Use of Artificial Intelligence Technologies in Education

Resul BUTUNER

Beypazarı Fatih Vocational and Technical Anatolian High School

M. Hanefi CALP

Hacı Bayram Veli University

Nazım BUTUNER

Eregli Yunus Emre Vocational and Technical Anatolian High School

Introduction

Artificial intelligence is able to perceive the human ability to know, reason, comprehend, make sense of, generalize, make inferences, learn, and successfully perform multiple jobs at the same time (Gondal, 2018, s.1). In a different expression, it is called information technology that can imitate human intelligence. In addition, artificial intelligence technology is a branch of science that continues to develop continuously by studying human intelligence and the working system of the brain. Human intelligence is superior to artificial intelligence. But it is known that artificial intelligence works much faster than the human brain if the environment changes rapidly, tasks are complicated and many tasks are solved simultaneously in a certain order and with an unchanged technique (Teng, 2019). It should be noted that artificial intelligence technologies are widely used in healthcare, industry, military, transport, transport, trade, etc. it is seen that it is widely used in fields. One of them has been the training area where it has been used a lot nowadays. Artificial intelligence has been an evolving technological field that can change every aspect of our social interactions. As an inevitable result of affecting our interactions, the field of education also affects and changes. Artificial intelligence technologies in education have begun to produce new teaching and learning solutions that are currently being tested in different contexts. An important area affected by artificial intelligence technology is education. 21. considering that individuals who grew up in the XIII century were individuals who grew up intertwined with technology and got acquainted with computers and the Internet from the moment they were born, it seems that different methods are needed in education than the traditional teaching method. It is one of the indispensable elements of my education to bring today's students to a level that can solve their current and future problems. Because of this, it is possible to see that the question "what do you want to be when you grow up" for children has been replaced by the question "what problem do you want to find a solution to in the future (Kis, 2019).

With this change, personalized training programs, individual performance monitoring, course content preparation, determining the teaching model, etc. are being implemented today with the use of a large dataset thanks to artificial intelligence technologies. the procedures have significantly improved the quality of training. Considering the artificial intelligence studies in the field of education today, it Dec seen that the most development has been achieved between the educational organization, parents, teachers and students, and the area where work has been done is on students and learning(Tablo 1).

Tablo 1. Advantages and Disadvantages of Artificial Intelligence in the Context of Educational Stakeholders (Osetskyi et al.,2020).

Shareholder	Advantages	Disadvantages
Educational Organization	Identification of students as personalities and individuals, School safety, Objectivity of assessment, Digital learning, Protection of student personal data, The possibility of efficient learning and study, Lifelong learning, Personalized teaching.	Low confidence in the new system, possible problems at the stage of evaluating the creative work of students, concerns about ensuring classroom discipline, the possibility of the System crashing or being hacked.
Student	The ability to objectively monitor the learning process, Improve the quality of distance learning, Integrate into new technologies, Access to it at any time.	Difficulty in being motivated, Lack of communication and interaction between students and teachers
Teacher	Ease of managing students, Automating task and content creation, Continuous improvement, Objective evaluation, Fast and complete feedback, Performance monitoring, Protecting teachers' strengths, Contributing to the development of their weaknesses	It can lead to an increase in the expected professional qualifications of the teacher, replace teachers.
Parent	Real-time feedback, Informing about progress, New learning opportunities for their students, Reducing problems in reaching education for financially disadvantaged families.	Since there is no communication with people, there is a lack of communication and interaction, as well as dehumanization.

Artificial intelligence studies in education are not limited only to the effectiveness of learning, but also work is underway to actively use it in other areas of education. In this context, the areas on which development studies are ongoing and the techniques that are intended to be applied in these areas are given in Table 2.

Tablo 2. Application Areas and Techniques of Artificial Intelligence in Education (Chen et al.,2020).

The Field of Application of Artificial Intelligence	Techniques
Evaluation of students and schools	Adaptive learning method, Personalized learning approaches, Academic analysis
Grading, evaluation of assignments and exams	Image analysis, Computer vision, Forecasting system
Personalized smart teaching	Data mining, Information intervention, Analysis of the individual and learning
Smart school	Face recognition and voice recognition, Intelligent laboratories, AR, VR systems, Hearing Dec technologies
Online and remote mobile training	Precise analysis of the individual, Virtual personalized assistants, Real-time analysis and instant feedback

In this section, studies conducted in education using Artificial Intelligence Technologies are mentioned. The use of artificial intelligence in education has been gaining importance in recent years. The part related to education occupies a small place in the field of artificial intelligence (Arık & Seferoğlu, 2020; Tahiru, 2021). Artificial intelligence plays a supporting role in education by helping teachers and providing meaningful lives for learners (How & Hung, 2019). Baker and Smith (2019), educational artificial intelligence tools are approached from three different perspectives: a) student-facing, b) teacher-facing, and c) system-facing educational artificial intelligence tools. Artificial intelligence tools for pupils, students use to learn a topic, adaptive or personalized learning systems such as learning management systems or intelligent software. Teacher-facing systems are used to support the teacher and reduce his workload by automating tasks such as management, evaluation, feedback and plagiarism detection. Educational artificial intelligence tools also provide insight into the learning process of students so that teachers can offer support and guidance when necessary. System-oriented educational artificial intelligence is a tool that provides information to managers and managers at the enterprise level, for example, to monitor data exchange models at faculties or schools. Although the educational applications of artificial intelligence were based on an information-based approach from the 1980s to the 2000s (Etzioni,A. & Etzioni, O., 2017) today's studies show that there are different applications in which data and logic-based artificial intelligence applications are involved in almost every field (Fritz &Dermody, 2019).

It seems that artificial intelligence will undoubtedly dominate all areas of life in the near future. A survey of 352 artificial intelligence researchers from Oxford and Yale Univer-

sities was conducted on when artificial intelligence can do various jobs that people do in the future. According to this survey, it has been concluded that by 2051, artificial intelligence will be able to automate all human tasks (Oztuna, 2017:99). At this point, both academic education and, in parallel, artificial intelligence will have a great share in shaping organizational educational activities today and in the future. One of them, Intelligent Instructional Systems, instead of providing the same content to all learners, creates a model according to the goals, preferences and information of each learner individually (Esdeira, 2017). Intelligent Training Systems are used by NASA in the training of astronauts. NASA has trained astronauts with Intelligent Instructional Systems on how to use robotic arms on a space shuttle. Astronauts learn to complete their tasks in this way, and feedback is given according to successes or failures in learning tasks. The system records performance data for each astronaut and provides appropriate performance results by making decisions based on the understanding capacity of the trainee (Noe, 2009).

The introduction and adoption of new technologies of artificial intelligence technologies in higher education policies, and especially in education and training, has been developing rapidly in recent years. It is known that many scientists are interested in artificial intelligence technologies and are exploring the areas of use of artificial intelligence in higher education (Bostrom & Yudkowsky, 2014; Khare, Stewart, & Khare, 2018; Muller, 2016; Popenici & Kerr, 2017; Russel & Norvig, 2010; Stefan & Sharon, 2017). Firstly, with the help of artificial intelligence, learning in higher education can be individualized and the special needs of students can be met (Chatterjee & Bhattacharjee, 2020). Students enjoy studying with a completely new and unique educational approach adapted to their individual needs. For example, Artificial intelligence can help with this kind of personalized learning approach. Therefore, different applications of artificial intelligence will also help to personalize the learning experience (Kumar et al., 2019).

Another area of application of artificial intelligence focuses on the student. For example, some artificial intelligence to observe the behavior of students of higher education institutions, student attendance, and homework are used to monitor while (Baker & Inventado, 2014), others, game, or game-based learning is increasingly common to prefer, it is observed that Intelligent Tutoring Systems (Spector & Ma, 2019). Another potential area where artificial intelligence can help on college campuses is the career placement office. Parker points out that artificial intelligence-assisted interviews through career placement offices at a university are more objective (Jackson, 2019).

In the pandemic period, the inclusion of artificial intelligence applications in the educational process has been of vital importance. In education, online training courses based on artificial intelligence systems have been organized using data mining and student analytics based on student information, and attempts have been made to prevent disruption of educational activities. Applications such as Questa, Cognii and Active have been

used to provide data for the establishment of artificial intelligence systems, and artificial intelligence-supported educational platforms such as Knewton, Century Tech, Voleybolu and Querium have been created (Raza, 2020).

Yin and Moore (1987), the use of artificial intelligence systems in the field of special education; Zawacki-Richter, Marin, Bond and Gouvernour (2019) the use of artificial intelligence systems in higher education and Timms (2016) the use of educational robots based on artificial intelligence systems and intelligent classrooms in the educational system; Ucar and Uludağ (2018), Intelligent classroom applications in the Turkish education system; Bahceci and Gurol (2010) conducted studies on the use of intelligent education systems based on artificial intelligence in education. Artificial intelligence in education has begun to produce new teaching and learning solutions that are currently being tested in different contexts. The most common examples of artificial intelligence applications in education are intelligent teaching systems, adaptive learning systems and recommendation systems. Intelligent Learning Systems use artificial intelligence techniques to model a human teacher to improve learning by providing better support for the learner (Hasanov et al.,2019). Recommendation systems are software tools based on machine learning and information retrieval techniques that provide recommendations for potentially useful items that may be of interest to someone (Syed & Zoga, 2018). Adaptive learning environments create a model of various characteristics of learners and provide an individualized learning environment that meets their needs (Somyurek, 2009).

Intelligent teaching systems are pedagogical computer programs that predict to whom, what, and how they should be taught. According to the data obtained by using artificial intelligence techniques and evaluating the student's performance in the learning process, he has the ability to organize the educational program, determine the level of the student, and interact with the student. It is a system that can imitate what a human teacher can do using pedagogical teaching techniques in a way that suits the student's level and abilities (Piramuthu, 2005).

An example of this type of education has been the "Intelligent Tutoring Systems" (ITS (McArthur et al., 2005). The first ITSs appeared in the 1980s. The main purpose of its early research and development work with a student teacher or coach was to simulate interactions between a human and educational experience. An ITS adjusts the content provided to each student based on the student's current state of knowledge in a particular field, such as mathematics, and provides the level of support and feedback needed for the student to learn and progress within the content. Within a personalized learning environment, ITS due to the nature of these systems in many schools, teachers in heterogeneous classrooms, which is a well-known difficulty for many students can be used to help accommodate a wide range of student abilities. Platforms such as Coursera, edX,

Skillshare, and Udemy have radically changed informal learning and career education. Wikipedia and YouTube have made it possible for anyone to learn almost everything. Now more people use Duolingo to learn languages than any other high school student in the United States. These are all prime examples of AI-driven platforms that provide real-time responses and results for continuous learning. In another study, a three-stage project aimed at creating and testing artificial intelligence-based games to improve the clinical reasoning and detection skills of nurses in home care and community settings using advances in information and information technologies was planned by Dariel and his colleagues, and the first stage was completed (Keskinkora,2019). Artificial intelligence is starting to transform classrooms through the use of customizable content and the monitoring of classifications. AI can automate basic routine tasks such as rating and evaluating simple tests. Be able to apply more individualization with adaptive learning programs, games, and software (Romiszowski, 1987). Artificial Intelligence will help create more efficient, personalized, and contextual support for students. Intelligent recommendation systems or machine-assisted systems will demonstrate the student's mastery, repeat the necessary lessons and suggest a personalized learning plan (McArthur et al., 2005).

A simulation game that is thought to reduce the stress and fear experienced by nursing and medical students during their first experience in the operating room has been developed and its effectiveness has been examined in an experimental study. Of these students, who were divided into control and experimental groups, it was observed that the fears of the experimental group students involved in the simulation game decreased and they made fewer mistakes. In addition, it was concluded that these students are more knowledgeable about how they should behave in the operating room and have a more cooperative attitude towards the patient or staff (Keogh et al., 2019).

(Boydak, 2015). Chopra (URL-4) states that artificial intelligence technologies, it is aimed to use each student's educational materials to customize them according to their abilities, preferred way of learning, and experience. In addition, it is expected that 47% of learning tools will be equipped with artificial intelligence capabilities by 2024. The education system in the world is now constantly renewing itself in line with the use of artificial intelligence applications. In our country, it is aimed to use artificial intelligence applications in order to make improvements in the field of education in accordance with the goals of the Ministry of National Education for 2023. Related studies in this direction, the provision of information about the uses and benefits of artificial intelligence in education, trainers keep themselves updated to adapt to new technologies and on the subject of themselves is important. In addition, the study is important in terms of providing up-to-date information and being a resource for those who want to work on artificial intelligence-based training. It will be useful to mention the artificial intelligence studies conducted in the field of education in Turkey. Many workshops and conferences are held

for artificial intelligence applications and training in the field of education in Turkey. In this regard, the institute of education industry and technology (ESTEN) has organized an artificial intelligence workshop in education six times. In the final report of the sixth workshop, it was mentioned that "Intelligent Classroom Behavior Management" can be realized thanks to image processing technologies. Thanks to this system, it is stated that the facial expressions of the students and their emotional state at the time of the lesson can be detected thanks to the cameras placed in the classroom and which can take December at intervals of 30 seconds. It has been emphasized that these feelings of the students can be analyzed and transmitted to the teacher as feedback. As a result, teachers have stated that thanks to these feedback, they can have information about which part of the lessons the students are active in or which part of the lesson the student is not interested in. It can be said that this system can help teachers in terms of determining the best course method. In addition, in the same workshop, it was stated that image processing technologies can be placed at school entrances and exits and polling control can be done (URL-7).

The Ministry of National Education is working to develop artificial intelligence applications in education. In this context, they collaborated with Istanbul Technical University and worked on the creation of personalized educational content to support the individual development of students. In addition, Istanbul Technical University organized training on artificial intelligence for teachers and made progress in providing guidance services to them (URL-12).

In addition, The Ministry of National Education General Directorate of Innovation and Educational Technologies stated that various content will be prepared for schools and teachers in order to use artificial intelligence applications in education starting from primary school students. In this context, the "Artificial Intelligence Education for Children" project has been launched and studies have been planned to provide artificial intelligence training to students with nine partners under the leadership of Manisa Celal Bayar University. It is also stated that within the scope of this project, different applications will be developed through various games and visualizations, and guide books related to artificial intelligence will be prepared. It has been stated that the Cambridge Professional Education Academy from the UK, CCS and Pobalscoil Neasain school from Ireland, and IBM Watson organizations will support the project. (URL-5). MATLAB, one of the techniques used for data analysis, is a software language that is suitable for technical calculations and has high performance. With MATLAB, mathematical calculations can be performed, algorithms can be developed, modeling, simulation, and prototypes can be created, data analysis Dec and visualizations can be performed, scientific engineering graphics can be created, and applications including graphical user interfaces can be developed. In the study where MATLAB was applied, researcher, 3. The effects of reading difficulties experienced by grade students; familial factors, individual factors,

environmental factors, education and training resulting from the results of the survey that is being applied to up to 174 teachers analyzed in a quantitative manner by installing Matlab, detect the degree of difficulty of items and more accurate results. (Celik, 2020).

In order to understand the Fuzzy Analytical Hierarchy Process, another artificial intelligence technique used in data analysis, it will be appropriate to have information about the Analytical Hierarchy process first. The Process of Analytical Hierarchy is a method of organizing and analyzing complex decisions using mathematics and psychology. The Process of Analytical Hierarchy provides a rational framework for a decision that is needed by digitizing its criteria and alternative options and correlating these elements with the overall goal. In a traditional method of the Analytical Hierarchy Process, each binary matrix is evaluated separately, and then the weight vectors are combined with a geometric mean. But in the method of a fuzzy Analytical Hierarchy Process, all binary matrices are first combined using a predetermined set of weights, and then a single vector of weights is calculated at the end. In the study where Fuzzy Analytical Hierarchy is applied, Fuzzy Analytical Hierarchy is used when creating a strategy decision model in open, remote, and flexible learning environments. The data obtained from the focus group interview conducted with 12 experts using the Delphi technique were analyzed using a Fuzzy Analytical Hierarchy and a decision model was created (Karatop & Guler, 2021).

Moodle, e-learning is a learning management system that provides a platform for educators is a free software that various courses, curricula, course structures and significantly simplifies the interaction with the students and thus helps in conceptualization online. In the study using this platform, the researchers followed the homework submissions of the students via Moodle with data mining and interpreted the general situation of the students (Akcapinar & Kokoc, 2020). There are also studies that develop projects from scratch using artificial intelligence techniques. For example, the ArtiBos project has been developed to design, implement and evaluate a game-based adaptive intelligent teaching system that can improve students' problem-solving skills. The project has received a lot of attention, has become a large number of publications and has received awards. The computer-aided educational technology, and artificial intelligence techniques used in this project followed the learning processes of the students in a hierarchical manner; the routing made has been assisted in decision making, has been reviewed and identified their training needs, students ' errors are detected, the solution produced short has helped students in many ways. Another English English language learning project developed from scratch is a machine learning-based mobile English learning application developed to facilitate English learning and increase accessibility for non-native English speakers (Gungor et al., 2021). Like MIT App Inventor, the ArtiBos Project (Erumit, 2019), which originated in Turkey and was developed using artificial intelligence techniques and made available to students, has entered the literature as a proud work on behalf of our country.

ArtiBos, a game-based project developed on problems in mathematics, introduces students to the logic of problem-solving, records students' mistakes, individualized learning, and supports equal opportunity in education because it is accessible to students from all walks of life.

It was designed by Butuner and Calp (2022) to predict the academic achievements of students studying in the distance education process using artificial intelligence methods. The data were obtained from the education management system used in the distance education process belonging to the students studying in elementary, middle, and high schools. Due to the fact that artificial intelligence methods are an effective tool, especially in the classification and forecasting business, the academic achievements of students have been estimated as high, medium, and low. As a result, the results of the study showed that Deep Learning, Random Forest and Support Vector Machine algorithms provide prediction success at higher performance than other used algorithms. Nowadays, when studying artificial intelligence studies in education, one can see different applications in which not only information-based, but also data- and logic-based artificial intelligence and artificial intelligence applications are involved in almost every field. Among these personalized dialogue education or education systems, exploratory Education, Education data mining in the analysis of the articles students, intelligent agents, chatbots, for children with various special needs education, child-robot interaction, artificial intelligence-based assessment systems, automatic test systems, creating is located. If attention is paid, these areas are mostly related to supporting learning. However, artificial intelligence in education also supports schools and universities from an administrative point of view. For example, course programs, personnel programs, exam management, cyber security, facility management, and security are areas where artificial intelligence contributes directly to school management and indirectly to teaching (Holmes et al., 2019).

Intelligent Instructional Systems, which can be considered the second generation of computer-aided Dec, are among the most widely used applications of artificial intelligence in education. In general, Intelligent Instructional Systems provide personalized learning environments that are appropriate for each student through well-structured topics such as medicine, mathematics, or physics and are conducted step-by-step (Alkhatlan & Kalita, 2018). The first example of intelligent instructional systems is SCHOLAR. The basic pedagogical approach of this system is based on the principles of Socratic dialogue. Using artificial intelligence techniques, the SCHOLAR creates a structure from a semantic network (here the semantic network can be seen as a way of representing geography knowledge, in which the semantically related concepts in the subject are interconnected), which gives individual responses to the student's answers (Carbonell, 1970).

In the study conducted by Butuner (2020) for the Guidance Service in schools, facial

recognition and emotion analysis on the human face were performed using the deep learning method (anger, disgust, fear, happiness, sadness, bewilderment, etc.) has detected feelings. According to these identified feelings, students who do not attend school guidance services are recognized and these faces have been published on the internet so that the guidance service can benefit from the system. As a result, it was ensured that students who had problems and did not have problems were followed up with daily emotion analysis.

Conclusion

Considering that computer and Internet technology is perhaps the most important turning point in terms of human history, artificial intelligence technology, which is just beginning to enter our new life, is both encouraging and alarming to humanity. This technology, which we are learning a new field of application every day, opens up new horizons for mankind in the cognitive field, the field that distinguishes man from all other living beings. The potential to affect all areas where there is a person naturally includes education.

In the study, artificial intelligence studies conducted in the field of education were examined. Educational management of artificial intelligence techniques, teaching techniques, material design, etc. can be seen that it appears in many of its operations. In addition, it is seen that these artificial intelligence studies increase the quality of education and provide continuity. With the rapid progress of technology, artificial intelligence studies will increase both in education and in many fields, and with it new teaching techniques, material designs, educational methods, etc. it is expected to develop rapidly in the following areas. With this study, artificial intelligence studies in the field of education have been examined and it is expected to serve as an example for other studies to be carried out.

References

Akcapinar, G., & Kokoc, M. (2020). Analyzing the relationship between student's assignment submission behaviors and course achievement through process mining analysis. Turkish Journal of Computer and Mathematics Education (TURCOMAT), 11(2), 386-401.

Arik, G., & Seferoglu, S.S. (2020). Eğitimde Yapay Zekâ Çalışmaları: Araştırma Eğilimleri, Karşılaşılan Zorluklar ve Çözüm Önerileri. Nabiyev, V. & Erumit, A.K. (Ed.). Eğitimde Yapay Zeka Kuramdan Uygulamaya içinde. Ankara: Pegem Yayıncılık

Aygun, E. S. (2019). Design a Gamification Adaptive Intelligent Tutoring System Toward Problem Solving Teaching (Master's Thesis, Trabzon University, Trabzon.

Bahceci, F. & Gurol, M. (2010). A model proposal on applications of intelligent tutoring systems in the education. Engineering Sciences, 5(2), 121-128.

Baker, R. S., & Inventado, P. S. (2014). Educational Data mining and learning analytics. J. A. J. A. Larusson, ve B. White (Ed.), Learning analytics: From research to practice içinde (s. 61-75). New York, NY: Springer.

Baker, T., & Smith, L. (2019). Educ-AI-tion rebooted? Exploring the future of artificial intelligence in schools and colleges. Access Adress:

https://media.nesta.org.uk/documents/Future_of_AI_and_education_v5_WEB.pdf

Bostrom, N., & Yudkowsky, E. (2014). The ethics of artificial intelligence. K. F. (Eds.), The Cambridge handbook of artificial intelligence. Cambridge: Cambridge University Press.

Boydak, H. A. (2015). Öğrenme Stilleri. Istanbul: Beyaz Yayınları

Butuner, R. (2020), Emotion Analysis with Using Deep Learning Methods And Use The On The School Guidance, Master's Thesis, Necmettin Erbakan University, Konya

Butuner, R., & Calp, M. H. (2022). Estimation of the Academic Performance of Students in Distance Education Using Data Mining Methods. International Journal of Assessment Tools in Education, 9(2), 410-429.

Carbonell, J. R. (1970). AI in CAI: An artificial-intelligence approach to computer-assisted instruction. IEEE transactions on man-machine systems, 11(4), 190-202.

Celik, C. (2020). Modelling Reasons For Reading Problems Experienced By Third Graders Through Artificial Intelligence Method (Master's Thesis, Bursa Uludag University, Bursa).

Chatterjee, S., & Bhattacharjee, K. K. (2020). Adoption of artificial intelligence in higher education: A quantitative analysis using structural equation modelling. Education and Information Technologies.

Chen, L., Chen, P. & Lin, Z. (2020). Artificial intelligence in education: A review. IEEE Access, 8, 75264 – 75278.

Erumit, A. K., Cetin, I., Kokoc, M., Temel, K. O. S. A., Nabiyev, V., & Aygun, E. S. (2019). Designing a Usability Assessment Process for Adaptive Intelligent Tutoring Systems: A Case Study, Turkish Online Journal of Qualitative Inquiry, 10(1), 141-179.

Esdeira, F.A.A. (2017), The Investigation Of Semantic Learning Environments For Knowledge Management, Master Thesis, Kastamonu University, Kastamonu.

Etzioni, A., & Etzioni, O. (2017). The ethics of robotic caregivers. Interaction Studies, 18(2), 174-190.

Fritz, R. L., & Dermody, G. (2019). A nurse-driven method for developing artificial intelligence in "smart" homes for agingin-place. Journal of Nursing outlook, 67(2), 140-153

Gondal, K. M. (2018). Artificial intelligence and educational leadership. Annals of King Edward Medical University, 24(4), 1-2.

Gungor, E., Sinem, A. K., & Orman, Z. (2021). Mobile English Learning Application Based on Machine Learning. Journal of Computer Science and Technologies, 2(2), 58-65.

Hasanov, A., Laine, T. H., & Chung, T. S. (2019). A survey of adaptive context-aware learning environments. Journal of Ambient Intelligence and Smart Environments, 11(5), 403-428.

Holmes, W., Bialik, M. ve Fadel, C. (2019). Artificial intelligence in education: Promises and implications for teaching and learning. Boston, MA: Center for Curriculum Redesign.

Jackson, S. S. (2019). Using artificial intelligence to improve access to and success in higher education. INSIGHT into Diversity, 34-36.

Karatop, B., & Guler, E. (2021). Açık ve Uzaktan Esnek Öğrenme Ortamlarında Yapay Zeka.

Keogh, T. J., Robinson, J. C., ve Parnell, J. M. (2019). Assessing behavioral styles among nurse managers: Implications for leading effective teams. Journal of Hospital topics, 97(1), 32-38.

Keskinbora, K. H. (2019). Medical ethics considerations on artificial intelligence. Journal of Clinical Neuroscience, 64, 277- 282.

Khare, K., Stewart, B., & Khare, A. (2018). Artificial intelligence and the student experience: An institutional perspective. IAFOR Journal of Education, 6(3).

Kis, A. (2019). Eğitimde Yapay Zekâ. The 14th International Congress On Educational Administration, 197.

Kumar, V., Rajan, B., Venkatesan, R., & Lecinski, J. (2019). Understanding the role of artificial intelligence in personalized engagement marketing. California Management Review, 61(4), 135-155.

McArthur, D., Lewis, M., & Bishary, M. (2005). The roles of artificial intelligence in education: Current progress and future prospects. Journal of Educational Technology, 1(4), 42-80.

McArthur, D., Lewis, M., & Bishary, M. (2005). The roles of artificial intelligence in education: Current progress and future prospects. Journal of Educational Technology, 1(4), 42-80.

Muller, V. C. (2016). Risks of artificial intelligence. Boca Raton, FL: Chapman & Hall.

Noe, R. (2009), İnsan Kaynaklarının Eğitim ve Geliştirilmesi (Translator Canan Cetin) Istanbul: Propedia Yayıncılık.

Osetskyi, V., Vitrenko, A., Tatomyr, I., Bilan, S. & Hirnyk, Y. (2020). Artificıal intelligence application in educatıon: Financial implicatıons and prospects. Financial and Credit Activity: Problems of Theory and Practice, 2(33), 574-584.

Oztuna, B. (2017). Endüstri 4.0: Dördüncü sanayi devrimi ile çalışma yaşamının geleceği. Ankara: Gece Kitaplığı, 106.

Piramuthu, S. (2005). Knowledge-based web-enabled agents and intelligent tutoring systems. IEEE Transactions on Education, 48(4), 750-756.

Popenici, S. A., & Kerr, S. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. Research and Practice in Technology Enhanced Learning, 22(12).

Raza, K. (2020). Artificial intelligence against COVID-19: A meta-analysis of current research. Big Data Analytics and Artificial Intelligence Against COVID-19: Innovation Vision and Approach, 78, 165-176.

Romiszowski, A. (1987). Artificial intelligence and expert systems in education: Progress, promise and problems. Australasian Journal of Educational Technology, 3(1).

Russel, S., & Norvig, P. (2010). Artificial intelligence - a modern approach. New Jersey: Pearson Education.

Somyürek, S. (2009). Adaptive Learning Environments: A New Paradigm in Educational Hypermedia Design. Journal of Information Technologies, 2(1).

Spector, J. M., & Ma, S. (2019). Inquiry and critical thinking skills for the next generation: from artificial intelligence back to human intelligence. Smart Learning Environments, 6(8).

Stefan, A. D., & Sharon, K. (2017). Exploring the impact of artificial intelligence on teaching and learning in higher education. Research and Practice in Technology Enhanced Learning, 1, 3-13.

Syed, A.B. & Zoga, A.C. (2018). Artificial intelligence in radiology: current technology and future directions Semin. Musculoskelet. Radiol., 22, pp. 540-545

Tahiru, F. (2021). AI in Education: A Systematic Literature Review. Journal of Cases on Information Technology (JCIT), 23(1), 1-20.

Teng, X. (2019). Discussion about artificial ıntelligence's advantages and disadvantages compete with natural ıntelligence. Journal of Physics: Conf. Series 1187, 1-7.

Timms, M. J. (2016). Letting artificial intelligence in education out of the box: educational cobots and smart classrooms. International Journal of Artificial Intelligence in Education, 26(2), 701-712.

Ucar, A. & Uludag, M. H. (2018). Smart classroom and student tracking system design with Internet of Things (IoT). Dicle University Journal of Engineering, 9(2), 591-600.

URL-4: Chopra, A. (2019, 11 Ocak). 21 Vital Chatbot Statistics for 2019. Access Adress: https://outgrow.co/blog/vital-chatbot-statistics,

URL-5: Calik, B. (2019, 30 Eylül). MEB okullarda "yapay zekâ" eğitimi için kolları sıvadı Access Adress: https://www.aa.com.tr/tr/egitim/meb-okullarda-yapay-zeka-egitimi-icin-kollari-sivadi/1597733,

URL-7: Eğitimde Yapay Zekâ Çalıştayı- 6 Sonuç Raporu (2019). Access Adress: https://tasam.org/Files/Etkinlik/File/Deklarasyon/EYC6_Sonuc_TR_pdf_9a161561-a82c-4cc1-adcdddc6c0e471e2.pdf

URL-12: Kasap, S. (2019, 26 Mayıs). MEB 'eğitimde yapay zekâ uygulamaları' için İTÜ ile el sıkıştı. Access Adress:https://www.aa.com.tr/tr/egitim/meb-egitimde-yapay-zeka-uygulamalari-icin-itu-ile-elsikisti/1489366,

Yin, R. K., & Moore, G. B. (1987). The use of advanced technologies in special education: Prospects from robotics, artificial intelligence, and computer simulation. Journal of Learning Disabilities, 20(1), 60-63.

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education– where are the educators?. International Journal of Educational Technology in Higher Education, 16(1), 1-27.

About the Authors

Resul BUTUNER is a Computer Teacher at Beypazarı Fatih Vocational and Technical Anatolian High School in Konya, Turkey. He has a master's degree in Computer Engineering from Necmettin Erbakan University. His main areas of interest are artificial intelligence, robotic coding, data mining and augmented reality applications. He is an instructor in the field of Robotic coding within TUBITAK. He continues to write a book in the field of robotic coding at the Ministry of National Education. He worked as a coordinator in budgeted projects related to student education. **E-mail:** rbutuner@gmail.com, **Orcid:** 0000-0002-9778-2349.

M. Hanefi CALP received his Master's degree in the Department of Electronics and Computer Education at Gazi University and his doctorate degree in the Department of Management Information Systems at Gazi University Institute of Informatics. Currently, he is working as an Associate Professor in the Department of Management Information Systems at the Faculty of Economics and Administrative Sciences of Ankara Hacı Bayram Veli University. His research interests include Information Systems Dec Technology Management, Information Management, Digital Transformation, Artificial Intelligence, Risk Management, Risk Analysis, Human Computer Interaction and Project Management. **E-mail:** hanefi.calp@hbv.edu.tr, **Orcid:** 0000-0001-7991-438X.

Nazım BUTUNER is a Computer teacher at Yunus Emre Vocational and Technical Anatolian High School in Ereğli, Konya. He has a Master's degree in Educational Programs and Teaching from Necmettin Erbakan University. He worked as a coordinator in the Ministry of National

Education on projects related to student education. eTwinning, TUBITAK, MEVKA, KOP etc. I have worked on national projects. I am an enthusiastic, energetic computer teacher with skills in software development and computer networking.

E-mail: nazimbutuner@gmail.com, **Orcid:** 0000-0002-5982-6005.

Similarity Index

The similarity index obtained from the plagiarism software for this book chapter is 20%.

To Cite This Chapter:

Butuner, R. & Calp, M.H.& Butuner, N. (2022). Use of Artificial Intelligence Technologies in Education,Y. Uzun. & R. Butuner (Eds .), *Current Studies in Artificial Intelligence, Virtual Reality and Augmented Reality* (pp. 74–88). ISRES Publishing.