

The analysis of postgraduate studies on AI in education in Türkiye

Received: 11/05/2024
Revised: 21/11/2024
Accepted: 23/11/2024

This is an open-access article.

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Abstract

Research to answer the question "How can artificial intelligence be utilized in educational applications?" has been gaining serious momentum over the years. Thanks to thinking machines, teachers can offer his expertise with more meaningful and economic opportunities, while learner become an autonomous learner. On the other hand, artificial intelligence (AI), which increases the quality of distance education that offers equal opportunities in education, enables students to become individuals who research and develop in the classroom environment. Therefore, the current situation regarding the application areas of AI in education, which is a subject of global curiosity, has become the focus of research in many countries. In this study, it is aimed to examine the studies published by universities in Türkiye between the year 2000 and 2024 on AI in education through criteria of publication year, research method, universities, study type (master's or doctoral) and focus group/ AI applications. As a result of content analysis, it is concluded that there is an increasing interest for AI in education faculties especially after the year of 2021. After result and conclusion, there are some suggestions for academicians, researchers and prospectives teachers.

Keywords: Artificial intelligence, education, thesis, dissertations, postgraduate.

Cite: Dağdemir, V. (2024). The analysis of postgraduate studies on ai in education in Türkiye. *Digital Security & Media*, 1(1), 60-77

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INTRODUCTION

While technological developments show its impact on many sectors, the field of education is looking for new ways to meet the needs of era. In addition to devices like interactive boards and tablets, digital learning platforms provide the opportunity to change students' role from passive to autonomous learners. One of the remarkable methods to recover academic and social demands of new generation and teachers is technology of artificial intelligence (AI). From its first studies in 1960s, AI has been an object of interest. Many countries around the world try to catch the developments as it grows up quicker than anything. It can be stated that advancements in education mostly mean to place AI in education. That's why it would be very useful to analyse scientific studies to describe the framework and outputs of AI in education (AIED).

AEID studies can be categorised into three groups as learner-centred, instructor-centred and institution-centred. Firstly, learner-centred practices represents the digital platforms in which students are users and the main point is to active students self-learning skills. Secondly, although the aim of teacher-centred practises is to provide students more qualified experience, the teacher is user. Preparing and picking up educational materials, assessment and evaluation processes are common use of this practises group. Lastly, institution-centred is essentially related to administrative stuffs like admission, scheduling or detecting risks and problems. Classification of these studies in a table is shown below (Chassignol, et al., 2018; Holmes and Tuomi, 2022; Labadze, et al., 2023; Ouyang and Jiao, 2021):

Table 1. Classification of AI Practises in Education

Learner-centred	Instructor-centred	Institution-centred
<ul style="list-style-type: none"> • Intelligent Tutoring Systems • AI-Supported Apps • AI-supported Simulations • AI for Special Needs Learners • Chatbots • Automatic Formative Assessment • Learning Network Orchestrator • Dialogue-based Tutoring Systems 	<ul style="list-style-type: none"> • Plagiarism • Smart Curation of Learning Materials • Classroom Monitoring • Automatic Summative Assessment • Classroom Management 	<ul style="list-style-type: none"> • Admission • Course Plans, Scheduling • e-Proctoring • Identifying Risky Learners

As it is shown in the table, learner-centred practises have 8 titles: AI-supported Apps, AI for Special Needs Learners, Intelligent Tutoring Systems, AI-supported Simulations, Chatbots, Automatic Formative Assessment, Learning Network Orchestrator, Dialogue-based Tutoring Systems. On another hand, Plagiarism, Intelligent Materials, Classroom Monitoring, Automatic Summative Assessment and Classroom Management are topics on which instructors need help by AI. Lastly, under institution-centred title there are 4 main topics: Admission, Course Planning and Scheduling, Identifying Risky Students and E-Proctoring. Under the next titles, each topic is defined.

1) Learner-centred AI

a) Intelligent Tutoring Systems (ITS)

It's the most funded and common area in AIED studies. The main purpose of these systems is to collect data from students' answers and provide an individualized and linear teaching order. Based on their answers, difficulty level of materials and types of content are presented in an AI-supported estimated manner. In addition, instant feed is one of the key points for this kind of practises. Students are active receiver in the systems based on the philosophy of behaviourism (Ouyang and Jiao, 2021). Spark, from a French company, is an example of ITS.

It provides individualised pathways for learners and a dashboard with analytics for teachers. Another example is Gooru Navigator in which the application routes ways for user's strengths, weakness and goals. If it needs, it can reroutes the pathways.

b) AI Supported Apps

In recent years, AI-based educational apps have been offered to the market in many disciplines such as English language, maths, history and geography. It can be stated that they are more specific than ITS. These tools analyse and present data in an "intelligent" way to engage learners in deep thinking. Thanks to AI support, the computer instantly collects learners' data and encourages them to develop higher thinking skills by providing activities based on their background and interests. However, the contribution level of such applications is controversial among researchers. For example, Chinese government has banned AI-based homework apps for students as it blocks learners creative thinking skills (Dan, 2021).

c) AI-Supported Simulations (Virtual Reality, Augmented Reality)

By adding interactive and intelligent functions to serious games designed for educational purposes, an environment can be prepared especially for collaborative and creative activities (Terzidou and Tsiatsos, 2016). Students are allowed to feel more meaningful and qualified experiences when Augmented Reality and Virtual Reality technologies are incorporated to disciplines such as health sciences and engineering. Google Arts and Culture is one of the example of this practises.

d) AI for Special Needs Learners

AI-supported applications are available to compensate for learning difficulties such as dyslexia, Attention Deficit/Hyperactivity Disorders (ADHD), dysgraphia, autism or physical disabilities. For example, the StorySign application developed by Huawei for children with hearing difficulties can be given as an example (Huawei, 2022).

e) Chatbots

Chatbots provide instant support by answering questions, providing explanations, and additional resources with various guidance. Chat agents, Chatbots can also act as virtual teaching assistants that provide support to instructors before, during or after teaching. Such applications are very useful for institutions where the student capacity is high and it is difficult for real people to answer all questions. Ada (named after the computer pioneer Ada Lovelace), virtual teaching assistant (TA), ChatGbt, Claude, Microsoft Bing AI, Meta AI can be cited as examples of chat robots used in the field

f) Automatic Formative Assessment (AFA)

Automated formative assessment applications use natural and semantic language processing together, in addition to other AI techniques. They are applications that provide quick and effective feedback on students' writings or other outputs. There are few studies and examples of this title as it is difficult to offer correct and helpful feedback. Open Essayist is an example of AFA practises. It provides feedback on essays.

g) Learning Network Orchestrator (LNO)

In the learning network orchestrator, for instance, if a student does not understand the subject in class, he/she logs into the mobile application and selects the topic. One of the online instructors explains the subject in the form of a private lesson, only by making voice calls and sharing the screen. Instructors are constantly rated by previous learners. Therefore, a learner can choose the instructor he wants to listen according to the ratings and instructors are supported by AI functions during teaching process. Since real teachers are used in these applications, it can be said that it costs high. OpenTutor application can be given as an example. Lessons are for 20 minutes and with human tutors. AI has a supporter role while the student decides what he wants to learn by himself.

h) Dialogue-based Tutoring Systems (DTS)

Dialogue-Based Tutoring Systems, where natural language processing is used, are applications offered within the framework of cognitive and social cognitive philosophy as it brings real teachers and students together by talking or texting. The most important part of the system is that it is based on different Socratic principles. Instead of classical lectures, teaching is provided through questions. AutoTutor which is the research of Memphis University, is one of the best-known examples.

2) Teacher-centred AI

a) Plagiarism

This kind of software, which are frequently used by teachers, have both paid and free versions. Examples of plagiarism detection programs that provide the originality rate in written texts can be given as follows: Turnitin, iThenticate, Plagiarism Checker X, Grammarly.

b) Smart Curation of Learning Materials (SCLM)

It becomes a time-consuming problem for the teacher to find correct material, as the internet has more and more data day by day. Educational resources for the purpose are automatically selected with applications such as X5GON (research tool), Teacher Advisor and Clever Owl.

c) Classroom Monitoring

AI-supported video applications can observe students in the classroom in terms of their focus levels (Lieu, 2018). In addition, there are studies that allow students to monitor and record mental activities by wearing EEG (Electroencephalography). For example, US based BrainCo application's headsets software provide instructor to signal to the panel when the learner needs more support during the lesson. It shows blue lights for pupils whose mental activities are slow, yellow is for average and red lights when mental progress is more than average.

d) Classroom Management

Classroom management is a concept that is about how a teacher manages activities for effective teaching within the available schedule, time and space. Although it has just started, there is some research on getting AI support in classroom management. In the FACT application, which is an example of this, while students solve the activity in small groups, the application offers recommendations to the instructor on which groups to visit and what to say (VanLehn, et al., 2019).

e) Automatic Summative Assessment (ASA)

After ITS, one of the most invested applications in the field of AIED is automatic summative assessment applications. These applications (called as autograder as well) are designed to evaluate written assignments and reports and they detect errors, explain how to correct them, and evaluate by providing the correct answer rate (Hsu, et al., 2021). A commercial example of ASA is e-Rater which is used for automated essay scoring since 1999 (Attali and Burstein, 2006).

3) Institution-centred AI

a) Admission

Nowadays, many institutions use AI-based software to recruit personnel (Suen and Hung, 2023; Suen, Chen and Lu, 2019). Software that enables remote interviews with interactive programs evaluates competencies and skills of candidates both academically and intuitively, while providing employers with insight into which position they are suitable for. The ethical view of the practice continues to be discussed in the scientific literature. GRADE, which is developed by the University of Texas, make suggestions on applicants by using data of test scores, academic background and recommendation letters.

b) e-Proctoring

Schools have done mid-term and final exams online after pandemic years. But there are some problems about integrity in academic. The purpose of e-Proctoring practises is to monitor students during online exams by AI-supported cameras microphone. EduSynch is one of the the example of the practises as it uses AI and human invigilators to ensure exam integrity and prevent students from academic dishonesty (EduSynch, 2024).

c) Course Planning and Scheduling

Lecture plans are prepared on students' academic and social background, interest and target of the expanded programme. Today, there are some studies that aims to guess students' achievements in the next term or difficulty level of next exams to be able to edit plans and programmes. This kind of practises enable administration objective views and tracks to manage the school.

d) Identifying Risky Learners

Preventive actions have an important role in education. AI-supported applications let administration team and school consultants to determine students at risk both in academic and social. Data given to the applications provide instructors what students are going to do in the next exam, task or social activities with clarified percentage.

It is very important to follow the developments in the field of education and to reveal the current situation in the country in terms of progress. However, while doing this, the researches should be carried out within the correct classification. Otherwise, a correct evaluation may not be made. The types of AIED reflected above can be seen in the analysis system of many studies in the international literature. In the following chapters, you will read the analyses of studies in Türkiye according to this classification.

In this research, it is aimed to examine the postgraduate studies published by universities in Türkiye on AIED between 2000 and 2024 according to publication year, research method, universities, thesis type, focus group and AI application. The research questions on which the study is based on are as follows:

- 1) How is the distribution of studies according to the year of publication?
- 2) How is the distribution of studies according to research method?
- 3) How is the distribution of studies according to their universities?
- 4) How is the distribution of studies according to type (Master's or Doctoral)?
- 5) How is the distribution of studies according to focus group and AI applications?

METHOD**Research Design**

This research was conducted within the framework of qualitative research designs. Qualitative research is an interpretative perspective based on the research problem of a social problem of individuals or groups. The researcher interprets the problem with his/her own deep thoughts while exhibiting both deductive and inductive approaches from this perspective (Creswell, 2013).

Data Collection Techniques

For examining artificial intelligence research in education, the document analysis technique, which is used in both qualitative and quantitative designs, was used. Document review can be considered as the examination of all kinds of written documents after the purpose of the research is clarified. It can be handled at different stages of the study. For example, scientific literature can be examined to develop a scale or it can be used directly as a research technique (Sönmez and Alacapınar, 2014). Through the Higher Education Institutions (YÖK) Database (<https://tez.yok.gov.tr/UlusalTezMerkezi/>), the studies searched with keywords with "artificial intelligence", "intelligent", "chatbots/chat agents" were examined in detailed and 72 studies were determined according to their research purposes.

Data Analysis

In this research content analysis method was used. Content analysis, which is frequently applied especially in social sciences, can be explained as dividing the written text into categories with certain codes and summarizing it with a systematic technique (Büyüköztürk, et al., 2020). The themes and codes to be used in the content analysis of 72 studies were created with the framework given above and accepted in the literature. While the themes for the analysis of the identified studies are "student-centred AI, teacher-centred AI and institution-centred AI", the codes are the AI application types. It means Table 1. Also represents themes and codes of this research.

FINDINGS

In this study, postgraduate research published by universities in Turkey between the year of 2000 and 2024 was analysed. It may be fruitful to see the findings obtained to researchers studying in the related field. The table presenting the 72 postgraduate researches in detailed is attached in the end of the paper.

Distribution of Studies According to the Year of Publication

The graph showing the completion rate of postgraduate thesis studies on artificial intelligence in the field of education by year is as follows:

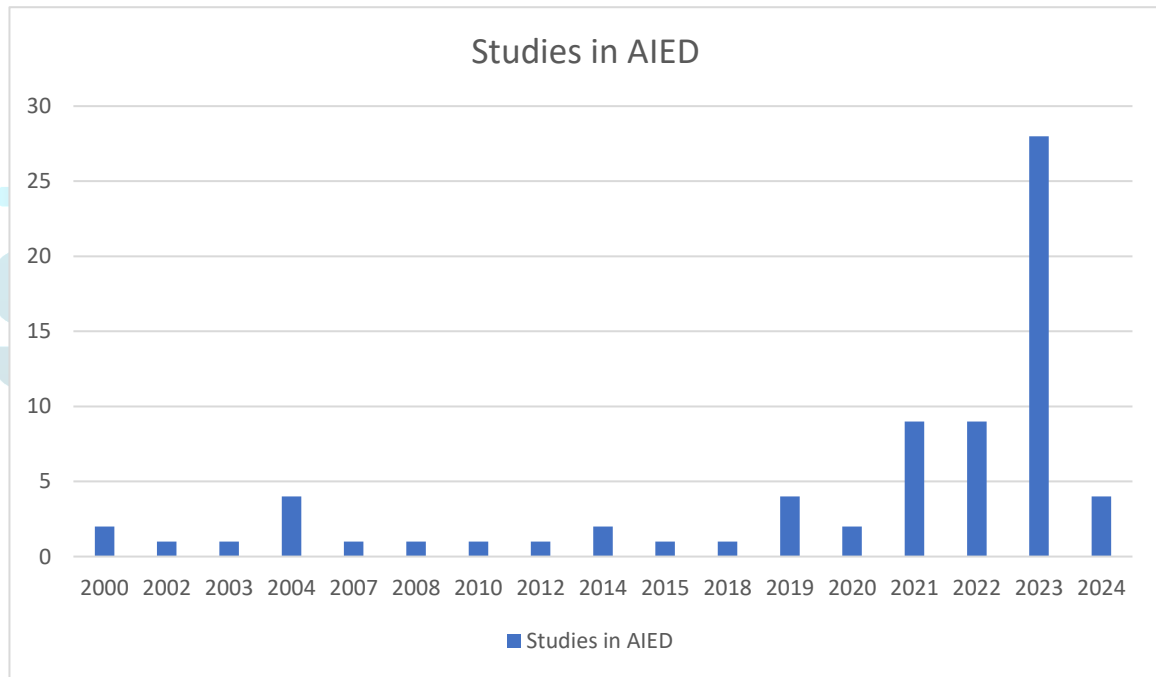


Figure 1. Studies According to the Year of Publication

Looking at the graph above, there were 2 in 2000, 1 in 2002, 1 in 2003, 4 in 2004, 1 in 2006, 1 in 2007, 1 in 2008, 1 in 2010, 1 in 2012, 2 in 2014, 1 in 2015, 1 in 2018. While there were 1, 4 studies in 2019, 2 studies in 2020, 9 studies in 2021 and 2022, it is seen that 28 studies were written in 2023, with a fast increase. It has been determined that 4 studies have been written in 2024, although the year have not been completed yet.

Distribution of Studies According to Research Method

The methodological framework of the studies written by postgraduate students on AIED is another research sentence of the research. The graph showing the distribution according to the methods is as follows:

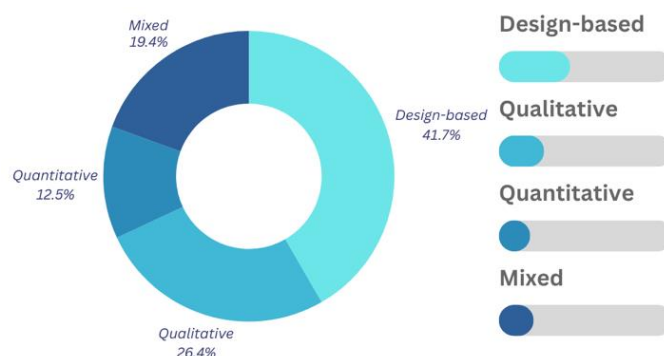


Figure 2. *Studies According to Methodology*

When the graph above is examined, the research methods of the studies are in order of density: 41.7% (30) are design-based, 26.4% (19) are qualitative, 19.4% are mixed (14) and 12.5% are quantitative (9) was determined.

Distribution of Studies According to Their Universities

Studies on AIED vary depending on the universities they are affiliated with. The table showing the number of studies in this field at 33 different universities is shown below.

Table 2. *Studies According to Universities*

University	Number	University	Number	University	Number
Anadolu University	7	Sakarya University	2	Erzincan Binali Yıldırım University	1
Bahçeşehir University	7	Kocaeli University	2	Çankaya University	1
Fırat University	5	İstanbul Aydın University	2	Van Yüzüncü Yıl University	1
METU	4	Karabük University	2	Trabzon University	1
Atatürk University	4	İnönü University	2	Mersin University	1
Marmara University	4	Çanakkale 18 Mart University	1	İstanbul Okan University	1
Gazi University	3	Karadeniz Tech. University	1	19 Mayıs University	1
Ankara University	3	Afyon Kocatepe University	1	Yıldız Teknik University	1
Bursa Uludağ University	3	Harran University	1	Düzce University	1
İstanbul University	3	Süleyman Demirel University	1	Çankırı Karatekin University	1
Çukurova University	2	Tekirdağ Namık Kemal University	1	Muğla Sıtkı Koçman University	1

One of the issues addressed within the framework of the research questions is to reveal the density of studies in terms of universities. It is seen that there 33 universities which have published thesis or dissertations in AIED. On the other hand, it could be said that Anadolu University, Bahçeşehir University and Fırat University are the most published studies in the country. The other universities and number of studies are shown in the table above.

Distribution of Studies According to Type (Master's or Doctoral)

In Türkiye, over a 24-year period (2000-2024), postgraduate stud which deal with the relationship between education and AI have been examined in two different types: master's and doctoral. For this analysis, the graph showing the distribution of 72 studies is as follows:

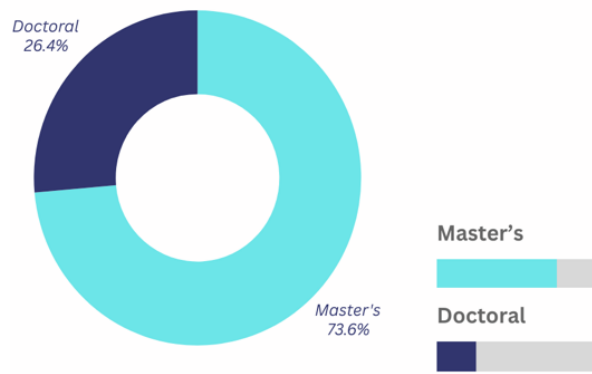


Figure 3. Studies According to the Types

Looking at the graph above, while 73.6% (53) of the 72 sample studies were completed as master's degree and 26.4% (19) were submitted to the literature at the end of doctoral programmes.

Distribution of Studies According to Focus Group and AI Practises

Studies in the field of AIED, published by universities in Türkiye, were analysed according to certain themes on literature review. The table showing the classification of them is as follows:

Table 3. Studies According to Focus Group and AI Practises

Focus Group	AI Apps	Diss. Code
Learner-centred	AI-supported Applications	T6, T7, T17, T18, T24, T25, T27, T32, T34, T35, T36, T37, T39, T42, T43, T44, T47, T48, T49, T51, T52, T54, T57, T64, T66, T69, T70
	ITS	T1, T2, T3, T4, T5, T9, T12, T13, T26, T29, T56
	Chatbots	T11, T38, T40, T41, T46, T62, T65, T71
	AI for Special Needs	T22, T58
	DBTS	T55
Instructor-centred	ASA	T10, T14, T19, T20, T28, T30, T31, T33, T59, T60, T67
	SCLM	T15, T16, T23, T61, T68
	Classroom Monitoring	T72
Institution-centred	Course Plan. Scheduling	T8, T21, T45, T53
	Identifying Risky Learners	T50, T63

Looking at the table above, studies published between 2000 and 2024 were mostly discussed in the field AI-supported applications from the student-centred group. ITS, chatbots, AI for learners with special needs and dialogue-based tutoring systems are student-centred AI application areas. When the studies where teachers are at the centre are examined, although it has been determined that automatic summative (ASA) assessment is the majority, there are research in the fields of curation of smart learning material, classroom monitoring. Finally, in order to produce administrative solutions, it is seen that researches have been published on course planning and scheduling and identifying risky learners, which are institution-centered AI practises areas.

RESULTS and DISCUSSION

It can be said that AI, which is seeking practises areas to increase quality in many sectors every year, has become a necessity today. National and international research shows that AI technologies have got around many steps of the education process. This study aims to examine the studies published by universities in Türkiye between 2000 and 2024 on certain themes. It is thought that this research will shed light on educational researchers, especially in the field of technology. As a result of the analysis, some inferences can be made about what the current situation is.

The studies identified within the framework of the first research question were analysed according to years. It is seen that AIED studies have started to increase significantly after the year of 2021. Looking at the findings, it can be said that this rise will continue in the following years. Güzey et al. (2023), who examined AI research in education in the Web of Science database between 2019 and 2021, found that there were 24 studies in 2019, 38 in 2020 and 86 in 2021. Therefore, it can be said in parallel that research in the field of AIED is constantly increasing every year in Türkiye.

When we look at the findings showing the distribution of studies according to research methods, it is seen that design-based research is in the majority. The value of theoretical studies is undeniable. However, it has critical importance for the literature that researchers and universities do not feel limited to scanning and contribute literature with studies in the experiential dimension by making designs. This also encourages those who want to work in the relevant field. Akdeniz and Özdiñç (2021) classified the 37 post graduate studies and articles they identified according to qualitative, quantitative, mixed and design-based methods. As a result of their analysis, it is seen that there are 5 qualitative, 7 quantitative, 8 mixed and 17 design-based studies. Güzey et al. (2023) classified the 148 articles they examined as experimental-applied (79), literature review (29), descriptive (16), action (15), method study (7) and professional study (2). When the literature is followed, it is clear that design-based and experimental research are in the majority. On the other hand, Meço and Coştu (2022) present a result in opposite, while emphasizing that the dissertations and articles they examined were mostly in the scanning method.

Limitations & Recommendations

This study is limited to the studies completed between 2000 and 2024 (May). It is researched on the database of YÖK TEZ (Higher Education).

At the end of the research, which aims to analyse the theses completed in the field of AIED between 2000-2024 according to certain themes, some contributions can be made to the literature.

- After the results of the analysis have analysed, it is determined that there are no studies on AI-supported Stimulations, Automatic Formative Assessment, Learning Network Orchestrator, Plagiarism, Classroom Management, Admission and e-Proctoring. It can be said that researchers' orientation towards these missing areas will contribute to the scientific literature.
- It was determined that doctoral studies were at a low rate. It is recommended that academicians encourage doctoral students to conduct research in the field of EYZ.
- Finally, for understanding the educational philosophy that will be provided by the use of artificial intelligence in education, qualitative studies that offer the opportunity for in-depth examination and reveal the needs and demands of teachers, students and decision makers can be applied more intensively.
- It is recommended that the similar study could be conducted on different databases.

Statement of Researchers

Researcher's contribution rate statement: Since the study has a single author, the entire contribution belongs to the author.

Conflict statement: The author declares that he/she has no conflict of interest.

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Attached File: **Studies about AIED in Türkiye**

	Studies	Type	Method	Focus Group	AI Application
T1	Integration of web based adaptive and intelligent education system into METU-online (Şimşek, 2000)	Master's	Design-based	Learner	ITS
T2	Development of an intelligent agent for distance learning (Özdemir, 2000)	Master's	Design-based	Learner	ITS
T3	A model concerning the usage of artificial intelligence program techniques on computer aided education (Tamer, 2002)	Master's	Design-based	Learner	ITS
T4	Development of an intelligent tutoring system for distance education at master's level (Yeşiltaş, 2003)	Master's	Design-based	Learner	ITS
T5	Developing an artificial intelligence based instructional software (Demir, 2004)	Master's	Design-based	Learner	ITS
T6	Computer aided preschool education and artificial intelligence (Karadayı, 2004)	Master's	Qualitative	Learner	AI Apps
T7	The effects of fuzzy logic and cybernetics on cyber society and artificial intelligence (Işıklı, 2004)	Master's	Qualitative	Learner	AI-supported apps.
T8	Using two artificial intelligence techniques, genetic algorithms and tabu search, in the preparation of weekly timetables in academic institution (Gülcü, 2004)	Master's	Design-based	Institution	Course Plan. Sch.
T9	Artificial intelligence and web based intelligent tutoring system design in learning-teaching process and an application in mathematics teaching (Keleş, 2007)	Doctoral	Design-based	Learner	ITS
T10	Modelling an instructional expert system perspective in artificial intelligence (Erkoç, 2008)	Master's	Design-based	Instructor	AFA
T11	Usability of artificial intelligent conversational agents as student support service in distance education (Kayabaş, 2010)	Master's	Design-based	Learner	Chatbots
T12	Effect on students' academic development of intelligent electronic advisory system (Demirkol, 2012)	Master's	Design-based	Learner	ITS
T13	Investigation of the change in sixth grade students' problem solving abilities, attitude towards problem solving and mathematics instruction based on Polya's problem solving steps (Erümit, 2014)	Doctoral	Design-based	Learner	ITS
T14	Student consultancy service information infrastructure design using artificial intelligence technics (Kaynak, 2014)	Master's	Design-based	Instructor	ASA
T15	The implementation of intelligent question bank using Matlab software on Moodle learning management system (Beyazşekeroğlu, 2015)	Master's	Design-based	Instructor	SCLM
T16	Designing of intelligent question bank by using heuristic methods (Diri, 2018)	Master's	Design-based	Instructor	SCLM
T17	Using artificial intelligence in museum education (Aslan, 2019)	Master's	Qualitative	Learner	AI Apps
T18	Artificial intelligence based smart toys for preschool children: A design based study (Akdeniz, 2019)	Master's	Design-based	Learner	AI Apps
T19	Analysis and evaluation of the exam results of the students attending the university examination with artificial intelligence: 2018 Şanlıurfa province (Tankuş, 2019)	Master's	Design-based	Instructor	ASA
T20	Predicting the success of distance education students using artificial intelligence techniques (Altınsoy, 2019)	Master's	Design-based	Instructor	ASA

T21	Building strategy decision model with artificial intelligence technique in open and distance flexible learning environments (Güler, 2020)	Doctoral	Qualitative	Instructor	Course Plan. Sch.
T22	Modelling reasons for reading problems experienced by third graders through artificial intelligence method (Çelik, 2020)	Master's	Mixed	Learner	AI for Special Needs SCLM
T23	Determination of difficulty level of Ataturk University Open Education Faculty exam questions with artificial intelligence methods (Canpolat, 2021)	Master's	Qualitative	Instructor	SCLM
T24	An artificial intelligence awareness level scale for teachers: A reliability and validity study (Ferikoğlu, 2021)	Master's	Quantitative	Instructor	AI Apps
T25	Analysis of university preferences for high school students studying in informatics with artificial intelligence methods (Türk, 2021)	Master's	Design-based	Learner	AI Apps
T26	The effect of artificial intelligence system on the academic success of students in the unit of interaction of light with matter (Kesler, 2021)	Master's	Mixed	Learner	ITS
T27	The effect of embedded system applications on intelligent device development performance, metacognitive awareness and academic achievement (Parlak, 2021)	Doctoral	Mixed	Learner	AI Apps
T28	Development of an machine learning-based system for determining the vocational future of students who will transfer to higher education (Sucu, 2021)	Master's	Quantitative	Instructor	ASA
T29	Intelligent tutoring systems on foreign language teachers using artificial intelligence (Şener, 2021)	Doctoral	Design-based	Learner	ITS
T30	Student academic performance prediction via artificial intelligence using machine learning algorithms (Bastem, 2021)	Master's	Design-based	Instructor	ASA
T31	Predicting graduation of open education high school students with artificial intelligence technics (Sulak, 2021)	Master's	Design-based	Instructor	ASA
T32	Perception of English language learners and teachers towards the use of artificial intelligence in the language classroom (Gücük, 2022)	Master's	Mixed	Learner	AI Apps
T33	Estimating LGS Revolution History and Kemalism subtests correct numbers using artificial intelligence methods (Başer, 2022)	Doctoral	Quantitative	Instructor	ASA
T34	The effect of course plan and contents developed for artificial intelligence teaching in secondary schools on students' metacognitive behaviours (Çolak, 2022)	Master's	Qualitative	Learner	AI Apps
T35	Analysis of instructional issues affecting the development of artificial intelligence literacy skills (Onat, 2022)	Master's	Qualitative	Learner	AI Apps
T36	Opinions of science teachers on the use of artificial intelligence in education (Bağır, 2022)	Master's	Qualitative	Learner	AI Apps
T37	The analysing of the points of science teachers concerning the usage of artificial intelligence technologies in science teaching (Sanca, 2022)	Master's	Qualitative	Learner	AI Apps
T38	The use of chatbots as an example of artificial intelligence application in social studies teaching (Yetişensoy, 2022)	Doctoral	Mixed	Learner	Chatbots
T39	The effect of use of artificial intelligence technologies in education on student success: Meta-analysis study (Altun, 2022)	Master's	Qualitative	Learner	AI Apps
T40	Interactive teaching of harmony between time and appearance markers and active attachment in teaching Turkish as a foreign language through chatbot (Çamcı, 2022)	Master's	Design-based	Learner	Chatbots

T41	An investigation of physicians' evaluations towards artificial intelligence chatbot's support for health literacy (Yıldız, 2023)	Master's	Qualitative	Learner	Chatbots
T42	The impact of physical programming in artificial intelligence training (Özyanık, 2023)	Master's	Qualitative	Learner	AI Apps
T43	Determination of pre-service teachers' awareness level on the concepts of artificial intelligence and artificial intelligence applications (Dumlupınar Arslan, 2023)	Master's	Quantitative	Learner	AI Apps
T44	Examination of artificial intelligence studies in education with social network analysis (Bayındır, 2023)	Master's	Qualitative	Learner	AI Apps
T45	Investigation of artificial intelligence readiness factors at open and distance education institution (Göçmez, 2023)	Doctoral	Qualitative	Institution	Course Plan. Sch.
T46	Examining attitudes towards chatbots used in open and distance learning support services (Helvacı Aydın, 2023)	Master's	Quantitative	Learner	Chatbots
T47	Examination of teachers' views on artificial intelligence-based language models (Kaya, 2023)	Master's	Qualitative	Learner	AI Apps
T48	An investigation of the effect of artificial intelligence-based education informatics network academic support system to the students' academic success (Aydın, 2023)	Master's	Quantitative	Learner	AI Apps
T49	Innovative effects of artificial intelligence on teacher education (Dengiz, 2023)	Master's	Qualitative	Learner	AI Apps
T50	Detecting the problems in distance education and predicting the academic performance of students by using artificial intelligence methods (Irmak, 2023)	Doctoral	Qualitative	Institution	Identifying Risky Learners
T51	An application example for the use of artificial intelligence in the art education (Erdurmuş, 2022)	Master's	Mixed	Learner	AI Apps
T52	The development of artificial intelligence literacy program for secondary school students (Özmutlu, 2023)	Doctoral	Design-based	Institution	AI Apps
T53	Determining the tendency of vocational high school information technologies teachers towards artificial intelligence and machine learning (Karahan, 2023)	Master's	Quantitative	Institution	Course Plan. Sch.
T54	Meta-analysis study on artificial intelligence applications in education (Yazar, 2023)	Master's	Qualitative	Learner	AI Apps
T55	Conversational artificial intelligence and foreign language: A model in the process of teaching speaking (Yavuz, 2023)	Master's	Design-based	Learner	DTS
T56	Analysis of e-learning settings, which are prepared on the basis of multiple intelligence domains determined by artificial intelligence in science instruction, as per different variables (Alan, 2023)	Doctoral	Mixed	Learner	ITS
T57	Opinions of high school principals and teachers on the use of artificial intelligence in education (Demir Dülger, 2023)	Doctoral	Mixed	Learner	AI Apps
T58	Teachers teaching special talent students AI awareness and innovative perspectives the relationship between (Yüregir, 2023)	Master's	Quantitative	Learner	AI for Special Needs
T59	Predicting of undergraduate students' course motivation using artificial intelligence methods (Yavuzarslan, 2023)	Doctoral	Design-based	Instructor	ASA
T60	Predicting science process skills with artificial intelligence and its effectiveness in students and gifted students (Sarığlu, 2023)	Doctoral	Design-based	Learner	ASA
Y61	Development of AI-powered chatbot for quantitative analysis selection (Ersöz, 2023)	Doctoral	Design-based	Learner	SCLM

T62	The creation of chatbots for a French foreign language class: Contributions and limitations (Dündar, 2023)	Doctoral	Mixed	Learner	Chatbots
T63	The effect of intelligent affective feedback on learner engagement, satisfaction and perceived learning online learning (Kimav, 2023)	Doctoral	Mixed	Learner	Identifying Risky Learners
T64	Methodology and scope of graduate thesis completed between 2012-2022 on the use of intelligent technologies in foreign language education in Türkiye (Behbudova, 2023)	Master's	Qualitative	Learner	AI Apps
T65	Artificial intelligence supported student clubs chatbot application (Altunyurt, 2023)	Master's	Design-based	Learner	Chatbots
T66	Artificial intelligence education for secondary students the effect of its content on artificial intelligence literacy (Soylu, 2023)	Master's	Mixed	Learner	AI Apps
T67	Predicting student academic performance in the field of educational data mining with artificial intelligence supported machine learning algorithms (Bingül, 2023)	Master's	Design-based	Instructor	ASA
T68	Creation of question generation platform using artificial intelligence method (Erdoğan, 2023)	Master's	Design-based	Instructor	SCLM
T69	K-12 teachers' awareness and perceptions of artificial intelligence in education (Senger, 2024)	Master's	Mixed	Learner	AI Apps
T70	Higher education instructors' artificial intelligence awareness and its effect on some demographics (Kebapçı, 2024)	Master's	Quantitative	Learner	AI Apps
T71	The development of listening and speaking skills in EFL via an artificially intelligent chatbot application: A quasi-experimental design study (Koç, 2024)	Doctoral	Mixed	Learner	Chatbots
T72	Development of artificial intelligence software that instantly measures students' attention to the lesson (Dikmen, 2024)	Doctoral	Mixed	Instructor	Classroom Monitoring