

APPLYING ARTIFICIAL INTELLIGENCE OPPORTUNITIES IN THE MODERN EDUCATIONAL PROCESS: LITERATURE REVIEW

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ABSTRACT

Using artificial intelligence tools in education provides personalized learning experiences for students, as well as the opportunity for teachers to develop new and effective teaching strategies. Nowadays special programs, handbooks and papers provide practical tips for teachers by examining in detail the various areas of use of artificial intelligence in education. As a result of studies conducted on artificial intelligence today, we know that artificial intelligence can improve itself, has the ability to learn, and is used in many areas with its superior analysis ability. Artificial intelligence, which feeds on knowledge and continues to improve itself every day, now teaches what it learns, gains experience as it teaches, and becomes a better teacher every day. So how is today's artificial intelligence technologies used in the education sector? The manuscript also focuses on how artificial intelligence can be integrated into different teaching environments, from primary school to high school, from special education to language learning. Effective examination and use of artificial intelligence technologies in the education and training process will contribute to our country's artificial intelligence literacy.

Keywords: Modern technology, education system, artificial intelligence, expert systems models.

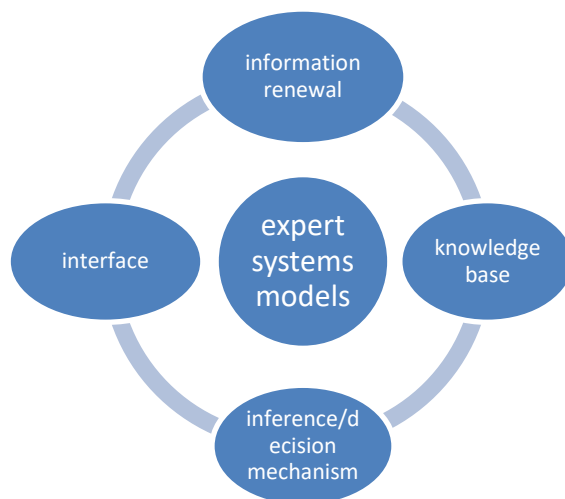
INTRODUCTION AND LITERATURE REVIEW

Artificial intelligence is one of the most important technologies in today's world. In fact, many of the scenes that we could only see in movies and encountered in various science fiction novels at the beginning of the last century have become possible with the introduction of artificial intelligence into our lives. For example, in a study conducted by Groover and others in 1986, robots in industry were defined as systems whose parts are programmed and move in different ways. However, this definition was first used in the text of a play prepared by Czech writer K. Capek in 1921. Today, artificial intelligence and its applications are effective not only in industry but also in almost every field such as energy, mining, agriculture, health, driver improvements, voice assistants, online chat and communication, and software development. It would be quite wrong to think that artificial intelligence does not take place in education along with this area of influence. According to the 2018 Horizon report, artificial intelligence and adaptive learning technologies have emerged as important developments in the field of educational technology (Becker et al., 2018). On the other hand, it would also be wrong to see artificial intelligence as a solution to all problems in education. Therefore, the aim of this study is to present the contribution that artificial intelligence has made and can make to education in a balanced way. Before defining artificial intelligence, it is necessary to understand and concretize the concepts of natural intelligence and brain. Definitions made regarding both artificial intelligence and intelligence differ from each other. The main reason for this can be shown as the fact that the brain's functioning process is still not fully understood. Zohar (2003)

states that the brain is like a universe that still contains countless secrets and cannot be easily understood. However, although we do not fully know the brain's working method or principles, our basic knowledge about the brain's functioning order is limited to neurons and their changes (Kim, 2011). Accordingly, the brain converts the data it obtains through different sensory organs into a common tool and neuron networks of different sizes. For example, when we listen to music, the sound waves that hit our eardrums are transmitted to the brain, and the brain systematically organizes the inputs (neural networks) according to the intensity, frequency and status of this input and gives them meaning. These structures basically mean learning for the brain. When artificial intelligence studies in education are examined today, it can be seen that not only information-based but also data and logic-based artificial intelligence and artificial intelligence applications are used in almost every field. These include personalized education or dialogue education systems, exploratory education, data mining in education, student article analysis, intelligent agents, chatbots, education for children with special needs, child-robot interaction, artificial intelligence-based assessment systems, automatic test creation systems. If you pay attention, these areas are mostly related to supporting learning. However, artificial intelligence in education also supports schools and universities in terms of management. For example, course programs, personnel programs, exam management, cybersecurity, facility management and security are areas where artificial intelligence directly contributes to school management and indirectly to teaching (Holmes et al., 2019). In parallel with the development of artificial intelligence in recent years, expert systems, which actually have a very old history, have found a great place in both research and development. Expert systems, in their most general definition, are computer programs that perform tasks performed by people specialized in a certain field using various artificial intelligence algorithms. They work based on knowledge and inference. In other words, four basic modules are needed for an expert system to be used effectively.

These are; (1) information renewal, (2) knowledge base, (3) inference/decision mechanism and (4) interface (Önder, 2003). The following picture was developed according to these classification:

Picture 1. Expert systems models



For example, just as someone specialized in the field of medicine can produce a solution (inference) to a problem based on the information they have obtained (knowledge base), the situation is similar for expert systems. Expert systems, which are a branch of artificial intelligence, differ from artificial intelligence in several ways. First of all, while artificial intelligence generally focuses on solving a problem by imitating a human intelligence, expert systems focus on problems that people specialized in a certain field can solve. Therefore, it is

very important to create a knowledge database related to that field in expert systems. For example, while a teacher uses only his/her own knowledge to solve a problem related to classroom management, expert systems can use the data and results obtained from different teachers to provide possible solutions, sometimes with 100% or close percentages, by loading the data related to the problem into the system. Another difference between artificial intelligence and expert systems is that expert systems are mostly based on human experience. As it is known, human experience is a phenomenon that is obtained as a result of years of work to obtain certain knowledge and is considered very important. The immortalization of these experiences with such systems and their use in every situation and condition is one of the basic reasons underlying the creation of these systems (Önder, 2013). One of the areas where expert systems are used in education is distance education. Expert systems provide structures that expand the knowledge base and develop decision mechanisms with completely individualized feedback and answers obtained through problems that they provide to students in distance education. The most well-known and widely developed expert system example in this field is MYCIN, developed by Prof. Feigenbaum and his colleagues from Stanford University for use in the diagnosis and treatment of bacterial diseases in the field of medicine (Doğaç, 2010). A doctor who wants to use this system is asked to answer various questions such as general information and analysis results by the system using an interface called DEC-20 connected to the expert system. However, if there is unknown data, the answer "not yet known" can also be added to the system. The system, just like an expert human, recommends diagnosis and treatment with possible missing data using a three-stage process of perception, comprehension and action (Holmes et al., 2019).

So how are today's artificial intelligence technologies used in the education sector?

a)It provides the opportunity to automate basic education activities:

The purpose of homework and tests created for a student who is going to high school today is to analyze the student's competence, complete the deficiencies related to the subject and determine in which profession group he/she can be successful in the future. Artificial intelligence creates this process with a plan by evaluating the information about the student. In the first stage, the knowledge and skills of the student are determined with artificial intelligence. A program is created according to the weight of the knowledge and skills. Since artificial intelligence technologies can analyze the deficiencies of the students, they can design the program they will create in a way that suits the individual. With the personalized education program, students will be more productive and will add value to their environment as individuals who love their jobs in the future.

b)Personalizes educational software according to student needs: Every individual is different and each individual has different abilities. During the process from primary school to university, students discover and develop their abilities and become individuals who benefit society by increasing these experiences in their professional lives. In today's educational planning, this development process is provided by teachers, tests and exams.

c)It better understands students' deficiencies and creates personalized support advantage for development: Teachers cannot be aware of all the mistakes students make in tests or homework; however, it is possible to solve this problem with artificial intelligence. "Coursera", which provides online use, is a very good example for this. With this application, if the student does their homework or a section of the homework incorrectly, the system warns the teacher and the teacher provides feedback to the students by creating hints about the homework to be done or the question to be answered. In this way, the artificial intelligence fed with information perceives the problems that will occur in the future, benefits from the previously created information and provides the student with hints, allowing him/her to reach the correct answers. When the information and hints created by the teachers reach the proficiency level, the

problems that may be encountered provide instant feedback with artificial intelligence support. In this way, instead of waiting for news from the professor, students interact with artificial intelligence and have quick access to the content they need.

d)Provides useful feedback: Artificial intelligence not only provides online courses and test management tailored to the needs of teachers and students, but also provides feedback on the success of courses and courses. Today, some schools use this system to track students' development and improve student performance with this analysis. Such artificial intelligence systems support the determination of students' needs and the creation of a plan for how the teaching staff should be organized regarding these issues. In addition, these systems help students choose their majors by determining the areas in which they are successful.

e)It can change the structure of education

In this way, we determine how we can find information in schools and academies; or how information should reach us, through the habits we have made. This automatically directs us to receive education in the right field by making us more knowledgeable individuals in our field of interest.

f)It constantly improves itself:

Smart data collection supported by smart computer systems is a process actively implemented by many schools today. In this way, schools ensure that the information they record is used according to the needs of the students in the systems they create.

Personal information of the students, student achievement information, student work and interest statistics provide the opportunity for students to choose the most suitable courses and lessons with the support of artificial intelligence. With the information collected, the main branches that the students will focus on according to their interests and work performance are determined in a shorter time.

Many fields, especially education, are affected by both artificial intelligence and technological and digital developments, and this area of influence is expected to expand in the near future. There seems to be a belief that the future education system cannot exist without artificial intelligence systems, technology and digital mobility. For this reason, schools need to give more importance to robotic coding, artificial intelligence, the digital world and technology as soon as possible (Coşkun and Küçükali, 2021). It can be said that artificial intelligence applications are important in education and teaching and that students and teachers should be encouraged to use these applications in a controlled manner by working with these applications (Uzun et al., 2021). The fact that artificial intelligence applications allow students to learn according to their abilities and learning speed is considered the most positive effect of these applications (Arslan, 2020). In addition, some applications increase the efficiency of education by offering flexible study options and allowing students to take courses when they feel ready.

CONCLUSION

In this study, where various tools and examples regarding artificial intelligence and the use of artificial intelligence in education are tried to be given as a whole, it should be accepted that; every explanation or every information to be made about artificial intelligence in education will definitely be incomplete, because new educational applications based on artificial intelligence will come to us tomorrow as they do today with new techniques. Artificial intelligence applications and examples, which are tried to be explained in this study with their rather limited and basic principles, continue to develop in education in different dimensions (target audience, learning area, learning approach, supporting learning and supporting teaching) and with different examples. As mentioned before, artificial intelligence is used effectively not only to support learning, but also in many different areas such as teaching,

evaluation, classroom management, administrative affairs, teacher duties and school management.

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