Artificial Intelligence (AI) in Education

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ABSTRACT

The rapid development of Artificial Intelligence is playing a major impact on education. (Giannini, 2023). Starting with this statement from the Assistant Director General at UNESCO, we will see some data in the world about the use of AI technology in the Education system in general. Various international data have been included for this paper - including, various websites, International Journals on Education, EU and US reports, and even the World Organization for the Conservation of Cultural Heritage (UNESCO). In this paper, first, it is about the history of AI, then the inclusion of AI in education – in the teaching and learning process, not overlooking the versions of CHATGPT (versions 3.0, 3.5 and 4.0). For the transformation of education in the framework of AI technology, then for applications and platforms, which, using AI, are used in the education system - emphasizing their importance in general. As important, and where it is included in this paper, is the challenge of using AI in the educational process as well as the ethical aspect, regarding the use of AI in the educational process. The purpose of this paper is to bring the latest data regarding AI (Artificial Intelligence) technology, with particular emphasis on the field of education, including advantages, various applications and platforms, challenges when using this technology, and even the ethical aspect.

In this paper, research has been conducted on various international documents in the field of education (Reports from International Organizations, Scientific Journals, International Conferences, etc.)

At the very end, this paper ends with *conclusions* and some *recommendations*, always based on the findings from the aforementioned documentation, and with the conviction that the work done will provide important data in this direction!

Keywords: Teaching, learning, ethical aspect, education, recommendations.

INTRODUCTION

The transition from version 3.0 to 4.0 of the industrial development of technology has enabled multiple advantages in all areas of life, in this case, including the field of education (teaching and learning process).

This paper is divided into several parts:

- Firstly, we deal with the definitions regarding AI
- Then we talked a little about the history related to AI
- ➢ Chat GPT in education
- Some of the AI applications and platforms used in the teaching-learning process
- Challenges of using AI in the education process
- Ethical guidelines for the use of artificial intelligence (AI) and data in teaching and learning for educators,
- Conclusions, and
- Recommendations.

Through this paper, I have tried to bring the latest data regarding the use of AI Technology in the field of Education. For the work in question, I have researched in various international scientific journals, then using various conferences regarding the field of education - emphasizing the policies that countries should have regarding the use of AI Technology.

I hope that this paper will be of particular importance, taking into account the use of AI Technology in all fields, without neglecting the field of education

What is artificial intelligence?

Artificial intelligence (AI) is perhaps the defining technology of the last decade, and possibly the future. (Boucher, 2020)

IA is a branch of computer science. IA systems use hardware, algorithms, and data to create "intelligence" to do things like make decisions, detect patterns, and take some kind of action. AI is a general term and there are more specific terms used in the field of AI. IA systems can be built in different ways, two of the main ways are: (1) through the use of rules provided by a human (rule-based systems); or (2) with machine learning algorithms. Many newer AI systems use machine learning. (Ruiz & Fusco, 2020)

Artificial Intelligence (AI) is a broad term that refers to activity devoted to making machines 'intelligent', such as that required for computer vision or 'autonomous' robots. While there is no single agreed-upon definition of AI, it is widely accepted that machines based on or incorporating AI are potentially capable of mimicking or even surpassing some human cognitive capacities, including empathy, linguistic interaction, reasoning and analysis, problem solving and even creativity. The UNESCO Recommendation on the Ethics of AI, adopted by 193 UNESCO Member States in November 2021, approaches AI systems as systems that have the capacity to process data and information in a manner resembling intelligent behavior and usually involves aspects of reasoning, learning. perception, prediction, planning or control'. To be able to perform such tasks, an AI-embedded device must be able to sense the environment and gather data dynamically, process it instantly and respond - based on the 'experience' of its past, its predetermined principles for decision-making and its expectations for the future. The ability to efficiently integrate dynamic data acquisition and machine learning algorithms for rapid decision making enables the creation of "cognitive machines". Cognitive machines are closely related to neuroscience and neurotechnology. (Neurotechnology, 2022)

Artificial intelligence (AI) is a group of emerging technologies used to solve a wide range of applied problems. At the heart of AI is machine learning (ML) - a complex of algorithms and methods that address the problems of classification, clustering and prediction.

AI encompasses several major scientific fields, such as machine learning, natural language processing (NLP), text and speech synthesis, computer vision, robotics, planning, and expert systems. (Mukhamediev. R, 2022)

Artificial intelligence (AI) is usually understood as the ability of a machine to exhibit human-like abilities such as reasoning, learning, planning, and creativity. (Grajewski, 2021)

Artificial intelligence refers to intelligent devices and programs that can reason, absorb, gather knowledge, interact, control, and distinguish between objects. (Awad AlAfnan, Dishari, Jovic, & Lomidze, 2023)

Artificial Intelligence in Education

Artificial Intelligence, today, has the potential to address some of the major changes in education, bringing innovation to teaching-learning practices. However, the rapid development of technology brings multiple risks and challenges, which have so far outpaced policy debates and regulatory frameworks.

UNESCO is committed to supporting Member States to harness the potential of AI technologies to achieve the 2030 Education Agenda, ensuring that its implementation in educational contexts is guided by the core principles of inclusion and equity. (Artificial intelligence in education, 2023)

Curriculum and instructional materials providers can also include AI assistants for instant help and tailored instruction for companies' products. An example is edX Xpert, a ChatGPT-based learning assistant on the edX platform. It provides instant, personalized academic and customer support to online learners worldwide.

But others warn that AI will enable the spread of misinformation, facilitate school and college cheating, kill any vestiges of individual privacy and cause massive job losses. The challenge is to exploit the positive potential while avoiding or mitigating the harm. A large number of AI applications are built on the basis of machine learning methods; these methods implement the basic idea of AI. (Bailey, 2023)

ML is applied to achieve better results in speech recognition and speech emotions. Machine learning (ML) is often used to solve scientific and applied problems. For example, the applicability conditions of ML, and the promise of deep learning are considered for solving problems in the field of chemistry. There are many cases of ML application in medicine, especially for medical imaging, astronomy, computer biology, agriculture, economics, etc. (Mukhamediev. R, 2022)

There are three main ML approaches: supervised, unsupervised, and reinforcement. Supervised learning involves data that has already been labeled – such as thousands of pictures of people that have been tagged by people. Supervised learning associate data with tags to build a model that can be applied to similar data—for example, to automatically identify people in new photos. In unsupervised learning, AI is provided with even larger amounts of data, but this time the data is not categorized or labeled. Unsupervised learning aims to discover hidden patterns in data, clusters that can be used to classify new data. For example, it can automatically identify handwritten letters and numbers by looking for patterns in thousands of examples. (Miao F. e., 2021).

Artificial intelligence can serve - or already is serving - in several teaching and learning roles:

Instructional assistants. AI-based feedback systems can provide constructive criticism of student writing, which can help students adjust their writing skills. AI models can also support personalized learning for students with disabilities and provide translation for English language learners.

Teaching assistants. AI can handle some of the administrative tasks that prevent teachers from investing more time with their peers or students.

Early uses include automating routine tasks, such as designing lesson plans, creating differentiated materials, designing worksheets, developing quizzes, and exploring ways to explain complex academic material.

Parental Assistance. Parents can use AI to generate letters requesting individualized education plan (IEP) services or to request that a child be evaluated for gifted programs.

Assistance for administrators. Using generative AI, school administrators can design various communications, including materials for parents, newsletters, and other community engagement documents. (Bailey, 2023)

ChatGPT – tool in education

ChatGPT is a prototype conversational chatbot capable of understanding natural human language and generating written text with impressive human-like detail.

It is the latest evolution of the GPT - or Generative Pretrained Transformer - family of text-generating AIs. (Lock, 2022)

Using ChatGPT in the classroom provides teachers/professors with a platform to show students/students writing as a process. Responses generated by ChatGPT to prompts, scenarios or case studies can be discussed and assessed in class.

They can be used as examples of possible responses and discussed about strengths and weaknesses. After these discussions, which serve as a practical learning base, students can be asked to write their responses. The speed

in generating responses from ChatGPT is an added advantage as it saves time in generating authentic seminar or discussion material.

Teachers/professors may be encouraged to use ChatGPT as part of formal and informal learning if students need a definition of a concept or knowledge or information about a term, however, it should be discouraged to use ChatGPT for writing assessments or formal presentations.

In the medium and long term, this practice definitely poses a challenge for the learning and development of students. (Awad AlAfnan, Dishari, Jovic, & Lomidze, 2023)

For teachers, ChatGPT can provide an opportunity to integrate technology into classrooms and provide students with examples to discuss and evaluate as part of seminars.

For students, ChatGPT offers a potential replacement for search engines that return billions of results. ChatGPT offers the alternative of providing a simple result that can be generated as often as the user wants. ChatGPT also provides a platform for students to prepare for presentations and review different examples. (Awad AlAfnan, Dishari, Jovic, & Lomidze, 2023

ChatGPT 3.5. The free version of ChatGPT released by OpenAI in November 2022. It was trained on data only up to 2021, and although it is very fast, it is prone to inaccuracies.

ChatGPT 4.0. The latest version of ChatGPT, which is more powerful and accurate than ChatGPT 3.5, but also slower, and requires a paid account. It also has extended capabilities through plugins that give it the ability to interface with content from websites, perform more sophisticated mathematical functions, and access other services. A new Code Interpreter feature gives ChatGPT the ability to analyze data, create graphs, solve mathematical problems, edit files, and even develop hypotheses to explain data trends. (Bailey, 2023)

Some of the AI applications and platforms used in the teaching-learning process

ALP - the system offers cutting-edge AI functionality to support standard educational technologies.

The system analyzes user data, aggregating it to create psychometric profiles of each individual student's interactions, preferences, and achievements.

UniTime - the project is a comprehensive AI-powered educational planning system that develops schedules for university courses and exams, manages time and room changes, and provides individual student schedules. (Miao F. e., 2021)

OU Analytics - an AI application created by the Open University of the United Kingdom, is designed to predict student outcomes and identify students at risk of failure by analyzing big data from the university's education management information system (EMIS).

Swift - Data collected from student interactions provides valuable insight into when and why a student may be struggling or failing. Analyzing this data helps create personalized learning paths tailored to meet student preferences. (Miao F. e., 2021)

AudioPen - This is an AI-powered web app that you can use on your computer or phone. The app takes your words and improves them while generating text, which you can edit as needed.

Canva Magic Write - Canva now offers an AI text-to-image generator called Magic Write, which can inspire creativity in writing. It offers ideas, helps with brainstorming, and supports lesson planning, making it a useful tool for educators to create a presentation or other graphic for use in the classroom.

CURIPOD - This website allows teachers to create interactive lessons in minutes using AI. Students can explore different topics, and the AI functionality helps generate personalized lessons tailored to their learning needs.

Eduaide.AI - This is an AI-assisted learning development tool that provides educators with more than 100 types of resources to choose from to create high-quality learning materials. It offers the ability to instantly translate the created content into more than 15 languages.

OpenAI - The recently released Teaching with AI Guide for Teachers was designed to help educators use ChatGPT in their classroom. The guide comes with some suggested requirements and includes explanations that clarify exactly how ChatGPT works and what its limitations are, as well as reminders about the importance of verifying information and checking for bias.

Quizizz - With Quizizz, teachers can design quizzes that will create a personalized learning path based on each student's responses. Teachers can also create lessons with Quizizz, which now has an AI upgrade that can adjust question difficulty, check grammar, and redesign questions to reflect real-world scenarios, with more features on the way.

Slidesgo - This tool offers access to free templates via Google Slides and now has an "AI Presentation Creator." With this new functionality, presentations can be created in minutes. (Poth, October, 2023)

Hello History - an app powered by ChatGPT that can allow students to have conversations with dozens of figures from around the world, from Cleopatra to Mahatma Gandhi.

Google Arts & Culture also offers a wide range of educational games. Here are two of them:

Odd One Out - Players must try to identify AI-generated "rogue" objects hidden next to three real objects or works of art. Students click on any of the real works of art to learn more about them.

There's also a media literacy aspect:

The more kids play, the better they can be at identifying AI-generated images based on telltale signs like a lack of concrete detail and some blurring around edges.

Magic School - This comprehensive AI-powered platform has an impressive number of tools that can perform a wide range of tasks. It can be used to create original content, generate ideas, make materials accessible, and speed up other administrative tasks.

PowerPoint Speaker Coach – is an AI-powered tool that can help you rehearse your presentations and practice your public speaking skills. This tool can analyze your speech through its tone, rhythm, and emphasis in order to provide constructive feedback in real time.

Education Copilot - is one of the best AI tools for designing classroom materials and lesson plans. The software uses AI to create content for the classroom.

You can use it to generate lesson plans, project outlines, writing prompts, student reports, and more. (Brock, 2023)

3D Pottery - Another challenging game, this one requires players to manipulate a rolling ball of clay and recreate ancient ceramic works from around the world. Students gain a hands-on understanding of this ancient art form—without the mess of real clay. (Daniel, 2024)

Foundational models - in generative AI, are systems trained on a large dataset to learn a broad knowledge base that can then be adapted for a variety of different, more specific purposes. This learning method is self-supervised, meaning that the model learns by finding patterns and relationships in the data on which it is trained. (Bailey, 2023)

Challenges of using AI in the education process

While there are many benefits to incorporating AI into the classroom, there are also some challenges that teachers

must overcome. One of the biggest challenges is the need for technical expertise. Teachers who are not familiar with AI may find it difficult to integrate this technology into their teaching practices and may need support and training to get started.

Another challenge is the cost of AI tools and applications. Finally, there are also ethical concerns associated with incorporating AI into the classroom. As AI becomes more sophisticated, there are concerns about its impact on privacy, security, and the job market. Teachers should be aware of these concerns and work to ensure that their students are protected as they explore this exciting and rapidly developing technology. (Melo, Dr. Nouridin, 2023)

Along with these potential benefits come some difficult challenges and risks that the education community must navigate:

1. **Overreliance on technology**. Both teachers and students face the risk of overreliance on AI-driven technology. For students, this can hinder learning, especially the development of critical thinking. This challenge extends to educators as well. While AI can speed up lesson plan generation, speed does not equal quality.

2. **Privacy concerns**. When students or educators interact with AI-powered tools, their conversations and personal information can be stored and analyzed, posing a risk to their privacy. With public AI systems, educators should refrain from entering or exposing sensitive details about themselves, their colleagues, or their students, including but not limited to private communications, personally identifiable information, health data, academic performance, emotional well-being, and financial information.

3. **Equity issues**. Not all students have equal access to computing devices and the internet. This imbalance could accelerate a widening achievement gap between students from different socio-economic backgrounds. (Bailey, 2023)

The implication of intelligent teaching systems may not be that AI replaces teachers entirely, but that teachers are entrusted with more responsibility than ever to help societies navigate this critical moment. (Antoninis & al, 2023).

Educators can deliver tailored learning experiences based on AI-driven analytics that provide valuable insights into student performance and learning trends. Using this data, AI can instantly adapt student learning materials. Teachers can then use this information to deliver personalized learning experiences, adapting to each student's strengths, weaknesses, and learning pace. (Poth, October, 2023)

Meanwhile, according to Shabani & Borry (2018) regarding data privacy and security, this is indeed a major and important problem in the use of digital data.

In this case, it is the data of students that use AI technology.

Therefore, there is a need for regulations and policies to protect this data. (Rahayu, 2023)

Ethical Guidelines for the Use of Artificial Intelligence (AI) and Data in Teaching and Learning for Educators

As we explore the possibilities of AI in education, it is essential to focus on the ethical aspects of this transformation. Our collective responsibility, as policymakers and educators, is to navigate these uncharted waters while upholding the principles of ethical conduct and ensuring that AI technologies are used with the greatest possible responsibility. (Dida, 2023)

Let's see below why ethical issues occupy such an important place.

1. **Combating bias and discrimination**: AI systems can unintentionally produce biases, caused by the algorithms and data they are trained on, leading to discriminatory outcomes. Ethical considerations

ensure that AI is designed and used in a way that avoids bias, promotes fairness, and protects against discrimination based on factors such as race, gender, or socioeconomic status. (Abby & Mezzanotte, 2022)

2. **Protecting privacy and data security**: AI relies on large amounts of data, often including personal and sensitive information. Ethical practices include implementing strong data protection measures, respecting privacy rights, and ensuring that data is handled, stored, and used securely only for legitimate purposes. (Kerry, 2020)

3. **Transparency and explainability:** Ethical use of AI requires transparency and explainability. Users should have a clear understanding of how AI systems make decisions and the factors considered in their algorithms. This transparency fosters trust, allows for accountability, and enables users to challenge or question the results generated by AI. (Candelon, 2023)

4. Addressing unintended consequences: Ethical practices require careful consideration of the potential unintended consequences of AI. AI systems can have broad impacts, both positive and negative, on various aspects of society. Ethical approaches involve actively identifying and mitigating potential risks, ensuring that the benefits of AI outweigh any negative effects. (Suh, 2021)

5. **Maintaining trust in AI**: Ethical practices are essential for maintaining public trust in AI. Trust is essential for the widespread acceptance and adoption of AI technologies. Ethical use of AI promotes transparency, fairness, and accountability, fostering trust among users, stakeholders, and the wider public. (Dida, 2023)

6. **Etc**.

CONCLUSIONS

Findings from descriptive research data Artificial Intelligence in Education, helped me to conclude that Artificial Intelligence is the present and the future technology in education.

Doubts about whether AI technology is an important technology or not, some interesting data emerge from the research: The data is generally positive when it comes to the use of this technology by students, parents, teachers, and school administrators.

The different versions of the ChatGPT chatbot offer a variety of features and are characterized by different forms of work in the field of education. Here it should be mentioned the fact of translations into different languages, feedback, other possibilities in solving different tasks, etc.

The pedagogical triangle of school (teaching) - student - parent has always been important in terms of the smooth running of the teaching - learning process. Here, AI technology plays an important role, because we can connect in real time with the student and simultaneously with the parents.

Here we see that UNESCO has organized a Conference with representatives of different countries where it has reviewed educational policies regarding AI technology, since this technology is revolutionizing education.

Different countries, based on their educational curricula, have drafted different educational policies as the reason for the introduction of AI Technology into the teaching and learning process!

I conclude that the use of AI technology affects, and appropriate changes should be made to, the stages of Bloom's Taxonomy.

Bloom's taxonomy has had and continues to have a special importance in education, but as such it dates back to the last century, and since we are in the 21st century, with the revolution made by AI technology in the field of education, I conclude that it is inevitable that such changes will be made, and that by making revisions at different stages in this Taxonomy.

In general, based on the research conducted, technology AI is a technology that has already made changes in education.

The use of various applications and platforms that use AI technology, offer different variations in terms of the use of different applications and platforms. As such, they are very positive in terms of the teaching-learning process.

Based on the above research, but also from daily experience in the use of information technology, we see that AI technology is present in application programs and platforms, which as such are computer-based and internet-based.

It is concluded that the AI technology included in these applications and platforms is of particular importance, for the very fact that it helps actors involved in education in many aspects: assistance in completing tasks, feedback, personalized notifications, and much more, while on the other hand it enables interactivity and motivation in carrying out work for all actors involved in the field of education!

The ethical aspect is particularly important in the field of education, not excluding the inclusion of AI technology. From the research I have done, I have come across certain cases where this technology has excluded people of color from being included in various tests, then care must be taken not to give out personal data, etc.

I conclude that over time, AI technology will eliminate some sensitive ethical aspects. As for the storage of personal data, this is an aspect of cybersecurity, which as such has existed and is present in our days!

RECOMMENDATIONS

1. Prepare for the Fourth Industrial Revolution in Technology SDG 4.
2. Research should be conducted regarding the impact of the use of AI in teaching and learning in the case of using Bloom's Taxonomy.
3. Teachers should receive appropriate training regarding the use of this technology in the field of education – Technology for the transformation of education
4. Use the ChatGPT chatbot as productively as possible.
5. Students and parents should use this technology in achieving their goals (tasks, seminar papers…), but at the same time be careful.
6. Appropriate policies should be made by MEST regarding the extension of this technology in the education process (see UNESCO 2023)
7. Teachers, pupils and students should use different platforms when it comes to AI Technology, as they enable easier work, motivation at work, quick and easy finding of information and problem solving.
8. Adapt different formats when it comes to the ethics of using this technology.
9. Etc

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