An Overview of the Research on Artificial Intelligence's Impact on Education

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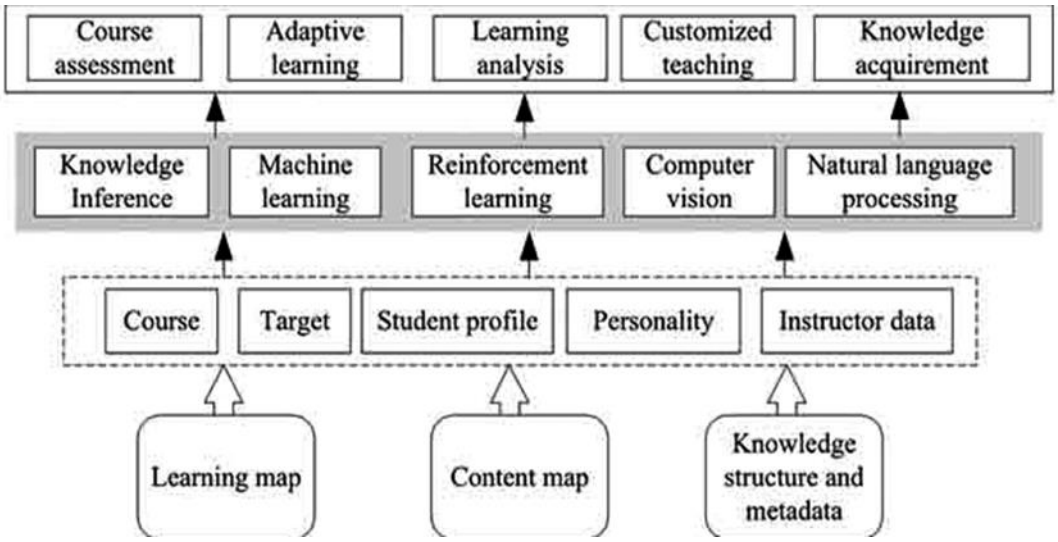
Abstract:
In the last few years, artificial intelligence research has advanced very quickly. One of the most significant technological developments of our time, artificial intelligence, will drastically change the global landscape. The fields of learning technologies and educational technology have seen tremendous advancements as a result of artificial intelligence's impact on education and training. Research on artificial intelligence and computer systems is growing along with the interest in these fields. This article looks at how artificial intelligence is causing a digital transition in education and what new educational processes this will bring about as a result of human-machine interaction. Thus, the purpose of this research is to comprehend how artificial intelligence affects.



It is a diagram of AI education system, which consists of teaching contents, data and intelligent algorithm, which can be divided into system model and intelligent technologies. Model building data map is crucial for improving learning, which establishes structures and association rules for collected education data. It works as a core in system, with technologies providing power for the system.

Keywords: Artificial intelligence, education, future, algorithm, deep Learning

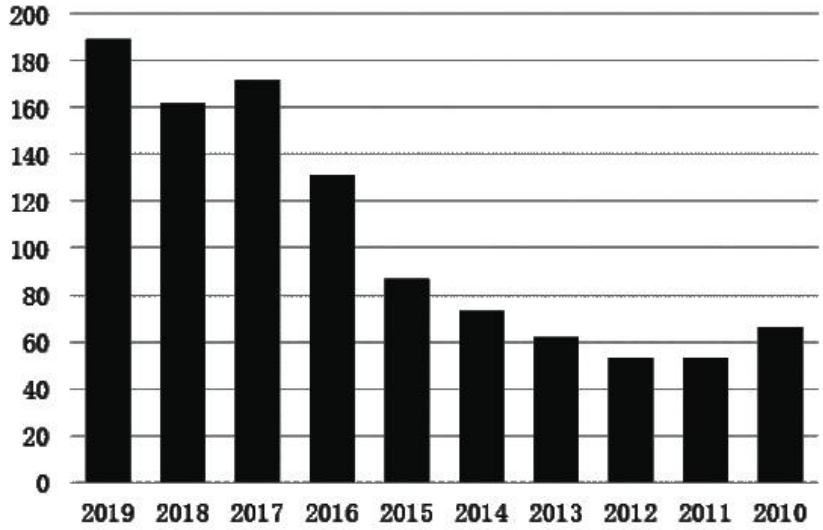


FIGURE 1. Papers in Web of Science and Google Scholar in the last ten year with key words "AI" and "Education".

Introduction:

There have been significant technological advancements since the industrial revolution. Technology, which has greatly benefited humanity, has taken the place of many labor-intensive jobs. In several fields, human labor-intensive manual tasks have been replaced by automated systems, such as artificial intelligence (AI). The science and technology known as artificial intelligence builds intelligent computers and machines to carry out a variety of jobs that call for human intellect. AI does exceptionally well on jobs by utilizing external data, such as big data. Artificial intelligence (AI) was once limited to science fiction and discussions on the topic. However, it is now a part of our everyday existence (Aoun, 2017).

Supply chains, manufacturing, healthcare, education, and other industries are all being significantly impacted by artificial intelligence. Because AI can accomplish tasks that humans cannot, it has a wide range of applications that improve productivity and performance. With the creation of artificial systems through analysis of human thought processes, the field of artificial intelligence has grown. It is crucial to comprehend how the human brain functions before delving into the analysis of artificial intelligence.The most unique quality that makes humans unique is their intelligence. We are different from other living things because of our one special quality. To what degree intelligence can be realized in an artificial environment is a subject that scientists are trying to find an answer for. There is a hierarchy to human intelligence. We can comprehend life thanks to these multi-layered patterns of structure. The brain associates and correlates symbols with one another. Ideas are formed by these connections. These concepts are related to acquired knowledge. According to Blaschke (2012), the two most crucial aspects of intelligence are the capacity for speech and information transfer.Beyond this, reasoning ability is intelligence. We solve problems, draw conclusions, adjust, communicate, and learn. There is nothing in nature that is more enigmatic than the human mind. What is the origin of the mind? What is the working medium for it? These are questions that scientists have been trying to find solutions to for decades. In the scientific discourse on the nature of the mind, two key issues predominate: The structure of the mind is derived from specific intricate biological systems. (2) The brain's hardware functions like a computer, and the mind is the software that runs on it. A third hypothesis is supported by basic consciousness. Like light or electricity, the mind is a deeply ingrained process in nature and not just an occassional phenomena in intricate biological or computer systems.Neuroscientists that excel in their domains are also employed in the artificial intelligence area. This is due to the fact that neuroscientists have

discovered the neuron networks in the human brain and have transferred them to the artificial neural network, laying the groundwork for artificial intelligence. Since the discovery of the human brain, its relationship with technology has served as an inspiration for many areas of artificial intelligence.With over 80 billion neurons, the human brain has an average weight of 1100–1500 grams. Two hemispheres make up the brain. There are differences between these hemispheres in terms of both anatomy and function. The "corpus collosum" is the barrier dividing the two hemispheres. Both hemispheres process information that comes in, but because of the differences in how they process information, they think in distinct ways.The process of learning in the brain is one of the major topics that researchers looking into the human brain—neuroscientists—are focusing on. The brain begins to learn while a person is still in the womb and continues this process throughout life. Through senses and experience, the human brain gathers and interprets information. The brain sorts the information it gets and stores it in the areas of the brain that are appropriate for it. At the proper time, this captured data is converted into the desired output. The learning model of the brain has been used to construct artificial intelligence. Over time, the human brain can lose information that is not required or utilized. Artificial intelligence, particularly the data it transfers through machine learning, might not, however, be lost like human intellect is.It is imperative, nevertheless, that this data collection be done in a safe manner. Like humans, artificial intelligence can acquire lifetime learning skills by reorganizing itself to take in new knowledge. Researchers have found that lifetime learning is possible in the brains of humans and other living things, and that the framework for lifelong learning in machines has also been developed.Every aspect of society is impacted by the growth and application of artificial intelligence, including the commercial sector, the educational system, the economy, and sociocultural structures (Acar, 2020). States should organize their education systems and development strategies with artificial intelligence systems in mind. Artificial intelligence systems have an impact on all the parties that comprise society. The study looks into how artificial intelligence affects education because of this, and it becomes more significant in this regard.The amount of research and studies "being conducted in the fields of artificial intelligence and education is growing annually, but the methodical organization of these studies inside an information network will make it easier for future researchers to carry out their work. Researchers will get further insight from this work in this regard.

Scenarios of AI education	AI-related techniques
Assessment of students and schools	Adaptive learning method and personalized learning approach, academic analytics
Grading and evaluation of paper and exams	Image recognition, computer-vision, prediction system
Personalized intelligent teaching	Data mining or Bayesin knowledge interference, intelligent teaching systems, learning analytics
Smart school	Face recognition, speech recognition, virtual labs, A/R, V/R, hearing and sensing technologies
Online and mobile remote education	Edge computing, virtual personalized assistants, real-time analysis

TABLE 1 Techniques for Scenarios of AI Education

Approach:

The purpose of this research is to assess how artificial intelligence is affecting schooling. In the study, one of the descriptive research methods—the survey method—was applied (Karasar, 2012). The research technique employed in the study was the document analysis method. First, data was gathered by scanning and compiling pertinent sources on the issue. The data collected was categorized and shown under relevant headings.

Following the study's data collection, the descriptive analysis method was applied to assess the data and make suggestions.

Result:

The importance of artificial intelligence on education, its definition, the systems that comprise it, and its relationship to education are all highlighted in this section. The purpose of this research is to assess how artificial intelligence is affecting schooling. A qualitative research method called a literature review was used to perform the study. Artificial intelligence-related articles, theses, dissertations, professional publications, and conference reports were found and examined in the literature.

What is artificial intelligence?

In human history, three major events are said to have occurred. The universe was created, and that is the first of these events. The commencement of life is the second. And lastly, artificial intelligence is starting to appear. The goal of the computer science field known as artificial intelligence is to create machines with human-like thought and behavior through the use of algorithms.

In this day of tremendous technological advancement, the term "artificial intelligence" is one we hear a lot. A technological revolution that is altering the world is artificial intelligence. It is the capacity of a machine to carry out mental tasks like perception, logic, learning, and communication.Computer pioneer Alan Turing created the famous "Turing Test" in 1950 to measure Machine intelligence. If a computer in a box could convince a human that there was another Human in the box, it passed the Turing test. This was a step that accelerated the process of Machine learning. The term "Artificial Intelligence", a combination of different fields of Science such as mathematics, physics, chemistry, biology, psychology, linguistics and Computer science, was first coined in 1956 during a conference at Dartmouth College In order to gauge machine intelligence, computer pioneer Alan Turing developed the well-known "Turing Test" in 1950. The Turing test was passed by a computer in a box if it could persuade a human that there was another person inside. This was a step that helped machine learning go more quickly. The phrase "Artificial Intelligence" was originally used in 1956 at a meeting at Dartmouth College. It is a synthesis of several scientific disciplines, including mathematics, physics, chemistry, biology, psychology, linguistics, and computer technology.The term "machine learning" was first used a year later by American computer scientist Arthur Samuel. Inspired by the Neural Networks (NN) found in the human brain, Ukrainian mathematician Alexey Grigorevich originally presented the idea of deep learning in 1965. The ability of a computer-controlled system to carry out activities in a human-like manner is defined by scientists, and human-like characteristics are mental processes including reasoning, inferring meaning, generalizing, and learning from prior experiences. The goal Is to develop intelligent systems capable of carrying out higher logic tasks unique to humans, such machine learning.The modeling of human intelligence, physiology, and neurology onto robots is known as artificial intelligence. Artificial intelligence, to put it briefly, is the ability of computer systems to think and act like people. In order to make sure that machines can think and act like humans, a lot of people and organizations have been studying and working in the topic of "Artificial Intelligence" (Pennington, 2004).The literature demonstrates how the definition of "Artificial Intelligence" has evolved in tandem with technological advancements. The idea that artificial intelligence refers to systems designed to replicate human mental abilities and traits through machines is shared by definitions of the term. In order to make computer systems function and behave like humans, artificial intelligence

Machine Learning: What Is It?

Computers can be taught to handle data in a way similar to the human brain using deep learning. It is one of machine learning's subfields. Audio and visual files are converted to text using deep learning. It is an algorithm with numerous input and output layers. By merging the data from each layer's preceding layer, this

method generates findings that are meaningful. Deep learning is applied in various fields, including time prediction, handwriting recognition, image and language processing, and classification.

Artificial Intelligence and Learning:

The field of education makes extensive use of artificial Intelligence, which has significant applications that significantly affect classroom administration and the teaching process. Artificial Intelligence consistently improves education and modifies the surroundings to foster students' passion, initiative, and inventiveness. Artificial intelligence is a field of study and technology that was developed to carry out a variety of tasks that call for human intellect using intelligent machines and computer programs. Through a variety of applications, artificial intelligence improves people's lives.Artificial intelligence has its uses and drawbacks in a number of industries, including education, law, healthcare, and security. The rising use of technology is not without drawbacks, despite benefits that accrue to both individuals and society as a whole. Artificial intelligence and its applications are successfully driving our modern world, and they are regarded as a key element in determining the course of events to come. There's little doubt that artificial intelligence in the future will be far more sophisticated than it is today. It is anticipated to have a more human-like system in terms of features. Innovations in e-commerce, healthcare, and transportation are just a few of the industries that artificial intelligence could impact. There's little doubt that the next breakthroughs will significantly affect people' sour everyday lives now heavily rely on digital technology that is driven by artificial intelligence that is dependent on our ideas, actions, and interactions. Artificial intelligence technology is growing at a rapid rate these days along with the advancement of worldwide science and technology. Artificial intelligence is a rapidly evolving field with many applications. As it develops, an increasing number of people are impacted. It is undeniable that artificial intelligence is permeating the classroom and school teaching process more and more.Education is being changed and influenced by technology as it continues to become more and more integrated into society. Both instructors' practices and school operations have changed as a result of these modifications. This circumstance demonstrates how crucialArtificial intelligence is widely employed in education, particularly by educational institutions, where it is applied in a variety of ways. Initially, computer technology and computer-related innovations were the foundation of artificial intelligence. Finally, with the use of embedded computer systems, humanoid robots, and web-based chatbots along with other technologies, the jobs and functions of tutors evolved independently. Previously, it had migrated to web-based and online intelligent tutoring systems.Deep learning and artificial neural networks gave rise to intelligent machines and artificial intelligence, which have a long history that began in the fourteenth century. Artificial intelligence has been applied in a variety of ways to the education sector for the past twenty-five years. AI-powered software and intelligent robots are being used by educators and students in elementary, middle, high school, and postsecondary education. AI technology also make it possible to use customized apps to fulfill each student's unique learning demands.

Due to their individuality and diversity, students differ from one another in terms of their needs, learning preferences, and skill sets. Meeting these expectations with conventional teaching methods is challenging. Artificial intelligence applications match these expectations in terms of investments and technological advancements.Technology use in classrooms has a long history. In an effort to prepare their students for the future, educators have long sought to incorporate cutting-edge technology into their classrooms, from the abacus to virtual reality. Teachers could display their lessons onto a board at the front of the classroom so that all students could see them, thanks to the invention of slide projectors. Students were later shown educational videos on televisions in the classroom. Computers were introduced after television and eventually found their way into every classroom. Then, internet connection was made available in all schools, even public ones.

The extent of internet access grew throughout time. E-books, video projectors, and smart boards then started to show up in many classrooms.Since they emphasize turning students into active learners, new technologies can be helpful for individualized learning. Differentiating teaching is crucial for adaptive learning, and AI

technology in particular provides a variety of chances for this. While some AI systems are mechanically intelligent, others are intellectually intelligent, with the ability to reason coherently, learn on their own, and adapt. Each of these various AI varieties has a propensity to adjust to particular circumstances, which may enable them to carry out some educational activities more effectively than others.The development of AI is also having a significant impact on the global economy. Many tasks are now completed by machines thanks to AI. The future workforce and the impact of artificial intelligence (AI) are hot topics of discussion. According to scientists, artificial intelligence will replace some occupations and create new ones. Even scientists have come to the conclusion that AI will eventually replace humans in all jobs. Many people are focusing on careers combining thinking and feeling activities as a result of the success and growth of artificial intelligence in the mechanical business sector, which has demonstrated the value of thinking.Additionally, researchers have found that there are other significant areas in which AI is used in education, even if the full consequences of AI on education have not yet been fully ascertained. There are several ways that artificial intelligence (AI) might influence education, including administrative, instructional, and data analysis-based jobs, even though its usage in educational technology is growing quickly. One application of AI is in student assessment. After being exposed to a vast amount of writing examples, AI systems have become capable of accurately evaluating student writings.It's critical to understand the advantages and disadvantages of utilizing AI in education. AI, for instance, is unable to comprehend the subtleties of textual communication and lacks human cultural adaptability. Divergent and convergent thinking is a concept that AI finds difficult to understand. Divergent thinking is coming up with several possible answers by applying creativity, whereas convergent thinking is analyzing options to determine the one correct response. Even though AI algorithms are highly skilled at completing tasks requiring both divergent and convergent thinking, like writing novels, they are not yet able to execute tasks that need just convergent thinking.

Discussion and Result :

Research and innovation have been ushered in by the development and use of computers and computer-related technology. Günay and Şişman (2019) claim that this circumstance has caused artificial intelligence-capable machines to be integrated into business lines, which has decreased the requirement for the basic cognitive abilities and physical strength that are required of people. As a result, artificial intelligence has been developed and applied in several fields.

Computers and computer-related systems were the first applications of artificial intelligence in education. Later, web-based and online learning platforms followed. Chatbots can now be used to do teacher or instructor-like tasks thanks to embedded systems and humanoid robots. The utilization of these platforms and technologies has enhanced or empowered teachers' efficacy and efficiency, leading to a richer or better quality of instruction. Similar to this, AI has improved learning opportunities for students by allowing learning materials to be tailored to each student's requirements and skills. AI has significantly changed education overall, particularly in the fields of management, instruction, and learning within the educational system or inside specific educational institutions.By handling tasks that a teacher would otherwise have to complete, artificial intelligence (AI) technologies in the classroom can help teachers work less. This point of view presents AI as a tool to assist educators in being as efficient as possible. At least for the foreseeable future, the most statistically significant improvements in student learning outcomes will be found in these AI programs, which can be readily implemented into the classroom without requiring a complete overhaul of the curriculum.Additionally, it is stated that AI systems would probably completely alter the job of the teacher. Teachers may eventually be replaced by AI-powered software that answers students' queries after providing them with the necessary content. In certain fields, new occupations have evolved as a result of the increasing usage of artificial intelligence, while other professions have become less important (Telli, 2019). For instance,

occupations like social media savvy, IT lawyer, and IT prosecutor have grown in popularity. Many vocations are changing rather than going extinct as a result of artificial intelligence systems (Altun, 2019).

There is still more to learn about the application of AI in educational settings. The inability of AI educational programs to effectively communicate with humans is a problem that is frequently mentioned. AS Tao (2017) points out, "The full implications of AI development are not yet foreseeable today, but it seems likely that AI applications will continue to be the most important educational technology topic in the coming period." Technology can help students perform better academically when used properly.Although there are numerous advantages of artificial intelligence for education, it is important to remember that there are some drawbacks as well, including concerns about ethics, security, and quality. Artificial Intelligence has been observed to have an effect on deep learning skills, student motivation, and learning process facilitation. AI should therefore be used to supplement education for kids, not to replace it. Children can use virtual reality to experience the subjects they learn thanks to artificial intelligence.

Children can learn in a way that is more engaging and concrete in this way. Artificial intelligence systems can bring about positive changes for humanity and aid in its advancement, if they are utilized appropriately. For this reason, it is critical that scientists from various fields participate in these investigations, especially educators who make significant contributions to societal awareness-raising. Artificial intelligence systems will help humanity evolve and bring about great changes as long as they are applied for the correct reasons. To this end, researchers in all fields of science should contribute to this field's studies, but notably educators, who have the biggest impact on societal change and awareness.

Guidelines for Action :

Future artificial intelligence applications in education will grow in tandem with the advancement of artificial intelligence technologies. To get a basic idea of the state of the educational system, it is crucial to examine how artificial intelligence (AI) is being applied in education as well as the difficulties that the technology is facing. The quality of instruction provided by teachers and students will increase, as will the variety and personalization of the learning strategies used by the latter. This is achieved by assisting them in embracing and utilizing AI technology in the classroom.AI-based programs are being used in classrooms all around the world more and more. School administrators will have to determine whether these programs make sense for their schools when this technology becomes more widely available and more reasonably priced. Therefore, it's critical that school administrators become knowledgeable about the various AI programs that are available to them and how they affect the education of their children.AI in education is likely to be adopted hastily and possibly to the detriment of the students, teachers, and administrators who will use it if additional research on the subject from a pedagogical standpoint is not done.

Conclusion:

Examining the effect of AI on education was the aim or purpose of this research. The research approach and methodology employed in this study was a qualitative one, utilizing a literature review. The study objective was realized by the identification and utilization of professional publications, conference reports, and journal articles in an analysis. Advances in computer technology and their use have sparked new lines of inquiry and creative thinking that have resulted in the creation and application of artificial intelligence across several industries. It has been especially possible to integrate or embed computer technologies in various devices, equipment, and platforms thanks to the advancement of personal computers and subsequent developments that have increased their processing and computing .

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