Scientific Journal of Finance and Financial Law Studies

Scientific Journal of Finance and Financial Law Studies

Cilt/Volume :3 | Sayı/Issue: 2 | Ekim/October 2023

ULUSAL YAPAY ZEKA STRATEJİLERİNİN EĞİTİM YÖNÜ: ÇİN VE TÜRKİYE ÖRNEĞİ

Bediha ŞAHİN[1]

Makale İlk Gönderim Tarihi / Recieved (First): 17.10.2023 **Makale Kabul Tarihi / Accepted:** 20.10.2023

Atıf/©: Şahin, B. (2023), Ulusal Yapay Zeka Stratejilerinin Eğitim Yönü: Çin ve Türkiye Örneği, Scientific Journal of Finance and Financial Law Studies,3(2), 78-94.

Özet

Günümüzde devletler yapay zeka araştırma ve geliştirme çalışmalarına ve yatırımlarına büyükönem vermektedirler. Küresel alandaki rekabetten yararlanarak dünya üzerinde hakimiyet kurmak isteyen ülkeler bu alanda yenilikleri ilk uygulayan devlet olarak üstünlük gücünü ele geçirmek amacındadırlar.

Yapay zeka alanındaki küresel rekabette önemli bir yere sahip olan Çin 2017 yılında Ulusal Yapay Zeka Stratejisi'ni kamuoyuna sunması ile yapay zekaya yönelik yapılan mevcut yatırımlara resmilik kazandıran, Devlet Konseyi'nin Yapay Zeka Geliştirme Ulusal Stratejisi belgesini yayınladı. Küresel çapta yapay zeka hakimiyeti açısından oldukça büyük öneme sahipolan bu belge diğer devletleri de ulusal yapay zeka stratejisi oluşturma yönünde teşvik etti. Aynı zamanda Çin'in ülke genelinde bu alanda hızlı yaşanan bilimsel araştırma ve geliştirmeler ile eğitimin yapay zeka alanındaki yenilikler bakımından önemini vurgulayan bir nitelik de taşımaktadır. Ayrıca bu süreç, Çin'de eğitimde yapay zeka teknolojileri deney ve çalışmalarının yoğunluk kazanması, yatırım ölçeklerinin oldukça büyük oluşu, eğitimde üst seviye yapay zeka teknolojilerini geliştirmesi dünyadaki eğitimsel yapay zeka gelişimindeki güç dengelerinin yönünü değiştirmeye başladı. Şimdilerde olduğu gibi, eğitimsel yapay zekadaki gelişmelerle küresel yönden gelecekte de ne denli değiştirip dönüştüreceğinin de işaretlerini vermektedir. Dünya genelinde oldukça büyük etki yapan bu belge, pek çok ülke tarafından yapay zekanın stratejik kullanımını amaçlayan "Ulusal Yapay Zeka Stratejileri"nin hazırlanmasına neden olmuştur. Bu makalede, Çin hükümeti tarafından yayınlanan yapay zeka gelişimi için eğitim kurumlarının ulusal ve bölgesel strateji alanlarında etkin olarak yer alan Ulusal Yapay Zeka Stratejisi eğitimsel açıdan ele alınmaktadır. Hükümet politikalarına göre yapay zeka eğitimingelişimini bir analiz yoluyla tasvir ederken, PISA sınavı sonuçları ile de bağlantı kurularak açıklanmaya çalışılmaktadır. Ayrıca Çin'deki Uluslararası Yapay Zeka Geliştirme Stratejisini eğitimsel alanda hızla uygulamalarının ve gelişmelerine yönelik yaptırımların neler olduğu onubu yönde diğer ülkelerden ayıran özellikleri ortaya konulmaya çalışılmaktadır. Ayrıca Çin'dekibu gelişimin sadece yapay zeka teknolojilerinin tasarımı değil eğitim sisteminin değişim ve dönüşümünde etkili olan nedenler ve çözümlere ilişkin yaklaşımlara yer verilmektedir.

Çin başta olmak üzere, diğer birçok ülke ulusal yapay zeka stratejisi belgelerini yayınlayarak yapay zeka alanında gelişmeyi kalkınma amaçları arasında yerleştirmişlerdir. Türkiye'de küresel çapta yaşanan yapay zekadaki hızlı gelişimin dışında olmamak için yapay zeka teknolojisine yönelik 2021 yılında Ulusal Yapay Zeka Strateji'ni yayınlayarak, eğitimsel yapayzeka teknolojisini daha fazla gelişmek zorunda kalmaktadır. Bu çalışma, Ulusal Yapay Zeka Stratejileri kapsamında eğitimde yapay zekanın gelişimi üzerine genel bir çerçeve belirleyerek yapay zeka teknolojisinin genel olarak küresel düzeyde ve Çin ile Türkiye ulusal yapay zeka stratejilerinin eğitim yönünden güçlü ve zayıf yönlerini değerlendirmektedir. Ayrıca Çin'in ulusal yapay zeka stratejisi ve eylem planında yapay zekanın eğitimsel yönünü analiz ederek Türkiye'nin eğitimsel yönden yapay zekayı merkezi alan bir ekosistem oluşturması ve gelişimini sağlayabilmesinde izleyeceği stratejiye yönelik öneriler sunmayı amaçlamaktadır.

Anahtar Kelimeler: Yapay Zeka (YZ), Türkiye, Çin, Eğitim, Ulusal Yapay Zeka Stratejisi, Eylem Planı, PISA.

[1] Lecturer Dr., Hacettepe Üniversity Institute of Education Sciences, Ankara, Turkey, E-mail: bediasahin5179@gmail.com, Orcid no: 0000-0003-0645-6431

1. INTRODUCTION

Artificial intelligence studies, which emerge from modelling the functioning of the human brain, aim for machines to model human learning, perception, and decision-making processes.Access to big data and rapid increase in computing power in artificial intelligence technology systems make it even more possible to use artificial intelligence technologies in education. Developments that we thought were impossible in the past now raise the question, "When willthey happen?". For example, according to recent news on social media, it is claimed that by 2050, students can take private lessons according to their DNA, and neurotechnology devices will be used in the education system (DailyMail, 2023). Although this news may seem impossible as it did in the days when Charles Babbage tried to imitate human mental characteristics in 1884 and designed the first calculator (Schultz & Ellen-Schultz, 2007), whichhe described as an artificial intelligence experiment of his time, when we look at the rapid development of artificial intelligence technologies, this may suggest that the basic principles ofthe system may increasingly be based on artificial intelligence technologies. Rob Waugh's statement, *"Children will be taught how to work with artificial intelligence systems, and this will be their most important skill"* (DailyMail, 2023), may be another expression that artificialintelligence in education has the potential to affect humanity as no other invention has ever affected.

Alan Mathison Turing made a significant contribution that affected the outcome of the war by developing the "Bombe", the most advanced fully automatic code-breaking machine of its time,to decipher Enigma codes designed by the Germans during the Second World War (Coşkun & Güleroğlu, 2021). It is possible to list these and similar actions related to artificial intelligence throughout history. However, the noteworthy point here is that, perhaps throughout history, there has been a tendency to believe that the intelligence displayed in humans and animals canbe explained by the intelligence of a (mechanical) structure (artificial intelligence) rather than by extraordinary reasons such as magic and miracle (İnce, 2017). This trend can be consideredthe accumulation of all these developments and the opportunity for artificial intelligence studiesto gain importance and evolve towards its development in modern times.

The development of artificial intelligence in modern times evolved during and after World War One of the most critical developments in artificial intelligence, which is even described as the beginning of a new era, was the organisation of the Dartmouth Conference in 1956 (Dick, 2019). At this conference, the name "artificial intelligence" was first proposed by McCarthy, and those who attended were considered the pioneers of artificial intelligence. However, whilethe period from 1965 to 1970 was defined as the period of stagnation of artificial intelligence, significant developments were achieved as of 1975, and research in this field was given priority.Sources that date the history of artificial intelligence to the 1940s tend to identify artificial intelligence with the emergence of digital computers. However, artificial intelligence in its modern sense was first systematically introduced by the British mathematician Alan Turing (McCarthy, 2007). In his article published in 1950, "Can Machines Think?" he suggests that the question should be considered. It led to the consideration of questions about whether machines can perform humanlike skills such as "decision-making" and "problem-solving" (Turing, 1950). In the same year, Alan Turing introduced the Turing Test as a measure of machine intelligence, and practical examples of artificial intelligence began to appear in writingprograms for games such as chess. The most effective of these games was IBM's chess programDeep Blue, which defeated humans in a match between world chess champion Garry Kasparov and artificial intelligence (DeepMind, 2017). Watson, developed by IBM in the field of artificial

intelligence, challenged human opponents by participating in a quiz competition called Jeopardy in 2011. In this competition, it was necessary to find a question suitable for the clue given by the presenter. Watson has shown that artificial intelligence can compete with human intelligence by leaving its human competitors behind with its fast and precise answers (İnce, 2017). In the following years, artificial intelligence Watson began to be used as a diagnostic tool by WellPoint, one of the largest healthcare institutions in America, to provide healthcare services. As mentioned, artificial intelligence technologies are used in many areas of our dailylives, as well as in education and training. The innovations brought by artificial intelligence technologies to education and their contributions to this field are mentioned in the following heading.

2. USE OF ARTIFICIAL INTELLIGENCE IN EDUCATION

Nowadays, the concept of school is changing day by day. According to Timms (2016), the school has now begun to be defined as a place where teachers and students come together to carry out teaching and learning activities physically and virtually (Timms, 2016:703). Teachersand students who are the subjects of school get to know many different aspects of artificial intelligence applications through this virtual education (İşler & Kılıç, 2021). As a result of reviewing additional studies on the use of artificial intelligence in education and training, it is seen that there are various applications. Generally, the following practices can be listed (Arnett,2016; Kulkarni, 2019).

Personalised teaching, one of the basic requirements of education, can be offered through artificial intelligence-based learning. Artificial intelligence learning systems can suggest this teaching, defined as determining teaching methods according to the student's needs (Xu, 2018; Knox, 2020). Many states, such as the USA, China, England, and Sweden, use personalised learning systems based on artificial intelligence. The artificial intelligence program Watson, designed by IBM in the USA, has been developed since 2010 and offers students a learning method through personalised learning. Also, in England, an artificial intelligence program called UTIFEN, which designs learning and provides feedback according to the student's characteristics, is used. In Sweden, personalised learning with artificial intelligence is achievedby separating the information into many parts in different fields, such as language, vocational education, and mathematics, revealing the needs and meeting these needs of the student. China,which we hear about more and more every day with innovations in educational artificial intelligence technologies, is known for analysing the facial and speech characteristics of students, monitoring the performance of each student in the classroom, analysing their emotions, participation, and results with a quantitative method (Li, 2018), and analysing the data obtained and personalised learning reports based on data (Xu, 2018) are prepared by making recommendations accordingly. Through the Artificial Intelligence Laboratory (AL Lab), *"visual, audio, natural language processing and machine learning"* are applied to support teaching to motivate students to create intelligent interaction and interest in the classroom (TAL; 2017b). In addition, through the combination of software and hardware, referred to as the *"magic mirror"* system, *"eyes (camera), ears (microphone), brain (cloud) andother organs (iPad) in the classroom* are determined, and thus the teaching process is measuredin many ways (People's Daily, 2018). It also promotes the *"Smart Teaching System", "Smart Application System", and Personalized Learning System* by taking advantage of the *"big data"*of the studies obtained during the education process (TAl, 2017b).

Therefore, artificial intelligence enables evaluations to provide feedback to students during learning, allowing them to identify and complete their missing information. Fast, personal, and exceptional support can be provided through various applications for educational feedback. However, it is seen that the development in teaching methods due to artificial intelligence will cause significant changes in the role of the teacher in the classroom. Considering the practicesin this field, it is thought-provoking that the teaching profession can turn into technical teachingwith studies in artificial intelligence and its impact on education.

While developments in artificial intelligence technologies bring up new daily discussions on educational institutions' functioning, content, and teaching methods, they seem to have the potential to significantly change these institutions and question them (Kış, 2019). Sinceartificial intelligence will change and transform all societies (OECD, 2019), countries rely on different criteria to analyse their current education structures. The fact that artificial intelligenceis based on fields such as algorithms and mathematics and carries similar criteria with the content of the Program for International Student Assessment (PISA) exam in the field of education shows that this exam can be used as a criterion for comparison. PISA is aninternational screening research to measure the knowledge and skills acquired by students. Countries that are members of the Organization for Economic Co-operation and Development (OECD) and other participating countries have applied for PISA exams every three years since2000. PISA exams, last held in 2018, were carried out to measure the skill levels of fifteen- year-old students in different countries in mathematics, problem-solving, reading, analysis, reasoning, and science and to measure their ability to make comparisons. These data provide essential indicators for creating and developing education policies (OECD, 2008).

According to the results of the 2018 PISA exam in which OECD countries participated, the average of OECD countries in reading skills was 487, while Turkey's average was 466. While the average of OECD countries in Science is 489, Turkey's average is 468. The average numberof OECD countries in mathematics is 489 points, while Turkey is 454 (OECD, 2018). In this context, according to past PISA results, analysis publications, and data from databases, Turkey'ssuccess in mathematics appears to be far behind the averages of OECD countries. These data show that the Turkish education system needs the development of skills such as thinking, practical thinking, problem-solving, and communication skills, which should be included in the basic education principles (Aydın vd., 2012). Artificial intelligence technologies can be used tosupport these skills that can contribute to students' development, especially in mathematics.

Therefore, Turkey's education system should increase the capacity to achieve qualified educational goals such as thinking, reasoning, applying the concepts learned at school, communicating effectively, developing models, and problem-solving. This is of great importance for developing the country and increasing social welfare. Therefore, to improve theability to compete with artificial intelligence in the information society, educational policies and philosophy of education should be reviewed, and academic policies that can offer appropriate solutions to rapidly developing artificial technology systems should be developed.

2.1. Chına's Natıonal Strategy For Artıfıcıal Intellıgence AndEducatıon

Today, China has become one of the most important global centres for innovation in Artificial Intelligence (AI). China determines artificial intelligence as one of the essential elements in developing its scientific and technological power (Louis, 2018). In 2017, the Chinese Government published the National Strategy for Artificial Intelligence Development documentby the State Council, which formalises the current investments in artificial intelligence (State Council, 2017). Including the "New Generation Artificial Intelligence Development Plan" in this document is evidence that it prioritises artificial intelligence development (Ding, 2018). The publication of this strategy document attracted the attention of other states in terms of the development of artificial intelligence technology in China. This document, which is importantfor global artificial intelligence dominance, encouraged other states to create a national artificial intelligence strategy (Knight, 2017; Thompson, 2018).

With the idea of becoming an international power instead of a regional power in artificial intelligence technologies (Knox, 2020), China has set particular criteria for artificial intelligence and artificial intelligence-related industries in its National Strategy Plan. Accordingto this plan, by 2030, China will invest RMB 1 trillion (US$150.8 billion) in the core artificial intelligence industry and RMB 10 million (1.5 trillion) in gross production, covering other related industries and thus has revealed its desire to take the lead in this field (iiMedia, 2017). Among the reasons why China wants to become proficient in the production of artificial intelligence technologies by 2030 (Ding, 2018:10), taking into account the geopolitical and economic aspects of this field (Ding, 2018; Webster et al., 2017; Lee & Triolo, 2017; Knox, 2020) is its intention to establish an international main innovation centre. On the other hand, the aim is to become self-sufficient in producing artificial intelligence technologies by minimising dependence on other countries' technologies and overseas expertise in artificial technologies (Allen, 2019).

It is noteworthy that China, with its developments in artificial intelligence and this significant investment, has taken necessary steps towards taking over this power from the USA, which is considered a global leader in technology and artificial intelligence (Knox, 2020). Since China thinks that it will have a significant share in the worldwide competition in the field of artificial intelligence technologies in the future, it carries out research and development (R&D) activities and studies in technology and scientific fields, without borders, in all fields, especially education (State Council, 2017). It seems that China aims to achieve technological integrationin a large part of education, social, economic, law, and all other public areas by using artificialintelligence as much as possible in processes such as thinking, reasoning, decision-making, andanalysis, which are inherent in the rationalisation of humanity.

Developing education with artificial intelligence technology requires looking beyond conventional education's traditional curriculum, pedagogy, teaching, and learning problems (Selwyn, 201: 30). While designers or educators plan formal education, a vast network of actors carries out artificial intelligence. However, it is seen that artificial intelligence technologies are developed within ready-made education and technology rather than emerging in their natural flow (Knox, 2020).

Education plays a vital and founding role in China's National Artificial Intelligence Strategy. However, more attention should be given to the role of education and the potential impact of government strategy on educational institutions and practices within this document (Knox, 2020). The critical role of higher education within the National Artificial Strategy can be illustrated by *"a long-term look at growing AI talent by creating an AI academic discipline andestablishing pilot AI institutes"* (Gayne, 2018). In other words, China's educational AI development appears to be tied to a higher education system designed to train a specific type ofAI expert. The importance China attaches to higher education in its artificial intelligence education strategy is also evidenced by the Action Plan for Artificial Intelligence Innovation inColleges and Universities Document 2018 (Knox,2020). This Plan aims to:

"*Accelerate the innovation and application of artificial intelligence in education, use smart technology to support the innovation of talent training model, reform of teaching methods and improvement of education governance capabilities, and create an intelligent, networked,personalised and lifelong education system*" (MEPRC, 2018).

China has regularly determined practices to achieve its goal in this Action Plan decided in 2018. The aim of 2020 is to develop university infrastructures and curricula in line with artificial intelligence and to prioritise research and development activities in this field. It is providing workforce training to provide specific skills in artificial intelligence until 2025. By 2030, Chinese universities will become global leaders in artificial intelligence innovation (MEPRC, 2018). Another noteworthy issue regarding education in the Action Plan (2018) is that special attention is given to opening new undergraduate programs in artificial intelligence-related subjects in Chinese Universities (Xu, She and Zhao, 2018). It also identifies the need for unifieddisciplines in universities, with *"mathematics, computer science, physics, biology, psychology,sociology, law, and others"* being subjects taught in applied artificial intelligence and also includes developing areas in disciplines defined as "Al + X" (MEPRC, 2018). Considering this critical role for educational institutions, the private sector in education, and the technology- based entrepreneurship side of artificial intelligence, the development of artificial intelligence in education also seems very important from an economic perspective. Action Policy (2018): While determining the plans of colleges and universities to "*make colleges and universities animportant source of global artificial intelligence technology innovation*", the role of such institutions is given much more attention with the statement that "*It will also strengthen the advantages of basic research, discipline development, and personnel training*" (MEPRC, 2018). Therefore, the role determined for the university seems to be determined not only as areas of artificial intelligence research and development but also as essential areas that can trainspecialists in this field for a future with artificial intelligence. At the same time, it is stated thatthey have been determined as the main areas that can provide workforce training for the futureeconomy based on artificial intelligence and produce qualified new training programs suitablefor this field (Knox, 2020).

One of the purposes of giving special attention to training for colleges and universities in China's development of educational artificial intelligence is to train local experts in the field ofartificial intelligence. Among the reasons why the Chinese government focuses on teaching local expertise outside China, especially in the USA (Sheehan & Ma, 2019), is that many Chinese citizens are working in essential positions in artificial intelligence in other countries. The Chinese government supports international and domestic talent programs that "*recruit AI researchers to work in China*" (Ball, 2018).

It provides significant financial incentives for artificial intelligence academics employed in countries other than China to return to work in the research and development systems in their own countries (Ding, 2018:5). The aim of these and similar initiatives of the Chinese government is not only to benefit from the research capacity of higher education in the development of artificial intelligence; but also to express the importance given to training the workforce for the future (Li, 2018). One of the essential goals of China's intensive work on artificial intelligence expertise and workforce training centres is to shift qualified workforce from higher education institutions in the USA, which has outstanding unnatural intelligence power in universities on a global scale, to higher education in China. Therefore, establishing internationally leading artificial intelligence schools can be a significant factor in internationalcompetition for future economic and global dominance based on the prestige and power createdby innovations in producing artificial intelligence technologies (Knox, 2020).

The Artificial Intelligence Action Plan (2018) proposes a universal education that includes adult education, including public or private education opportunities (Xu, She and Zhao, 2018). China defines educational artificial intelligence development as "*a strong education country, a strong science and technology country, and an intelligent society*" (MEPRC,2018). Therefore, China addresses the issue from a universal perspective by including adults in developing educational artificial intelligence. However, with the discourse of "*deep integration of artificial intelligence and education*" (MEPRC, 2018), it is understood that particular importance is given to the education of new generations in concentrating on the scope and content of artificial intelligence education and training artificial intelligence experts. In this direction, artificial intelligence education is rapidly being developed and disseminated in Chinese primary and secondary schools. The PISA exam results constitute clear and concrete evidence that artificial intelligenceeducation has been developed in China, starting from primary education. According to the PISA2018 exam results, it is seen that Chinese 15-year-old group students received 555 points in reading comprehension, while the OECD average was 487 points in reading comprehension. While the OECD average in Mathematics was 489, China's success was 591 points. While theOECD average in Science was 489, China ranked first in all three fields in 2018, with 590 points (OECD, 2018). At the same time, these successful results mean that Chinese students will effectively get high scores in the Gaokao, defined as the university entrance exam, and be placed in the departments of higher-level universities. In preparing for this exam, many studentsonly prepare in private schools, which support local extracurricular projects that include data such as "*Artificial Classroom Director*" (Xu, 2018). For example, extra-curricular artificial intelligence education in private schools such as New Oriental Group (2019), which provides this type of education, is seen as aimed at children of families with higher socio-economic statusin China. According to Knox (2020), having the opportunity to receive such an education doesnot mean it is only aimed at the activities or behaviours of the elite Chinese student population.At the same time, the development of artificial intelligence in education also means choosing aselective and somewhat elite education path to succeed in this exam (Knox, 2020).

The Chinese government defines educational artificial intelligence development and implementation as varying by regional area. China is conducting various studies based on cooperation with the private sector in education so that the educational artificial intelligence technologies developed in the National Artificial Strategy Document can be used generally throughout the country (Ding, 2018:5-10). However, 845 provincial policies have been determined regarding the artificial intelligence development industry distributions produced in this field; the "*three core regions" Beijing, Shanghai, Guangzhou, and their surrounding areas*are highlighted (CISTP, 2018:79-80). Beijing Artificial Intelligence Academy, one of the key representatives of the AI Academy, is supported by academic and private sector leaders

(Lehmann, 2019:21) with the support of some of the most influential institutions and companiesin AI and consists of coalitions such as *"bureaucratic agencies, private companies, academic laboratories, and sub-national governments."* (CISTP 2018:3). This situation can be explainedby the fact that startups, especially those working on education projects, receive tax deductionsfor these activities, and these areas are generally seen as safe options for investors (Hao, 2019).On the other hand, we can also deduce from this approach that China's educational technologysector has a significant place among private entrepreneurs. In domestic extra-curricular trainingprovided by Chinese private education companies, the growth of data-based technologies, the rapid development of products in artificial intelligence technologies, and the expansion of essential education markets have brought about an increasingly international perspective(Knox, 2020).

2.2. Natıonal Artıfıcıal Intellıgence Strategy And Educatıon In Turkey

It is a fact that everyone agrees that countries that invest in artificial intelligence technologies will be among the most powerful countries of the future. Therefore, "National Artificial Intelligence Strategies" aiming at the strategic use of artificial intelligence have been preparedby many countries (Dutton, 2018). The "National Artificial Intelligence Strategy Report 2021-2025", the first strategic document for the future in Turkey, has been prepared in line with the targets set in this field. Investments in artificial intelligence and innovative ideas in this field are crucial for Turkey. The National Strategy Artificial Intelligence Report published by the Presidential Digital Transformation Office has aims compatible with the Eleventh DevelopmentPlan for using artificial intelligence in education (National Artificial Intelligence Strategy 2021-2025, 2021). In the field of education, both in the Eleventh Development Plan and in the Artificial Intelligence Strategy, it is stated that the requirements will be made to increase the opportunities, and the aim is to raise the quality of education to international standards. Amongthe objectives for artificial intelligence education included in the "*National Artificial Intelligence Strategy Report 2021-2025*":

Purpose 1.2 "The academic and technical capacity of universities in artificial intelligence willbe improved, and new programs will be opened."

Purpose 1.3. "The number and quality of students receiving associate, undergraduate and postgraduate education in artificial intelligence will be increased."

Purpose 1.4. The article states: "Pre-higher education young people will be provided with applied training in algorithmic thinking, coding and artificial intelligence in line with their interests, abilities and temperaments, and by their education levels."

Goals Set Within the Scope of This Strategic 1 Priority (National Artificial Intelligence Strategy2021-2025, 2021):

- *Employment in artificial intelligence will be increased to 50,000 people.*
- *Employment of artificial intelligence experts in public institutions and organisations will be increased to 1,000 people.*
- *The number of postgraduate graduates in artificial intelligence will be increased to 10,000 people.*
- *The number of academics working in artificial intelligence will be increased to 5,000.*

•*It will be ensured that the number of postgraduate theses conducted in social and technical fields in artificial intelligence is at least 1,000* (National Artificial Intelligence Strategy 2021-2025, 2021).

According to the purposes of applying artificial intelligence in education, it is predicted that the number of people who specialise in this field will increase, and employment will be provided by 2025. Therefore, it is necessary to increase education's quantitative and qualitative aspects of artificial intelligence technologies, and artificial intelligence education policies should set goals in line with these requirements. On the other hand, there is a need to increase the numberof undergraduate programs in artificial intelligence in universities.

Conferences and workshops are organised for artificial intelligence studies, applications, and training in Turkey's education field. As a result of these workshops, it was mentioned that the "Smart Classroom Behavior Management" system could be implemented with image processing techniques. The final report of the sixth workshop organised by the Education Industry and Technology Institute (ESTEN) stated that through this system, students' facial expressions and emotional states during the lesson could be determined by taking images of thestudents in the classroom at 30-second intervals. It has been stated that students' emotional stateduring the lesson can be analysed in which area of the lesson they are interested or uninterestedin and can provide feedback to the teacher to determine a better lesson method. In addition to workshops and conferences, the Ministry of National Education (MEB) also carries out studies on artificial intelligence applications and activities carried out together with Istanbul TechnicalUniversity (ITU) to create personalised educational content (Kasap, 2019).

Robot competitions were organised in different age groups at the TEKNOFEST Aviation, Space and Technology Festival by the General Directorate of Vocational and Technical Education of the Ministry of National Education (MEB). In cooperation with TOBB and TOBBUniversity of Economics and Technology, Non-Governmental Organizations (NGOs) and the university and the private sector, within the *"Artificial Intelligence Education and Awareness"*project, high school and university students, teachers and academicians, individuals in working life and companies are provided with training in this field (National Artificial Intelligence Strategy 2021-2025, 2021). The scope of the "*Deneyap Turkey*" project, which is carried out under the Ministry of Industry and Technology (STB) 's leadership, aims to implement artificialintelligence training programs within the scope of new-generation learning skills in Deneyap Turkey technology workshops.

MEB General Directorate of Innovation and Educational Technologies (YEĞİTEK) stated that materials covering different contents will be prepared for students and teachers, starting from primary school, to use artificial intelligence in education. In this context, the "Artificial Intelligence Education for Children" project, led by Manisa Celal Bayar University, aimed at providing fake intelligence education to children (Çalık, 2019). Although these studies offer awareness in the field of artificial intelligence, it is seen that there is a need to include theory and practical applications by the development periods of students in the curriculum at all levelsof education to increase the quality of the field of artificial intelligence. Another requirement isto equip talented young people in artificial intelligence technologies with the essential competencies of the field before higher education. In this context, there is a need to increase new-generation education opportunities.

There are also various research infrastructure projects related to Artificial Intelligence technologies. It is stated that *"The Robotic Artificial Technologies Research, Development andTraining Center"* project within METU, *"National High-Performance Computing Center*" project of ITU, *"Robotics and Artificial Intelligence Laboratories"* project of Boğaziçi University, and *"Neuroscience and Neurotechnology Center of Excellence"* project carried outin cooperation with Ankara University, Gazi University and METU are supported by investment funds (National Artificial Intelligence Strategy 2021-2025, 2021). Such projects with such universities, which contribute directly or indirectly to developing artificial intelligence technologies, are essential for this field. At the same time, these projects, which will support the development of artificial intelligence technologies, create the opportunity to make research more widespread and raise it to international standards.

3. CONCLUSION AND RECOMMENDATIONS

Today, artificial intelligence has great importance at the international level. This artificial intelligence competition at the global level and the effects of artificial intelligence technologieson the education system clearly show this importance. China is one of the countries at the forefront of international competition in artificial intelligence. The main reason for this competition is making a significant investment, including an investment of 1 trillion RMB (150.8 billion US dollars) for the essential artificial intelligence industry by 2030 and a gross production of 10 million RMB (1.5 trillion) covering other related industries that demonstrate China's desire for global leadership in the field of artificial intelligence technologies (iiMedia,2017). This approach shows that the returns on artificial intelligence investments will be significant globally, as in the case of China. This investment by China until 2030 confirms themagnitude of the economic potential of artificial intelligence. Therefore, while artificialintelligence increases the dominance of countries at the global level, it also has the potential tocreate high-added values, which is of great importance for development. Artificial intelligencetechnologies have published national artificial intelligence strategies to increase competition between countries such as China and obtain cumulative values in vital areas such as education and the economy. (Its strategic importance at the international level is increasing daily). With this document, which provides a formal framework for its current investments in artificial intelligence, in 2017, the Chinese Government explains the development of artificial intelligence in China not only from a uniform national perspective but also with the cooperationand competition of market-oriented approaches led by the Chinese government (Nelson, 2019;Knox, 2020). This contributes to determining the content of the educational artificial intelligence environment beyond shaping it.

As revealed in this study, the National Artificial Intelligence Strategy has given essential tasksto educational institutions, especially universities and colleges, regarding academic artificial intelligence development. These tasks play a significant role in research and development and training the next generation of technical artificial intelligence experts. The Chinese government attaches particular importance to teaching local expertise because many Chinese citizens are working in essential positions in artificial intelligence, especially in the USA and other countries (Sheehan and Ma, 2019). China offers financial incentives to artificial intelligence academics working abroad to return to their home countries and supports international and local talent programs. These initiatives are essential for developing educational artificial intelligence and the education of the future workforce (Li, 2018). Another aim of China's artificial intelligence expertise and workforce training centre is to attract qualified workforce from universities with distinguished unnatural intelligence power in the USA to China. In this way, with the establishment of internationally leading educational artificial intelligence schools and the reputation of its innovations in producing educational artificial intelligence technologies, itcan become an essential force at the centre of international competition for future economic andglobal

dominance (Knox, 2020).

The fact that the Chinese Government included the *"New Generation Artificial Intelligence Development Plan"* in its National Artificial Intelligence Strategy document can be considered clear evidence that it prioritises the development of educational artificial intelligence (Ding, 2018). The fact that it ranked first in mathematics, reading skills, and science in PISA among OECD countries and other participating countries in 2018 is clear and precise evidence of their importance to education, starting from primary education. At the same time, these successful results show that Chinese students' high scores in Gaokao, the university entrance exam, will affect their placement in higher-level universities. In addition, choosing personalised education based on the development of artificial intelligence in education means following a selective and somewhat elite education path to succeed in this exam.

China implements the obligations set out in this strategy by a wide range of stakeholders, including local governments, educational institutions, and specific regional networks, including private sector companies. According to Knox (2020), these developments show that private sector entrepreneurs have brought significant innovations to this field by carrying out R&D studies to develop educational artificial intelligence and have gained representation in educational artificial intelligence (Knox,2020). Therefore, it is seen that applying the basic principles in the field of traditional or academic artificial intelligence in education is necessary.The inclusion of the private sector in China's National Artificial Strategy Document suggests the capacity of public schools to offer personalised education based on educational artificial intelligence technologies developed in this country in certain regions, cities or schools. It raisesconcerns that inequality of opportunity and opportunity in this field may be reproduced throughdigital inequality.

International Artificial Intelligence Strategies are essential for global artificial intelligence dominance (Knight, 2017; Thompson, 2018). Turkey published the International Artificial Intelligence Document in 2021, showing that it attaches importance to artificial intelligence research and development, like other countries. The artificial intelligence system is growing in Turkey with the studies carried out, and R&D studies on artificial technologies have increased recently. As mentioned in this study, Turkey has set goals for educational artificial intelligencein its national artificial strategy to reach a level where it can compete with other countries in the field of education.

There is a need for more comprehensive R&D activities in various fields of artificial intelligence technologies in Turkey's education field. In addition, according to the 2018 resultsof the PISA exams held among OECD countries, students' reading, mathematics, and science skills are below the average of OECD countries, which shows that they should be re-evaluatedby the experts of the education system in cooperation with the Ministry of National Education (MEB) and the Council of Higher Education (YÖK), and solutions to increase success should be provided and education policies need to be developed. The data obtained has revealed that the Turkish education system is far from raising individuals who develop perception, practical thinking, problem-solving, and communication skills, which should be included in the basic education principles (Aydın, Sarıer, Şengül, 2012). Students need to be able to use artificial intelligence and related technologies, especially in mathematics, to develop these qualifications.Therefore, the qualified goals of Turkey's education system, such as thinking, reasoning, communicating effectively by applying the concepts learned at school, developing models, identifying the problem and producing solutions, are also crucial for developing the country and increasing social welfare. For this reason, education policies, one of the most critical areasfor countries to compete in artificial intelligence in the information society, and the education philosophy that forms the basis for them should be reviewed. Education policies suitable for rapidly developing artificial technology systems and can offer solutions to existing problems should be produced.

Artificial intelligence studies in Turkey evaluate educational artificial intelligence technologiesas a serious alternative to support the development of future generations worldwide. In this global context, the artificial intelligence initiative in Turkey needs to be handled with a conscious approach. In this context, all investments, initiatives, and R&D studies that Turkey will make at the national level in educational artificial intelligence will provide significant added value at the global level in the future.

Students should be allowed to make sufficient artificial intelligence applications to gain the technology-based skills required by today and to gain orientation towards new professions based on these. The existing needs and deficiencies regarding artificial intelligence in schools and education training fields must be identified and eliminated. In determining these, systems for artificial intelligence learning can be developed by taking the suggestions of the teachers, students, and all school staff, who are the subjects of the school in this field. It is also essential that the private sector that develops artificial intelligence applications cooperate with educational institutions that implement the artificial intelligence system.

Although these studies provide awareness in the field of artificial intelligence, it is seen that there is a need to include theory and practical applications by the development periods of students in the curriculum at all levels of education to increase the quality of the field of artificialintelligence. Another requirement is to equip talented young people in artificial intelligence technologies with the essential competencies of the field before higher education. In this context, there is a need to increase new-generation education opportunities.

Such projects with such universities, which contribute directly or indirectly to developing artificial intelligence technologies, are essential for this field. At the same time, these projects, which will support the development of artificial intelligence technologies, create the opportunity to make research more widespread and raise it to international standards.

It is seen that the applications of artificial intelligence in education lead to the change and transformation of the teacher's role in the classroom. As a result of this change and transformation, the teaching profession is showing an increasing trend towards technicalteaching.

The development of artificial intelligence technology may lead to results such as high-qualified workers being in demand and low-qualified workers being less in demand or losing their jobs. When we evaluate this situation regarding education, while children from families with stronger economies can benefit from artificial intelligence technologies that offer personalised education, children from families with lower socio-economic status may be deprived of these opportunities because their cultural capital will be insufficient. This situation, especially whencombined with factors such as Gaokao or the university entrance exam, can lead to the reproduction and reinforcement of digital inequality.

When it is predicted that robots will take a more significant place in the lives of the new generation, it is necessary to take precautions for the problems that may occur with such technologies. Especially considering that students will receive artificial intelligence-supported education, providing personalised training based on their needs, interests, and feedback can contribute to their learning. However, how students' emotional states will be affected based on their differences while receiving education with artificial intelligence has not yet been adequately addressed. Therefore, more research is needed to determine at what age, when or inwhat kind of situations students are ready for education with artificial intelligence technologies.Students spend their most important age-related periods at school, and it should be consideredthat consuming these processes with artificial intelligence technologies, that is, machines, willcause possible adverse effects. Therefore, further research is needed from a pedagogical perspective. Considering the future, students' failure to experience developmental periods according to their unique characteristics may cause them to experience problems in the future.

Based on the fact that the rapid development of artificial intelligence systems today causes rapid change and transformation in the lives of states, societies and individuals, it is essential to raise awareness of both students and society about the developments and importance of this field inthe media and even through public spots. Training should be given to all age groups to developthe skills of using and managing artificial intelligence in society, from working life, educationand training to children and retired people. In addition, control and audit mechanisms must ensure security to prevent the misuse of artificial intelligence systems. In addition to all these, it would be beneficial to prioritise using artificial intelligence, especially in education, and to support research in Technoparks. Conducting practical applications for educational studies related to artificial intelligence in every university discipline will contribute to developing thisfield.

REFERENCES

Allen, G. C., (2019). Çin'in yapay zeka stratejisini anlamak, Çin'in yapay zeka ve ulusal güvenlik konulu stratejik düşüncesine yönelik ipuçları. *Yeni Amerikan Güvenlik Merkezi*. https://www.cnas.org/publications/reports/understanding-chinas-ai-strategy

Arslan, K., (2020). Eğitimde yapay zeka ve uygulamaları, *Batı Anadolu Eğitim Bilimleri Dergisi, 11*(1), 71-88.

Arnett, T., (2016). *Teaching in the machine age: How innovation can make bad teachers good and goodteachersbetter*. Christensen Institute. https://www.christenseninstitute.org/wpcontent/ Accessed: 27.08.2023.

Aydın, A., Sarıer, Y., Uysal, Ş., (2012). "Sosyoekonomik ve sosyokültürel değişkenler açısından pısamatematik sonuçlarının karşılaştırılması", *Eğitim ve Bilim Dergisi, 37*(164), 20-30.

Ball, P., (2018). China's great leap forward in science, *The Observer*. Accessed: 6.09.2023 https://www.theguardian.com/science/

Çalık, B. (2019, 30 Eylül). *MEB okullarda "yapay zekâ" eğitimi için kolları sıvadı.* Erişim adresi: https://www.aa.com.tr/tr/egitim/meb-okullarda-yapay-zeka-egitimi-icin-kollari-sivadi/1597733, Erişim tarihi: 20.09.2023

CISTP (2018). *Chinese ınstitute for science and technology Policy*. China Artificial I ntelligence Development report, Tsinghua University, Accessed: 8.09.2023. http://www.sppm.tsinghua.edu.cn/eWebEditor/UploadFile/China_AI_development_report_2018.pdf

Çoşkun, F., & Gülleroğlu, H.D., (2021), Geçmişten günümüze yapay zekanın gelişimi ve eğitim alanında kullanılması. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi,* 1-20, https://dergipark.org.tr/tr/pub/auebfd/issue/64805/916220#cited_by_articles Accessed 20.07.2023

DailyMail (2023), https://www.dailymail.co.uk/sciencetech/article-12513183/EXCLUSIVE-Former- Google-futurist-predicts-classrooms-future-look-like-include-virtual-reality-lessons-downloadable- knowledge.html Accessed 25.09.2023.

Deepmind, (2023), *The story of alpha go so far*. https://deepmind.com/research/ alphago/ Accessed:24:09.2023.

Ding, J., (2018). *Çin'in yapay zeka rüyasının şifresini çözmek: Çin'in yapay zekada dünyaya liderlik etme stratejisinin bağlamı, bileşenleri, yetenekleri ve sonuçları*. İnsanlığın Enstitüsü Raporu. https://www.fhi.ox.ac.uk/wpcontent/uploads/Deciphering_Chinas_AI-Dream.pdf. Accessed: 6.09.2023

Dick, S., (2019). Artificial Intelligence, *Harvard Data Science Review*, 1(1),1-8. doi: 10.1162/99608f92.92fe150c

Dutton, T., (2018). An overview of national AL strategies. Accessed 25.09.2023 https://medium.com/politics-ai/an-overview-of-national-ai-strategies-2a70ec6edfd

Gagne et al (2018). "Global Artificial Intelligence Talent Report 2018", Element Artificial Intelligence. www. jfgagne.ai/talent/ Accessed: 18.09.2023.

Hao, K., (2019). “China Has Started a Grand Experiment in Artificial Intelligence Education. It Could Reshape How The World Learns” MIT Technology Review. https://www.technologyreview.com/ Accessed: 22.09.2023

Kasap, S. (2019, 26 Mayıs). *MEB 'eğitimde yapay zekâ uygulamaları' için İTÜ ile el sıkıştı.* Erişim adresi: https://www.aa.com.tr/tr/egitim/meb-egitimde-yapay-zeka-uygulamalari-icin-itu-ile-elsikisti/ 1489366, Erişim tarihi:20.09.2023.

Knight,W.,(2017).“China’s artificial ıntelligence awakening“ MIT Technology Review. https://www.technologyreview.com/s/609038/chinas-ai-awakening/ Accessed:18.09.2023.

Kış, A., (2019). 14. Uluslararası eğitim yönetimi kongresi tam metin bildiri kitabı-2-, 4 Mayıs 2019, “*Eğitimde yapay zeka*”, s. 197-202.

Knox, J., (2020). Artificial ıntelligence and education in China, learning, media and technology, 45(3), 298-311. Accessed:04.06.2023 https://doi.org/10.1080/17439884.2020.1754236

Kulkarni, A., (2019). Artificial ıntelligence in education. Where Is ıt now and what ıs the future? Accessed: 22.09.2023. https://www.lexalytics.com/,

Laskai, L., & Toner, H., (2019). *Can China grow ıts own artificial ıntelligence tech base ? , In artificial ıntelligence policy and china: Realities of state- led development*, (Ed. G. Webster), 3-8. Stanford: New America Digichina Project Special Report No.1.Accessed: 13.09.2023.https://newamerica.org/.

Lehmann, T.,(2019). *Artificial ıntelligence politics ıs local”.In artificial ıntelligence policy and China: Realities of state-led development*, (Ed: G. Webster), 21-25. Stanford : New America Digichina Project Special Report No.1 . Accessed: 11.09.2023.https://newamerica.org/

Lee, K.F., &Triolo, P., (2017). *China’s artificial ıntelligence revolution: Understanding Beijing’s structural advantages sinovation ventures report*, Eurasia Group, Accessed: 11.09.2023. https://www.eurasiagroup.net/.

Lİ, Q., (2018). China must overcome talent gap to fulfill artificial ıngelligence ambitions. *Global Times.* Accessed: 11.09.2023.http://www.globaltimes.cn/.

Lucas, L., (2017). Alibaba to ınvest $ 15bn in R&D labs in push to become artificial ıntelligence leader . *Financial Times*. https://www.ft.com/ Accessed: 07.09.2023.

MEPRC, (2018). *Ministry of education of the people’s republic of China, Action Plan for Artificial Intelligence Innovation in Colleges and Universities*. Accessed: 02.07.2023.http://www.moe.gov

McCarthy, J., (2007). From here to human- level, *Artificial Intelligence*, 171(18), 1174-1182.https://doi.org/

Mirrlees, T., & Alvi, S., (2019). *EdTech ınc: Selling, automating and globalizing higher education inthe digital age,* Abingdon: Routledge.

Nelson, M., (2019*). Shall we take an “ Alternative Route”, or “Overtake on The Curve”?” In artificial ıntelligence policy and china: realities of state – Led Developme*nt, (Ed: G. Webster), 9-12, Stanford :New America Digichina Project Special Report No.1, Accessed: https://newamerica.org/documents/4353/DigiChina-AI-report-20191029.pdf.

NOETG, (2015a). *New oriental education and technology group overview*. Accessed: http://www.neworiental.org/english/who/201507/8213540.html.

NOETG, (2015b). New oriental education and technology Group, *Investor Relations*, . http://investor.neworiental.org/. Accessed:26.06.2023

OECD (2019), *Artificial ıntelligence in society*, OECD Publishing, Paris, s.6.

OECD (2018). *OECD PISA 2018 Database*, https://www.oecd.org/pisa/data/2018database, Accessed: 25.09.2023

OECD,(2008). *Education at a glance, OECD Indicators*, www.oecd.org/ Accessed: 26.06.2023

iiMedia(2017). China artificial ıntelligence ındustry special researc report,.http://www.sohu. com/ Accessed:25.09.2023

İşler, B., &Kılıç, M., (2021). Eğitimde yapay zeka kullanımı ve gelişimi, *Yeni Medya Elektronik Dergisi*, 5 (1), 1

İnce, G., (2017). *İnsanlığın yapay zeka ile imtihanı*, (Ed. M. Karaca). İnsanlaşan makineler ve yapayzeka içinde, s.14-17, İstanbul:

People's Daily, (2018). *Magic mirror system upgraded to smart classroom, Artificial ıntelligencehelps educations ındustry development*, People's Daily Online- Education Channel. Accessed: 20.09.2023.http://edu.people.com.

Poritz, J., & Rees, J.,(2017). *Education ıs not an App: The future of university teaching in the ınternetage.* Abingdon: Routledge.

Routhiainen, L.,(2019). *How artifical ıntelligence and data could personalize higher education* .Accessed:13.09.2023 https://hbr.org/.

Sheehan , M.,& Ma, J.D., (2019). *The talent chinal : Building and stumbling blocks for China's artificial ıntelligence ambitions marco polo*. Accessed: 12.09.2023. https://macropolo.org/

Selwyn, N., (2013). *Education in a digital world: Global perspectives on technology and education*,New York: Routledge.

State Council, (2017). *State council notice on the new generation artificial ıntelligence development plan*, http://www.gov.cn/ Accessed: 05.06.2023.

TAL, (2017b). Tomorrow enhancing life, *Educational Technology*. Accessed: 04.06.2023. https://www.100tal.com/

Thompson , N., (2018). *The artificial ıntelligence cold war that threatens us all*, WIRED. https://www.wired.com/ Accessed: 09.08.2023.

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

Turing, A. M., (1950). Computing machinery and ıntelligence, *Mind a Quarterly Review of Psychology and Philosophy*, (pp. 433-460). Accessed: 13.09.2023. https://academic.oup.com/

Türkiye Ulusal Yapay zeka stratejisi 2021-2025, Erişim Tarihi:01.07.2023.https://cbddo.gov.tr/

Xu, W., (2018). China's new oriental unveils artificial ıntelligence - related education ınitiatives, *YiCai Global*. Accessed: 12.09.2023.https://www.yicaiglobal.com/.

Xu, D., & He, L., & Zhao, W., (2018). The current situation of artificial ıntelligence education in domestic universities: It ıs ımperative to establish a first-level discipline and strengthen the ıntegration of production and education, *The Paper*. Accessed: 18.09.2023.

Webster, G., R. Creemers, Triolo, P., &Kania, E., (2017). China's plan to "lead" in artificial ıntelligence: purpose, prospects and problems. New America. Accessed: 10.09.2023.https://www.newamerica.org/