



INFORMATION STRATEGIES
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Artificial Intelligence: An Overview of Developments in the Education World

In this special issue of BSM Bulletin, we focused on Artificial Intelligence in all its aspects. In our newsletter, we touched on many important topics with the contributions of our valuable educators. We would like to draw attention to the issue and raise awareness in a wide range from the reflections of the developments in the world of education to the definition and history of Artificial Intelligence, from ethical concerns to different fields of study.

A report published by The U.S. Department of Education's Office of Educational Technology, '[Artificial Intelligence and the Future of Teaching and Learning: Insights and Recommendations](#)', covers all aspects of the issue to address the clear need for sharing knowledge, engaging educators, and refining technology plans and policies for Artificial Intelligence (AI) use in education¹. The report provides important recommendations to education leaders regarding technology policies in the context of Artificial Intelligence:

1. Emphasize humans (teacher/student) in the loop.
2. Align AI models to a shared vision for education.
3. Design using modern learning principles.
4. Prioritize strengthening trust.
5. Inform and involve educators.
6. Focus R&D on addressing context and enhancing trust and safety.

The '[Artificial Intelligence Index 2023](#)' report by the Stanford Institute for Human-Centered Artificial Intelligence documents a significant acceleration in investment in AI, as well as a significant increase in research on ethics, including issues of fairness and transparency². The European Commission has also recently published an important guidelines report, '[Ethical guidelines on the use of Artificial Intelligence \(AI\) and data in teaching and learning for educators](#)'³.

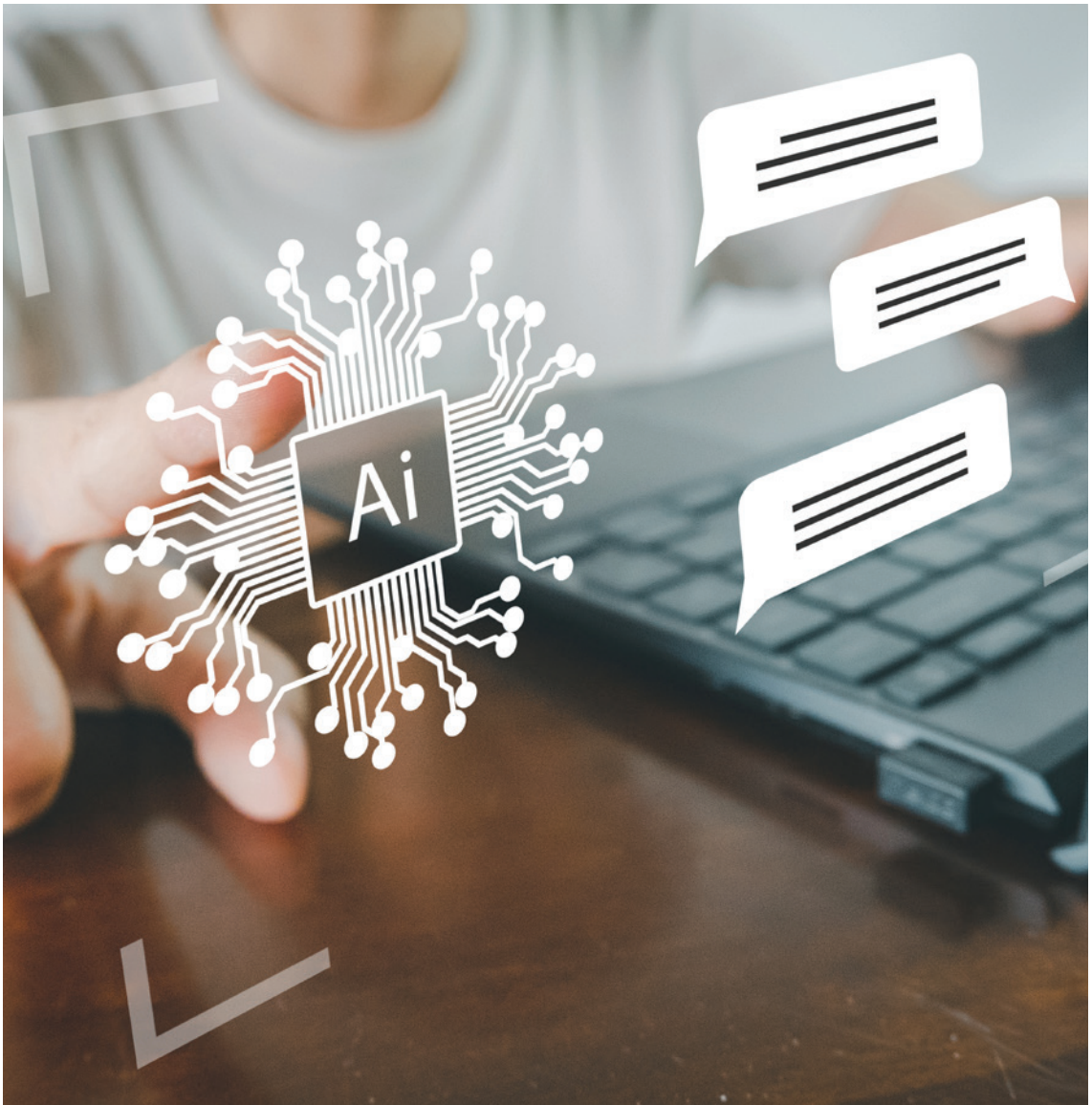
¹ Artificial Intelligence and the Future of Teaching and Learning

² AI Index Report 2023

³ Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators

These studies and reports show that Artificial Intelligence not only has a strong potential for short and long-term effects on the education ecosystem, but also draws attention to the existence of many concerns. The European Union's report also draws attention to the most common misconceptions regarding the use of Artificial Intelligence and data in education. Considering these common myths and opinions:

It is normal that many people find it difficult to fully understand how AI systems work, as it is a large and complex field. Rather than trying to understand all the processes of AI systems, it is more important for educators to understand the underlying mechanisms and limitations and be aware of how they can be used to support teaching and learning safely and ethically.



Artificial Intelligence is changing the way we learn, work and live, and education is normally affected by these developments. In studies about the role of AI in education, we can focus on ethical principles, thereby paving the way for the development of AI systems and solutions.

AI will increasingly complement or replace certain tasks performed by humans as its systems become more powerful each day. This can lead to ethical and trust issues in making fair decisions and protecting data by using Artificial Intelligence. The complexity of the legal field can be a real challenge for educators. Therefore, education authorities and schools must adhere to applicable data protection regulations while focusing on the ethical use of AI and data in order to support educators and students in their teaching, learning and assessment processes.

The McKinsey report states that the first and important benefit of Artificial Intelligence may be to improve teaching by reducing low-level loads. Studies show that teachers work about 50 hours a week and spend less than half of their time interacting directly with students⁴. The Artificial Intelligence can automate repetitive routine tasks, allowing teachers to devote more time to their students / students' learning. Many teachers worry that their role will diminish as the use and impact of AI in education increases. However, instead of reducing the role of teachers, Artificial Intelligence can support students to be creative, to think about and to solve real-world problems, and to collaborate effectively.

I am ending my article with the excitement of going through a very dynamic and new process together as a learning school community.

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Artificial Intelligence: Education Policies

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Isaac Asimov, who is considered one of the three most influential authors of all time who writes on robotics and artificial intelligence, was born in Russia in 1919 and immigrated to the United States with his family due to the conditions at the time. In addition to being a biochemical professor at Boston University, he left behind thousands of pages of science fiction legacy and defined the “Three Laws of Robotics”, which are still valid and decisive for the behaviors of robots and artificial intelligence:

1. A robot cannot injure a human being or let a human being get injured.
2. A robot has to obey the orders given by a human being as long as it does not conflict with the first rule.
3. A robot is obliged to protect its existence as long as it does not conflict with the first and the second rules.

Perhaps even Asimov himself didn't foresee these three laws to become so decisive in the policies that were established for the integration of artificial intelligence into the educational environment.

Another topic is an anecdote that astonished me. It is the fact that the use of artificial intelligence in education, which has intensively been on our agenda for the past year, has a much longer history. In fact, I learned this while I was reading about a conference to which our students sent their studies and were invited to give a presentation: the **24th International Conference on Artificial Intelligence in Education**, which will take place in Tokyo, Japan on July, 3-7. When I first saw that it was the 24th conference, completely prejudiced, I thought number 4 was a keyboard slip. After some skeptical research, I learned in astonishment that it was, in fact, the 24th edition of the conference. When I read the notes of the previous conferences in the past years and researched into the subject a little more, I realized that the production in this field has been far beyond what is believed, and in this regard, successful countries have made great progress according to the research carried out by different assessment organizations in education. Hence, the introduction section to the above-mentioned conference's call for papers is very impressive:

*A sustainable community is led by the principle of achieving peace and prosperity for all people and the planet, with inclusion that “leaves no one behind.” As the **AIED** community, we are focused on the*

mission of using Artificial Intelligence (AI) in order to contribute to a world with equal and universal access to quality education at all levels. In line with our aim, we have chosen this year's theme as "Artificial Intelligence in Education for Sustainable Society." We invite authors to present their research about how artificial intelligence in education can help meet our society's need for inclusive and equal quality education and lifelong learning opportunities.



This image is produced with Artificial Intelligence

As one can see, the integration of artificial intelligence into education is built on much greater social and pedagogical motives, rather than delegating the thinking abilities of the learner to a robot. This is possible by seeing the bigger picture, having a vision and developing policies on the integration of artificial intelligence into education.

The papers in this bulletin offer a rich content about artificial intelligence: practices, ethical discussions, the process of artificial intelligence, predictions about the future and even its reflections on art... Therefore, in this bigger picture, I will touch upon the importance of developing policies for a potential transformation with the integration of artificial intelligence into education. Besides, I will share the reports and policies which I benefited from at the end of my paper. Another note of mine is about the fact that texts dealing with education and artificial intelligence in Turkey are limited on policy level and, for now, there are only translated texts about practices. In this respect, I would like to share my view about the significance of establishing a policy, regarding the use of artificial intelligence in our school and classrooms, which is based on our self-practices, school culture, vision and strategic objectives. That's why I reviewed the literature, thinking that examining current policies might be a good starting point. Of course, the reports of UNESCO, the United States, the Technology Office of Education Department, OECD and the Council of Europe were the ones that I have come across with.

Definitions for the Process of Developing Policies

The fragmentation algorithm in the reports that I have examined is very remarkable. Firstly, definitions about AI are made on a summary level. It is important for the school community to agree on basic definitions and know what they are talking about when discussing a concept and in which aspects they limit the concept. Therefore, when we are developing a policy, we need to read the related literature well and, with the participation of our students, to enable our stakeholders clearly to know what we are talking about and seeking, and in fact, to comprehend why we are in the midst of such a discussion.

The Importance of Research

There is a lot of research about the integration of artificial intelligence into education on both micro and macro levels. These are the studies that either have examined the students' performances by using artificial intelligence practices in a single module of a course, or have investigated the perception of artificial intelligence on a macro level among the school stakeholders. To effectively conduct such a transformation, all of us reviewing these micro and macro studies, knowing AI's areas of use, risks and potential towards our aims and in our field will enhance productivity in terms of developing policies and practices. Another issue is that the articles in the policy will establish a reinforced foundation through theory and research in the field. In case of limited reading and inadequate research, I think making decisions and doing practices "against or for" might lead us to the syndrome of "one can know everything where no one knows anything."

Focusing on Opportunities Instead of Worrying

Artificial intelligence, as a matter of fact, the history of integration of technology into education on a simpler scale, has always caused concerns in a certain part of the education community. Some of these concerns paved the way for an efficient output and enabled us to ask the right questions to use technology more successfully. On the other hand, some concerns are about experiencing deep losses in terms of the roles

and importance of teachers and schools. We observe that the second type of concern does not have much response for now regarding the negativity towards the roles of schools and teachers. However, we have to acknowledge that none of the technological tools has the potential of artificial intelligence. Thus, it is essential to consider rational concerns that AI may cause in education today and to present the risks and opportunities of AI objectively and inclusively in the policies to be developed. Another point to consider is not to think of AI only in the role of “doing the job for the learner.” Of course, due to AI, it is possible for the learner to transfer their mind and thinking ability to a mind that they assume it thinks better and is more practical than themselves, and put aside their own mind. This has always been a risk for education. Unlike previous technologies, AI offers to produce information in a quick and unique way. Despite the risk, limiting the potential of AI only to the quoting feature reminds me of the opportunities in our history that were missed out on by resisting the technology and developments. Briefly, it is about avoiding prejudices due to the problems we face in the daily or instant use of AI in the process of establishing a general policy trying to focus on “teachers, students and learning.”

Seeing the Bigger Picture of Artificial Intelligence

The education and school system is affected by technological developments, just like other systems in the society. Education and school are critical structures that provide the input of social systems and have an impact on determining social events and directions. Therefore, there is an extensive mutual interaction between social developments in terms of economics, politics, and technology etc., and education. At this point, we need to follow what kind of changes AI will lead up to not only in education and schools but also in other social systems. Otherwise, ignoring the great potential changes to be made by AI in the fields of academia, health, employment and consumption/production while establishing policies in education and schools might lead to policies and practices that lack authenticity and continuity. In this regard, the policies to be established should have a vision for social development. Also, these questions should be considered as our compass: “What do we want to change in society through education?” “What kind of transformation will the changes in society lead up to?” “How will the aim of education, that it is an institution that not only keeps up with social changes but also raises individuals who have high values, and search and create scientific knowledge, be protected?”

Determining the Roles

I think education has a distinctive feature when it is compared to other social institutions: Everybody has an idea about education and nobody shies away from saying it. This may be useful in terms of the richness of thought and expression. However, the inflation of ideas not being based on information and research or generalizations based on only personal experiences cause innovative opportunities in education to be missed or practices that are not adequately grounded to start on a whim and not continue. At this point, in the reports and policies that I have read about AI that causes an exponential increase in digital transformation, I realized that the roles and responsibilities have been determined clearly and based on expertise in a way that includes different stakeholders of schools and the education community. Actually, the principle of determining the roles and responsibilities is very simple: 1. Everyone should know what to do according to the policy to be written for this transformation. 2. Each and every individual should know the roles and responsibilities of others. How will these roles defined in the AI policy affect the

fundamental roles of students and teachers? Who will conduct research and development on artificial intelligence? Who will be the strategists and practitioners? Who will carry out pilot schemes? And how? From the beginning stages, determining the fundamental aspects such as “how will this business and transformation network be monitored, assessed and how will its communication process be carried out?” etc., through conversations and calls, aiming for consensus, are prerequisites for a policy to be successful.

Reflection

Realizing an idea, a project or a change requires a long process of thinking and research. However, it might be misleading for major integration policies and implementations on AI to assume the thinking process is completed. In fact, there is an assessment phase in all project implementation models. The word that I have used here is a traditional definition inspired by a philosophical thought and an approach similar to the project assessment phase: Reflection. In other words, it is to think over and over again on what we think, know or think we know and practice. At this point, I think our cultural habits and the energy that we spend while realizing a project are obstacles in the path of reflection. Thinking on and assessing what we have done, fairly examining what has been successful and what needs to be improved, self-criticism and receiving feedback... These are the components of reflection that should be included prominently in the policy of a massive work such as the integration of AI into education. Furthermore, it is a matter that requires consideration and determination on the methods of assessing the decisions and practices, as much as the effort devoted to the planning process.

It is delightful to think, learn, discuss and examine the practices about artificial intelligence and education. Not even a day goes by without astonishing developments in this field. If I wrote this paper a couple of weeks later, I may have written a very different paper with new research and insights. In this seemingly uncertain situation, determining a policy and a road map, assessing the values of our school as well as the needs, capacity and potential of our students effectively, taking the risks into consideration without getting lost in worries, being open to testing but not being shortsighted and unplanned will enhance our readiness and confidence.

- UNESCO - AI and education: guidance for policy-makers
- Suggestions by the Office of Educational Technology
- OECD - Trustworthy Artificial Intelligence In Education
- Council of Europe - Artificial Intelligence and Education Report
- Artificial Intelligence and Future Scenarios in Education

Leon Furze, an independent researcher in the field of artificial intelligence and education, offers advice on developing policies and a template for policy-making for schools: [Artificial Intelligence Policy in Secondary Schools](#)

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A Brief History of Artificial Intelligence

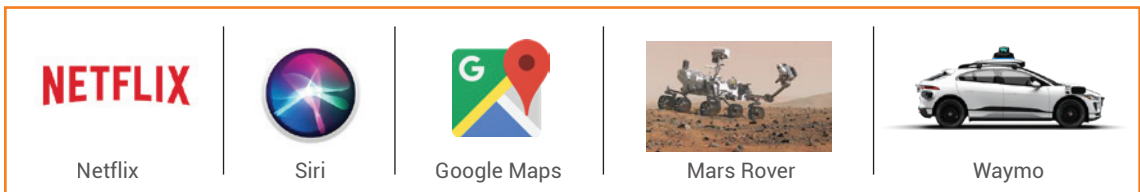
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Artificial Intelligence (AI) is an engineering project that aims to develop machines with thinking abilities similar to humans¹.

In this age, many such products have been developed for daily use and enabled many services that could not even be imagined in the previous century. Any system that can do anything more “intelligently” than it is currently done can be the subject of an Artificial Intelligence study. We can take the differences between “smartphones” and non-smartphones¹ and generalize them to cars, refrigerators, or any processes in traffic, shopping, home, and work. For any of our actions from time management to fuel consumption, more efficient, cheaper, and safer alternatives that we have not discovered yet can be invented by systems with high computing power and access to more data than we can see, leading to an easier and faster life in many aspects. In this context, Artificial Intelligence aims to develop and use computer systems that are more autonomous, can make decisions with less human intervention, and can change and improve their behavior according to their experience.

Just a few of the products of Artificial Intelligence technology that are already in daily use include navigation devices that calculate the most appropriate route when we need to go from one place to another, devices that understand voice commands, programs that recognize people’s faces in photographs or camera signals and act as necessary, autonomous spacecraft and cars, automatic translation applications that help people who do not speak each other’s languages communicate, and systems that can predict what you’ll want next from your previous shopping data.



¹ A hundred years ago, people could not carry their phones with them, they could only use them to talk, and in order to achieve this, they had to first call an intermediary (a third person) and ask for the connection.

Artificial Intelligence Applications

Artificial Intelligence, which already has applications in a wide variety of fields, is expected to affect every aspect of our lives in the future.

Contrary to what is portrayed in some science fiction works, most engineers working on Artificial Intelligence do not have the goal of developing an autonomous, human-competing 'general' intelligent system with all human capabilities. The goal of creating such a 'thinking entity' that is in no way distinguishable from human beings is called 'general AI', while studies that aim to build high-performance, 'intelligent' systems in only one subject (for example, navigation or medical diagnosis) are called 'narrow AI'.

Since trying to build 'thinking' machines requires us to clarify our ideas about how the human mind works, Artificial Intelligence researchers have been involved with psychology, philosophy and linguistics experts in the founding and development of the 'cognitive science' that deals with the mind.

Although the dream of making machines that can think has been voiced centuries ago (for example, from the famous thinker Leibniz), it was after the invention of the electronic computer that this idea came to the fore in earnest. The human brain has been compared to the leading technological devices of that period (for example, mechanical clocks, motors or telephone networks) by different thinkers throughout history, but its similarity to a computer is more striking than all of them. The fact that computers take certain information as "input", "process" them, that is, subject them to various calculations and give the result of this calculation as "output", is very important to the cycle of people receiving information from the outside world with their sense organs, "thinking" and reacting appropriately to the situation with words or actions. similar. The observation that computers can be built in a way that can 'imitate' any system that has been described to them in sufficient detail by calculating how it will behave led to the question, 'Why should not computers imitate humans as well?'

The great English mathematician **Alan Turing**, considered to be the founder of computer science, defended in an article he wrote in 1950 that, if a computer can acquire the ability to write by imitating a human being in such a good quality that it can fool an intelligent person, it can be said to be 'thinking'. Excited by the idea, a group of US scientists came together at a scientific meeting at Dartmouth College in Hanover in 1956, where the term 'Artificial Intelligence' was first used, and set forth their goal of building such 'intelligent' machines within a few years.



Artificial Intelligence pioneers attending the Dartmouth Workshop in 1956

As they wrote in the preparatory text of the Dartmouth meeting, these Artificial Intelligence pioneers predicated the 'recognition that all aspects of any quality of intelligence can in principle be described so clearly that it can be imitated by a machine'. In other words, they thought that in order to get the computer to do any 'intelligent' job, it would be enough to understand how to do that job and to code it as a program on the computer. Artificial Intelligence studies have progressed in this line for many years. The computer system that managed to beat world chess champion Garri Kasparov in 1997 was the triumph of this idea.



The Turing test predicts a scenario in which the computer tries to convince a correspondent that it is a human being.

At the beginning of the 21st century, there have been important developments in the 'machine learning' branch of Artificial Intelligence studies. Machine learning is the creation (i.e. 'learning') of a program necessary for the computer to acquire a skill, not by a human, but by the computer itself from a large number of examples of that skill. Using machine learning techniques called 'deep learning' or 'artificial neural networks', which are inspired by the nerve cell network in the human brain, artificial intelligence products have been developed, which can compete with the performance of humans in many subjects.



This image is produced with Artificial Intelligence



Sibel YALKIN

Preschool Principal & PCG Department Head

Artificial Intelligence in the Shadow of Ethical Concerns*

** ChatGPT (An AI Language Model developed by Open AI) was used as a tool to write this article.*

Today, we are witnessing that the rapid technological progress and global connections lead to significant social, economic and environmental changes.

Artificial Intelligence (AI) has become a part of our daily lives and has made significant strides with personal assistants like Siri and Alexa, or advanced chatbots and language models like ChatGPT. We can say that the social effects of AI spread over a wide spectrum. So, let me introduce the 'AI for Earth' program: Launched in the summer of 2017, it aims to empower organizations working to solve global problems related to the environment, humanitarian issues, accessibility, healthcare, and cultural heritage for social good. Thus, the program develops innovative solutions for the way we monitor, model and manage Earth's natural systems through grants, technologies and data access to individuals and organizations. 'AI for Health', on the other hand, is a social responsibility program created to support researchers and organizations with AI to improve the health of people and communities around the world, focusing on collecting and sharing data to address serious health issues.

AI also embarks on efforts aimed at global independence and inclusion, focusing on family, community, education and employment. Technologies that break down the barriers to the access to education for individuals with various levels of disability, ensure the elimination of inequalities. AI-powered tools in education enable access to learning materials, language development, and technologies. Considering the individual and public benefit, the idea that technology can be a powerful tool to connect people is getting stronger day by day, given that any form of disability can affect any of us or our loved ones at any time.

AI also invests in all phases of employment, including job search, interviewing and skills development. Looking into the impact areas of AI, it is not difficult to understand that it will be more and more effective in shaping children's present, as well as their future personal and working lives. It is vital that children and young people are equipped to question and understand the role of AI systems. AI-related education must go beyond traditional STEM approaches to cover AI-related ethical and social issues. This education must ensure that children understand the role of AI in their lives (now and in the future) and engage critically with AI to make informed choices about the way they interact with it.

As the range of AI expands, AI and ethics stand out as another important issue we need to address.

Ethical approaches are guided by principles, and as the field of AI ethics has expanded, multiple principles and guidelines have emerged to guide us (Aitken et al., 2020). We witness these principles being developed and adopted by a range of organizations, including research institutes, policy bodies, and technology companies. Fjeld et al. (2020) review the principles of international organizations regarding AI and identify eight common themes:

- Privacy
- Accountability
- Safety and Security
- Transparency and Explainability
- Fairness and Non-Discrimination
- Human Control of Technology
- Professional Responsibility
- Promotion of Human Values



This image is produced with Artificial Intelligence

These principles highlight the importance of both technical and social methods to support ethical approaches to AI. Although AI introduces convenience and efficiency to our lives and has great potential to revolutionize, it also raises ethical issues that need to be addressed to ensure its responsible use. Therefore, in any industry, including education, it is important that the principles such as privacy protection, fairness and transparency are applied correctly and consistently.

One of the main ethical issues with AI is its potential to perpetuate bias and discrimination. AI systems are only as unbiased as the data they are trained on, and if that data is incomplete or distorted, the system will reflect these biases. Another concern is AI's lack of transparency and accountability in decision making. As AI systems become more complex, it may become harder for even developers to understand how certain decisions are made by the systems. This, in turn, may lead to a lack of responsibility if something goes wrong, as it can be difficult to pinpoint who or what is responsible for the decision.

However, there is also a risk that humans will become too dependent on AI for communication, leading to a gradual loss of real human connection. Systems such as ChatGPT, like any language model, is limited by the data it is trained on and cannot replicate the complexity and nuance of human communication. Our over-reliance on AI communication may also lead to a lack of empathy and understanding.

To address these ethical issues, it is important that developers and users of AI systems prioritize responsible and transparent use. This includes ensuring AI systems are trained on diverse and representative data, regularly auditing AI systems for bias and discrimination, and taking clear responsibility measures in case AI decisions go wrong.

In conclusion, we are increasingly recognizing that AI has the potential to change our lives for the better. However, it is a fact that this also leads to ethical concerns. Therefore, ethical values should always guide us in the design and implementation of AI systems with the main purpose of protecting human rights, freedoms and privacy, preventing discrimination, encouraging fair and transparent decisions, adopting a human-oriented approach, and providing social benefits, "as in every field".

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The Rise of Artificial Intelligence: Advancements and Educational Potential

How Did Artificial Intelligence Rise?

Artificial Intelligence, which we have been talking about for a long time, has changed the game as OpenAI has presented the most amazing applications we have seen so far. OpenAI released a language model called GPT-3 in 2020. This model was trained with a much larger dataset compared to previous GPT models and considered a major breakthrough in natural language processing. Later, the company announced DALL-E, which can automatically generate visual content based on a word or phrase input. In 2021, OpenAI introduced Codex, which was a breakthrough in the software world. OpenAI Codex is the next version of the GPT-3 algorithm used in the development of language models. This algorithm is an Artificial Intelligence system that can understand the instructions given by humans in natural language and produce solutions to real-world problems by using natural language processing technology. OpenAI Codex is designed specifically for use in software development and can be used by software developers to speed up their coding process. This system can convert descriptions written in natural language into programming code and help software developers write code quickly. However, the technology that OpenAI developed and introduced to the widest audience was ChatGPT, used in natural language processing.

What is The Potential of Artificial Intelligence in Education?

Artificial Intelligence offers many potentials for students in the field of education. First, Artificial Intelligence algorithms can be used to create learning materials customized to students' learning styles and performance. In this way, the learning process of students can be made more effective and a learning experience suitable for students' interests, needs and learning speeds can be offered. In addition, Artificial Intelligence technologies can be used to detect difficulties in the learning process of students and provide appropriate support. Once students' weaknesses have been identified, a specific learning plan can be presented and support can be provided to help them achieve success. Finally, Artificial Intelligence technologies can enable students to access learning materials more easily. Artificial Intelligence technologies can be used to automatically classify and organize learning materials. In this way, students can be provided with faster and easier access to learning materials. However, by all means it is of great importance for students to inquire about this information on their own.

Why is AI Similar to Autonomous Vehicles?

The rise of Artificial Intelligence worries even tech giants. Elon Musk believes that Artificial Intelligence studies should be limited to prevent the abuse of Artificial Intelligence and demands that OpenAI stop language model studies. In response to this demand, OpenAI announced that they would limit language model studies and continue to work to address ethical concerns. These concerns have not only been raised by Elon Musk, but there are also researchers, ethicists, and technology leaders who have expressed similar concerns. For example, Professor Stuart Russell, an expert on Artificial Intelligence ethics at Oxford University, also indicated that Artificial Intelligence studies should be limited. Therefore, Artificial Intelligence is similar to autonomous vehicles. If necessary precautions are not taken, such a vehicle may go in the wrong direction due to its autonomous nature and cause accidents. Similarly, Artificial Intelligence can harm people and cause negative consequences when used incorrectly and without the necessary ethical rules and precautions. Therefore, it is extremely important to work on the ethical aspects of Artificial Intelligence and to keep the applications under control. For the correct use of Artificial Intelligence, it is necessary to set ethical standards and regulations and establish institutions that supervise the implementation of these standards. In this way, the potential risks of Artificial Intelligence can be avoided and its benefits can be enjoyed.

What is Artificial Intelligence Literacy?

Artificial Intelligence literacy is the ability to understand, use and ethically evaluate Artificial Intelligence technologies. While this skill helps people understand how these technologies work, it also increases their awareness of the place of these technologies in daily life. This skill also enables people to be conscious of the ethical aspects of Artificial Intelligence technologies. Artificial Intelligence literacy aims to increase the sensitivity of those who work with Artificial Intelligence technologies, researchers, policy makers and



This image is produced with Artificial Intelligence

decision makers to ethical problems and make these technologies beneficial to people and society. Artificial Intelligence literacy, which is expected to be included in school curricula soon, is an important skill not only for students but for everyone.

Artificial Intelligence literacy, which is expected to be included in school curricula soon, is an important skill for everyone, not just students.

What is an Example of Artificial Intelligence Applications Developed Recently?

Google announced a resounding Artificial Intelligence translation technology on May 10. Universal Translator imitates the lip movements of the speaker while dubbing videos in a different language. An astonishing video is used to explain how this technology has reached a different level thanks to the latest advances in Artificial Intelligence. A video was first shown in English, and then in Spanish with one-to-one lip movements of the speaker. Universal Translator is a Deepfake technology. However, the company has announced that it is taking precautions about the possibility of abuse. We will see the potential benefits and problems of this technology in the near future.



This image is produced with Artificial Intelligence



Michelle DUSCHANG

Director of International College Counseling

Artificial Intelligence and University Admission Processes

While Artificial Intelligence has revolutionized many industries around the world, we see that it has also affected university admissions processes. The developments in Artificial Intelligence supported tools and platforms such as ChatGPT create both positive and assertive effects. This will significantly change the way students, admissions staff, and university counselors approach the application and recruitment process.

One of the most obvious and significant impacts of AI and ChatGPT on university admissions is assisting students in writing essays and personal statements. While university applications are full of basic academic information (curriculum, grades, test scores), the essay is the one area where students are encouraged to 'use their voice.' With so much pressure to make their essays stand out, many students find it immobilizing to write creatively about themselves, their values, and something heartfelt that will grab the admission committee's attention.

Can ChatGPT help though? Yes, used responsibly it can offer suggestions, eliminate writer's block, or provide an outline. However, plagiarism is a serious risk and conversations need to take place about best practices and that passing off something directly from ChatGPT as one's own is plagiarism.

When asked to write an essay for admission using university-specified criteria and a few personal details, ChatGPT produces an excellent response in seconds. However, as noted in a recent article in New York Magazine, [Can ChatGPT Write a Good College-Admissions Essay?](#) ChatGPT doesn't yet go beyond generalities. It's missing what we emphasize as the most important part of the application process: self-reflection. Self-reflection is the voice, personality and style that brings a student's application to life and makes it unique. Most university admission officers will tell students that it is the essays they read first in order to 'get to know the applicant' before looking at all of the data.

In addition, AI-powered chatbots and virtual advisors, built on models like ChatGPT, can offer personalized guidance to students throughout the admissions process. These virtual assistants can answer frequently asked questions, provide information on specific universities, and offer tailored advice based on a student's academic profile and aspirations. By leveraging AI, students can access on-demand support and receive accurate information.

For example, our career guidance and university application planning platform, Cialfo has recently implemented SuperSearch: an AI powered advanced university search feature that is designed to assist students in finding their best fit schools with greater ease and accuracy. With SuperSearch the process of searching for and applying to universities will be more seamless and accessible. If you are a high school student or parent, we encourage you to try out this new feature for yourself!

The university admissions process has long been criticized for inherent biases, such as racial, socioeconomic, and geographical disparities. AI systems can help mitigate these biases by providing objective evaluations of applicants' qualifications and removing human bias from the equation. Algorithms can assess students based on merit, achievements, and potential, contributing to a fairer and more inclusive admissions process. However, it is crucial to ensure that AI models are themselves trained on diverse and representative data to avoid perpetuating existing biases. This also prompts concern about the diminishing role of human judgment



This image is produced with Artificial Intelligence

and personal connection in the admissions process. Is it the end of university visits and fairs? We hope not. While AI can make more efficient and objective assessments, it may lack the nuanced understanding and empathy that human admissions officers bring to the process. Striking a balance is crucial to ensure a holistic evaluation where academic qualification and personal characteristics are given due consideration.

Perhaps one day soon application platforms will integrate technology that allows admission officers to more directly 'hear the student's voice' and those of the counselors and teachers who support them. Maybe changing the medium of delivery to audio/visual would provide a better sense of how a student would engage in the classroom or on campus more so than a written essay. The Faculty of Engineering at the University of Toronto already uses a recorded real time personal profile as part of their admission process. The same could be said for counselor and teacher recommendations. Would it be easier for us to advocate for our students in a more convenient medium?

The integration of AI and ChatGPT into the university admissions process will undoubtedly streamline procedures, offer more personalized guidance, and promote a fairer and hopefully more inclusive admissions process. However, striking the right balance between AI and human involvement will be imperative to upholding the values of transparency and personal evaluation in university admissions. The successful integration of AI in the admissions process will require collaboration and ongoing dialogue between all parties involved.



A New Definition of Artificial Intelligence and Nostalgia

Merve VURAL
Visual Arts Teacher

For many people, collecting is a passion. These “somethings” serve as “reminders” for people, because everyone has a different way of remembering the past. For some, it may be a small note, a photograph, an object, a meal or a scent. “While there is a possibility to create a new memory at any moment and a new past with a single click in the digital age, will the feeling of longing for the past disappear in the near future?”



'Bliss,' created by Charles O'Rear in 1996, has become the default background for Windows XP. This photo is recognized as the most viewed photo worldwide. Location: Sonoma, California

Does the image above look familiar to you? When we see it, perhaps many of us have heard the sound of our computer booting up... the games, the consoles, and a single photograph give us a nostalgic experience.

“Nostalgia, a wistful or excessively sentimental yearning for return to or of some past period or irrecoverable condition.”¹

This longing for the past manifests itself in many areas and this nostalgic experience is felt especially in computer games for a generation of 1990s children. Today, many gamers from that period say that they cannot find the old taste in today's games and they are looking for those games. Aware of this, game developers continue to offer nostalgic experiences by re-creating classic video games or using Artificial Intelligence. **Nintendo Switch** is the most recent example of this. Thanks to the compatibility feature of the Switch, you can play some games released on previous generation Nintendo consoles: **The Legend of Zelda**, **Super Mario**, or **Pokemon**, to name just a few.

In this photo created by **Midjourney**, an Artificial Intelligence tool, Elon Musk, born in 1971, appears as an engineer in the Soviet Union. Items, objects and propaganda posters from that period are highly preferred in today's culture industry and are featured as 'Soviet Visuals' in many social media accounts. Elon Musk is beyond time and everywhere in these photos. At this point, when we users see images like this, will we be able to distinguish between truth or illusion?



Elon Musk as a soviet engineer, 2023, according to Midjourney.

¹ <https://www.merriam-webster.com/>

“Midjourney is defined as an Artificial Intelligence system that creates images based on text descriptions. By using the words related to the image to be created, it becomes possible to obtain the targeted image. This system, which works via the **Discord** application, can be used by almost every computer user since it does not require detailed computer knowledge. This program is also referred to as an AI (Artificial Intelligence) bot that transfers words to pictures.”² From this definition, we realize the importance of the text in the creation of an image. **Joseph Kosuth**’s work, ‘One and Three Chairs’ can be an important starting point for conceptualizing the text. Because Artificial Intelligence creates an area of dominance over the ‘signified’ beyond the human eye.



Joseph Kosuth, ‘One and Three Chairs’, New York, 1965.

Here, “France Farago has made the following interpretation for Kosuth’s ‘One and Three Chairs’, based on the structuralist thinker Saussure’s statement that “A linguistic sign is not a link between a thing and a name, but between a concept and a sound pattern.” Kosuth modifies this definition by combining the primary perceptual image (chair) with its optical counterpart (photo) and the visualizing concept (word and definition). Thus, the photograph plays the role of the ‘signified’ (mental image) and the word given inside the painting plays the role of not acoustic but optical image, that is, paradoxically the ‘signifier’. However, the definition refers not only to the ‘signified’ that refers to the thing itself (the chair), but also to the universal ‘signified’ formed by the linguistic structure and the verbal code. In this case, what Conceptual Art abandons by describing the mechanism of language that symbolizes the world on an arbitrary basis is the ‘idea’ in the Platonic or Hegelian sense. France Farago. Sanat. P.268.Doğubatı Yayınları.”

² <https://www.isbank.com.tr/blog/midjourney-nedir>

So, can we bring the images of our memories in our minds to life? Many of us have heard the line: "Can you paint me a picture of happiness?" To keep our memories alive, we often write, which is a way of visualizing our memories in our own world. We will mention here an Artificial Intelligence tool, defined as **Prome AI**, which is based on text-based descriptions. Therefore, the more detailed the descriptions in the text, the more realistic and detailed the visual representation **Prome AI** can be and it can thus help represent our memories.

Our family house, which I created using **Prome AI** according to the descriptions of my elders who were born in the Federal Republic of Yugoslavia; this house is right now just a memory that does not exist or does not have a single photo of it.



An image created by Prome AI, 2023.

The prompt of the memory is as follows: "A stone building is a structure surrounded by high walls and with two garden gates. A stream passes outside both doors and a small stream flows through the middle of the garden of the house. When you enter through the garden gate, there is a two-story barn where horses are tied. This building is designed in the Yugoslav village house style. There are also two cherry, apple, and mulberry trees in the garden.

It would be an interesting idea to have memories as a prompt. The road to happiness may pass through prompts, who knows?

“Artificial Intelligence algorithms learn from datasets created by humans and produce designs based on this data. In this process, the algorithm ensures that existing items are rearranged. Therefore, the way algorithms process data based on collective human knowledge and experience, that is, how it organizes them, directly shapes the design. The control possibilities of the designer over this arrangement and its outputs differ according to the algorithm, in general, and the working conditions of the art, in particular.”

As a result, it is difficult to foresee how Artificial Intelligence will interact with nostalgia and how longing for the past will change in the future. However, we can say that Artificial Intelligence can play a potential role in animating our nostalgic experiences and visualizing our memories, but it can also be misleading.

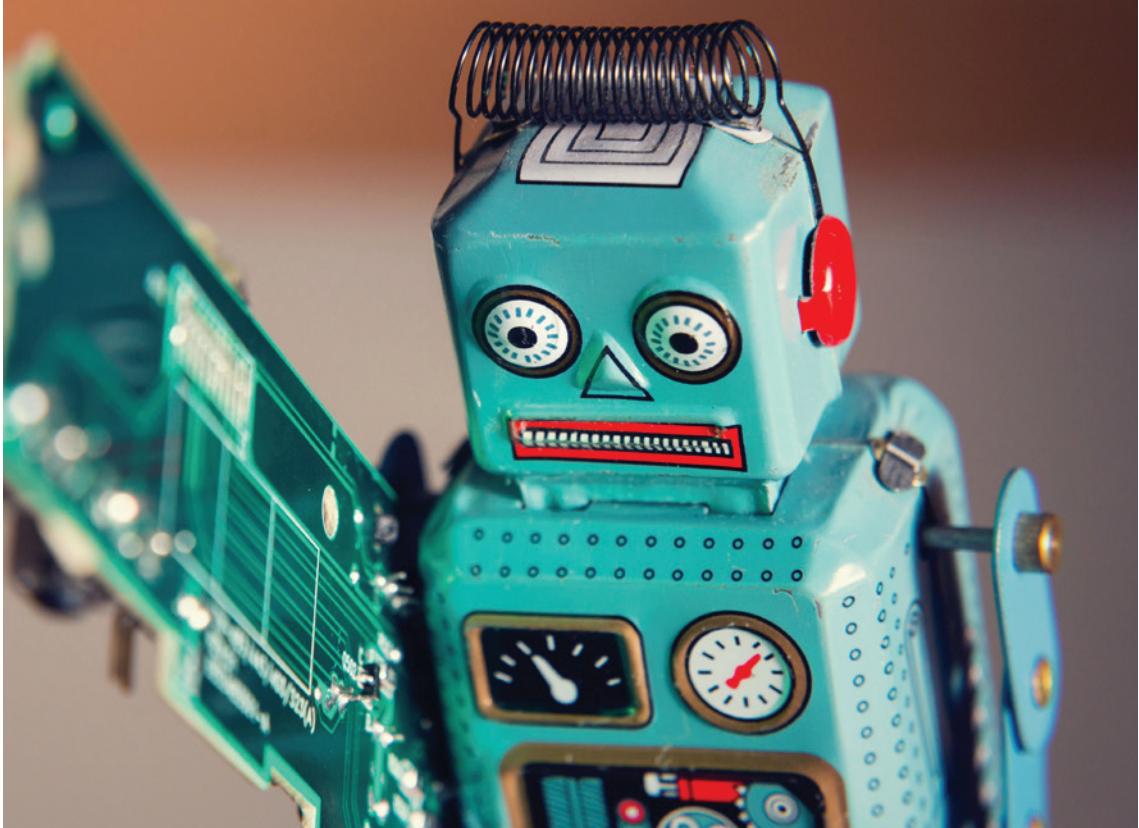
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FabLab Project: DancÆR

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İrem BAŞ'23, Demir ALP'23, Melis ALSAN'24,
Lara Ceren ERGENÇ'24, Andy Emre KOÇAK'23

DancÆR: Efficient and Accurate Dance Choreography Learning by Feedback Through Pose Classification

Hisar School FabLab: As Idealab students, we carry out research and development studies and projects in the field of Computer Science. In an environment where individualized learning assistants are widespread in almost every field; W-we would like to share with you the details of our smart dance trainer project, which gives feedback to users with the **DancÆR** application, which brings together Artificial Intelligence, augmented reality and dance.

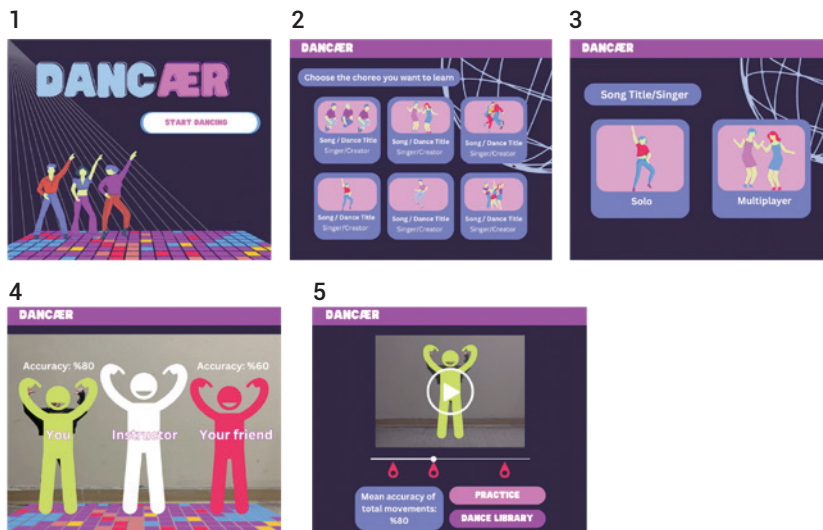
In recent years, education has focused on differentiated and self-learning systems that emphasize the adaptation of instruction to meet individual needs and the collection, processing and storing information without the assistance of another person. Consequently, it has become increasingly important to create opportunities for self-learning systems.

The idea of **DancÆR** emerged with the aim of providing people who do not have the time or opportunity to attend face-to-face dance classes with a real dance learning experience in their own environment, e.g. homes, gardens, etc.

Some people have started to prefer virtual applications to traditional learning practices for a variety of reasons, including the transportation problems or the difficulty of matching timetables to face-to-face classes in metropolitans. However, the creation of such platforms or opportunities for physical education are more difficult as individuals need continuous and precise feedback on the use of their bodies. Accordingly, **DancÆR** is an augmented reality (AR) application that offers a dance platform for anyone with access to a tablet or computer. This intelligent choreography trainer allows differentiated and self-learning experience with accurate feedback.



DancÆR, was developed based on face-to-face dance lessons, where a trainer introduces the moves step-by-step, gives continuous feedback to the learners, and finally combines choreography with music. Augmented Reality (AR) offers unique opportunities for dance training as it interactively drives all body systems by giving real-time feedback, allowing users to directly visualize ideal movements. For our project, we used the **Swift** programming language to build the augmented reality prototype and Apple's **Vision** pose detection model - in addition to our own neural network - to capture body position. In fact, our project can make a valuable contribution to the learning of physical activities supported by Artificial Intelligence systems.



We are pleased to share with you that our intelligent choreography trainer application, which we developed using Artificial Intelligence and augmented reality, has been accepted to the [24th International Conference on Artificial Intelligence in Education \(AIED 2023\)](#) to be held in Japan from July 3 to 7, 2023 with its article, '[DancÆR: Efficient and Accurate Dance Choreography Learning by Feedback Through Pose Classification.](#)'





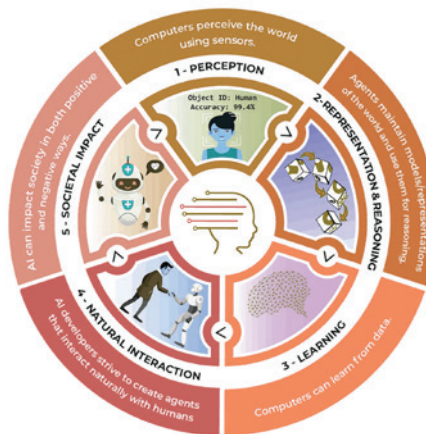
Dilara VARDAR
Information Strategies
Center Coordinator

Artificial Intelligence: Commonly Used Applications and Impressive Results

The definition and limits of Artificial Intelligence are controversial and there is no single universally accepted definition. UNICEF defines Artificial Intelligence as: *Artificial Intelligence refers to machine-based systems that can make predictions and recommendations, or make decisions that affect real or virtual environments, given a set of human-defined goals. Artificial Intelligence systems interact with us, directly or indirectly. They often operate autonomously and can adapt their behavior by learning about the context (UNICEF 2021)*¹. We see that Artificial Intelligence technologies are positioned as a natural component for many frequently used applications and offer inspiring options to users.

The Five Big Ideas in Artificial Intelligence

The Computer Science Teachers' Association (CSTA) and the Association for the Advancement of Artificial Intelligence (AAAI) propose to define AI as a cluster of five themes to clarify the issue in the context of educators.²



The Five Big Ideas Artificial Intelligence

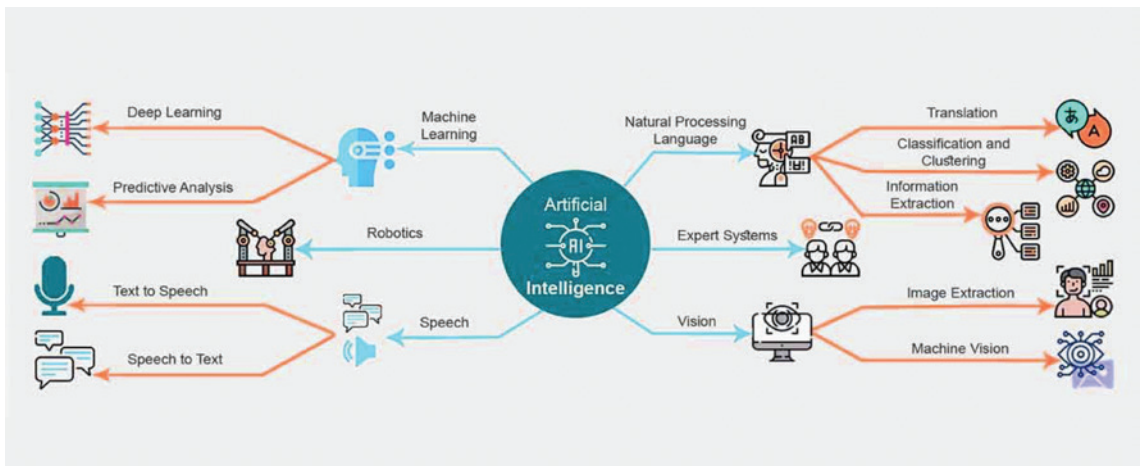
¹ www.unicef.org/globalinsight/reports/policy-guidance-ai-children.

² <https://ai4k12.org/>

1. Perception: Computers can perceive the world using sensors.
2. Representation and Reasoning: Computers create models using data structures, and these models use reasoning algorithms that derive new information from what is already known.
3. Learning: Computers can learn from data. Machine learning is a type of statistical inference that finds patterns in data.
4. Natural Interaction: Artificial Intelligence developers aim to build systems that interact naturally with humans.
5. Social Impact: Artificial Intelligence can affect society positively or negatively.

Artificial Intelligence technologies are positioned as a natural component for many applications we use in our daily lives, and the areas mentioned here continue to be integrated with each other.

- Machine Learning
- Natural Language Processing
- Robotics
- Vision
- Speech
- Expert Systems

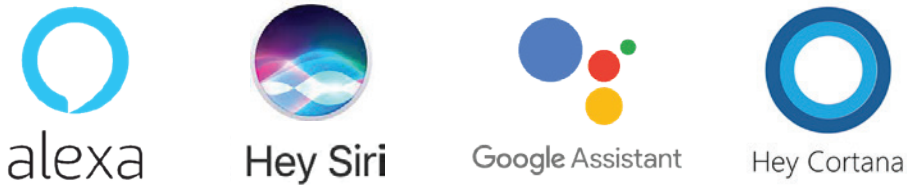


Artificial Intelligence Applications

When we look at the frequently used artificial intelligence applications, we see that alternative applications in different fields offer inspiring options to the users.

1. Dijital Assistants

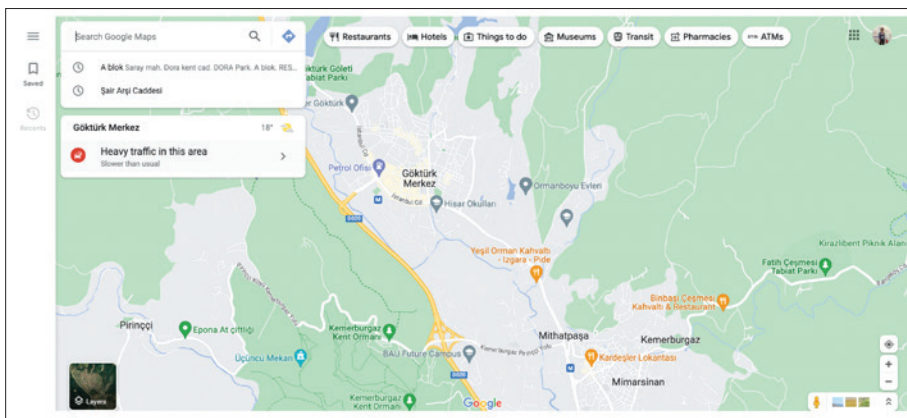
Dijital asistanlar gibi **Siri, Alexa, Google Assistant, ve Cortana** doğal dil işleme (NLP) teknolojilerini kullanır, bu da Yapay Zeka'nın bir alt alanıdır. Bu sistemler ses komutlarını metne dönüştürür ve yorumlar. Yapay Zeka algoritmaları kullanıcılardan gelen cümleleri analiz eder ve ne istendiğini belirler ve uygun yanıtları üretir. Kullanıcılarla etkileşimden sonra, kullanıcı geri bildirimini alır ve makine öğrenimi yoluyla daha iyi yanıtlar ve hizmetler sağlar.



2. Navigation and Map Applications

Navigation and mapping apps such as **Apple Maps, Google Maps, and Waze** provide guidance and real-time traffic information to millions of users.

These applications use machine learning algorithms to analyze satellite images, street view images, aerial photographs, and large user-generated datasets. Machine learning algorithms can analyze existing images and data and they can also detect changes in new data. So, maps are updated in real time using only the latest changes.³



Google Maps

³ <https://www.springboard.com/blog/data-science/machine-learning-google-maps/>

3. Translation Applications

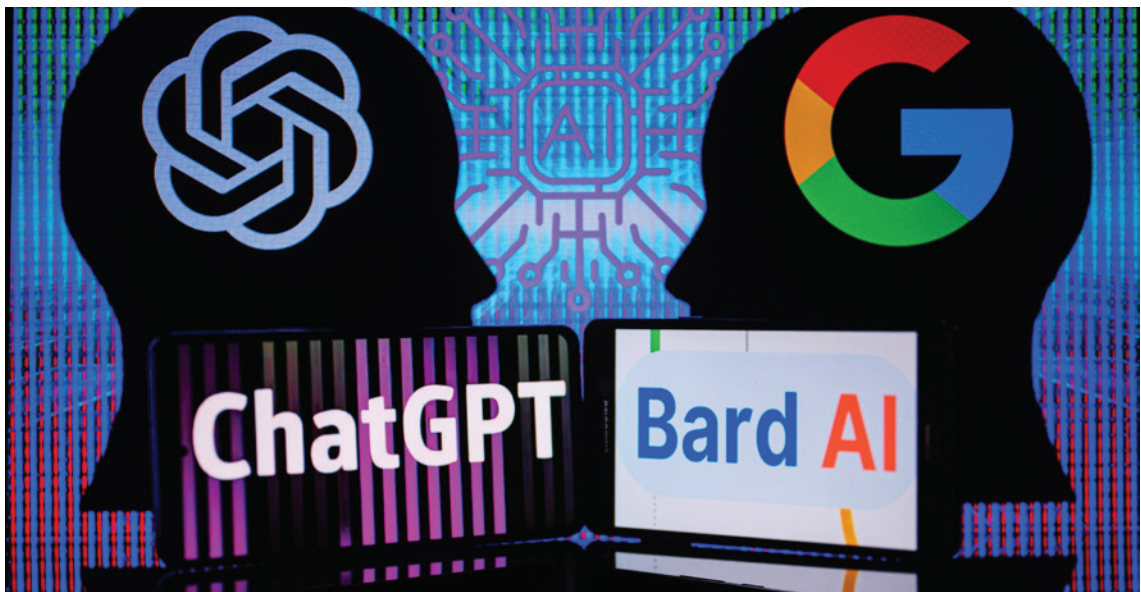
Translation applications such as [Google Translate](#), [Microsoft Translator](#), [Yandex Translate](#), [DeepL Translator](#), and [iTranslate](#) provide text or speech-based translation services using Artificial Intelligence technologies. Working on large amounts of language data using machine learning algorithms, translation systems use natural language processing (NLP) techniques to analyze the user's input, parse sentences, determine the meanings of words, and then perform the translation. Translation applications evolve by constantly analyzing feedback and learning from user interactions. This continuous learning process improves translation quality and accuracy over time.



4. Chatbots

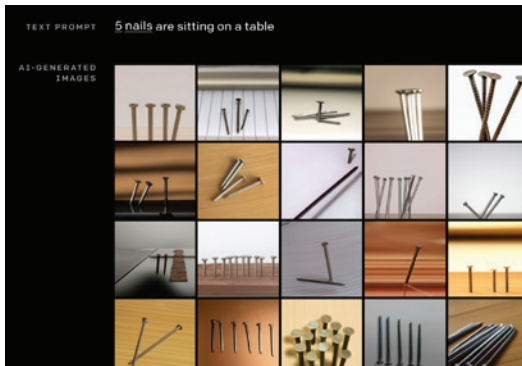
[ChatGPT](#) (Chat Generative Pre-Trained Transformer), is an Artificial Intelligence model developed by [OpenAI](#), equipped with natural language understanding and generation capabilities. Trained using a large set of texts, it is well versed in different areas such as providing general information, answering questions, giving tips and speaking on a variety of topics. However, ChatGPT has its limitations, such as misunderstandings, misinformation, or reflecting biases.

Google launched [Google Bard](#), which has been developed with next-generation language and speech capabilities supported by LaMDA (Language Model for Dialogue Applications), which it has been working on for a while.



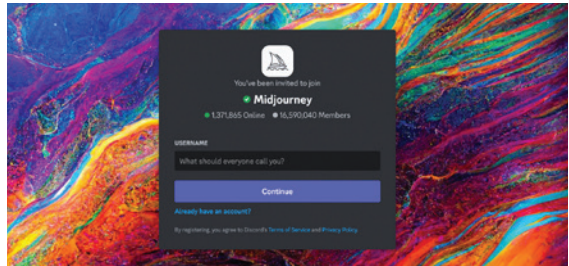
5. Versatile Artificial Intelligence Applications

DALL-E is an Artificial Intelligence application developed by **OpenAI**, which can create realistic images and artwork from a natural language description. DALL-E is an artificial neural network trained on a large dataset and uses deep learning techniques to generate the outputs. It can thus recognize various objects, concepts and image styles, thereby creating new and unique combinations.

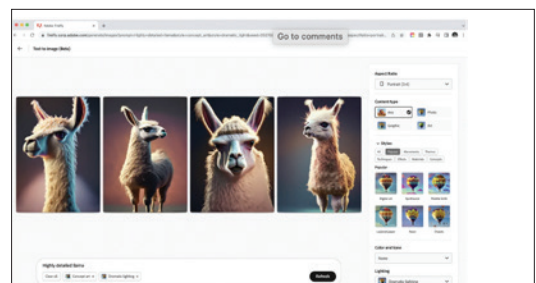


Official blog post by OpenAI on DALL-E

Midjourney is an Artificial Intelligence program and service created by Midjourney, Inc., an independent research lab. Midjourney creates images by processing natural language descriptions called “prompts” and works similarly to **OpenAI**’s models such as **DALL-E** and **Stable Diffusion**.



Adobe Firefly is an application developed by Adobe as an alternative to Artificial Intelligence robots **DALL-E**, **Midjourney** and **Stable Diffusion**, and generates images using words in the text.



Adobe’s AI image generator in Adobe Firefly

Dream Studio and **Bing Image Creator** are multi-purpose Artificial Intelligence applications that generate images similarly.

6. Presentation & Video Applications

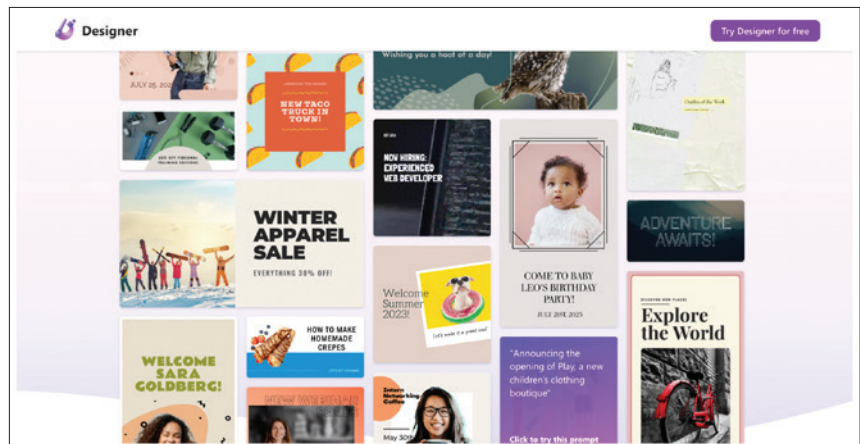
Beautiful AI allows to quickly create presentations with smart templates and content using artificial intelligence.

beautiful.ai

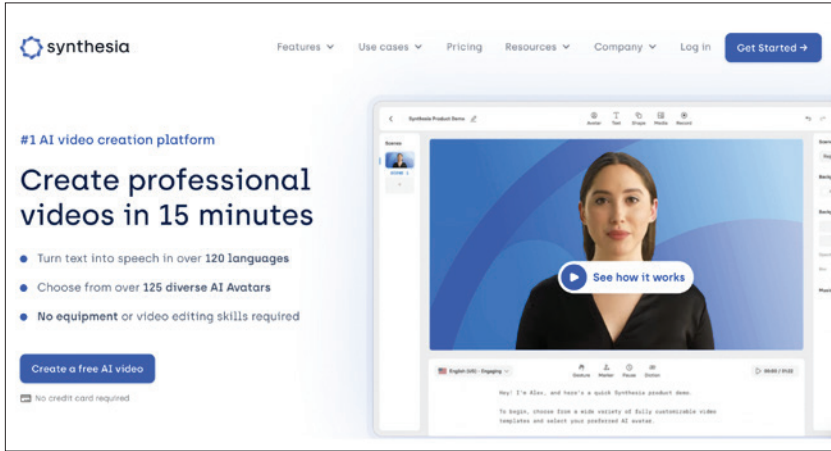


Microsoft Designer, is an Artificial Intelligence tool that creates visual designs and templates. With Microsoft Designer, you can simply select social media posts, slides, or other, and then enter information that describes your project.


Microsoft Designer

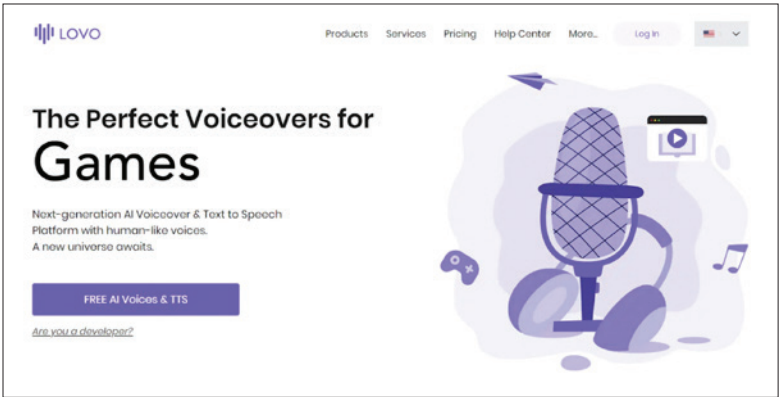


Canva and **Visme** similarly bring the power of Artificial Intelligence to the presentation - video process. Artificial Intelligence applications such as **Synthesia** and **D-ID** can convert text to speech in many languages, creating professional videos in minutes without the need for equipment or video editing skills.



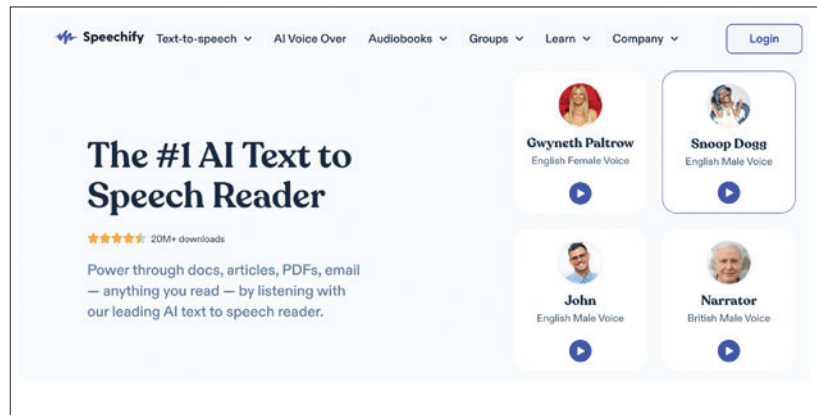
7. Text & Audio Applications

Lovo.ai, Murf, and Play.ht are platforms that enable the conversion of content with high-quality voice-overs created by Artificial Intelligence.



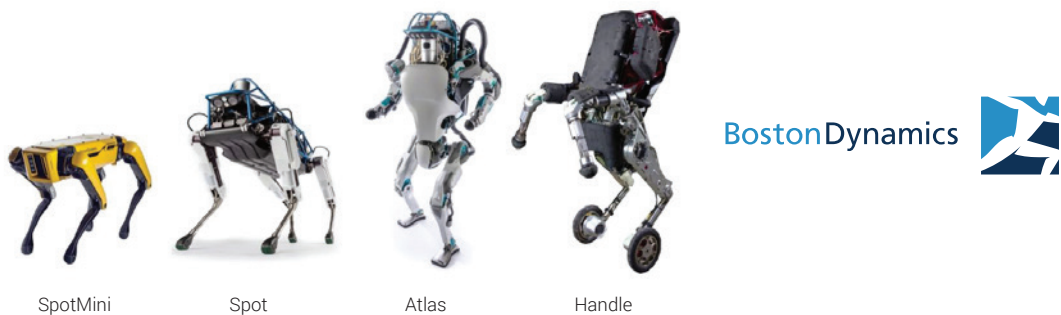
Providing a range of customization options, these platforms can create high-quality, professional-grade voice-overs. Today's AI voice models can examine speech patterns from voice samples and generate artificial voices that span different languages, accents, genders, and speaking styles.

Speechify on the other hand, is a text-to-speech program that converts any written text into spoken words in a natural-sounding language.



8. Robotic Applications

Boston Dynamics, a robotics company founded in 1992, describes its mission as 'imagining and creating extraordinary robots that enrich people's lives'. The Company has launched the **Boston Dynamics AI Institute** to focus on four key areas: cognitive AI, athletic AI, organic hardware design, and robot ethics.



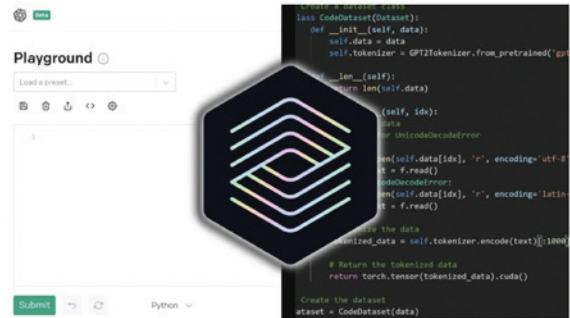
The **Boston Dynamics AI Institute**, founded by Marc Raibert, who is also the founder of Boston Dynamics, states that they will develop machines that contribute to human safety, provide care for the disabled and the elderly, increase industrial productivity, and help people live their lives more fully.⁴

⁴ <https://www.springboard.com/blog/data-science/machine-learning-google-maps/>

9. Code Applications

Codex, uses GPT (Generative Pre-trained Transformer) language models that are trained on a large dataset of code using various programming languages. Programmers can use Codex to write codes by entering the result they want to achieve through natural language explanations.

GitHub Copilot, is a collaboration between GitHub and OpenAI to take the concept of Codex to the next level. Copilot is an AI-powered tool integrated into GitHub's code repository and can be used to generate codes, suggest improvements, and provide context-specific recommendations.⁵



10. Autonomous Vehicles

Artificial Intelligence has led to revolutionary developments in the automotive industry that were once unimaginable. With the help of machine learning algorithms, autonomous vehicles are now designed as systems that can make decisions on their own by adapting to changing road conditions and traffic patterns in real time.

Waymo, is an autonomous car company owned by Google's parent company Alphabet. Waymo's autonomous cars continue to be tested on public roads in several cities in the United States, including Phoenix, Arizona, Detroit, and Michigan.

Tesla Autopilot, is a semi-autonomous driving system available on select Tesla models. While not a fully autonomous system, it enables the vehicle to perform some driving tasks such as lane keeping and lane changing with minimal input from the driver.



Waymo One

11. Expert Systems

Dendral, is an Artificial Intelligence project used as a chemical analysis expert system. It has been used in organic chemistry to detect unknown organic molecules with the help of mass spectra and chemistry knowledge base.

Mycin, was one of the earliest back-chain expert systems designed to detect bacteria that cause infections such as bacteremia and meningitis. It has also been used to recommend antibiotics and to diagnose blood coagulation disorders.

Pxdes, is an expert system used to detect the type and level of lung cancer.

Today, the number and function of mentioned applications continue to increase rapidly.

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Information Strategies Center, 2013

Ayşe Hilal AVCI, Bahadır YILDIZ, Başak BAŞMAN, Dilara VARDAR, Gökçe Behice YILMAZ ASLAN, Hatice Beyza ÖZER, Jose Luis Perez Cabello, Mustafa BOZKURT, Sedat YALÇIN, Tuğçe ÖZNEMLİ, Utku ÖZTEKİN

We are closing this academic year with articles and contents that cover many different topics within the scope of digital transformation and include different opinions and suggestions in the light of national and international reports and research. Our aim is to support and inspire each other within the scope of digital transformation and in this context, ensure that the school community is in communication and cooperation. We would like to thank all of our contributors and our Institutional Development department for making the publication happen, and we hope it will be an inspiring process for all our teachers who follow our newsletters.

We would like to thank all our contributing writers and the Institutional Development Department, which makes this publication possible. We hope that it has been a pleasing and inspiring process for all our teachers who follow our newsletters.

Dear Hisar Family, BSM Newsletter is always open to your contributions and suggestions. We believe in the importance and power of creating together. As we always say: "We are stronger together!"

Ayşe Hilal AVCI **Preschool Teacher**

Like every new invention, Artificial Intelligence has both advantages and disadvantages. It is a fact that we will encounter people who use Artificial Intelligence for bad intentions as well as those who use it for good intentions and purposes. In this case, our responsibility as individuals and organizations should be to plan our purpose and form of use in a way that highlights the positive aspects of Artificial Intelligence and to ensure its sustainability.

"Of course I'll hurt you.
Of course you'll hurt me.
Of course we will hurt each other.
But this is the very condition of existence.
To become spring means accepting the risk of winter.
To become presence means accepting the risk of absence."

Little Prince, Antoine de Saint-Exupéry

Başak BAŞMAN

Middle School Vice Principal, Mathematics Teacher

As we observe and experience what has been done so far, it is very exciting to follow what can be done from now on. Developments in education increase our options to follow and direct our students' learning processes, also supporting our students in taking responsibility of their own learning processes. We will continue to innovate every day with the eye-opening developments that take place in a short time.

Dilara VARDAR

Information Strategies Center Coordinator, Computer Teacher

Artificial Intelligence (AI) has significant potential to address some of the major challenges in education, provide a quality education for all, and foster lifelong learning opportunities. However, rapid technological developments inevitably bring many risks and challenges. In the face of these risks and challenges, UNESCO proposes a human-centered approach to Artificial Intelligence and carries out projects accordingly.

"There is an urgent need to rebalance the situation for women in AI to avoid biased analyzes and to build technologies that take into account the expectations and needs of all of humanity."

Director-General of UNESCO Audrey Azoulay

Hatice Beyza ÖZER

Primary School Class Teacher

Artificial Intelligence was actually a concept that has always existed in our lives, but recently it has become visible both in social media, as well as photo editing and image creation. Although there have been some previous efforts, the deep penetration of Artificial Intelligence into our lives has brought more concrete ideas to education. Virtual classes, virtual trips, the chance to view artistic portraits from inside, quality interviews for the employer... all bring a different perspective to experience. Of course, it still does not replace real experiences, but I believe that it will become an important part of both daily life and education in the future. It is important to be able to foresee the advantages and disadvantages of such a power, and to utilize its opportunities it can offer especially as a part of the education system and learning.

Jose LUIS PEREZ CABELLO

Spanish Teacher

Although Artificial Intelligence has the potential to revolutionize the way we think about education, there are still many challenges and concerns that need to be addressed.

It is important that researchers and developers continue to explore the potential of Artificial Intelligence in education and work to address the challenges and concerns that may arise as this type of technology continues to improve and be applied in today's education system.

Mustafa BOZKURT

High School Vice Principal, Physics Teacher

According to Fermat's principle, light traveling between two points chooses the path that can be traveled in the minimum time and this does not always have to be the shortest path. No matter how artificial the word 'artificial' sounds to us, the incipient development of Artificial Intelligence is not much different from the operation of a natural process. Brain is a cute organ of ours, loving pathways and early solutions, where neurotransmitters are transported over the shortest distances between synapses. It is obvious that it cannot remain indifferent to the inviting solutions, shortcuts and effortless results offered to it for long.

Utku ÖZTEKİN

Physics Teacher

Artificial Intelligence and machine learning applications, which has met with resistance from the established education system, bring to mind this newspaper clipping from the 1980s.



Teachers who opposed the use of calculators in education rose to the level of protest. Today, calculators that draw graphs and solve equations are used extensively as a tool to support students' problem solving and analysis skills.

We can observe a very small part of the available potential of these tools at a very low quality, and, although they are relatively the prototypes, they require both a major change in professional working life and a comprehensive re-planning in formal education. Using Artificial Intelligence tools, you can do the job of a task force of 10-20 people on your own in a very short time. In this case, the following questions become important for the business world and the education world, respectively: "Why is the presence of humans important in business processes?" and "How to develop the characteristics that the 'important humans' should have?"



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