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GUIDE ON AI AND EDUCATION

1st Edition - September/2024

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GUIDE ON AI AND EDUCATION

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1. Why a guide to Artificial Intelligence in education?

This guide is designed to guide managers, teachers, graduates and students on the use of artificial intelligence in education, helping them to make decisions on a subject that is still poorly regulated. The use of AI in education is not limited to the use of tools that are now widely known, such as ChatGPT and the like. These make up only part of the set of resources available for educational use. Other more limited applications have been used, which may be a better alternative, with a more refined pedagogical intent.

Teachers and students have been using some of these tools without clear guidelines from governments or secretariats. This has led to confusion and little pedagogical use. Students use them to produce texts and teachers use them to create questions or lesson plans: but how can we ensure that the results are not wrong or even disrespect rights or are consistent with ethical principles? **In this sense, this guide is designed to be a motivator for discussions within schools, so that the local communities can form their own policies on the use of AI, just as many of educational institutions have been doing in relation to the use of screens and cell phones.**

Firstly, we will present the most common definitions of artificial intelligence, also trying to bring up specific terminology and associated issues, such as the use of data and the differences between machine learning and deep learning, generative and predictive AI. We then present some examples of how AI has been used in education, taking count of the risks and opportunities. Finally, we provide some international guidelines on the use of AI in education.

We wish you a very good reading!

2. What is Artificial Intelligence?

2.1 History and Development of Artificial Intelligence

Artificial intelligence can be defined as a field of computing sciences or even as a set of models that seek to reproduce certain human cognitive operations. **Although it became known mainly after the launch of ChatGPT, artificial intelligence has been developed since at least the 1950's.**

The field of Artificial Intelligence (AI) is the result of progress in different disciplines, including mathematics, logics, computer science, cognitive science, linguistics and neuroscience. The concept of machines that can simulate aspects of human intelligence dates back to the 19th century, but it was in the 20th century that the field began to formalize itself.

The first concrete proposal for a system that could be considered "intelligent" came from Alan Turing in 1950. In the article "Computing Machinery and Intelligence", Turing addressed the question "Can machines think?" and formulated what is now known as the Turing Test. This test does not measure a machine's intelligence directly, but assesses its ability to imitate human behavior to the point of being indistinguishable from a real person. Turing's work is often considered a milestone in the foundation of AI as an academic field.

Throughout the 1950s and 1960s, the term "Artificial Intelligence" began to take shape, especially after the Dartmouth Conference in 1956, which is considered the official starting point of the field.

During this conference, researchers such as John McCarthy, Marvin Minsky, Nathaniel Rochester and Claude Shannon discussed the possibility of creating machines capable of performing tasks that, until then, had been considered exclusive to human beings, such as playing chess or proving mathematical theorems.

To get us started, here is a selection of definitions of the term taken from well-known documents and books on the subject.

An AI system is a machine-based system that, for explicit or implicit purposes, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptability after deployment.

Source: OCDE. Available at: https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449

Artificial intelligence seeks to prepare computers to do the kind of things that the mind is capable of doing. Some of these things (such as reasoning) are usually defined as "intelligent". (...) Intelligence is not a single dimension, but a richly structured space with different abilities to process information. Consequently, AI uses many different techniques and engages in many different tasks.

Source: Boden, Margaret A. Inteligência artificial: uma brevíssima introdução. São Paulo: Editora Unesp, 2020.

There are numerous definitions of Artificial Intelligence, reflecting the specificities intrinsic to each field of knowledge. Russell and Norvig (2009) list eight of them grouped into two dimensions: (a) those relating to thought, processes and reasoning and (b) those relating to behavior. (...) Generalizing, and from a simplified perspective, we can think of AI as the reproduction of all the behaviors that the human brain controls. The movement of walking, for example, is controlled by the brain (balance, movement of the legs and body); seeing is also controlled by the brain: all the sensations that go to the brain are the domain of intelligence, so they are potentially in the field of Artificial Intelligence. However, the "mental process" of Artificial Intelligence surpasses the human mental process; if, on the one hand, AI performs tasks that are supposedly the prerogative of human beings, its capacity surpasses human limitations, as can be seen in different everyday situations with the use of appropriate technologies.

Source: Kaufman, Dora. Artificial intelligence: ethical questions to be faced. Available at: https://abciber.org.br/anaiseletronicos/wp-content/uploads/2016/works/artificial_intelligence_ethical_issues_to_be_faced_dora_ kaufman.pdf

Nowadays, AI is developing intensely due to the processing of large amounts of data (big data), so that it can perceive and assimilate new information (creating patterns) and make predictions. AI identifies meaning in the face of available data, whether structured or not, building knowledge, identifying patterns and correlations between data, and generating predictions. Most of the data available for AI to identify meaning is unstructured data, i.e. unlike structured data (organized in databases), it does not have a defined structure, but rather a variable one.

Source: Gonsales, Priscila. Intelligence beyond artificial: educating for complex thinking. São Paulo: Z editions, 2022.

Generative artificial intelligence is an approach that uses models to create new data that is similar to the input data. These models are trained on large data sets to learn the underlying distribution of the data and then generate new data based on this distribution. Generative models can be used for a wide range of tasks, from creating images and music to generating text and code.

Source: Campos, Guilherme (2023). Generative Artificial Intelligence: A Beginner's Guide (Portuguese Edition). Kindle edition.

Historically, researchers have pursued several different versions of AI. Some have defined intelligence in terms of fidelity to human performance, while others prefer an abstract and formal definition of intelligence called rationality - loosely speaking, doing the "right thing". The subject itself also varies: some consider intelligence a property of internal thinking and reasoning processes, while others focus on intelligent behavior, an external characterization. Of these two dimensions - human vs. rational and thought vs. behavior - there are four possible combinations, and there have been supporters and research programs for all four. The methods used are necessarily different: the search for human-like intelligence must be partly an empirical science related to psychology, involving observations and hypotheses about actual human behavior and thought processes; a rationalist approach, on the other hand, involves a combination of mathematics and engineering, and connects to statistics, control theory and economics.

Source: Russel, S. and Norvig, P. Artificial Intelligence: a Modern approach.

AI is today an extremely complex area of research and knowledge. To give a minimum account of this complexity, it is enough to name just a few terms from its scientific jargon: symbolist method, genetic program, inverse deduction, linear regression, backpropagation, Bayesian probability, statistical methods, predictive modeling, and so on. (...) For some experts, Stocker (2021, p. 106) for example, "our AI is little more than data mining on steroids. It looks at data (massive amounts of data), breaks it down into small pieces, compares them, recognizes patterns and correlates them to arrive at statistical conclusions. (...) Distinct from the many communication and information technologies stemming from the industrial and post-industrial revolution, AI challenges the notion that humans have of themselves, forcing us to search for new and more appropriate concepts about ourselves. To think about AI today is simultaneously to think about the human.

Source: Santaella, Lucia. Is artificial intelligence intelligent?

Following these definitions, we can identify a series of concepts that are associated with artificial intelligence: algorithms, data/big data, machine learning, intelligence, models, computer language, thinking, neural networks, probability/statistics, predictive and generative models. In general, we need to distinguish what algorithms are from what artificial intelligence is. We also need to distinguish between generative and predictive AI. Finally, we need to talk about the role of data, especially the huge volume of data we can have today with the internet. We'll talk about these concepts below.

2.2 Algorithms and the Development of AI

At the heart of AI development are algorithms, which are sets of rules or instructions that guise machines in **performing specific tasks**. From the first rule-based systems, known as 'expert systems', to the most advanced algorithms used today in neural networks and deep learning, the progress of AI is closely linked to the development of more efficient and powerful algorithms.

During THE 1970s and 1980s, AI researchers focused on expert systems, which applied algorithms based on specific knowledge to solve problems in areas such as medical diagnosis and planning. **An iconic example of such systems is *MYCIN*, an expert system developed in the 1970s to diagnose bacterial infections and recommend treatments.**

In the 2010s, with the emergence of deep learning, artificial intelligence models became more complex and capable of dealing with large volumes of data. *Convolutional Neural Networks (CNNs)* are a prominent example of this era, used for tasks such as image recognition and natural language processing. Networks such as *AlexNet* revolutionized computer vision by winning the ImageNet COMPETITION in 2012 by a large margin, showing the effectiveness OF CNNS in identifying objects in images.

More recently, *Transformer algorithms, such as BERT and GPT* (which includes ChatGPT) have been used for natural language processing, enabling much more sophisticated text comprehension and generation. **These models use attention mechanisms to deal with large sequences of text and have enabled significant advances in tasks such as machine translation and answering questions.**

Although related, algorithms and artificial intelligence (AI) are distinct concepts. An algorithm is a set of well-defined instructions followed to solve a specific problem or perform a task. Artificial intelligence, on the other hand, involves using algorithms, among other techniques, to find patterns in large volumes of data, even when that data is not clearly organized. AI can therefore generate new algorithms or adjust existing ones based on these patterns, in a partially autonomous way. **In this sense, AI can be understood as a learning "model" that uses large volumes of data to identify patterns and generate outputs or results.**

What is an Algorithm?

An algorithm is a set of clearly and precisely defined rules or instructions that guide the execution of a task or the resolution of a problem. In simple terms, it is a sequence of steps that, when followed correctly, lead to a desired result.

Sorting Algorithm: In computing, a classic example of an algorithm is the Bubble Sort Algorithm. It works as follows:

- Compare the first element in the list with the second.
- If the first element is bigger than the second, swap them around.
- Keep comparing and swapping adjacent elements until the list is sorted.

This algorithm is designed to sort a list of numbers or words, and each step is clearly defined to ensure that the list is sorted at the end.

```python
# Lista de alunos com suas respectivas notas
alunos = {
    'Ana': 8.5,
    'Bruno': 6.0,
    'Carla': 7.5,
    'Daniel': 5.0,
    'Eduarda': 9.0
}

# Função para verificar se o aluno está acima ou abaixo da média
def verificar_alunos(alunos):
    for aluno, nota in alunos.items():
        if nota >= 7.0:
            print(f"{aluno} está acima da média com nota {nota}.")
        else:
            print(f"{aluno} está abaixo da média com nota {nota}. Um exercício de recuperação foi gerado.")
            gerar_exercicio(aluno)

# Função para gerar um exercício de recuperação
def gerar_exercicio(aluno):
    print(f"Exercício de recuperação para {aluno}:")
    print("1. Revise o conteúdo da última prova e resolva os exercícios complementares.")
    print("2. Refaça os problemas que errou na última prova e explique o raciocínio por trás da solução.")
    print("3. Prepare uma apresentação sobre o tema da última prova e apresente-a à turma.")

# Executa a verificação dos alunos
verificar_alunos(alunos)
```

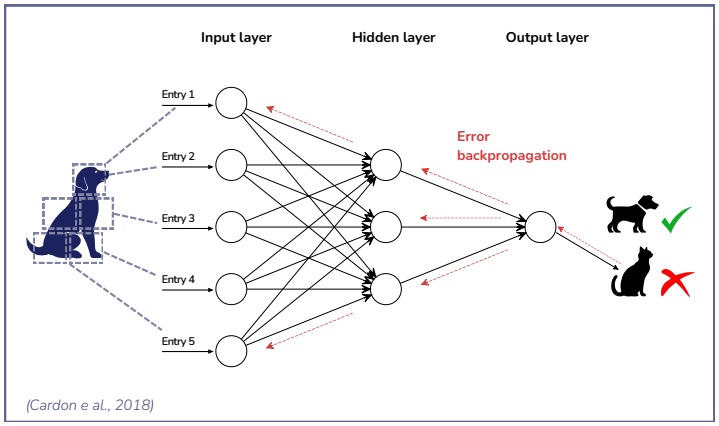
Example code in Python to separate students above and below average and then send them a remediation exercise. Algorithms use conditionals (if/else, if/if not) for the set of instructions, the structure of which is called a decision tree. Illustrative example only. The instructions are in Portuguese language.

2.3 Artificial Intelligence as a Disciplinary Field

Over time, AI has evolved to become a comprehensive discipline with several sub-disciplines. **Machine Learning and Deep Learning have emerged as critical areas within the field. Machine Learning, in particular, rose to prominence in the 1990s with the increase in computing power and the availability of large volumes of data.** This subdiscipline focuses on creating models that allow machines to learn from data, adjusting their models to improve performance on specific tasks.

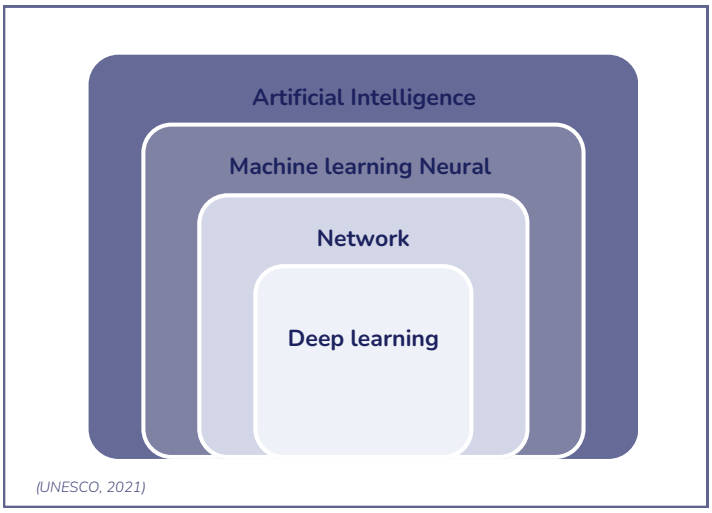
Deep Learning, an approach within Machine Learning, uses artificial neural networks with multiple layers to process data at higher levels of abstraction. This method has been particularly effective in areas such as speech recognition, computer vision and natural language processing, where large volumes of complex data need to be interpreted.

Operation of a simple neural network



(Cardon e al., 2018)

AI, machine learning, neural networks and deep learning



(UNESCO, 2021)

Elements translated from the French Ministry of Education publication entitled "Intelligence Artificielle et Éducation". Available at: https://www.ac-paris.fr/l-intelligence-artificielle-dans-l-education-130992

2.4 Difference between Predictive AI and Generative AI

In the contemporary context, AI can be categorized into different types, two of the most studied being predictive AI and generative AI. **Predictive AI uses historical data to predict future events or outcomes.** A common example of predictive AI is its use in finance, where algorithms analyze market data to predict asset price trends and behavior.

On the other hand, generative AI is defined by its ability to generate new data or content from learned patterns. An example of generative AI is the creation of images, music or text that did not previously exist.

Models such as generative adversarial networks (GANs) and large language models such as GPT exemplify this capacity, and are used to generate from synthetic images to musical compositions and textual dialogues.

Both generative and predictive AI use machine learning and large amounts of data, but their objectives are different: while predictive AI uses machine learning to predict future trends, for example in relation to consumer behavior, generative AI uses machine learning to generate content.

2.5 The Role of Data in AI Training

Data plays a fundamental role in the development of AI systems. The AI training process involves feeding large volumes of data into models, which then identify patterns and adjust their parameters to perform specific tasks more efficiently.

The greater the quantity and quality of the data, the better the performance of the AI system. For example, when training a facial recognition model, numerous images of faces are needed, captured under different lighting conditions, angles and expressions. The model uses this information to learn the distinctive features of human faces and eventually be able to recognize new faces with high accuracy.

3. Examples of AI applied to education

The use of Artificial Intelligence (AI) in education has expanded significantly in educational institutions, but there is still significant resistance. The use of these tools varies according to the education system (public and private) and according to the level of education (Early Childhood Education, Primary Education and Higher Education). Although the large corporations involved in the development and marketing of digital and AI tools promise innovative solutions, such as intelligent tutoring systems and adaptive learning platforms, their application raises significant issues that cannot be ignored.

The use of digital tools in education should always be aimed at enriching the teaching-earning process, valuing the collective construction of knowledge and an informed critical view of the world we live in. Without this, there is a high risk of teachers becoming overworked or losing their autonomy in the classroom. Below, we present some types of AI-based systems and some examples of platforms used in different education systems and levels.

3.1 Intelligent Tutoring Systems and Adaptive Learning Platforms

Intelligent tutoring systems are platforms that use AI to provide personalized support. These systems analyze student performance in real time and adapt content and activities based on individual needs. One example is **Khan Academy**, which uses AI to guide students to solve questions mainly in the area of exact sciences, offering feedback and suggestions according to the student's progress.

Adaptive learning platforms, such as **DreamBox**, adjust the content and exercises based on the student's responses and progress. These systems promise to deliver a more personalized learning experience, adjusting the difficulty and approach of exercises to meet each person's specific needs.

Another well-known example of a digital platform that uses AI tools and that we can consider within the scope of tutoring and adaptive learning systems is **Elefante Letrado**, a Brazilian platform aimed at developing the reading and writing skills of students from elementary to high school.

3.2 Virtual Assistants and Chatbots

Virtual assistants and chatbots are used to answer frequently asked questions and provide administrative support. One example of a chatbot for education is **Blip**, which offers assistance to students and parents with questions about registration, deadlines and other administrative information, with the aim of contributing to greater efficiency in school management. Another well-known example is **ChatGPT**, developed by OpenAI, which can be integrated into educational platforms to provide interactive support and tutoring. **In addition to these examples, many private schools and education systems have their own chatbots to answer questions about platforms, resources and solutions.**

3.3 Learning Analytics

Educational data analysis tools use AI to interpret large volumes of data on performance, behavior and learning trends. **Cerego** is an example of a platform that uses AI to analyze, through data, how students retain information over time, guiding educators to adjust their teaching strategies based on data provided by the platform. Other tools, such as those used by the **Coursera** platform, offer global competency reports based on data from millions of usersaround the world.

3.4 Speech Recognition and Transcription

Systems such as **Google Speech-to-Text** and **Otter.ai** are tools that allow speech recognition and automatic transcription, offering support for people with hearing or writing difficulties to convert speech into text. This can be particularly useful in educational environments, facilitating accessibility and the participation of everyone in activities

3.5 Automated Feedback Tools

Automated feedback tools such as **Grammarly** and **Turnitin** use AI to offer grammar corrections and check the originality of texts These tools help students improve their writing skills and avoid plagiarism by providing detailed, real-time feedback on their productions.

3.6 Simulation and Augmented Reality Platforms

Platforms that use AI in simulations and augmented reality offer immersive learning experiences. Labster, for example, offers virtual laboratories where students can carry out scientific experiments in a simulated environment, with the support of AI to guide and evaluate their actions.

3.7 Machine Translation Tools

Machine translation tools, such as Google Translate, help to translate texts, providing support to overcome language barriers and promoting a more inclusive learning environment.

3.8 Thinking about AI Tools Applied to Education

These examples show how AI can be applied in a variety of ways in education, offering resources that promise personalized support, facilitating accessibility and improving the efficiency of administrative and teaching processes. However, the use of these applications has a number of **ethical implications** that directly interfere with the quality of education, as well as social implications relating to inequality of access and teaching work.

The effectiveness of these systems depends on the quality of the algorithms and data used. Misuse or biased use of data can lead to **inappropriate and even harmful recommendations.** In addition, dependence on these systems can reduce the role of the teacher to mere operationalization of these tools. Another critical point is the potential exacerbation of educational inequalities. **Data privacy** is another important concern. The extensive collection and analysis of student data by AI systems puts sensitive personal information at risk. We'll look at these risks in more detail below.

In summary, although AI can offer some advantages in education in general, and in the teaching-learning process specifically, its challenges and risks are significant and should not be underestimated. **The implementation of AI-based technologies must be approached with caution**, considering the ethical and practical implications. Education must prioritize **equity** and the protection of student and teacher data, ensuring that innovation does not compromise fundamental values or accentuate existing inequalities.

4. Risks and opportunities of AI in education

Although there are important points of attention when it comes to AI, the advantages have been more vaunted than the risks. But, especially when it comes to education, it is essential to look at them with a critical and cautious eye.

Since the early days of attempts to automate education, some of the advantages of using technology in education have been highlighted, which could be summarized as: **1) personalizing teaching; 2) reducing the burden of repetitive tasks on the teacher; 3) greater efficiency in teaching and 4) the possibility of giving students an assessment with automatic feedback.** These are still the advantages often highlighted for AI in education. Below, we highlight some of the risks, correlating them with these vaunted benefits.

4.1 Data Privacy

Among the resources made possible by machine learning and big data is the **tracking of student behavior** - for example, in relation to lesson videos on an online learning platform. It is possible to identify whether the students watched the videos and at what times, whether they paused and at what points, whether they sped up the playback to watch it in less time, whether they abandoned the lessons before finishing, among other data.

For Mayer-Schönberger and Cukier (2014), identifying these patterns in students' activities could, among other things, help teachers with this data to adjust their lessons accordingly, make them decide to reinforce concepts that students apparently didn't understand or lead them to modulate the way they present a given topic. It is important that these resources are seen as support for the teacher, representing data that needs to be interpreted in order to reach a conclusion.

There are also particular issues that need to be considered and weighed up with regard to the surveillance provided by the saving of data in algorithmic systems. In the school context, there are several layers or dimensions to this surveillance - assessment is just one of them. What happens inside the school is related to what is happening outside.

To the extent that we use algorithmic platforms, the vast databases that draw personal profiles from the data captured belong to large corporations and government departments, and the mechanisms for capturing data are rooted in the mechanisms behind these platforms. This surveillance affects individuals in various ways; it can increase inequalities and oppression, emphasize prejudices and affect individuals in different ways based on ethnicity, social characteristics, the presence or absence of a disability, and so on.

4.2 Evaluation

The same goes for the use of data in evaluation: a critical look at the data, trying to understand what it can represent in a given context and for a given individual or group of people, guarantees a human look to the evaluation. This look is indispensable, because only it can consider what goes beyond what the data captures.

Students are not just numbers and their background, their behavior, their emotions observed over a certain period of time also influence the results of their learning.

When it comes to expecting technologies such as AI to help personalize teaching, it is essential to understand that, while some level of personalization is possible in teaching and learning processes with AI, it can also go in the opposite direction. This is a risk involved when, for example, artificial systems are delegated the ability to "understand" what each student wants or needs, leaving it up to them to meet the particular needs of students in terms of learning pace.

AI systems can be useful in setting up exercises and activities that can engage students because they are adapted to some of their characteristics, for example, but it should be remembered that the teacher has an indispensable role when it comes to mediating these interactions. It is the teacher who has the ability to understand and analyze their students as a whole, identifying characteristics, skills and points that deserve greater attention.

4.3 Technical and Decision Errors

Technical errors and decision mistakes can have significant impacts on artificial intelligence (AI) systems used in the educational context, affecting the quality of teaching and the experience of students.

In terms of technical errors, a common flaw in AI-based educational systems is the inadequate implementation of algorithms. For example, a poorly configured algorithm in an adaptive learning platform can generate incorrect content recommendations, making it difficult for students to learn.

The problem of **overfitting** is also relevant: a system that has been trained on specific student data can become over-fitted to that data, providing suggestions that don't apply properly to new students with different learning profiles. **Underfitting**, on the other hand, can occur if the system fails to capture the nuances and variability in learning modes, leading to simplistic and ineffective recommendations.

Another technical error can happen when student performance data is inaccurate or incorrect, resulting in analysis and *feedback* **that does not accurately reflect students' abilities and needs.**

One of the most recurrent errors is the phenomenon of "hallucination", where AI can generate information or educational suggestions that seem valid but are completely incorrect. This happens because conversational agents deliver answers very convincingly and in very logical language, and we generally believe that the machine doesn't make mistakes. This can disorient both students and teachers.

4.4 Teacher overload

In addition to technical and decision-making errors, the use of artificial intelligence (AI) platforms and systems in the educational environment can overload teachers, negatively affecting their well-being and professional performance.

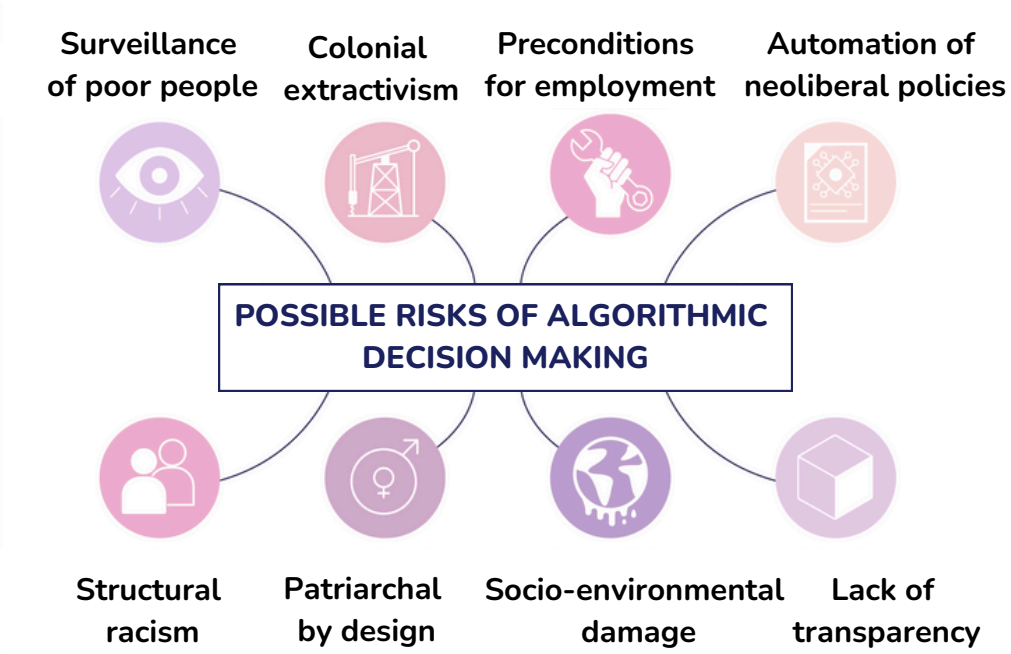
Firstly, integrating new technologies requires teachers to acquire additional skills and knowledge. This often means extra hours of training and adaptation, in addition to the daily tasks of planning, teaching and assessing.

This process of continuous training can become exhausting, especially when teachers need to familiarize themselves with several different platforms, each with its own functionalities and interfaces. The need to keep up with constant updates and changes to systems can also increase the workload, leaving less time to focus on essential teaching activities.

Another form of overload occurs when teachers have to manage the interaction between students and AI tools. Systems that offer automated feedback or personalized recommendations often require human supervision and intervention to ensure that AI responses are interpreted correctly and that students' individual needs are met. This can turn teachers into managers of technological systems rather than facilitators of learning, losing the meaning of the teaching profession.

Teachers are often asked to analyze and interpret this data in order to adjust their teaching practices, which can be a complex and time-consuming task. Although the aim is to personalize the students' learning experience, too much information can paradoxically lead to paralysis or inefficient use of this data, contributing to professional burnout.

Feminist movements have advocated "data feminism" to warn about the many risks of AI. A project by Coding Rights, in association with activist Paz Peña, has drawn up a diagram to understand these more general risks.
Source: https://notmy.ai/pt/noticias/ia-opressora-categorias-feministas-para-compreender- your-political-effects/



5. Real risks in Brazilian education

Querido Diário Project: Using Facial Recognition in Schools

The Querido Diário Project, by Open Knowledge Brasil, investigates the implementation of facial recognition technologies in schools, which have been justified by security and access control. However, studies show that this technology has a higher error rate for individuals from minority groups. A study by the MIT Media Lab (2018) found that error rates in facial recognition systems are significantly higher for women and black people. The project points out that “facial recognition technology has gained space in the legislative debate in cities such as Belo Horizonte (BH) and Recife (PE), with bills that seek to block its implementation in the cities. Other cities, such as Jundiaí (SP) and Monte Alto (SP), promote bids or contract services for this technology to record school attendance, which raises the alarm about the risks to the privacy of the school community.”

Production of Teaching Materials with AI

The government of the state of São Paulo has proposed using Artificial Intelligence (AI) to produce teaching materials as a way to modernize education. The proposal, which is part of the "Education for the Future" program, aims to use algorithms to create personalized educational content for students. How can we ensure the quality of this content and ensure that artificial intelligence can produce materials with a pedagogy adapted to each school?

Watched Education Project: Big Tech in Education

The Education Monitored Project seeks to understand the impact of big tech on the education sector, especially in relation to privacy and technological dependence. According to UNESCO (2021), the adoption of platforms such as Google Classroom and Microsoft Teams increased significantly during the pandemic, but raised concerns about the centralization of data and student privacy. The project's investigations show that the adoption of technologies from these companies often occurs without a critical analysis of the long-term impacts. For example, the privacy of student data has been a constant concern, with criticism about the lack of transparency in the use of this data by big techs.

Deviations Involving Robotics Kits

The scandal involving robotics kits revealed serious management and corruption problems in the education sector. In June 2023, the Federal Police discovered overpricing in the purchase of these kits for public schools, with public funds that should have been diverted to education being diverted. According to the operation report, more than R$1.6 million was diverted in fraudulent contracts (G1, 2023). The scheme involved public servants who, in collusion with businessmen, overcharged for the prices of robotics kits and directed part of the funds to pay bribes.

The Use of Platforms in Education in Paraná and São Paulo

In Paraná, the use of digital platforms, coupled with the implementation of facial recognition technologies and the emotional monitoring that accompanies this technology, is particularly controversial, raising questions about the invasion of privacy and the lack of informed consent. According to a report by the Observatório das Metrópoles (2023), this surveillance in schools is being implemented without adequate public debate, and teachers have reported that the mandatory use of these platforms compromises the quality of teaching.

In São Paulo, the situation is similar. The imposition of digital platforms as part of the state government's educational policies has led to widespread dissatisfaction among educators. In May 2024, there were protests and strikes organized by teachers opposed to the compulsory use of these technologies. According to reports, the platforms were implemented without the participation of the school community and without taking into account the real conditions of the schools. The main criticism is that these platforms not only replace but also devalue teachers' work, turning the educational process into a simple task of filling in digital data. As pointed out in recent articles, teachers feel that they are just "filling in platforms" and not actually teaching.

AI Fueling Disinformation and Gender Violence: Deepfake in Schools

Recent cases of deepfakes in schools show how artificial intelligence can be used in harmful ways. In Belo Horizonte, a student was accused of creating deepfakes of female schoolmates using manipulated images (R7, 2023).

In Maceió, a police operation revealed the responsibility of seven teenagers in the creation of deepfakes, exposing the risks of misinformation and cyberbullying (G1, 2024). According to a study by the Brookings Institution (2020), the use of deepfakes for misinformation can undermine trust in institutions and the media itself, highlighting the urgency of policies that protect students and promote awareness of the risks of these technologies.

Screen use among children

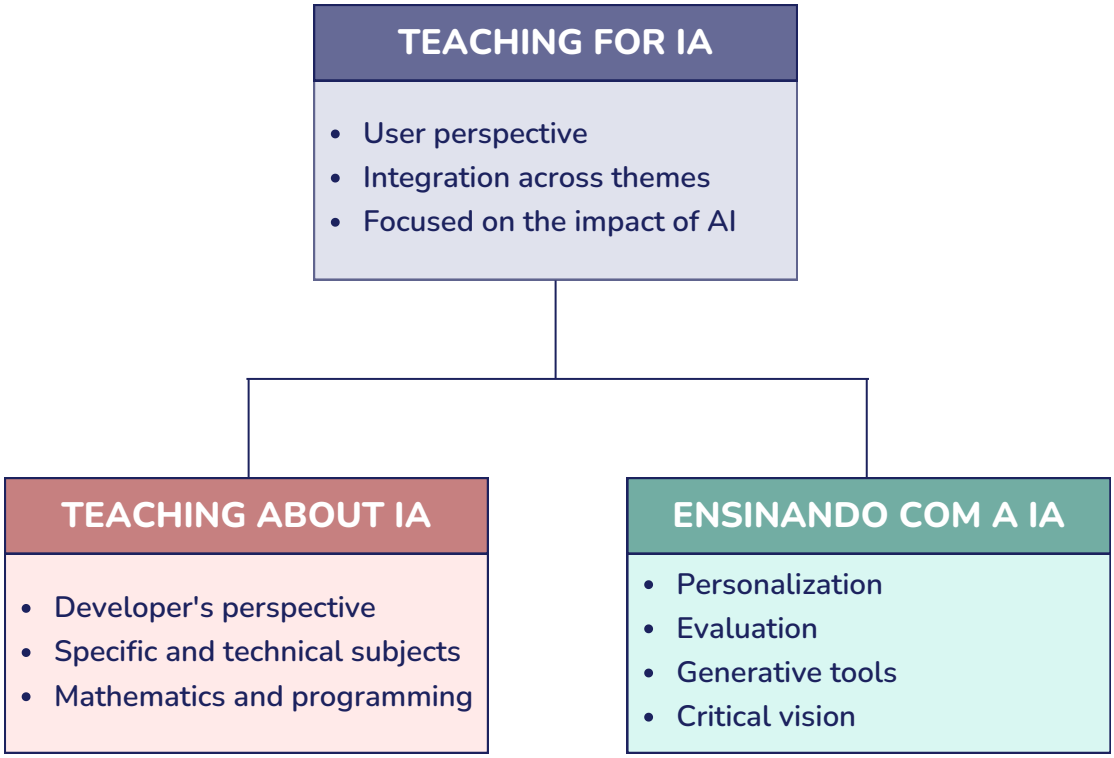
Screen time use among school-aged children has increased significantly, especially with the ease of touch screens. According to the World Health Organization (WHO, 2021) report, screen time should be limited, and physical and social activities should be encouraged to ensure healthy development.

The use of technologies in education must be accompanied by policies that promote the comprehensive well-being of children, preventing problems related to excessive screen use.

6. International recommendations for the use of AI in education

The European Commission's 2024 report on Artificial Intelligence (AI) in education explores both the potential benefits and challenges associated with using AI in this sector. It highlights how AI can support personalized teaching, provide real-time feedback and optimize educational planning. However, it also warns of risks, such as a lack of transparency, algorithmic bias and the need for human supervision to avoid harmful automated decisions. **The report recommends a balanced approach that maximizes the benefits and minimizes the risks.**

The report elaborates the paradigm of teaching with, about and for artificial intelligence: this means that these three dimensions must be thought of together. Not just the use of AI systems to support, for example, student management and learning data (the area called learning analytics), but also knowing how to educate about how these systems work and how they impact on the various dimensions of life, as well as programming principles and model development.



From an ethical point of view, the document makes the following recommendations:

> *Caution should be a key word at all levels in the use of AI in education. Students need to learn their rights and how to protect themselves, teachers need to be aware of the range of information collected in the AI tools they use, developers need to protect themselves against undue influence and be aware of potential biases, and finally, government bodies need to take a firm stance with robust legislation to protect their citizens, while eliminating a stringent approach to their own use of AI in data collection.*
>
> ***In general, we recommend the following learning goals related to AI literacy and ethics:***
>
> - *Identify and analyze the ethical and environmental opportunities and threats arising from the daily use of AI.*
> - *Promoting the safe, responsible and conscious use of AI-related digital tools and technologies.*
> - *Analyze and understand the human footprint and the influence of risks in automated decision-making processes.*
> - *Identify and evaluate the ethical and political implications of the design and use of AI systems, including fairness, bias, discrimination and accountability.*
> - *Critically analyze the potential of AI to improve people's quality of life, assessing its operability in different social, economic and cultural contexts.*
> - *Know and understand the risks and benefits of AI in different areas, such as health, security and privacy.*

With the increasing prominence of Artificial Intelligence (AI) in the field of education, especially with the advance of generative AI (GenAI), which offers the possibility of creating new content from command prompts, UNESCO, recognizing the potential impact of these technologies, has been drawing up a series of guidelines to support countries in adapting to this new educational scenario.

The main focus of these guidelines is to ensure that the implementation of AI is human-centered, promoting inclusion, equity and cultural and linguistic diversity. In addition, there is concern about protecting data privacy and regulating the use of these technologies in schools and universities.

In the context of the 2030 Education Agenda, UNESCO reinforces the importance of inclusive and quality education for global sustainable development.

> The role of AI in this process is twofold: on the one hand, it can facilitate access to knowledge and improve the efficiency of educational processes; on the other, it requires careful adaptation of pedagogical policies and practices to ensure that its use does not compromise fundamental humanistic values. AI integration must always be aligned with the principles of gender equality and cultural diversity, with special attention to the world's most vulnerable regions.

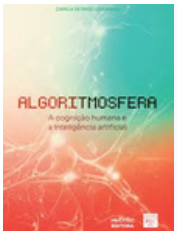
In this sense, UNESCO's documents also establish a series of guidelines for public policy makers and other players in the public debate, reinforcing the need for a broad and democratic discussion on the subject.

In September 2024, Unesco published a reference for teachers on the use of AI in education. The reference is based on the same principles that have guided the institution's documents: a human-centered approach and use guided by safety, effectiveness and ethics. The framework is organized into aspects and degrees of proficiency (acquire, deepen, create). This material can help teachers define their training needs and plan their pedagogical actions.

1	2	3	4	5
Human-centered mindset	**AI ethics**	**Fundamentals of AI and its implications**	**AI Pedagogy**	**AI for professional development**
Acquire: Human agency	Acquire: Ethical principles	Acquire: AI techniques and applications	Acquire: AI-assisted teaching	Acquire: AI for lifelong learning
Dig deeper: Human accountability	Deepen: Responsible and safe use	Deepen: Application skills	Dive deeper: AI-integrated pedagogy	Dive deeper: AI for organizational learning
Create: Social accountability	Create: Co-create ethical rules	Create: Create with AI	Create: AI-augmented pedagogy	Create: Support professional transformation

7. References to go further

BOOKS



LEPORACE, Camila. *Algorithmosphere: human cognition and artificial intelligence.* Rio de Janeiro/São Paulo: Editora PUC-Rio and Hucitec, 2024

Comment: *The book addresses the relationship between cognitive sciences and the field of AI and the idea of the extended mind. It proposes an approach where the human is highlighted in relation to intelligent systems.*

GONSALVES, Priscila. *Intelligence Beyond Artificial.* Rio de Janeiro: Editora Sextante, 2021

Comment: *The author explores the impact of artificial intelligence on various aspects of modern life, from technological advancement to its ethical and social consequences. The book addresses how AI is transforming the way we live and work, and also discusses the opportunities and challenges that arise with these technologies.*

SANTAELLA, Lucia. *Is Artificial Intelligence Intelligent?.* São Paulo: Paulus Publishing House, 2020

Comment: *The book explores the concept of artificial intelligence (AI) and its philosophical, technical and social implications. The author offers a critical analysis of what it means to be intelligent and how AI compares to human intelligence.*

ARTICLES AND REPORTS

"EdTechs must offer scientifically validated solutions" - Nejiba Belkadi - EdtechActu. Available at: https://www.edutecia.com/artigo-2024-08-31-edtech

Comment : *The article defends the importance of the participation of researchers and education professionals in the processes of creating, selecting and using EdTechs.*

Education in a scenario of platformization and data economy - CGI.BR. Available at: https://cgi.br/publicacao/educacao-em-um-cenario-de-plataformizacao-e-de-economia-de-dados/

SITES

- **Observatório Edutecia:** www.edutecia.com
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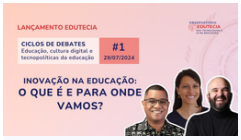
- **MEC RED:** www.plataformaintegrada.mec.gov.br
- **Watched Education Observatory:** www.educacaovigiada.org.br
- **ICT in education survey:** https://www.cetic.br/pesquisa/educacao/

VÍDEOS



Cycle of Debates on Education, Digital Culture and Technopolitics of Education - Edutecia Observatory. Available at: https://www.youtube.com/watch?v=pb4b4_MlNwo

Comment : *Our Observatory's cycle of debates on various topics on education and technology, including debates on artificial intelligence and the platformization of education.*

TECNOPOLITICS #2fifi - Can ChatGPT in schools make education worse? - Tecnopolítica Podcast. Available at: https://www.youtube.com/watch?v=02fCrdECmTY

Comment : *Sérgio Amadeu and Nelson Pretto discuss the use of Generative AI in schools, criticizing a proposal to use ChatGPT to prepare lessons. Pretto warns that this could reduce teachers' autonomy, homogenize education and make teachers' work more precarious, defending a critical appropriation of these technologies.*

Artificial Intelligence: Everything you need to know - Miguel Nicolelis - 20 Minutes Program. Available at: https://www.youtube.com/watch?v=pb4b4_MlNwo

Comment : Miguel Nicolelis addresses issues such as: the concept of Artificial Intelligence, the risk of robotization of the human mind, the precariousness of work and the concentration of profits by BigTechs with the aim of "infinite profit". He also points out the need to regulate Artificial Intelligence and what the role of the Ministry of Science and Technology should be.

[Sem. Plataformas Educacionais] Platformization of education and impacts on teaching - NICbr. Available at: https://www.youtube.com/watch?v=RqiBFpUPfSM

Comment : *Seminar on the platformization of education, impacts on teaching and the protection of rights, discusses the challenges and consequences of the use of digital platforms in teaching and issues related to the protection of the rights of those involved.*

REPORTS

"The floor of the AI Factory" - Intercept Brasil. Available at: https://www.youtube.com/watch?v=F0M9OH5n-hg

Comment : *The Intercept reports on the workers behind the training and operation of intelligent systems, known as click farms.*

Artificial Intelligence: the successes of the professor who was called 'crazy and alarmist' - BBC News Brasil. Available at: https://www.youtube.com/watch?v=67yTnDrYG_4

Comment : *The article highlights the predictions of NYU professor emeritus Gary Marcus about the risks of unregulated AI and uncontrolled algorithms. He points out three main dangers: 1) deaths caused by chatbots, exemplified by the suicide case of a man in Belgium who interacted with the chatbot Eliza; 2) hallucinations by machines; and 3) the mass production of fake news, which could drive a post-truth era. In addition, this report draws attention to the recurring fact that researchers are stigmatized as crazy, anti-AI when they point out the problems to be considered in the development of AI.*

About the EDUTECIA Observatory

The Observatory of Technologies and AI in Education aims to bring about a debate on the present and future of Brazilian education from the perspective of new technologies. We are a network of researchers and teachers who aim to bring together all the actors in the educational field to contribute to the construction of inclusive, supportive and intelligent public policies in the field of education, technology and society.

One of the main objectives of our initiative is to provide teachers, educators, managers and pedagogues at all levels with a reference portal on the rapid evolution of educational technologies in order to form a public opinion capable of interfering in future public policies in the sector. In this sense, a second objective is to set up a permanent forum for debate, where we can bring together initiatives from various parts of Brazil on good practices in the use of technologies in education and give a voice to the actors in educational spaces. Thirdly, we also aim to produce data, mapping, research, analysis and recommendations for public policies aimed at guaranteeing the values of gratuity, quality and equity in Brazilian education.

To efficiently fulfill these three objectives, the Observatory aims to provide a critical reading of available data and reports considered relevant to provide educational agents with background information to interpret the environment in which we live.

WANT TO DEVELOP A PROJECT WITH US? BUILD COURSES, PROJECTS OR INTERNAL POLICIES FOR THE USE OF AI IN YOUR INSTITUTION? CONTACT US HERE:

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