

Innovative Technology and Education: Artificial Intelligence and Language Learning in Turkey

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Abstract

During the Fourth Industrial Revolution, especially in the internet age, digitalization and smart uses have significantly increased today, and they also deeply affect life and learning forms. Since language education is a difficult process, learners must make great efforts in the world. In this sense, the importance of traditional methods has decreased with the increase of technological inputs. In this study, the potential of using artificial intelligence technologies in language learning, which have radically increased worldwide, is analyzed. In addition to this, artificial intelligence language applications in Turkey and Turkish are examined. Here, it is claimed that, with artificial intelligence applications, language learning has become easier with some visual exercises and especially a non rote-oriented approach there. Moreover, it is noticed that Turkey has started to develop language learning programmes based on artificial intelligence, and despite the shortcomings, some productive artificial intelligence applications have been developed to learn Turkish. These findings suggest that the modern society necessitates innovative technology in teaching language or any subjects, and it is important to understand the advantages of employing a collaborative technique in learning the subjects.

Keywords: Fourth Industrial Revolution, Artificial Intelligence, Education, Language Education, Turkish Learning

Introduction

The widening of the internet usage and the digitalization outputs since 1990s has huge effects to our lives. Thomas Friedman, in his famous book “The Earth is Flat” (2007), lists the reasons that cause the world to become flat. He defines the flattening of the world as the acceleration of communication, the effective use of fiber-optic cables, and the fact that there is not much difference between a person living in the USA and a person living in India in terms of access to technology. Friedman argues that these developments will continue with artificial intelligence, thinking robots and machines that make decisions instead of humans. In this context, we will also see where artificial intelligence inventions will take humanity in the field of education (Grunwald, 2018; Kaufmann & Servatius, 2020; Mire, 2019; Say, 2019).

With the new generation technologies, new methods have been developed for education in general and language education in particular, too (İşler & Kılıç, 2021; Pikhart, 2020; Woolf, 2009). For example, virtual reality and augmented reality are also used in language learning; such as, if you are learning Italian, you will be able to practice by going to virtual Tokyo or İstanbul. Like this, some smart applications of artificial intelligence, which has been investigated since the 1950s, have multiplied since the 2000s. Armin Hopp, chairman and founder of Speexx, stated that they developed a special software for pronunciation with the

artificial intelligence-based application in 2019, and that they also use artificial intelligence to predict the behavior of the user. Another interesting development in this regard is Chatbot Applications for learning English. These robots, which are said to be built with the logic of artificial intelligence, chat with the individuals they will communicate with after determining their English level. After this application, another important step of Google regarding artificial intelligence was the introduction of its product called Translatotron. This app is a three-step translation process: It transcribes the speech, translates the text and reads the text in his hand (Avci, 2021). After these developments, traditional practices have already become obsolete, especially for the new generation (McCourt, 2019).

Traditional education is a form of practice in which methods such as question-answer and discussion are used which are produced with students in the presence of a teacher in a school environment. This education system is generally rote learning, teacher-centered, and group learning is prominent. In the contemporary system, which also includes technology, visuality, experience, individualistic method and benefit generation come to the fore.

This study will examine the contribution of artificial intelligence to language education in this context, accepting that technological developments affect education methods deeply. It is also claimed that artificial intelligence language applications facilitate language education and so language learning will be easier. On the one hand, artificial intelligence could leave some language teachers unemployed, as some other (such as business) sectors, but it is not believed that human factor (such as teachers) will disappear in the language teaching sector. In addition to this, the relevant experience of Turkey will be explained as a case study.

Literature Review

Definition, Potential and Limits of Artificial Intelligence (AI)

The Fourth Industrial Revolution is especially based on knowledge. Artificial intelligence as one of the innovative technologies has a critical position in the Fourth Industrial Revolution (Russell & Norvig, 2019).

Machine learning lies at the heart of artificial intelligence technologies. With deep learning and the endless algorithms, life becomes more flexible, fast, comfortable and risky. On the one hand, while new jobs are being produced, on the other hand, some professions are either decreasing in importance or disappearing (Andrew, 1991; Ermağan, 2020; Charniak & McDermot, 1985). It must be stated that such a reality seems far (if not impossible) yet. This vital problematic raised the question: "Can robots really destroy humanity?". Experts make statements as optimistic and pessimistic, statements made and the events encountered both increase people's attention and worry about the issue (Bakırtaş & Çavuş, 2020). In other words, generating ideas about the future of the relationship between humans and AI will be to note the trajectory of human beings (Tegmark, 2017). On the back cover of Kurzweil's book, Bill Gates wrote: "The author's new book, which makes people curious, predicts a future where information technologies develop rapidly enough to allow humanity to transcend the biological boundaries and transform our lives in ways that we cannot even imagine today." (Kurzweil, 2016). Such that, two Microsoft executives Brad Smith and Harry Shum suggest that AI can replicate the characteristics of humans and that users will become twins with AI in the next 20 years (Microsoft Corporation, 2018). Nevertheless, it is a fact that with the algorithms used by computers, solutions can be found to many problems of humanity (Christian & Griffiths, 2017). It is also a fact that artificial intelligence applications make life easier.

Main application areas of AI can be sorted as speech recognition, image processing, natural language (tongue) processing and reasoning. In daily life, it is mainly used in the following areas: Cyber security and defense industry, voice assistants, language translations, suggestion systems, navigation, social security, healthcare, e-Commerce, assistant robot applications (Pannu, 2015).

In context of developing artificial intelligence technologies, the critical advances have been realized in recent years. There are especially three stages which can be seen below:

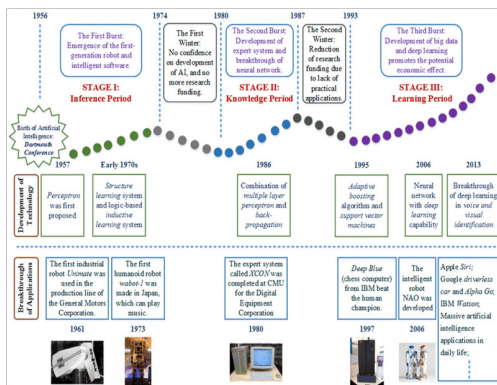


Figure 1 The History of Artificial Intelligence (Jin, Su, Kong, Bai, Miao & Dou, 2018, p. 21)

With its many contributions from education to sports, from economy to security, the states around the world now aim to develop their artificial intelligence technologies. The UN provides some valuable criteria for countries in order to develop successful AI strategies (UN, 2020; World Economic Forum; 2019):

- “AI should not be seen independently from the robotic process automation of repetitive tasks, where human involvement can be completely eliminated.
- [...] The ethical dimension of AI and related guidelines for responsible coding are vital to a national strategy.
- [...] Legislation should be innovation-friendly.
- AI will eliminate jobs but not work. Countries must therefore update school curriculums to include coding skills and skills that cannot be replicated by machines, such as critical thinking, cooperation and team-building, and social and emotional skills;
- The AI industry is too broad to standardize, and related application sectors vary between countries but are always based on national competitiveness and priorities.”

Artificial Intelligence and Language Learning

What kind of benefits could artificial intelligence provide in education? Let’s start our analysis by answering this question:

“The highlights of the forums where the world’s leading technology leaders come together and seek answers to this question are as follows:

- It provides a personalized perspective on the artificial intelligence learning process.
- Artificial intelligence helps that students realize their shortcomings and strengths more easily.
- Artificial intelligence can closely monitor the development processes of students.
- Artificial intelligence can support content production faster.
- Artificial intelligence can help increase quality and facilitate access to information.” (Balçıkıanlı, 2019):

In all educational activities, language learning is an issue that takes effort and time. Artificial intelligence technologies also affect language teaching and provide efficiency with advanced teaching techniques against traditional models. Artificial intelligence is used not only to support learning, but also in many different areas such as teaching, assessment, classroom management, administrative affairs, teacher duties and school management (Arslan, 2020). By using artificial intelligence, it is aimed to create individualized educational contents and environments that support the personal development of students. Artificial intelligence also takes into account the individual characteristics of the target person or group for successful self-learning. One of the difficult and complex aspects of language education begins when the individual characteristics of the target audience come into play (Ermağan, 2022). Artificial intelligence undertakes a mission to solve this problem. In addition, projects are being developed to prepare educational content for schools and teachers in order to provide artificial intelligence education to students starting from primary school. According to Hovsepyan there are four advantages there:

- Providing instant feedback: One of the greatest advantages of artificial intelligence in language learning is the immediate correction of mistakes in tests and exercises. Instead of waiting for days to receive feedback, learners receive on-the-spot responses that they can take immediate action to fix.
- Eliminating the fear of failing: The way this feedback is given is not judgemental. Making mistakes is completely normal, yet some people feel uncomfortable or embarrassed. The AI tools

do not criticize learners in front of the classroom but instead evaluate them without judgment.

- Personalizing the needs of learners: Thanks to data collection and predictive analytics software, AI tools allow learners to create their own learning paths, adapting to the user’s personal needs and interests. Learners can choose their level and topics they’re interested in, and most language apps will offer personalized curriculums with personalized games and quizzes.
- Gamification: This brings us to an important element in e-learning that fosters motivation and competitiveness—gamification. The usage of gaming elements such as quizzes, marathons, and contests has increased engagement and enjoyment among learners.” (Hovsepyan, 2022).



Figure 2 Benefits of AI in Language Learning (Rykov, 2021)

Natural language processing, which is a common area of computer and linguistics, has become increasingly important in parallel with the developing technology in recent years. The design and development of computer systems in which basic functions such as analysis, interpretation and production of a natural language can be developed constitute the basis of the subject. Natural language processing is divided into two; the first one can be stated as the processing of the sound, and the second as the translations between the voice and the text (Külekçi, 2001).

Conversational artificial intelligence applications make great contributions by improving the user experience in the field of education, as in many other fields. These technologies, which enable human-

machine interaction with natural language, allow users to communicate with various systems as if they are human and start a new era in language learning. Applications focusing on user experience are put into use by including up-to-date artificial intelligence technologies in e-learning platforms. Audio technologies supported by artificial intelligence provide great benefits in terms of user experience. Moreover, one of critical the results obtained in language teaching using artificial intelligence is the reservation system; that is, artificial intelligence automatically matches trainers and coaches according to many variables such as learning behaviors, language levels, trainer profile, interests. Artificial intelligence is also used for vocabulary, reading, writing and even pronunciation(Avcı, 2021). AI chatbots, AI language learning software, AI writing assistants and personalized language materials and resources are main exaples of AI language learning.

With the further development of language teaching practices in future, or the eventual discovery of a language-speaking chip, the question arises, too: Will the profession of language teachers disappear? For us, this could not be argued now. “First of all, students treat the tutor not only as a carrier of information but also as a mentor or even friend. Secondly, the student feels his or her responsibility to their mentors. Machines need to analyze thousands of options to give any advice that is not related to learning and studies. We all need human attention and attitude; that’s why AI solutions can be considered only as effective assistants to the teacher and not as the teachers themselves.”(Rykov, 2019). Besides, as a result of developing technology, language learning will no longer be a big problem in the medium term.

Artificial Intelligence and Language Learning in Turkey

After these conceptual explanations, how is this situation in Turkey? More exactly asked: How do reflect the critical developments in the artificial intelligence technology to the Turkish language education system and Turkish learning? In this section, we will focus upon this issue in some general points.

First of all, it could be informed that Turkey, as

a developing and medium-sized country with a GDP of 800 billion dollars, has 85 million population and a quarter there is young. Despite its shortcomings, the country is trying to adapt its national education policies to technology and to increase its R&D budget for education. President Recep Tayyip Erdoğan draws attention to the importance of today's technologies for Turkey with the following statements: "We call this new period 'National Technology Move and @DijitalTürkiye' and we will prepare Turkey to this great transformation by linking our aims with the means of science and technology." (CBDDO, 2019). Also Ali Taha Koç, Head of the Digital Transformation Office of the Presidency of Turkey which was established in 2018, underlines the following about AI and Turkey's assignments, in the context of "National Strategy for Artificial Intelligence" which was in the 2020 Presidential Program of Turkey: "Our sine qua non in the field of AI; Turkey to produce value from the data, improving local and national software to contribute to our society and economy." (BT Haber, 2020). To what extent are the goals achieved?

In the relationship between artificial intelligence applications and language learning methods, it could be useful to look at the situation of foreigners who want to learn Turkish as well as the situation of Turkish students who want to learn a foreign language in public and private schools in Turkey. As a general trend, innovative language teaching practices that develop in the world can find a place in Turkey. For example, in recent years, it has been noticed that students coming to Turkey for education, especially from African and Middle Eastern countries, and senior executives of international companies who came to Turkey for business purposes have increased. This has raised the number of people who want to learn Turkish. It is claimed that the number of people speaking Turkic languages worldwide has exceeded 130 million, and Turkey-Turkish, spoken by 90 million people when Turks in Europe are included, ranks 20th among the most spoken languages in terms of number of people (Hürriyet, 2020). However, the resources for learning Turkish in the digital area are insufficient. Here the related policies and applications in Turkey are becoming more important. In such a background, Turkey

looks for productive solutions by including artificial intelligence applications in language learning.

The Ministry of National Education of Turkey and Istanbul Technical University (ITU) signed a cooperation protocol in 2019. It is understood that the Ministry of National Education plans to expand the subject of artificial intelligence in the curriculum of the relevant programs. A joint study will be conducted on the use of artificial intelligence in learning tools in schools. Moreover, joint studies will be carried out on the career planning of students with artificial intelligence. For the first time, it is aimed to create individualized educational content and environments that support the personal development of students. In addition, artificial intelligence applications will be used in the Education Management Information System of the Ministry of National Education. In the related studies, informative trainings on the risks of artificial intelligence technologies and data usage ethics will also be organized. Finally, artificial intelligence technology can be used as a support in the creation of education policies (MEB, 2019).

Audio and artificial intelligence technology companies Sestek and Morpa have started to develop a framework of an artificial intelligence learning platform for online education for the teaching of Turkish as a foreign language with the financial support of TÜBİTAK, the official research and development institution of the Turkish state. Thus, it will create an interactive education platform that includes artificial intelligence technologies for foreigners who want to learn Turkish. Morpa develops E-learning environments. Sestek provides technology support in the areas of speech recognition, speech synthesis, natural language processing and pronunciation scoring. With this education platform, it is aimed to support Turkish learning by offering a system that can be accessed from anywhere. In this system, which will include communicative activities that enable users to become speakers and writers, not only Turkish language knowledge, but also the use of communication language on a socio-cultural basis with real-life examples will be taught (Hürriyet, 2020).

When artificial intelligence is analyzed in terms of its benefits in teaching Turkish as a foreign language, it has many benefits for the learner. One

of the points that are ignored in language education classes is individual differences, and in this respect, artificial intelligence creates an alternative for personalized education program in language learning classes. When evaluated from this aspect, they help learners to realize their deficiencies and to undertake a complementary task. We can say that especially by analyzing the phonological, morphological, semantic and syntactic features of the language to be learned/taught, it will help to make language education more qualified, if not completely, but to a large extent. Akkaya and Çıvğın (2021) divide the advantages of using artificial intelligence in Turkish education into three groups: for instructor, for learner and for the learning process. In terms of learners, students can receive additional support from instructors created with artificial intelligence, and it could positively change the way students access and interact with information. In terms of the teachers, artificial intelligence has made basic activities such as grading easier in the education process. It acts as a guide for teachers and can positively change the efficiency of teachers in the educational process. Regarding the learning-teaching process, artificial intelligence programs produce useful feedback to educators and students, and as a result, learning with different processes and applications will cease to be scary-annoying (Akkaya & Çıvğın, 2021).

For Turkish learners, a successful program was developed in 2022, named İTÜRK: Artificial Intelligence Supported Language Learning Technology for Additive Languages (Eryiğit, Bektaş, Ali, & Dereli, 2021). In Turkish, words are formed by putting various suffixes one after another on some noun or verb roots. For example, in a sentence such as “Are you one of those with whom we still cannot get close?”, it is seen that many suffixes are added to the word “close”. One of the most challenging points for foreigners trying to learn Turkish is to comprehend the order in which such suffixes should be used and the different rules of sound harmony. In recent years, many language learning support applications (such as, Duolingo, Busuu) have been developed around the world. However, they are generally produced by considering languages such as English-German in the first place. And basically they do some interlingual translation exercises using some sentences prepared

by hand. Yet, such exercises do not work well for languages with very complex and long suffixes, such as Turkish. Language learners need to practice a lot, especially on suffix and sound harmony. At this point, the idea was put forward that the learning of Turkish and similar languages could be facilitated by using artificial intelligence technologies. And this idea was presented to foreign language learners by researchers from ITU (Istanbul Technical University) for the first time in the world in a gamified mobile application environment. This technology, in which the exercises are created dynamically, so that the student can practice with different words each time, has been published in recent months by “Computer Assisted Language Learning”, one of the leading international journals in this field in the world. Currently, studies are continuing to support different languages of the application and to increase the supported structures in Turkish (Ay, 2022).

Methods

This study is prepared by using document analysis method in accordance with qualitative research techniques. “Document analysis includes the analysis of written materials containing information about the case or cases that are aimed to be investigated” (Yıldırım & Şimşek, 2018: 189).

In this study, there are three focused subjects: the reflection of artificial intelligence as a technological development, using artificial intelligence in the field of language learning and the analysis of the relevant situation in Turkey-Turkish.

In order to obtain a comparative perspective, the current situation in the literature has been taken into account. This study based on both primary and secondary resources in three languages that are English, German and Turkish. In addition, search engines (Google, Yandex) were also used to use artificial intelligence in language education and to obtain necessary information about the situation in Turkey. The data obtained from books, articles, YouTube contents and published projects were analyzed and the findings were revealed. In all, the principal methodological steps followed in this study are access to scientific resources; drawing the current situation in the literature and finally objective analysis of the main subject and comparative analysis.

It is accepted that the technical analysis in technology-language education will be facilitated through visualization. Here, the historical development of artificial intelligence technology (in the context of content and product output) and the benefits of artificial intelligence in language learning are visually reflected. While examining the situation in Turkey, the data of the state institutions were also taken into consideration to understand the related policies.

Conclusion

In this study, first of all, how artificial intelligence can be used in language education is explained, and then similar studies in Turkey are examined.

Today, technology is transforming many branches of life. The Fourth Industrial Revolution has been advancing especially since the 2010s, and artificial intelligence is one of the most fundamental elements here. It includes smart applications developed with various algorithms based on artificial intelligence. It is possible to see these smart applications in many areas. Around the world, the use of artificial intelligence applications in the field language education increases day by day. Artificial intelligence applications aim to facilitate the work of human beings trying to keep up with the changing and transforming world. In particular, the pandemic process has reduced the functions of existing methods and revealed new training needs suitable for the era and the process. It is observed that artificial intelligence makes a healing contribution to the learner, the instructor and the learning process, and offers facilitating techniques by taking into account the individual differences of the learner. Especially e-learning platforms, online courses and mobile applications for educational purposes, making individual-specific analysis and giving feedback on the deficiency of the individual are among the factors that will increase the efficiency in language education. In order to establish more effective education system, artificial intelligence and its applications are needed with innovative inventions. As a result of these developments, traditional education methods have partially lost their importance. Contemporary methods with artificial intelligence increase productivity by making training flexible. However, because of the fundamental

effect of the teacher-student interaction on language learning, it seems that human beings will continue to be critical in education.

It has been generally determined that the studies on language education in Turkey, especially on teaching Turkish as a foreign language, are limited when compared to the relevant studies in the world. There has been some progress recently. In parallel, in Turkey, artificial intelligence applications have just begun to develop in the fields of correct education, language education, Turkish education as a foreign language. On the one hand, when the activities in the field of Turkish education are examined, the existence of technology-based studies involving artificial intelligence draws attention. In particular, artificial intelligence studies appear as projects. On the other hand, in the relevant literature in Turkey, it has been noticed that how little the use of artificial intelligence in the field of language education and specifically Turkish education has been researched. As a basic suggestion, new projects should be developed as they are of strategic importance. Competition in the relevant field should be increased in Turkey. It is stated that the applications are expensive. There is a need for projects to be developed especially on natural language processing. With these projects, it is obvious that Turkish, which is an agglutinative language, will contribute to a more perfect communication, especially by speakers of other language families. Communication can be more accurate with these projects focusing specifically on speaking and writing skills. As well as realizing artificial intelligence projects, it is essential to use it in the classroom or to enable the learner to apply it on their own. As a result, there is a need for more artificial intelligence applications in language education. In order to compete with the world, a solid infrastructure should be established, government support should be provided for this area, the budget should be increased and learners should be given more artificial intelligence opportunities.

In the end, these studies will raise awareness about artificial intelligence-oriented language education. In the final analysis, artificial intelligence helps teachers and learners and contributes to the education process.

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