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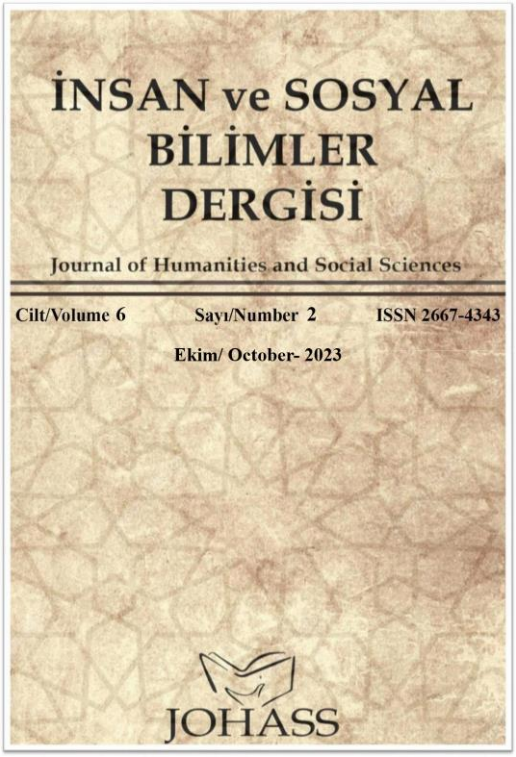

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A Literature Review on the Effect of Artificial Intelligence on Education

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Abstract

The science of artificial intelligence has been advancing at a great pace in recent years. Artificial intelligence, one of the most important technologies of our age, will cause a great transformation for the world. Artificial intelligence has also affected education and training, leading to significant developments in the field of learning technologies and educational technology. Interest in computer systems and artificial intelligence is increasing and the studies on them are increasing. This article examines the issue of digital transformation in education as a result of the development of artificial intelligence, and the new educational processes that will occur as a result of the interaction of humans and intelligent machines. Therefore, the aim of this study is to understand the impact of artificial intelligence on education. For this purpose, firstly, information is given about what artificial intelligence is. Then, it is discussed whether machines show human-like behaviors or not. Finally, an analysis is made on how and in what way artificial intelligence contributes to education, what the advantages and disadvantages of artificial intelligence are, and which artificial intelligence applications can be used in education. The research was conducted with a literature review from qualitative research methods. Artificial intelligence has provided students with enhanced learning experiences as it enables learning materials to be customized and personalized according to students' needs and abilities. AI in general has had a major impact on education, especially on the management, teaching and learning areas of the education sector or in the context of individual learning institutions.

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

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Introduction

Since the industrial revolution, there have been great advances in technology. Many demanding manpower jobs have been replaced by technology that has done so much for humanity. Artificial Intelligence (AI) is one of the technological innovations that have replaced manual work done by humans in various fields. Artificial Intelligence is a science and technology that creates intelligent machines and computer programs to perform various tasks that require human intelligence. AI uses external data such as big data to achieve excellent performance on given tasks. Once upon a time, AI was a concept only seen in science fiction and debates discussing artificial intelligence. But now it has become a part of our daily lives (Aoun, 2017).

Artificial Intelligence is having a significant impact on industries such as education, manufacturing, healthcare, supply chains, etc. Artificial Intelligence's ability to do things that humans cannot do brings many applications that increase efficiency and performance. The science of artificial intelligence has emerged with the development of artificial systems by analyzing the thinking methods of human beings. Therefore, when analyzing artificial intelligence, it is important to first understand how the human brain works.

Intelligence is the most distinctive feature of human beings. It is our unique feature that distinguishes us from other living things. Scientists are looking for an answer to the question to what extent we can realize intelligence in an artificial environment. Human intelligence works in a certain hierarchy. These layered patterns of structure allow us to understand life. The brain matches symbols and makes logical connections with each one. These connections form ideas. Acquired knowledge connects with these ideas. Being able to speak and transfer knowledge to another person are the most important characteristics of intelligence (Blaschke, 2012.).

Beyond this, intelligence is the ability to reason. We make inferences, solve problems, adapt, interact and learn. Nothing in nature is more mysterious than the human mind. Where does the mind come from? What does it work with? Scientists have been searching for answers to these questions for decades. There are two important points that dominate the scientific debate on the nature of the mind: (1) The mind is a structure that emerges from certain complex biological systems. (2) The mind is the software that controls the computer-like hardware of the brain. Basic consciousness accommodates a third hypothesis. The mind is not an occasional phenomenon in complex biological or computational systems, but a

highly pervasive and deeply embedded process in nature, like light or electricity, which is in itself extremely important (Brady, 2012).

Scientists working in the field of artificial intelligence are also neuroscientists who are successful in their fields. This is because neuroscientists have laid the foundations of artificial intelligence by discovering the neuron networks in the human brain and transferring them to the artificial neural network. As the human brain has been discovered, it has inspired various fields of artificial intelligence by establishing its connection with technology.

The human brain weighs an average of 1100-1500 grams and consists of approximately 80 billion neurons. The brain consists of two hemispheres. These hemispheres are both physically and functionally different from each other. The two hemispheres are separated by the "corpus collosum". Both hemispheres process incoming data, but because they process information differently, they think in different ways. For example, the right hemisphere of the brain focuses on the present, while the left hemisphere focuses on the past and future. Based on the similarities between the human brain and computers, there are researchers who say that in the future there will be thinking robotic machines with emotional intelligence, and there are also researchers who say that no human-made machine will ever reach the potential of the human brain (Cook and Gregory, 2018). Time will undoubtedly show us which of these two ideas is correct.

One of the important issues that scientists studying the human brain, namely neuroscientists, are working on is how learning takes place in the brain. Learning in the brain is a process that starts in the womb and continues throughout life. The human brain receives and processes information through experience and senses. The brain categorizes the data it receives and stores it in the relevant brain regions. This recorded information is transformed into appropriate outputs when needed. Artificial intelligence has been developed by taking the brain's learning model as an example. Information that is not needed and not used in the human brain can be lost over time. However, artificial intelligence, especially the information transferred by machine learning, may not be lost as in the human brain as time progresses and information transfer may gain continuity. From this point of view, it is a fact that in the coming years with artificial intelligence, models will develop in which the existing knowledge increases and is not forgotten even if time passes. However, it is important that this information data can be carried out in a healthy process. Artificial intelligence can realize lifelong learning skills by restructuring itself to learn new information, just like humans. Scientists say that the brains of humans and other living creatures are capable of lifelong

learning, and that the necessary infrastructure has been established for machines to learn lifelong in the same way.

The development and diffusion of artificial intelligence affects all segments of society, from the education system to the business world, from the economy to the sociocultural structure (Acar, 2020). It is important for states to consider artificial intelligence systems when organizing development plans and education systems. All stakeholders that make up the society are affected by artificial intelligence systems. For this reason, the study investigates the impact of artificial intelligence on education and gains importance in this direction.

While all these studies and researches in the field of artificial intelligence and education continue to increase every year, their systematic design in an information network will facilitate the work of new researchers. In this respect, this study will shed light for researchers.

Method

The aim of this study is to evaluate the impact of artificial intelligence on education. The survey method, which is one of the descriptive research methods, was used in the study (Karasar, 2012). Document analysis method was used as a research technique in the study. Firstly, the relevant sources on the subject were scanned and information was collected. The information obtained was classified and presented under related topics. The data obtained as a result of the study were analyzed using the descriptive analysis method and recommendations were made.

Findings

In this section, the definition of artificial intelligence, the systems that make up artificial intelligence, the relationship of artificial intelligence with education and the impact of artificial intelligence on education are emphasized.

The aim of this study is to evaluate the impact of artificial intelligence on education. The research was conducted by literature review, one of the qualitative research methods. Articles, theses, dissertations, professional publications and professional conference reports on artificial intelligence were identified and analyzed in the literature.

What is Artificial Intelligence?

It is said that there have been three great events in human history. The first of these events is the creation of the universe. The second is the beginning of life. And finally, the emergence of artificial intelligence. Artificial intelligence is a computer science consisting of algorithms that focus on the creation of machine people who can think and act like humans. Artificial intelligence is a term we often encounter with the rapid development of technology in our age. Artificial Intelligence is a technological wave that is changing the world. It is the ability of a machine to perform cognitive functions such as perception, reasoning, learning and interacting (Dickson, 2017).

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 (Lieberman, 2018).

A year later, American computer scientist Arthur Samuel introduced the concept of "machine learning". In 1965, Ukrainian mathematician Alexey Grigorevich first introduced the concept of deep learning, inspired by the human brain's Neural Networks (NN). Scientists define it as the ability of a computer-controlled device to perform tasks in a human-like manner, while human-like qualities are mental processes such as reasoning, inferring meaning, generalizing and learning from past experiences. The aim here is to create intelligent programs that can perform human-specific higher logic processes such as machine learning (Maderer, 2016).

Artificial intelligence is the transfer of human intelligence, physiological and neurological structure to machines by modeling. In summary, artificial intelligence is computer systems that think and behave like humans. Many people and organizations have been researching and working on "Artificial Intelligence", which is a field where research is carried out to ensure that machines have the ability to think and produce just like humans (Pennington, 2004).

In the literature, it is seen that the definition of "Artificial Intelligence" has changed with the development of technology. The common point of the definitions of artificial intelligence is that it is artificial systems that try to imitate the mental characteristics and skills

of humans through machines. Artificial intelligence tries to ensure that computer systems behave like humans and perform specified tasks. Experts who claim that a machine can learn just like a human being have divided artificial intelligence into two areas: machine learning and deep learning.

What is Machine Learning?

Deep learning is teaching a computer to process data based on the human brain. It is one of the sub-branches of machine learning. Deep learning is used to convert image and audio files into text. It is an algorithm with many layers of input and output. This algorithm produces meaningful results by combining the information in the previous layer in all layers. Deep learning is used in many areas such as image and language processing, handwriting recognition, classification, and time prediction (Pool and Qualter, 2012).

Artificial Intelligence and Education

Artificial intelligence is widely used in the field of education and has important applications that have a profound impact on the teaching process and classroom management. AI continuously enhances learning and influences the environment in a way that encourages student enthusiasm, initiative and creativity. Artificial Intelligence is a branch of science and technology created through intelligent machines and computer programs to perform various tasks that require human intelligence. Artificial intelligence makes people's lives easier by offering different types of applications (Seldon, 2018).

Artificial intelligence is used in various fields such as education, law, health, security, etc. and has its own advantages and disadvantages. While there are advantages that benefit both the individual and society, there are also disadvantages to the increased use of technology. Our modern world is being successfully guided by artificial intelligence and its applications and is seen as one of the important factors in shaping the future. The artificial intelligence of the future will undoubtedly be much better equipped than it is now. It is predicted to have a system with features more similar to human beings. Artificial intelligence will bring innovations in health, transportation, e-commerce and many other fields. It is certain that the upcoming innovations will have a great impact on people's lives and future generations. It has increased to the point where AI has become a viable option for many schools worldwide (Schrum and Levin, 2009).

Digital technology powered by artificial intelligence based on our thoughts, behaviors and interactions has become a very important component of our daily lives. Today, with the development of global science and technology, artificial intelligence technology has also developed at a great pace. Artificial intelligence technology is constantly updated and widely used in various fields. In the process of development, it affects more and more people. It is an indisputable fact that artificial intelligence is increasingly penetrating the educational environment and teaching process of schools.

As technology continues to embed itself in society in new and ever-changing ways, it continues to change and direct the field of education. These changes have altered the way teachers work and the way schools function. This situation shows how important it is not only to bring a new perspective to education, but also to have educators who have a good command of educational technology to make the right decisions and guide the process.

Artificial intelligence is widely used in education, especially by educational institutions in different ways. Artificial intelligence initially started as computer and computer-related technologies. Then it moved to web-based and online intelligent tutoring systems and finally, with the use of embedded computer systems, humanoid robots and web-based chatbots, along with other technologies, the tasks and functions of tutors developed independently (Tao, 2017).

The history of intelligent machines and artificial intelligence, which developed as a result of the emergence of artificial neural networks and deep learning, dates back to the 14th century. For about 25 years, artificial intelligence has been incorporated into the education sector in various ways. Educators and students in elementary, middle, high school and higher education are using AI-powered applications and intelligent robots. AI technologies also enable the use of individualized applications to meet the educational needs of each student. Because each student is unique and has various characteristics, their learning styles, abilities and demands are different from each other. It is difficult to meet these demands using standard educational practices. With investments and technological developments, artificial intelligence applications meet these demands in terms of performance and awareness.

The history of technology use in schools is quite long. From the abacus to virtual reality, educators have always tried to integrate the latest technology into their classrooms to give their students a step into the future. Slide projectors were the first type of technology that allowed teachers to project their lessons onto a board at the front of the classroom for all students to observe. Later, televisions were used in the classroom to show learning videos to

students. After television, computers were introduced and gradually became common in every classroom. Then internet access was introduced in every school, including public schools. Over the years, the scope of internet access increased. Then smart boards, video projectors and e-books began to appear in many schools. This provided access to more books, lowered costs and gave students more educational options. The first research into the systems that would become known as artificial intelligence dates back to the 1950s, and the term "artificial intelligence" is attributed to a professor named John McCarthy. The goal of AI researchers is to understand how humans think and to create programs that can approach that thinking. Therefore, the convergence between AI and education is both natural and inevitable (Webster, 2017).

New technologies can be beneficial to individual learning as they focus on making students active participants in their learning. AI technology in particular offers a range of opportunities for differentiation of instruction, which is essential for adaptive learning. Some AI systems are mechanically intelligent; some AI systems are intellectually intelligent, designed to be coherent, to learn and adapt autonomously. Each of these different types of AI tends to adapt to certain types of situations that can make them more capable of performing some types of educational tasks better than others.

The development of AI is also changing the global economy in many ways. With AI, many workloads are being done by machines. There is much debate about how the transformation brought about by AI will affect the workforce of the future. Scientists say that artificial intelligence will eliminate some professions and some new professions will emerge. There is even a group of scientists who believe that AI will eventually take away all human jobs. The spread and success of artificial intelligence in the mechanical business sector has shown the importance of the power of thinking, which has led many people to focus on professions involving thinking and feeling activities. There is a debate about what the main goals of AI are and whether its aim is to imitate or replace humans (Wells, and Lewis, 2006). In addition, although the full implications of AI on education have not yet been fully determined, researchers have noted that there are many important areas where AI is used in education. Although the use of AI in educational technology is rapidly expanding, there are a variety of ways in which it can have an impact in education, including administrative, instructional, and data analysis-based tasks. For example, AI is used in the assessment of students. AI programs have been able to accurately assess student essays after exposure to a large number of writing samples.

There are benefits as well as drawbacks to using AI in education and it is important to know them. For example, AI lacks the cultural agility of humans and the ability to understand the nuances of communication in texts. AI struggles with the concept of divergent and convergent thinking. Convergent thinking is concerned with weighing alternatives to find the one right answer, while divergent thinking involves using creativity to find many potential answers. While AI programs are quite adept at performing convergent thinking tasks and even tasks that require a mix of convergent and divergent thinking, they are not yet capable of performing completely different tasks, such as writing a novel.

Discussion and Results

The development and use of computers and computer-related technologies has been a harbinger of research and innovation. According to Günay and Şişman (2019), this situation has led to the inclusion of machines with artificial intelligence in business lines and subsequently reduced the need for physical strength and simple cognitive skills expected from humans. This has led to the development and use of artificial intelligence in different sectors. In particular, the development of personal computers and subsequent advances in processing and computing capabilities, as well as the huge impact of computer technologies, have encouraged the development and use of artificial intelligence. Artificial intelligence is widely used in the education sector, especially in educational institutions, which is the focus of this study.

Artificial intelligence in education initially took the form of computers and computer-related systems, then web-based and online education platform. Embedded systems and humanoid robots have made it possible to use chatbots to perform teacher or instructor-like functions. The use of these platforms and tools has enabled or improved the effectiveness and efficiency of teachers, resulting in richer or improved teaching quality. Similarly, AI has provided students with enhanced learning experiences as it enables learning materials to be customized and personalized according to students' needs and abilities. Overall, AI has had a major impact on education, especially in the management, teaching and learning areas of the education sector or in the context of individual learning institutions (Arslan, 2020).

The use of AI programs in the classroom can help to reduce the teacher's workload by doing work that would otherwise need to be done by the teacher. This view establishes AI as a tool to help teachers achieve the highest efficiency. It is in such AI programs, which can be

easily dropped into the classroom environment without changing the entire instruction, where the most statistically significant increases in student learning outcomes will be found, at least in the near future.

It is also said that AI programs are likely to change the role of the teacher altogether. Some AI-powered software that provides material to a student and then helps them with their questions has the potential to replace teachers. With the widespread use of artificial intelligence, some professions have lost their importance, while new professions have emerged in some areas (Telli, 2019). For example, professions such as social media expertise, IT lawyer, IT prosecutor have emerged and become popular professions. With artificial intelligence systems, many professions are changing rather than disappearing (Altun, 2019). The use of AI in educational spaces is an area that needs further study. An often cited drawback of educational AI programs is the communication barriers between AI and humans. The rapid advancement of AI technology may soon make these concerns a thing of the past. Demir (2019) states that states should consider artificial intelligence systems when organizing their development plans and education systems.

As noted by Tao (2017), "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." When used appropriately, technology can lead to improved student academic performance.

While artificial intelligence has many positive and positive effects on education, it should be kept in mind that care should be taken on issues such as ethics, security and quality. It is seen that AI has an impact on facilitating learning processes, increasing students' motivation and providing deep learning skills. Therefore, AI should be used to support children's education, but not replace it. Artificial intelligence can enable children to experience the subjects they learn with virtual reality technologies. In this way, children can learn in a more concrete and interactive way. As long as artificial intelligence systems are used for the right purposes, they will ensure positive transformations for humanity and contribute to its development. For this purpose, it is important that scientists from all disciplines contribute to these studies, including educators who contribute greatly to raising awareness of the society. As long as artificial intelligence systems are used for the right purposes, they will enable positive transformations for humanity and contribute to its development. For this purpose, scientists from all disciplinary fields, especially educators,

who make the greatest contribution to the change and awareness of society, should contribute to the studies in this field.

Recommendations

With the development of artificial intelligence technology, artificial intelligence will be increasingly used in the field of education in the future. Therefore, it is important to analyze the application of AI in education and the challenges faced by AI technology, to have a general understanding of the situation in the education system. By helping teachers and students to better face and use AI technology in the teaching and learning process, teachers' teaching quality and students' learning methods will become more diverse and personalized, as will students' learning styles.

Programs using AI are becoming increasingly common in schools around the world. As this technology becomes more accessible and affordable, school administrators will have to decide whether such programs make sense for their schools. It is therefore important for school administrators to educate themselves on the different AI programs available to them and their impact on their students' education.

Without more studies examining AI in education from a more pedagogical perspective, it is likely that this new technology will be implemented haphazardly and potentially to the disadvantage of the students, educators and administrators who will use it.

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