, benefiting from significant freedom. Designers offer various learning alternatives to facilitate engagement in learning web.

- Some of the prominent learning activities based on connectivism theory :

- Continuous participation in developing the course content wiki.

- Reading, reviewing, and critiquing the core content of the curriculum through personal blogs.

- Sharing articles through social bookmarks.

- Creating educational materials to assist other learners in understanding and publishing them on the web.

- Engaging in microblogging activities through Twitter.

- Sharing various media types such as audio, images, and videos through dedicated platforms like YouTube, Google Docs, and other relevant sites.

4. Educational Technology in Algeria :

Algeria is among the countries that have shown early interest in adopting and integrating technology in education. It worked on reforming the university education and academic research systems through a decision by the National Committee for Educational System Reform adopted by the Cabinet on April 20, 2002. This initiative aimed at comprehensive reform of higher education between 2004 and 2013, starting with the adoption of the LMD system. Internet integration was also introduced into the higher education sector through various regulatory and operational mechanisms for sector digitization.

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In this context, the Algerian university witnessed an attempt at digitization during the period 2003-2015¹⁰.

4.1. COVID-19 Pandemic and Educational Technology :

Despite the challenges posed by the COVID-19 pandemic, for educational institutions, which faced pressure due to disruptions in the annual education program, it served as an impetus for embracing technology in education. The Algerian government resorted to distance learning, amid questions about the success of this experience given the obstacles it faced, especially the transition to distance learning, especially for students who had concerns about failure due to different circumstances. The Algerian Ministry of Education launched an online support program on April 5, 2020, for fourth-year middle school and third-year high school (baccalaureate) students through digital platforms provided by the government for distance education and training. ¹¹ The ministry also allocated a digital platform for fifth-year students preparing for the primary education certificate exam. On April 13, Algerian Education Minister "Mohamed Wajaot" chaired a video conference meeting with education directors from the country's provinces to review the weekly assessment of remote learning sessions for students. Waqouat stated that "the remote learning sessions had surpassed 10 million views according to YouTube statistics." He added that "efforts to address the education gap are ongoing, and the program needs to be activated and expanded to include local radio stations, especially for students who do not have access to technology."

4.2. The Issue of Teacher Compensation via a Virtual Platform :

Among the questions raised by the Parents' Organization about the effectiveness of distance learning and whether the quality of education will be maintained in the absence of physical presence of teachers and the change in the teaching

¹⁰- Houssam din islam, Algeria.. *Challenges facing distance education in light of Corona (report)*, Visited : 16/02/24 Link : <https://shorturl.at/awBU4>

¹¹ - A statement issued by the Algerian Ministry of National Education

environment, (the school.) The Parents' Organization also added that broadcasting educational sessions on digital platforms or through official television channels would face difficulty in achieving understanding among students. They emphasized the importance of prioritizing students' interests, whether educational, psychological, or material, especially regarding access to and control of technology by students."¹²

4.3. Examples of Educational Technology in Algeria :

In the actual implementation stage of previous educational technology theories and visions, obstacles and difficulties that hinder this implementation inevitably arise. However, the Ministry of Education and those involved in education and scientific research, including teachers and supervisors, have greatly contributed to the presence of educational technology. Among the means of technology available for use there are :

- Websites :

Websites serve as an endless source of information, offering organized content accessible with a single click, such as the Algerian education website

- (eddirasa) ¹³ It provides news on ministerial decisions and updates in the education sector, along with annual programs and lessons from primary to university levels, as well as remote learning and literacy training sections.

- Tarbiadz :

This site was created by teachers to provide educational content digitally, covering lessons in all subjects from elementary to secondary levels.¹⁴

- Applications

- Applications like Onec, available for Android devices, offer educational content, annual programs, lessons, exercises, solutions, and books for different educational levels.

¹² ¹Houssam din islam, Algeria.. *Challenges facing distance education in light of Corona (report)*, Visited : 16/02/24 Link : <https://shorturl.at/awBU4> "Personal translation of article ideas"

¹³ -eddirasa.com

¹⁴ -www.tarbiadz.online

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- Teams application : focused on during the COVID-19 pandemic, became essential for continuing university education, providing features like lecture recording, file uploading, live lessons, and remote attendance notifications.

- technological Devices :

- Computers : provide technological means for delivering educational content in a modern way, offering audiovisual content to students, especially effective when connected to the internet, allowing greater freedom in information search.

- Interactive tablets: it is the latest technology being gradually introduced into education spaces, aiming to alleviate students' backpack burdens and add fun to learning.

Additionally, data show, speakers and microphones facilitate the teaching process.

- Conclusion :

In conclusion, the work we have presented leads us to the understanding that the field of education has always been prone to development, continuously adopting new methods and approaches to keep it contemporary and adaptable to the changes happening around it. It is likely the foundation and source of the changes and advancements occurring on intellectual and industrial levels. Therefore, we have witnessed learners' interest in developing the field of education itself by establishing curricula and theories that present new ideas and perspectives on education. On the other hand, educational technology, like previous educational theories, was also a theory that humans sought to apply. However, the difference lies in its ability to find tangible counterparts in reality. It is no longer just abstract theories with mental and psychological effects but has acquired a physical presence through various technological devices made available thanks to human advancement, especially with the discovery of precision industry, which changed the course of history. As for the reality of educational technology in Algeria, it has many indicators, one of which indicates the extent of its desire to achieve and frame it in all fields, especially after Algeria started digitizing its institutions. There are also other indicators tells that the

apparent success of educational institutions and their welcoming of the idea, whether from the teacher or the student's side. Although the road to mainstreaming this project is challenging and lengthy, time and members efforts are capable of achieving it.

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