

Contributions of Artificial Intelligence and Modern Technology to the Development and Improvement of the Educational Process

Dr.Abdellaoui Nadjete¹

¹Faculty of letters, language and arts, Dr.Moulay Eltaher University Saida (Algeria)

Received: 01/2023

Published: 01/2023

Abstract

Artificial intelligence is a trendy discipline that is attracting researchers from several fields of study, such as philosophy, engineering, mathematics, logic, and computer science. The latter is considered an essential component of artificial intelligence science, which is a self-contained science that is based upon its own foundations and components. It uses these components to keep up with modern technologies. It trains the machine to think like a human by giving it applications, electronic media, and technical programming. It is likewise, built on symbols and concepts that are interconnected with one another according to programs based on a database and knowledge of computer symbols. On this premise, the creation of artificial intelligence is attributed to the digital revolution and contemporary technology, both of which have come into contact with the educational system and the educational process to develop and improve both, as seen recently. In the educational process, programmed intelligence is simulating the human mind to a point where it understands its symbols and can solve difficult issues.

Keywords: Artificial Intelligence, Modern Technology, Education, Learning.

Author Email: nadjete.abdellaoui@univ-saida.dz

Tob Regul Sci. TM 2023;9(1): 277-285

DOI: doi.org/10.18001/TRS.9.1.19

Introduction:

Technological advancements have resulted in the birth of modern cognitive sciences, which are used in modern ways that invest their applications in several fields of different disciplines, the most prominent of which is artificial intelligence, which is considered a technical science based on the overlapping of several disciplines and sciences such as mathematics, engineering, logic, biology, and computing. It aims to comprehend the nature of human intelligence by creating computer systems capable of simulating human behaviour and providing intelligent applications.

Based on this, artificial intelligence is now used in all industries. In this research paper, we specifically focus on the education sector because it has suffered recently, particularly in light of the crises brought on by Covid 19, which prompted the investment of cutting-edge technology and its means. The educational sector uses a variety of formats, including text, image,

audio, and video, to facilitate effective communication between the components of the educational learning process, which are represented by the teacher, the student, and the scientific material. This communication is not required to be within the educational institution or within the educational classroom. Rather, communication takes place from various places, provided that computers and the Internet are provided as tools for disposing of them between educational elements and electronic media. such as distance education and the establishment of forums, conferences and seminars by employing the spacing technology, by applying Google Meet and Zoom.

The following question is what this research paper aims to answer: What do modern technology, artificial intelligence, and education mean? What cognitive framework is the history of the development of artificial intelligence based on? And what traits does it possess? How may artificial intelligence be used to improve the educational process? What connection exists between modern technology and artificial intelligence? What are the ways artificial intelligence is being applied in education? What does it mean in the context of the learning process?

In response to this assertion, I will define artificial intelligence, modern technology, and the educational process in my research paper. I will also give a brief overview of the cognitive reference for the history of the development of artificial intelligence, describe its traits, and concentrate on the connection between artificial intelligence and modern technology, before discussing applications of artificial intelligence used in the educational process ?

1-The Concept of Artificial Intelligence:

a term made up of the words "intelligence" and "artificial," where intelligence is defined as the capacity to comprehend novel or shifting circumstances, and it has numerous terms, including perception, comprehension, and learning. The term "artificial" is derived from the verb "make," and the word is applied to all things that result from the activity or action by which things are synthesised and formed. This supports the claim that artificial intelligence is the science of contemporary machines¹.

It is described as "one of the branches of computer science that deals with the simulation of human behaviour by machines," and the scientist "John McCarthy" was the first to develop this term; where he defines it as the science of engineering the creation of intelligent machines and depicts the characteristics of computer programs, as it is the science of creating computer devices and programs that lead to thinking in the same way that works. Because it has a human brain, it makes decisions and behaves in human-like ways.²

In his book "Artificial Intelligence," Dr. Ahmed Kazem describes it this way: "It is that branch of computer Science by which the computer can be created to perform some tasks in place of the human being, which simulates the method of human intelligence so that the

¹ Saad: Y, Ghaleb . Fundamentals of Management Information Systems and Information Technology, Dar Al-Manhaj for Publishing and Distribution, Amman - Jordan, 2012, p. 114.

² Shams, Nassib : Artificial Intelligence and its future implications, The Thinking World Gate, website <http://www.shorouknews.com>

computer can perform some tasks in place of humans, which require thinking, understanding, hearing, speaking, and movement in a logical and orderly manner.³

It can also be defined as "one of the most significant modern sciences resulting from the convergence between the sciences of logic, mathematics, languages, and psychology on the one hand, and the sciences of logic, computers, and automatic control on the other, as it aims to understand the nature of human intelligence by making computer programs with these programs." Accordingly, artificial intelligence is the ability of computer programs to solve problems or communicate the best course of action by drawing upon the wide range of inferential processes that are fed into the program. "Artificial intelligence is employed because it can draw conclusions quickly and more accurately than humans can."⁴

Artificial intelligence is "systems that are able to independently build multiple competencies and form linkages and generalisations across domains, which significantly reduces the time required for training"⁵

Based on these notions of artificial intelligence, it can be claimed that it is an attempt to replace humans with machines because it is based on programs that are based on knowledge bases that depend on the existence of computers. However, we discover that it differs from other sciences in terms of speed and accuracy, and it also solves issues.

In order to design machines in a way that enables them to replicate human thought, artificial intelligence is built on programs and applications that interact with one another, and multiple subjects and varied disciplines overlap in it. The goal of developing computer functions that resemble the human mind is shared by mathematics, biology, computer science, philosophy, logic, and engineering.

2- The Concept of Modern Technology:

Modern technology is a collection of accumulated and accessible knowledge, abilities, experiences, materials, organisational and administrative tools, and means that man uses to exploit environmental resources and adapt those resources and energies to serve him in carrying out a task or function in the realm of his daily life to satisfy material and moral needs, whether at the level of society or the individual. ⁶ It is also defined as a branch of "knowledge that deals with the creation and use of technology and its interrelationship with life, society, and the environment, based on topics such as industrial arts, engineering, applied sciences, and research sciences."⁷

³ Kazem, Ahmed: Artificial Intelligence, Ministry of Higher Education and Scientific Research, Al-Sadiq University-Iraq, College of Information Technology, 2012, p. 04.

⁴ Al-Malkawi.Y, Ibrahim: Knowledge Management - Practices and Concepts, Dar Al-Warraq for Publishing and Distribution, 1st edition, Jordan, 2017, p. 216.

⁵ Al-Khabiri, Sabrina : A training course on artificial intelligence, 2020, p. 02.

⁶ <http://www.dictionary.com/browse/lechnology>

⁷ Abu Al-Yazid, Ahmed: Continuous Development, Dimensions and Approach, Bustan Al-Maarifa Library, Egypt-Alexandria, 2007, p. 187.

To put it another way, it symbolises "a human effort and a way of thinking about the use of information, skills, experiences, and human and non-human elements available in a specific field and applying them in discovering technological means to solve human problems, satisfy their needs, and increase their capabilities."⁸

This brief introduction to modern technology has led us to the conclusion that it is an applied process that uses knowledge, skills, and various sciences in an organised manner. This conclusion is supported by the fact that modern technology is based on an organised and integrated administrative base and is connected to the Internet, which is a crucial and essential component for the process to be delivered successfully.

Accordingly, modern technology can be defined as electronic tools for human endeavours that attempt to use this knowledge and employ its talents, capacities, efficiency, and speed to find various electronic means to solve issues and overcome hurdles related to human needs and requirements.

3- The Relationship Between Artificial Intelligence and Modern Technology:

One of the subsets of modern technology is artificial intelligence, which is based on a computer, a structured database, and numerous electronic applications, media, and technical programs linked to one another and dependent on computer-related codes.

To improve and facilitate services, modern technology also provides cloud platforms and automated systems that replicate the human mind. These systems also do automatic natural language processing, which is one of the foundations of artificial intelligence.

This supports the claim that artificial intelligence and modern technology are closely related and cannot be separated because of their interdependence and the role that modern technology plays in artificial intelligence. After all, neither modern technology nor artificial intelligence exist without the other. They must therefore be in a relationship that cannot be broken.

4-The Cognitive Reference to the History of the Emergence of Artificial Intelligence:

As a result of the "transformation from traditional programming systems after World War II, which represents the first stage of the beginning of the emergence of artificial intelligence and was characterised by finding solutions to games and solving puzzles using the computer and relied on the fundamental idea of developing research methods, the cognitive and actual reference for the emergence of artificial intelligence is being discussed. According to three criteria and causes that are depicted in the spatial representation of the case, which led to the development and creation of computational modelling⁹:

representation of the primitive state of the subject under study, and the two worlds "Vigen and Feldman" represented it on the chess board when starting to play.

⁸ Dalio, Fadil : New Technology for Information and Communication - Concept, Uses and Prospects, House of Culture, Kingdom of Jordan, 2010, p. 20.

⁹ Kazem, Ahmed: Artificial Intelligence, Ministry of Higher Education and Scientific Research, Al-Sadiq University-Iraq, College of Information Technology, 2012, p. 08.

- Choosing the conditions for realising reaching the end (reaching overcoming the opponent).
- The set of rules governing a player's movement by moving chess pieces on the board”

When it comes to the early 1960s to the middle of the 1970s, "it represents the second stage of the beginnings of the development of artificial intelligence, and this stage was known as the poetic stage." "At this stage, the scientist (Minsky) made frames to represent information, the scientist (Ingrad) developed a system for understanding English sentences, such as stories and conversations, and the two scientists (Winston and Brown) summarised all that has been developed."

The third stage of the evolution of artificial intelligence “spans from the middle of the 1970s to the early 20th century." This stage represents the period of prosperity for artificial intelligence, which led to the prosperity of artificial intelligence systems and its technologies, such as symbolic modelling and list processing mechanisms. The development was broad and distinguished by the emergence of modern technologies that deal with many applications, which led to the transfer of a significant portion of human intelligence to computer programs. Expert systems, which are one of the applications of artificial intelligence programs intended at tackling complicated issues that involve significant mental and human effort, experienced a quantum leap in success in the 1980s. Expert and user communication”¹⁰

Based on recent advancements in neuroscience, a new mathematical theory of information, and the growth of cybernetics, some scientists and researchers started to investigate a novel method for creating intelligent machines during the 20th century. The leaders and experts in the field of artificial intelligence study, including McCarthy and Marvin Minsky, convened at this conference in 1952, notably on the site of the Faculty of Dar Timothy, where the roots of the present field of artificial intelligence research were created. ”¹¹

5-Characteristics of Artificial Intelligence in Light of its Employment in the Educational-Learning Process:

Before exploring artificial intelligence's characteristics in relation to how it might be used in the educational-learning process, it is necessary to discuss their general characteristics. Once we have allocated their characteristics in the educational-learning process, their characteristics can be condensed as follows:¹²

- The ability to quickly respond to new situations and circumstances.
- The ability to think, comprehend, acquire, and practice knowledge.
- The ability to provide information to support administrative decisions.
- The ability to deal with difficult and complex cases.
- The ability to visualise, create, understand, and comprehend visible things.
- The ability to learn and understand from previous experience and expertise.

¹⁰ Ibid. p. 09.

¹¹ Al-Khabiri, Sabrina: A training course on artificial intelligence, 2020, p. 06.

¹² Juma Al-Najjar, Fayza: Administrative Information Systems, an Administrative Perspective, Dar Hamid for Publishing and Distribution, 3rd edition, Amman-Jordan, 2010, p. 169.

-Using artificial intelligence to solve presented problems.

-The ability to use trial and error to troubleshoot issues in various disciplines.

However, if we go back to defining the characteristics of artificial intelligence in light of the educational-learning process, they can be summarised as follows:

- Artificial intelligence helps reduce the burden on school administration, by converting management systems into digital electronic systems, which contributes to making the right administrative decisions and distributing educational classes, programs and courses.

- Artificial intelligence helps build a knowledge database, through which it seeks to store information effectively in educational institutions.

Artificial intelligence protects private knowledge; it stores it.

- Artificial intelligence is one of the modern methods of helping the learner in his educational process. where he employs smart applications such as the application of educational platforms, and here the learner limits himself to self-dealing and develops his communicative, cognitive, and skillful competence through artificial intelligence applications.

- Artificial intelligence helps to find solutions to complex problems in the educational process, by analysing, interpreting and addressing them in a timely manner.

- Artificial intelligence has tools on which it is based in the educational process, including Microsoft or Lens, cognitive systems service, chatbot, and language translation.

6-Types of Artificial Intelligence:

There are three types of artificial intelligence:

6-1- Narrow (weak) AI:

One of the most direct varieties of AI is narrow or weak AI. As it is programmed to carry out certain tasks within the appropriate educational environment, and because it serves as a reaction to a particular circumstance, its work is limited by the constraints of its surroundings. An example of this is the IBM Deep Blue robot.

6-2- Strong AI (general):

Strong AI is characterised by the capacity to gather, explain, and analyse information by a team of specialists who bear responsibility for it, such as self-driving cars, instant chat bots, and the use of auxiliary programs to download them in a self- and personal way.

6-3- Superior Artificial Intelligence:

The goal of superior artificial intelligence is to replicate people, and this concept is still being tested. There are two models of this kind. The first model makes an effort to comprehend how human emotions and thoughts impact behaviour. It has been discovered that this sort of intelligence has a constrained capacity for social engagement. The second is the theory of mind model, which uses powerful machines to replicate human emotion and forecast the other person's feelings while interacting with them.

7- Mechanisms of Applying Artificial Intelligence in the Teaching-Learning Process:

Artificial intelligence was able to solve issues in the educational-learning process, particularly those involving its three parties—the teacher, the student, and the educational

material. By utilising some contemporary mechanisms and technologies that aid in and contribute to the growth of education, artificial intelligence, in this case, played a significant role in improving the educational process in both form and content. We highlight the following among these applied processes used in artificial intelligence:

7-1- Smart Content Application:

Incorporating digital content into the educational process includes using "digital guides to textbooks to customizable digital learning interfaces at all educational levels from primary to post-secondary to corporate environments for educators with digital curriculum design and content across devices, such as Nextec Learning, an educational cloud platform designed for modern workplaces, where these curricula are designed with cloud platforms and integrated through multimedia¹³

7-2- Smart lesson systems:

Smart lesson systems are a collection of guiding concepts that are closely related to Benjamin Bloom's educational psychology research from the 1970s. Using a dynamic educational process, we can modify our weaknesses and our strengths.¹⁴

Smart lesson systems simultaneously work to support learner effectiveness and provide focused feedback. These artificial intelligence-based "smart lessons" in the teaching-learning process are made up of three parts: learner knowledge, educational knowledge relevant to the study curriculum, and educational knowledge. capabilities, with strategic understanding making up the last element.

Smart lesson systems, within the framework of employing artificial intelligence technology, are based on several models, which are:¹⁵

1- The Domain Model:

The domain model, which is one of the smart lesson system models, has a set of characteristics, including:

- The domain model is a source for generating learning content by providing explanations and their association with examples related to the content of the educational lesson.
- The domain model is a source for finding typical solutions to the problems raised in the educational process.
- The domain model is a reliable standard in the process of evaluating and correcting the learners' answers and presenting the final result that the learner obtains in his educational process.

Thus, the field model presents a set of major and important tasks in the educational-learning process compared to classical education.

¹³ Ibid: p. 200.

¹⁴ Abu Al-Qasim.M, Al-Rutimi : Artificial Intelligence in Education - Intelligent Learning Systems, Libyan Society for Artificial Intelligence, Libya, 2009, p. 89.

¹⁵ Amal, Al Badou, and Abdullah, Muhammad: Smart Learning and its Relationship to Creative Thinking and its Most Used Tools by Mathematics Teachers in Smart Learning Schools / Journal of the Islamic University for Educational and Psychological Studies, Volume 25, Issue 02, Gaza - Palestine, 2017, p. 64.

2- The Education Model:

The education model includes educational decision-making that is relevant to the learner, such as choosing the best time and presentation approach for the educational session and modifying the methodological stages. This approach assesses a learner's cognitive capacities by looking at how they respond to questions and issues they encounter while learning, and it also calculates how many of their answers are correct and incorrect.

3-The Learner Model:

By taking into account the learner's cognitive state and his presentational abilities, the learning model stands out. Indicators of the learner's conduct are also provided, as are distinctions between the errors he commits during the teaching process and a determination of his ability based on his responses to the questions posed.

4-The Interface Model:

The interaction interface model integrates the student into the teaching-learning process by utilising contemporary educational material, and interacting with it in a communicative educational environment. many approaches of resolving educational issues.

Conclusion

The purpose of artificial intelligence in the educational process is to teach students about artificial intelligence and its fundamental function, according to the conclusion of our research paper titled "Contributions of artificial intelligence and modern technology to the development and improvement of the educational process." It also concerns the ethics of the artificial intelligence community and wants to use it to lead humanity. Artificial intelligence thus simulates mental capacities by attempting to transfer intelligence similar to that of the human brain to computer equipment. The student gains abilities and information based on artificial intelligence methods and algorithms, which assist in problem-solving and rational decision-making.

Particularly in recent years and in light of the pandemic's spread, artificial intelligence has emerged as one of the necessities that must be present in educational institutions. Education requires the use of computer machines in the educational process in order for the teaching and learning processes to be successful.

List of References

- 1-Saad.Y, Ghaleb: *Fundamentals of Management Information Systems and Information Technology*, Dar Al-Manhaj for Publishing and Distribution, Amman- Jordan, 2012.
- 2- Shams, Nassib: *Artificial Intelligence and its future implications*, The Thinking World Gate, website <http://www.shorouknews.com>
- 3-Kazem, Ahmed : *Artificial Intelligence, Ministry of Higher Education and Scientific Research*, Al-Sadiq University-Iraq, College of Information Technology, 2012.

- 4- Al-Malkawi.Y, Ibrahim: *Knowledge Management - Practices and Concepts*, Dar Al-Warraq for Publishing and Distribution, 1st edition, Jordan, 2017, p. 216.
- 5- Al-Khabiri, Sabrina: *Training course on artificial intelligence*, 2020.
- 6- Abu Al-Yazid, Ahmed: *Continuous Development, Dimensions and Methodology*, Knowledge Garden Library, Egypt-Alexandria, 2007.
- 7-Dalio, Fadel : *New Technology for Information and Communication - Concept, Uses and Prospects*, House of Culture, Kingdom of Jordan, 2010.
- 8- Al-Najjar.J, Faiza: *Management Information Systems, an Administrative Perspective*, Dar Hamid for Publishing and Distribution, 3rd edition, Amman-Jordan, 2010.
- 9- Al-Ali, Abdul Sattar and others: *Introduction to Knowledge Management*, Dar Al-Masir, 3rd Edition, Amman-Jordan, 2009.
- 10- Abu Al-Qasim.M, Al-Rutimi: *Artificial Intelligence in Education - Smart Learning Systems*, Libyan Society for Artificial Intelligence, Libya, 2009.
- 11- Ama, Al Badou, and Abdullah, Muhammad: *Smart Learning and its Relationship to Creative Thinking and its Most Used Tools by Mathematics Teachers in Smart Learning Schools* / Journal of the Islamic University for Educational and Psychological Studies, Volume 25, Issue 02, Gaza-Palestine, 2017.