ARTIFICIAL INTELLIGENCE IN THE ETHICS OF EDUCATION

RESEARCH BOOK

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Introduction

As the prevalence of artificial intelligence (AI) continues to grow, it is crucial to recognize the potential drawbacks associated with its advancement. The rise of AI brings with it a multitude of concerns that have profound implications for both individuals and society as a whole, highlighting the pressing need for ethical considerations in the realm of AI. It is essential to recognize that misuse of AI technology can exacerbate existing inequalities, while also acknowledging that inappropriately programmed algorithms can result in unfair discrimination against individuals, such as denying them access to vital services such as health insurance. The ethical dimension of AI therefore plays a critical role in mitigating these adverse outcomes and ensuring that the benefits of AI are leveraged fairly and equitably.

Artificial intelligence plays a prominent role in various aspects of our daily lives. Voice assistants, such as Siri or Alexa, have become commonplace and allow us to interact with technology using natural language. When we search for something on Google, the predictive search feature uses AI algorithms to anticipate and display relevant search results. Similarly, online stores employ AI to provide personalized product recommendations based on our browsing and purchasing history. Many businesses now use chatbots, powered by AI, to improve customer service and support.

AI is also at the heart of home automation systems, allowing us to control and manage various devices such as lights, thermostats, and security systems with ease. Even when we use maps for navigation, AI algorithms work in the background to provide real-time traffic updates and suggest the most efficient routes. The reason behind all these advancements is that artificial intelligence can process and analyze large amounts of data and information, mimicking human intelligence. This means that AI systems possess

capabilities such as reasoning, learning, perception, planning, prediction, and control, allowing them to perform tasks that were previously reserved for humans.

In this context, the European Union already warns in its proposed regulation on artificial intelligence that its use may have a negative impact on fundamental rights due to its characteristics (such as opacity, complexity, dependence on data or autonomous behavior).

Similarly, the Recommendation on the Ethics of Artificial Intelligence, adopted by UNESCO's 193 Member States in 2021, highlights the ethical implications of artificial intelligence in terms of its impact "on decision-making, employment and work, social interaction, healthcare, education, media, access to information, the digital divide, consumer protection and personal data protection, the environment, democracy, the rule of law, security and policing, dual use, and human rights and fundamental freedoms, including freedom of expression, privacy and non-discrimination."

In this sense, the comprehensive Law 15/2022 on Equality and Non-Discrimination represents the first regulatory approach in Spain for the use of artificial intelligence by public administrations and companies. Administrations and companies will also promote the use of artificial intelligence that is "ethical, reliable and respectful of fundamental rights."

Chapter 1

Evolution of artificial intelligence (AI) since Turing

Throughout history, humans have longed for the ability to create beings similar to themselves. They have strived to develop artifacts that not only look like humans, but also move and behave like them. One person who delved deeper into this concept was the Russian writer and historian Isaac Asimov. Born in 1920 and died in 1992, Asimov explored the realm of science fiction, imagining objects and scenarios that seemed far-fetched at the time. However, as time went on, many of his ideas became reality.

In his book Runaround, Asimov presented what are now known as the three laws of robotics. This literary masterpiece served as a catalyst for scientists and engineers, igniting their desire to bring these laws to life. A major breakthrough came in the 1950s with the development of the Rossenblatt perceptron. This revolutionary system focused on visual pattern recognition, aiming to solve a wide range of problems. Unfortunately, the initial enthusiasm surrounding this achievement quickly faded.

Meanwhile, around this time, the English mathematician Alan Turing, who lived from 1912 to 1954, proposed a test to determine the presence of "intelligence" in non-biological devices. This test, known as the "Turing test", was intended to prove the existence of artificial intelligence. Edward Feigenbaum and his team of researchers began developing expert systems to solve everyday problems. These systems aimed to address more concrete and practical issues, laying the groundwork for the field of expert systems.

Then in 1957, Alan Newell and Herbert Simon created a program called GPS (General Problem Solver) while working on theorem proving and computer chess. This program allowed users to define an environment with objects and operators, separating the problem information from the strategy used to solve it. Although GPS could solve

certain problems such as the "Towers of Hanoi" problem, it was unable to address real-world problems or make important decisions. It relied on heuristic rules and trial and error to achieve the desired results. The first expert system, Dendral, was built in 1967 and served as an interpreter of mass spectrograms. However, the most influential expert system turned out to be Mycin, developed in 1974.

Mycin had the ability to diagnose blood disorders and prescribe appropriate medication, making it a remarkable achievement for its time. These expert systems even found practical applications in hospitals, such as the Puff system. Overall, these advancements and contributions by various researchers and scientists have paved the way for the development of intelligent machines and artificial intelligence systems in the field of computer science. Alan Turing made two major contributions in this field. First, he designed the first computer capable of playing chess, which was a groundbreaking achievement. Second, he established the symbolic nature of computer science, highlighting the fundamental principles underlying this field.

In 1958, John McCarthy developed a programming language known as LISP while working at MIT. LISP, derived from "LISt Processing", is still in use today and is particularly known for its utilization of linked lists as important data structures. According to Alan Turing in 1950, if a machine exhibits intelligence in all aspects, then it can be considered intelligent. This statement led to significant focus by researchers at the time on the development of artificial intelligence linguistic systems, also known as "chatbots". It marked the birth of these chatbots and sparked a great interest within the scientific community for the creation of intelligent machines. In 1965, Joseph Weizenbaum created the first interactive program called ELIZA. It allowed users to engage in written conversations with a computer in English, marking a significant advancement in the field of natural language processing.

1.1 AI: Models

Within the scope of Artificial Intelligence models there is a classification system based on the objective and operation of the system. Initially, these classes were considered separate entities, but as time went by, characteristics have been mixed between them:

- The concept being explored is the idea of developing systems that are capable of thinking and reasoning in a manner similar to the human mind. Researchers are attempting to understand the inner workings of the mind through psychological experimentation, with the goal of creating computational models based on their findings. The field of cognitive science plays a major role in shaping this research, as it provides insight into how the human mind works. A notable example of this research is the General Problem Solver (GPS), developed by Newell and Simon in 1963. Unlike traditional problem-solving systems, the focus of the GPS was not solely on finding the correct solution, but rather on understanding the reasoning behind the answers provided by the system. It is important to note that while computers are used in this research, most of the studies are conducted on humans and animals in order to gain a deeper understanding of cognitive processes.

- The concept of building systems that emulate human behavior serves as the foundation for the development of artificial intelligence. The ultimate goal is to create a system that can successfully pass the Turing Test, which determines whether a machine possesses human-like intelligence. This requires the incorporation of various capabilities such as natural language processing, knowledge representation, reasoning, and learning. However, it is critical to note that while passing the Turing Test is a major achievement, it is not the only goal of

AI. The ability of these systems to seamlessly interact with people requires their ability to mimic human actions and responses. Therefore, the focus is not only on achieving intelligence but also on ensuring that these systems can effectively emulate human behavior.

- Systems that possess the ability to think rationally rely on the laws of logic, specifically Aristotle's syllogisms. Intelligent programs rely heavily on formal logic as a foundation, a concept known as logicism. While there are two major challenges that hinder progress in this field. First, effectively formalizing knowledge proves to be an incredibly challenging task. Second, there is a substantial gap between the theoretical potential of logic and its practical application. Expanding on Aristotle's syllogisms, predicate logic plays a crucial role in this endeavor, further reinforcing the importance of logic as a fundamental pillar of this intellectual quest.

- Acting rationally involves the process of achieving goals based on a set of beliefs. This concept is commonly applied to various robotic systems, where the rational agent serves as the paradigm. The primary function of the agent is to perceive its environment and respond accordingly, consistently considering the context in which it operates. To perform its function effectively, the agent must possess essential capabilities such as perception skills, natural language processing skills, knowledge representation, reasoning capabilities, and machine learning capabilities. It is important to note that the agent's performance is not solely focused on imitating human behavior, but on achieving optimal outcomes in a broader sense.

1.2 Turing Test

The Turing test, proposed by Alan Turing in 1950, aims to provide a means of assessing Artificial Intelligence. To be considered intelligent, a being or machine must successfully fool an evaluator into believing that it is a human being, demonstrating the full range of cognitive abilities that humans possess. According to Turing, if a machine is able to engage in dialogue and make a similar number of errors as a human in communication, it can be considered "intelligent".

Today, the task of programming a computer to pass the Turing test is complex. The computer must possess several key capabilities:

- First, it must be able to process natural language, allowing it to communicate effectively in any human language, be it Spanish, English, or another language.

- Secondly, you must have the ability to store and access knowledge, using a database to receive and retain information.

- Third, the computer must possess the ability to reason automatically, using stored information to answer questions, draw new conclusions, and make decisions.

- Finally, you must be capable of self-learning, which will allow you to adapt to new circumstances.

This self-learning process also leads to self-assessment. The Turing Test sets a high standard for assessing artificial intelligence, requiring machines to possess a variety of complex capabilities in order to convincingly mimic human intelligence. To pass the full Turing Test, a computer must also be equipped with visual and robotic capabilities. Vision allows a machine to perceive objects in its environment, while robotics allows it to manipulate the objects it has perceived.

1.3 Programming languages

A programming language serves as a human-caused means of communicating commands to a computer. While it is possible to use any computational language to create artificial intelligence tools, there are dedicated tools that are specifically designed to assist in the development of intelligent systems, among the most prominent of which are:

- IPL-11 is known to be the pioneering programming language designed specifically to address the challenges of Artificial Intelligence. Newell and Simon used IPL for the development of GPS (General Problem Solver) in 1961. The credit for inventing this programming language goes to Herbert Simon, physicist Allen Newell, and J.C. Shaw, who collaborated to create it in 1955. Soon after, these three brilliant minds created the "Logic Theorist," which served as a precursor to GPS. The Logic Theorist possessed the remarkable ability to prove a wide range of mathematical theorems. It is widely recognized as the first program intended to simulate human problem-solving abilities.

- Lisp, which stands for LISt Processor, is a programming language that has a rich history and continues to be actively used today. It was originally developed by John McCarthy and his colleagues at the Massachusetts Institute of Technology in 1958, making it one of the oldest programming languages still in use. One of Lisp's notable contributions to the field of programming is the introduction of tree-like data structures. These structures allow for efficient organization and manipulation of data, and Lisp relies heavily on them. In fact, Lisp programs are composed of lists, making the language unique in its ability to treat source code as a data structure. This feature has given rise to powerful macrosystems, which allow programmers to create new programming language syntaxes tailored to specific

domains within Lisp itself. As a pioneer in symbolic processing, Lisp has the distinction of being the first language designed for such purposes.

- Prolog is a programming language that derives its name from the acronym PROgramming in LOGic (PROLOG). Unlike many other programming languages, Prolog is specifically designed to solve problems involving predicate calculus. This unique purpose arose from Alain Coulmeauer and Philippe Roussell's interest in developing a tool that could make inferences from text. The first complete description of Prolog was presented in 1975 as a manual for the Marseille Prolog interpreter, written by Roussel. A more recent paper titled "The Birth of Prolog" was written by the language's creators in 1992, which provides a broader perspective on the origins of Prolog.

- OPS5, also known as Official Production System 5, is a programming language designed specifically for cognitive engineering. It allows for the representation of knowledge through the use of rules. While it may not be as widely recognized as other programming languages, OPS5 has the distinction of being the first language successfully used in the development of expert systems. It is part of the OPS family of languages, also known as Official Production System, and was created by Dr. Charles Forgy in the late 1970s. The fundamental algorithm of OPS5, known as the "Rete Algorithm", serves as the basis for many current systems. Dr. Charles Forgy introduced this algorithm as part of his doctoral thesis in 1979.

- Small Talk is the result of extensive research aimed at designing a computer system specifically adapted to the field of education. The main objective was to create a system that would encourage and enhance the creativity of its users, providing them with an environment conducive to experimentation, creation and research. This language, developed under the direction of Alan Kay, was an innovative

effort in the quest to create a truly complete "personal computer". Its origins date back to Kay's doctoral thesis, which he completed as a student at the University of Utah in 1969.

This language not only introduced a visually appealing and easy-to-use development environment, but also revolutionized the programming world by introducing the concept of objects and fundamentally changing existing programming paradigms. While there are certain shared customs and general steps in application development among programmers, working with Smalltalk is a highly personalized experience, with each individual configuring the environment and using the tools in his or her own way. This language completely disrupts the traditional write/compile/run cycle, replacing it with an interactive and creative process. In Kay's own words, "The purpose of the Smalltalk project is to provide computational support for the creative spirit that resides in every person" (Ingalls, 1981). The ideas and principles employed in the development of Smalltalk serve as the foundation for modern object-oriented programming (OOP), although it took several years for OOP to gain widespread popularity. In addition, Smalltalk played a pioneering role in the development of graphical user interfaces (GUIs), paving the way for the sophisticated interfaces we see in today's software applications. In particular, Kay continues to be involved in the development of Smalltalk through open source initiatives such as Squeak and Croquet.

- Logo: Seymour Papert, a mathematician and educator from South Africa, collaborated with renowned educator Jean Piaget at the University of Geneva from 1959 to 1963. Following this, Papert moved to the United States of America where he crossed paths with Marvin Minsky, a highly dedicated scientist in the field of

artificial intelligence during that era. Together they co-founded the MIT Artificial Intelligence Laboratory. Through collaboration with de Bolt, Beranek, and Newman, led by Wallace Feurzeig, Papert's work resulted in the creation of the initial version of Logo in 1967. This programming language, which is based on Lisp, incorporates numerous concepts associated with constructionism. Renowned for its user-friendly nature, Logo has become a preferred tool for engaging children and young people in programming. According to Harold Abelson, "Logo" encompasses both a philosophy of education and a continually evolving family of programming languages that contribute to its implementation." One of the primary goals of this language was to establish a means for effective interaction between humans and computers.

1.4 Applications

The first successes in AI research can be seen in the field of language. One example of global recognition is the program called "Eliza," developed by Professor Joseph Weizenbaum at the Massachusetts Institute of Technology between 1964 and 1966. Eliza, one of the first programs to process natural language, attracted the attention of both supporters and skeptics of AI. Weizenbaum aimed to create a program capable of engaging in coherent text conversations with humans.

This famous demonstration simulated the renowned psychologist Carl Rogers, who contributed to the development of person-centered therapy. Weizenbaum also expressed his concerns about AI in his book "Computer Power and Human Reason," highlighting the potential loss of civil liberties if AI is not used responsibly, despite its enormous opportunities. Another area where extraordinarily successful AI applications

occurred was the natural sciences. These applications paved the way for the principles of storing and manipulating knowledge bases in expert systems.

An expert system is defined as a computer application that solves complex problems that would normally require extensive human expertise. One of the first expert systems, known as "Dendral", was developed by Edward Feigenbaum at the Carnegie Institute of Technology. Feigenbaum was influenced by the work of other influential researchers such as John Von Newman initially and later Herbert Simon and Allen Newell. Feigenbaum's interest in studying human mental processes was piqued when Newell announced to his class the first computer models of human thought and decision making.

Thus, the evolution of artificial intelligence has been marked by different stages, some facing skepticism and others leading to significant advances. Expert systems, language processing, and applications of natural sciences have played essential roles in the development of AI. In addition, researchers such as Weizenbaum and Feigenbaum have contributed to the field, both in terms of innovative applications and thoughtful considerations of the ethical implications of AI. Since its inception, artificial intelligence has gone through several stages, each with its own level of motivation and funding for research.

Some stages were met with skepticism about AI's achievements, while others were marked by significant breakthroughs and advances. Nevertheless, even at times when one path was closing, new opportunities emerged that allowed AI to continue progressing and yielding fruitful results. Among the prominent applications of AI, expert systems stand out as one of the most prominent products. These systems have played a crucial role in the resurgence of AI when it needed a boost. In fact, expert systems are now widely recognized as typical AI products.

Feigenbaum's team embarked on a new project at Stanford University from 1972 to 1980. This expert system introduced the use of imprecise knowledge and the ability to explain the tool's reasoning process. While Feigenbaum initially led the project, Shortliffe and his collaborators completed it using Lisp. The significance of this system lies in demonstrating the effectiveness of its knowledge representation scheme and reasoning techniques, which influenced the development of rule-based systems in both the medical and non-medical fields. Mycin, which aimed to diagnose infectious blood diseases, exemplifies the impact of this project.

Instead of focusing on decision making, Feigenbaum turned his attention to studying memorization and created a program called EPAM (Elementary Perceiver and Memorizer). A significant contribution of Feigenbaum's work in artificial intelligence was the development of "discrimination networks," which later became part of neural network research. In the early 1960s, Feigenbaum worked on an application involving a mass spectrometer and realized the need for a knowledge base to use the programs.

In 1965, Feigenbaum and his colleague Robert K. Lindsay developed Dendral, the first successful expert system, which had the ability to deduce information about chemical structures based on Feigenbaum's knowledge of chemistry. Despite criticism from some researchers who believed that Dendral's specialization in chemistry limited its usefulness, Feigenbaum was undeterred and formulated "The Knowledge Principle," which emphasizes that reasoning is useless without knowledge.

1.5 Development environments

In the 1980s, expert systems experienced great success, leading to the emergence of a new development known as shells. Shells are software programs that serve as an interface for users. Expert systems consist of two main components: a knowledge base

and an inference engine. The knowledge base contains information related to a specific problem or phenomenon, encoded using various techniques such as rules, predicates, semantic networks, and objects.

The inference engine, on the other hand, combines facts and questions using the knowledge base to generate relevant results. In the context of expert systems, a shell is a tool designed to simplify the development and deployment process. It is an "expert system" with an empty knowledge base but equipped with the tools necessary to populate the knowledge base for a particular application.

Shells also provide the knowledge engineer with additional functionalities such as knowledge representation mechanisms, inference mechanisms, explanatory components, and sometimes even a user interface. These development environments have gained popularity because they allow the creation of efficient expert systems without requiring extensive programming knowledge. This has made shells a popular choice for developing expert systems in various knowledge domains.

1.6 Artificial intelligence, education and technologies: good or bad?

Are arbitrary decisions being made about our identity and our lives? Do they create violence through online gaming? Do they improve education? Do they democratize knowledge? Who holds the truth? Where is the balance? Finding answers to these questions is not a simple task. The conclusion is never simple. Technologies cannot be examined in isolation. Blaming the Internet alone for the spread of false information or hate speech overlooks the society in which this content is generated, circulated and shared.

Similarly, when it comes to AI, should we re-evaluate our education system? Should we adapt our approach to education in the face of AI? It is not just about the

content itself, but also how individuals use and share that information. In today's interconnected world, social phenomena are increasingly intertwined, and attributing responsibility to a single factor, actor, or dimension oversimplifies the issue and overlooks the intricate contexts.

For decades, and even today, there is a dichotomy in the perception of screens. They have been vilified as enemies of culture and praised as a means of democratization. Depending on one's perspective, screens can be seen as responsible for "the disappearance of childhood" or as a solution to poor educational performance, social isolation, and communication gaps within families. Despite ideological divisions, both perspectives have something in common: they are "media-centric," that is, they put excessive emphasis on media and technology in the debate, attributing to them immense power, either to destroy or to create.

The same applies to Artificial Intelligence and its impact on education. It is crucial to consider not only the technology itself but also how it is used and the context in which it operates. In our complex and interconnected world, blaming a single factor or dimension oversimplifies the issue at hand. For decades there has been a debate around the role of screens in society. Both have been denounced as detrimental to culture and hailed as a tool for democratization.

Depending on the perspective adopted, screens have either been blamed for eradicating childhood or praised for their ability to address educational failures, social isolation and communication challenges within families. Despite their different ideologies, both viewpoints share something in common: they are "mediacentric," meaning they place excessive emphasis on media and technology in the discussion, endowing them with significant power, either for destruction or construction.

Although they hold different ideological positions, both approaches share a common characteristic: they are "mediocentric", meaning that they place media and technologies at the forefront of the discussion and attribute a significant amount of influence to them (whether for destructive or constructive purposes).

The presence of screens alone does not promote individualism or sociability. They do not hinder learning or improve the quality of teaching, they are not the cause of inequality or the catalyst for democracy and equality. Technology does not isolate us or encourage participation. So where do we go from here? The key is to strive for two goals simultaneously:

- First of all, we should not blame technology alone for the spread of false or discriminatory content on social media platforms.

- Nor should we hold technology responsible for the unauthorized use of individuals' private information by companies or governments.

- Finally, we cannot attribute the design of algorithms and artificial intelligence systems that make decisions for users, discriminate, censor or perpetuate inequalities solely to technology.

Undoubtedly, technologies have a certain responsibility in all these scenarios. However, we must also consider the citizens who use these technologies and the urgent need for them to understand the social, political, economic and cultural implications that technology and the Internet have on their lives and communities. It is in this context that education plays a crucial role.

To address current problems arising from the use of the Internet, it is crucial to have a comprehensive public policy and an education system that prepares teachers and students to become responsible digital citizens. It is essential that both teachers and

students are able to identify, understand and respond effectively to the challenges presented by the Internet. They must be aware of their rights and responsibilities in the digital world and be equipped with the knowledge and skills to defend and assert them when necessary. The aim is to avoid situations where a single photo or online profile can have a detrimental impact on someone's future, or where decisions are made by algorithms or artificial intelligence systems without human intervention.

1.7 AI: meaning

In our personal lives, AI becomes evident when we capture moments through photography. The algorithm built into our smartphones can quickly identify and detect the faces of people present in the image, allowing us to conveniently tag them when sharing the photos on our social media profiles. This further exemplifies the omnipresent role of artificial intelligence in our daily activities.

The influence of AI starts from the very beginning of our day. We can tell a smart speaker to wake us up at a certain time, and it goes further by suggesting the right outfit based on the day's forecast. Furthermore, AI plays a major role in our ability to communicate effectively by providing automatic language translation and even helping us rectify our spelling mistakes. Banking institutions benefit from AI as it helps efficiently organize and manage large amounts of data. Furthermore, doctors rely on AI to screen patients and assess their potential health risks.

Artificial intelligence has seamlessly become an integral part of our everyday lives. Its presence can be observed in various scenarios such as when a camera on a road efficiently identifies a car's license plate, or when we rely on GPS technology to navigate and find the optimal route. Even when we make a phone call and encounter an automated system that claims to help us solve a problem, AI is at play. Furthermore, content

platforms leverage AI to recommend suitable movies or songs based on our preferences, and our mobile phones use AI to recognize our unique fingerprints or faces for security purposes.

Furthermore, advances in AI technology have led to the development of machines capable of making phone calls to make restaurant reservations. These machines engage in conversations that closely resemble interactions between two individuals, including natural inflections in tone, occasional hesitations, and even a hint of informality. Surprisingly, the people answering these phone calls are often unaware that they are communicating with a machine.

The sheer wonder of this technological feat is undeniably captivating, igniting our imagination and prompting us to imagine the vast possibilities such technology offers. AI robots play a crucial role in the healthcare industry, enhancing the physical capabilities of surgeons and significantly aiding in surgical interventions. Moreover, the implementation of AI systems has the potential to drive new scientific discoveries and contribute to the growth of the economy.

A notable advantage of AI is its impressive memory capacity, which enables it to handle extensive calculations and improve productivity in various job functions. A compelling example of this was demonstrated in a study conducted by the prestigious Massachusetts Institute of Technology (MIT), where researchers aimed to evaluate the impact of ChatGPT, a language-based AI system, on document preparation productivity. In this experiment, 444 people were selected to complete an online writing task, half of them used the AI system and the other half did not. The findings revealed that those who used ChatGPT exhibited faster and more accurate writing skills compared to those who did not. Consequently, the study concluded that AI significantly increased productivity by reducing the time taken to complete tasks and elevating the overall quality of work.

Chapter 2

Artificial intelligence, learning and ethics. How does it work?

For artificial intelligence to be able to perform tasks similar to a human being, it must collect and store data for future classification and organization. AI then processes this data to solve tasks, make decisions, and produce results. The AI system is fed with information, which it stores, analyzes, classifies, and organizes. Its foundation lies in data, as it identifies patterns and probabilities within that data, encodes it, processes it, and organizes it to generate a model.

This model is specifically designed to make decisions and provide answers based on specific instructions. An excellent example of how AI works is demonstrated by Internet search engines, which can predict and complete words or sentences as we type. Similarly, AI systems can assess whether a potential customer will be able to repay a bank loan before it is granted.

The underlying mechanism of artificial intelligence is algorithms, which are systematic sequences of steps that provide logical instructions for calculations, problem solving, and decision making. Algorithms serve as a means to achieve a desired result. As an example, consider a cooking recipe, which can be viewed as an algorithm since its steps are aimed at solving the problem of preparing a meal. However, a recipe alone cannot make a soup; it requires a person to read and execute the steps.

However, it is feasible to create an AI machine that incorporates this algorithm and prepares the soup automatically. Examples of AI systems include GPS, automatic language translators, and fingerprint-recognizing mobile phones, all of which have been fed data and organized into algorithms to perform specific actions such as suggesting the best route, translating text, or unlocking a screen.

Algorithms serve several purposes, one of which is to predict behaviors. This is evidenced by the algorithms developed by Netflix and Spotify, where they analyze users' preferences to suggest movies, series, or songs of interest. Likewise, language-based AI systems have become advanced enough to answer our queries and generate new content based on the information they have been trained on. These systems have become so integrated into our daily lives that we often rely on them for reminders, guidance, and decision-making. We are amazed by AI's capabilities and often idealize its benefits. However, it is important to recognize the potential dangers of naturalizing AI and algorithms without critically analyzing their design and impact. To illustrate this point, we can compare it to the story of two fish that were so accustomed to their aquatic environment that they never questioned its existence. Similarly, we have become so accustomed to AI in our lives that we rarely stop to consider its implications. We must therefore take a step back and critically examine how AI and algorithms are designed and implemented.

To fully understand the impact and functioning of artificial intelligence, it is crucial to delve into the explicit mechanisms that drive its decision-making process, particularly when those decisions directly affect our lives. It is critical to avoid falling into the trap of techno-chauvinism, which assumes that technology always provides the solutions we seek or need.

While it is undeniable that AI brings numerous benefits to our daily lives, such as advances in healthcare, the development of life-saving medicines and potential solutions to environmental problems, we must not overlook the ethical dimensions of its operation and design. It is important to recognize that there are limits to what we should do with technology, and, similarly, there are limits to what technology should do with its users. Our priority must always be to ensure that AI systems are used in ways that serve the

best interests of people, societies and the environment. Importantly, the enormous benefits of artificial intelligence are of little importance if the foundations on which it rests are shaky.

2.1 Discrimination and inequality

In contrast to the idealized image, there are growing concerns and calls for attention around artificial intelligence. While the potential of AI in our daily lives is undeniably fascinating, it is important to recognize that not everything is admirable. The design and operation of AI systems have raised global red flags and concerns. To fully understand the nature of these concerns, let's take a deeper look at how AI works.

AI relies heavily on data. It stores, organizes, and classifies this data and then uses it to build models, respond to instructions, make decisions, and produce results. To illustrate this, let us consider a simple example of an AI system designed to differentiate between apples and oranges. To train the system, we need to provide it with a dataset consisting of several images of apples and oranges. However, if we only feed the system images of red apples and not green apples, the machine learning system might infer that all apples are red. Consequently, it might not recognize a green apple as an apple due to its training. This example highlights the critical role of the training dataset in AI systems.

An alarming case from 2014 involving Amazon exemplifies the potential dangers of AI systems. The company sought to automate the process of staff recommendation and hiring by developing an AI system that would select the top five candidates for a job from a pool of one hundred resumes. However, a major problem arose when the AI system designed by Amazon programmers showed a bias against women. It failed to consider resumes from candidates who had attended women's colleges and even marginalized

resumes that included the word "woman." This incident demonstrates the serious repercussions that can arise from flawed AI systems.

The AI system is responding to the goal of differentiating apples from oranges based on the data it has been trained on. In the case of the aforementioned example, if it were fed exclusively images of red apples, it would never identify green apples as apples. While this example may seem harmless, it serves as a reminder of the potential risks associated with poor AI design. In more serious cases, AI systems that apply similarly flawed logic could lead to major problems.

The model was clearly biased against women, as it did not recommend any degree programs for women. This problem arose from the faulty data that the AI system had been trained on. Over the course of ten years, the company had hired male engineers, resulting in the models being trained only on male-focused degree programs. As a result, the AI had learned to recommend hiring only men. Since the information fed into the system was based on men's CVs, it is not surprising that it did not recognize women's CVs.

However, Amazon encountered a bigger problem along the way: a clearly discriminatory outcome against women. It is worth noting that the lack of diversity in Amazon's workforce predates the implementation of the AI system, with the majority of employees being men. While the AI system perpetuated this inequality and left no room for future change, the system's designers had created a model that maintained and reinforced inequality in hiring practices. The hiring tools of the future were being shaped by the discriminatory practices of the past and present. Consequently, the result was a discrimination machine that perpetuated itself by posing as technically neutral.

The above is not an isolated incident, as there have been other instances where AI has produced discriminatory outcomes. For example, the Wall Street Journal conducted an analysis that revealed differential pricing on Staples.com, where customers were charged varying prices for a simple stapler based on the zip code they provided during registration. Similarly, researchers at Northeastern University found that customers browsing the HomeDepot.com store were offered different prices depending on whether they accessed the website from a mobile device or a desktop computer. These examples highlight how AI systems can inadvertently amplify social inequalities under the guise of neutrality.

These examples serve as clear evidence of the biases that artificial intelligence can perpetuate. Addressing and rectifying these biases is critical to ensuring that AI systems are fair and equitable to all people. Furthermore, a recently designed algorithm produced surprising results during testing. The algorithm was given several equations to solve and correctly answered equations such as "Man is to a king what women are to a queen" and "Paris is to France what Tokyo is to Japan." However, the problem arose with the equation "Man is a computer programmer what woman is to a housewife."

The algorithm's response revealed a discriminatory result, as it had not been trained with data that included female programmers. This omission highlights how biases within AI systems can negatively impact people's lives. AI systems are known to exhibit significant racial biases, as evidenced by incidents such as the viral video of a soap vending machine in 2017. In this video, the machine consistently dispensed soap when a white person placed their hand underneath it, but failed to do so when a black person repeated the same action. This discriminatory behavior persisted even after multiple attempts, indicating that the AI system behind the machine was designed with incomplete and flawed data, leading to biased and racist results.

Banks use algorithms to enable AI systems to make predictions about loan approvals and rejections. Similar to the situation with Amazon and its resume screening tool, banks provide AI with data and information about people who have been granted loans in the past and then ask the system to analyze and classify this information. The goal is to generate a model that can be used to determine whether to approve or reject future credit applications.

Unfortunately, in the United States, problems arose with this AI system designed specifically for banks. It was discovered that the data fed to the AI was based on people who had already received loans from the bank, most of whom were white and belonged to the economic middle class. As a result, when Black, Indigenous, and poor people applied for loans, they continued to be disproportionately rejected. This was mainly due to the fact that historically, very few of these people had been granted loans.

Facial recognition systems also pose risks of bias and discrimination. Security agencies such as the U.S. Transportation Security Administration developed programs like SPOT to monitor travelers' facial expressions after 9/11, with the goal of automatically identifying potential terrorists. However, this approach relies on 94 criteria that indicate stress, fear, or deception. Unfortunately, people who are naturally stressed, uncomfortable with questioning, or who have negative experiences with law enforcement or border control may be unfairly disadvantaged and receive higher scores.

One of the risks inherent to facial recognition systems is the scarcity of data available to train them and their inability to consider contextual factors. They simply capture a snapshot of the moment, without considering the nuances of individual situations. The impact of AI on perpetuating inequality is a complex issue that is often difficult to fully understand.

A major challenge is that people who are denied loans, for example, may never utterly understand why their application was rejected or realize that the decision was made by an artificial intelligence system operating on biased models and designs. In 2023, Human Rights Watch, a prominent human rights organization, revealed that a World Bank-funded algorithm known as Takaful was excluding eligible families in Jordan from receiving financial aid. Takaful classifies families based on 57 socio-economic indicators, but applicants argue that this calculation does not accurately reflect their economic circumstances and oversimplifies their situation, leading to unfair and inaccurate results.

The algorithm's reliance on indicators such as water and electricity consumption, which do not necessarily correlate with poverty, further highlights the system's flaws. Some families even believed that owning a car, regardless of its age and need for work, negatively affected their ranking. Human Rights Watch found that the algorithm's statistical objectivity masks a more complex reality, where economic struggles and efforts to overcome them are often invisible to the algorithm.

Artificial intelligence (AI) has a significant impact on people's daily lives, often exacerbating inequalities and perpetuating inequality. Its influence can be seen in a variety of aspects, such as determining visa approval, assessing bank loan applications, selecting job candidates, awarding student scholarships, and allocating social subsidies to low-income individuals.

This influence is particularly worrying due to the fact that AI systems rely on incomplete or erroneous data, which can lead to discriminatory outcomes. Recognition of these biases has led 193 countries around the world to sign a Recommendation on the Ethics of Artificial Intelligence, prepared by UNESCO in 2021. The agreed document recognizes that while AI technologies can bring immense benefits to humanity and all countries, they also raise significant ethical concerns. One such concern is the potential to

embed and exacerbate biases, leading to discrimination, inequality, digital divides, exclusion, and posing threats to cultural, social and biological diversity, as well as creating social and economic divisions.

Artificial intelligence (AI) has the potential to reproduce and perpetuate existing inequalities and is far from the neutral and objective entity it is often perceived to be. AI systems are not simply mathematical tools, but rather social actors that can be influenced by discrimination and prejudice. Despite claims of objectivity, algorithms can shape meaning and make controversial decisions.

The effectiveness of AI depends on the quality and biases present in the training data it is exposed to. The decisions and intentions of the company behind the AI system play a crucial role in its design. Training data acts as a basis for AI predictions and shapes its perception of the world. However, simplifications made by machine learning systems can lead to serious inconsistencies.

This becomes problematic when AI systems make discriminatory classifications and labels that directly impact people's lives, reinforcing prejudices and stereotypes. It is clear that artificial intelligence is not neutral. Biased training data can lead to erroneous and discriminatory results. For example, if an AI algorithm consistently associates certain characteristics such as gender, social class, age or ideology with ineligibility for bank loans, it is engaging in discrimination.

Studies have shown that AI algorithms can also influence future opportunities and careers by selectively presenting job offers to certain people based on their educational background. It is therefore crucial to critically examine the ethical dimension of algorithms, including their construction, ranking methods, and biases. These rankings

always carry values, and when they perpetuate discrimination, they distort our perception of reality.

2.2 Arbitrary decisions

In September 2016, a well-known Norwegian writer named Tom Egeland caused a stir on social media when he shared a famous photograph from the Vietnam War on his Facebook page. The image, taken in 1972 by AP news agency reporter Nick Ut, captures the harrowing moment of a 9-year-old girl running naked from a napalm bombing carried out by the US Army on her village. This powerful photograph, known as "The Napalm Girl," won the prestigious Pulitzer Prize and has become one of the most iconic images of the 20th century.

Egeland's intention in sharing this photo was to shed light on the horrors of war, specifically the unimaginable suffering endured by innocent children. However, Facebook's algorithm, designed to detect and remove inappropriate content, flagged the image due to the girl's nudity. Egeland's profile was consequently suspended, sparking outrage across Nordic society. Many saw Facebook's actions as a form of censorship, an attempt to silence an important historical document.

The outcry against Facebook's decision grew even more when Aftenposten, one of Norway's most widely read newspapers, decided to stand in solidarity with Egeland and published the same photograph on its own profile. Within hours, the newspaper received an email from Facebook demanding the removal of the image. This prompted Aftenposten's editor-in-chief, Espen Egil Hansen, to address Mark Zuckerberg directly in an open letter printed on the newspaper's front page. In his letter, Hansen expressed his refusal to comply with Facebook's request to remove the photograph. He criticized

the social media giant for limiting freedom of expression rather than supporting it and condemned its authoritarian approach.

This bold move inspired others in Norway to follow suit, sharing the image on their own platforms, only to be met with the same demands from Facebook to remove it. The company justified its actions by citing its policy against posting explicit content. The incident involving the "Napalm Girl" photograph and Facebook's response sparked an important debate about the power and responsibility of social media platforms in policing the content shared by their users. It also raised questions about the balance between protecting users from harmful or offensive material and preserving the right to freely express important historical events.

The issue in question received significant attention, leading even Norwegian Prime Minister Erna Solberg to express her concern about it. Solberg took to her social media account to express her disagreement with Facebook's decision to censor photographs like the one in question. In her post, she emphasized the significance of the image, stating that it holds a place in universal history as it captures the heartbreaking reality of a young girl fleeing the horrors of war.

To further emphasize her point, the Prime Minister shared the iconic photograph along with her words. In her closing remarks, Solberg highlighted how acts such as Facebook censorship only serve to limit freedom of expression. However, following a massive public outcry, the company eventually rectified its stance, reversing its decision and reinstating both the censored images and the deleted accounts of the people who had shared the photograph. This incident serves as a clear and serious example of the potential dangers associated with algorithms and artificial intelligence systems. Rather than being neutral, these systems are designed with certain biases and their decisions can

have far-reaching consequences, even affecting the very foundations of democracy, as this particular case demonstrates.

A similar incident occurred on Instagram with a promotional poster for Pedro Almodóvar's film "Madres separadoras." The film focuses on the story of Janis and Ana, two women who meet in a hospital room where they are about to give birth. The poster showed a nipple with a drop of milk, which Instagram deemed "erotic or pornographic content." Surprisingly, Instagram removed all posts featuring the poster, including those by its own designer, Javier Jaén.

Jaén expressed her disappointment and re-shared the image, highlighting the absurdity of the situation. She argued that Instagram was wrong to label her work as dangerous and pornographic, as it simply depicted a natural and universal image associated with birth. Instagram defended its decision by stating that its technology cannot recognize context. However, this argument is insufficient to justify the ban, as the algorithm must be trained to understand context.

Instagram eventually apologized and reinstated the posts, allowing the poster to be shared on the platform. However, Instagram's initial decision, similar to Facebook's with the Norwegian writer, had broader implications. It posed a risk to democracy and individual freedoms, as it restricted the dissemination of art and ideas. This incident serves as a reminder of the power and responsibility social media platforms have in shaping public discourse and the need for them to strike a balance between regulating content and preserving freedom of expression.

In another incident, Guardian journalist Carole Cadwalladr shed light on the potential dangers of search engine algorithms. In her article, she recounted an experiment in which she typed "Did the Holocaust happen?" into Google's search engine. To her

surprise, Google automatically completed the phrase with "Did the Holocaust happen?", leading her to a list of online pages. The first link she found was from a neo-Nazi website called "Stormfront," which claimed that the Holocaust never happened.

This discovery raised concerns about the way search engines prioritize and present information. It highlighted the need for algorithms to be more discerning and cautious to prevent the spread of misinformation and hate speech. The Cadwalladr experiment emphasized the potential consequences of relying solely on technology without considering the context and implications of the information being shared. It serves as a reminder that platforms like Google must take responsibility for curating accurate and trustworthy content to ensure the dissemination of truthful information.

Many people tend to rely solely on the first search result they find when using a search engine. They often hesitate to explore additional websites that might offer different perspectives or content to compare. This behavior stems from the belief that the top-ranked result has the most authority and expertise on the given topic. However, it is important to recognize that the top listing is often determined by those who have paid for priority placement, rather than being a true reflection of credibility.

Google's algorithm, which determines how websites are ranked, is designed with its own economic and commercial interests in mind, which may not coincide with the best interests of users. While Google claims to operate neutrally, its prioritization of content involves subjective decision-making. This is worrying when one considers that most users tend to stick with the first link they find, which could lead them to unreliable sources, such as a neo-Nazi movement. Such a hierarchy based on economic factors poses significant risks. The potential consequences are evident when a person unquestioningly accepts Holocaust denial thanks to Google's ranking system. Google plays a role in shaping the world not only by presenting it but also by actively participating in its

creation. The lack of transparency regarding the methods used to rank websites prevents us from assessing whether Google truly serves the interests of users or is biased in favor of its own commercial goals. The company has the ability to hide specific content that it deems undesirable for users to see.

By prioritizing certain content, we are no longer making objective decisions. This is worrying when you consider that most users tend to stick with the first link they find, even if it leads to a neo-Nazi movement. The hierarchy and ranking system employed by Google could pose serious risks if biased or misleading information is prioritized. Unfortunately, Google does not disclose the methods behind its decisions and rankings, making it difficult to determine whether it is truly serving users' interests or simply promoting its own commercial agenda. This lack of transparency allows Google to hide content that it deems unfit for users to view.

This issue becomes even more problematic when you consider that this hidden content often ends up being placed at the bottom of search results, where people rarely land. The influence of AI systems goes beyond search engines and extends to browsers and social media. These systems make decisions on our behalf, dictating what we can and cannot share, as well as what we can and cannot view. This significantly impacts our perception and understanding of the world, as these systems shape our reality by offering us curated selections and hierarchies. For example, how does Netflix's recommendation system determine which movies or series to suggest? How does Amazon prioritize certain books in our searches? Why do Facebook and Twitter highlight specific stories and news on our profiles over others? These are questions that need to be answered in order to fully understand the extent of AI's influence on our lives.

2.3 Fingerprints

Artificial intelligence relies on data to function, data that includes the information shared daily on the Internet. Data serves as a source of information and can be seen as a unique digital fingerprint. Our online activities, such as Internet searches, music preferences and movie choices, as well as our interactions on social media, reveal aspects of our lives and privacy is no longer guaranteed.

The Internet has become the platform for our private lives and now occupies the public domain. In today's society, value lies in personal display and the desire to be noticed and acknowledged. The Internet has created a culture that emphasizes visibility and constant connectivity. This new order, driven by technology, prioritizes being seen and sharing experiences. It has become a common belief that if an experience is not shared and does not contribute to the global exchange of information, it loses its meaning.

The proliferation of screens allows individuals to put themselves on display and serve as proof of their existence. The mantra of the 21st century could be summed up as "I show, therefore I am." Every action taken on the Internet leaves a digital footprint, encompassing websites visited, videos or photographs viewed, created and shared, comments made, friends contacted, searches performed, articles read and even music and movies enjoyed. For many, digital identity is more revealing than their real-life persona, reflecting their true interests, concerns and motivations behind specific Internet searches. Importantly, this digital footprint is public and accessible to anyone, making it difficult to erase or hide. It has the potential to persist indefinitely.

Our fingerprints are meticulously recorded and documented, and tech companies act as observers and exploiters of this information. They foster and promote this visibility because their algorithms and AI systems thrive on the traces we leave on the internet.

YouTube's famous slogan, "record yourself" or "stream yourself," exemplifies this mindset.

Through sensor networks, surveillance cameras, and website cookies, tech companies constantly monitor and learn about our driving habits, reading preferences, web searches, hobbies, medication use, and various other aspects of our lives. Oddly enough, we remain oblivious to how these companies use this knowledge to influence our daily decisions, as well as those made by other companies.

The more we rely on search engines and social media platforms to satisfy our wants and needs, the more power and influence these entities will have in our lives. Their real strength lies in their ability to include, exclude and sort information. Their motto seems to be "tell us everything, don't hold back. The more you reveal, the better we can help you. And it won't cost you anything!" However, this notion is nothing more than a myth. Every click we make on the web has a price. In fact, the footprints we leave on the Internet are a source of economic profit. Behind every click lies a technology company armed with programs, algorithms and artificial intelligence systems that calculate how to best use and sell this information to interested parties, whether to offer products, services or ideas.

All of this happens even without explicit permission from the user. Most people are unaware of how their fingerprints are used and how they shape their digital profiles and identities. Very few people realize that a simple "like" on Facebook has the potential to hinder future job opportunities. Tech companies design artificial intelligence systems that, based on our own data, can recommend movies or decide whether to hire us.

Facebook defines our essence, Amazon determines our desires, and Google shapes our thoughts. These entities shape our opportunities. Our online activities are

meticulously studied by algorithms, allowing us to better understand users and offer personalized services, products, and ideas based on their digital identities. That is why it is often said that there is no such thing as a free Internet. Someone always bears the cost, and in this case it is the user themselves who pays with access to their data and private life in exchange for the supposedly "free" digital services they receive and use. Information therefore becomes one of the most valuable assets offered by people when they browse the online world. All users will voluntarily give up their data in exchange for these "free" digital services.

In today's digital age, people willingly give up their private information in exchange for various forms of gratification. Whether it's the desire to improve physical well-being or to maintain constant communication with loved ones, people are often willing to overlook the potential risks associated with sharing personal information. The prevalence of social media platforms further exemplifies this phenomenon, as people willingly divulge sensitive details, such as photographs, locations, and personal information, in exchange for social validation and approval in the form of likes and comments.

This trend is further accentuated by the staggering sales figures for smart speakers, which reached a global total of 147 million units in 2019. However, it is worrying that a significant portion of those who buy these devices are unaware of the extent to which their conversations are being recorded and the purposes for which this information is being used.

The collection of data about people's online behavior and identity by social media and search engines is an ongoing and significant process. Simply being connected to a digital device allows these platforms to collect information about users, including their

preferences, identities and desires. Our online presence not only grants us access to vast amounts of information, but also transforms us into data sources.

This understanding has been emphasized through the prevalence of free social media and apps, where it has become clear that when something is offered for free, it often means that we are the ones being exploited. In exchange for the services provided by these companies, we unwittingly contribute to their profits by giving them our attention, which can be sold to advertisers, as well as our personal data, which feeds their algorithms. This same pattern is now being repeated with AI bots, albeit on a larger scale and with new complexities. Even though many users are unaware of how tech companies use their personal information, they cannot ignore this mechanism. Arguing that one does not care about the right to privacy because one has nothing to hide is like saying that one does not care about freedom of speech because one has nothing to say.

Companies accumulate immense amounts of knowledge about us, but unfortunately it is not for our benefit. Mark Zuckerberg, the founder of Facebook, once boasted that the platform would eventually know every book, movie, and song a person had ever consumed in their life. Furthermore, Facebook's predictive models would even suggest which bar to visit when a person arrives in a new city. Our personal information becomes the main source of income for technology companies, who often sell this data to public or private entities upon request. For example, the supermarket that appeared on my screen with its offers while I was reading the newspaper paid the search engine to access my user and consumer profile. It is important for all people to understand the information that technology companies possess about them, the reasons for its collection, the authorization process, and how it is used.

The extent to which tech companies can gather knowledge about us is quite significant, particularly through our online activities and clicks. In fact, they can even

predict our behaviors with a high degree of accuracy. For example, a study conducted on a social network that counted 90,000 users revealed that the company's algorithm was able to predict people's responses without any errors. This was achieved by analyzing the "likes" that users gave to various web pages, images, and videos to which they were exposed. Surprisingly, the social network's algorithm outperformed even coworkers in terms of response predictions, requiring only 10 "likes" to surpass its accuracy.

It took 70 likes to beat friends' predictions, 150 to beat family members, and 300 to beat spouses. Another example is Netflix, which stores vast amounts of information about millions of users. This includes their preferred film genres, the series they watch, the time of day they choose to watch, their viewing habits (such as fast-forwarding or rewinding), the time it takes them to finish a show, and the devices they use to view. All of this data is collected, stored, and used by the platform. Today, access to big data is highly valued as a reliable source of information. Indeed, the economy is based on collecting data about people's desires in order to make informed decisions based on this information.

Other people accessing the same online newspaper may not find the promotional offers from my local supermarket at the bottom of their screen, especially if they reside far away. Instead, they will be exposed to different advertisements that are tailored to their preferences based on their Google searches or information they have shared on their social media platforms. For example, if they have collected data about Rio de Janeiro by reading news or performing online searches, they will undoubtedly receive advertisements related to tourism agencies, flights, hotels, and tours in this Brazilian city. This fact is the result of a crucial mechanism employed by algorithms and artificial intelligence systems that analyze user data, known as personalization.

Personalization in search results is vital for businesses to ensure their financial success. The more detailed a user's profile is, the more effective the algorithm and AI

system will be, and consequently, the more profitable the sale of that user's profile will be to those interested in targeting that particular type of customer. A candy manufacturer or retailer, for example, would be willing to pay a higher price for a list of people who have searched for the term "chocolate" on Google. This is precisely what AI and the algorithm strive to create and sell. However, the personalization generated by algorithms and AI systems can lead to significant social risks and problems, such as the formation of digital bubbles.

A digital bubble refers to the realm of personalized messages and content that users receive while browsing the Internet, which caters exclusively to their specific interests. Consequently, individuals only encounter content that aligns with their own perspectives, preferences, and beliefs, while content that contradicts their views is filtered out. This phenomenon effectively isolates users within their own bubbles, where they only interact with like-minded individuals who share similar tastes and interests. Over time, this can result in confirmation bias, which is the tendency for people to seek out and select information on the Internet that confirms their existing beliefs, thereby reinforcing their own preconceived notions.

Digital bubbles create barriers that prevent the free flow of ideas and hinder the exchange of knowledge between people who have different perspectives. These bubbles effectively segregate people with contrasting viewpoints, and only allow those who share the same ideas and concerns to interact within them. Consequently, users within these bubbles tend to ignore content that does not align with their own beliefs, leading to a reduction in their understanding and decision-making ability.

Within these isolated bubbles, individuals are exposed only to a limited range of news and information that caters to their specific interests, thereby impoverishing their knowledge of broader social issues. In a participatory democracy, it is crucial that citizens

stay informed about social problems, even if they have not initially expressed interest in them. Issues such as malnutrition, poverty, illiteracy, immigration and the situation of the disabled affect the whole of society and require the attention of all individuals.

Algorithms should not have the authority to exclude such important topics simply because an individual showed no interest in them. In a complex world, all aspects of life are interconnected and have an impact on our lives, even those issues that may not be immediately relevant to our personal concerns. Therefore, it is essential for democracy to foster individuals who are able to think beyond their own interests.

Unfortunately, the way social media sources such as Facebook or Twitter work perpetuates this problem. The news and information people find on their profiles are tailored to their interests, based on their online activities or the preferences of their friends and contacts. As a result, individuals perceive and construct a biased reality that is influenced solely by the concerns of their social media connections or by what algorithms have determined may interest them based on their previous searches. These algorithms, designed to keep individuals within their own digital bubbles, pose a serious threat to society, as they undermine the principles of pluralism, diversity and coexistence of different viewpoints that are fundamental to a healthy democracy.

According to UNESCO, a lack of transparency in AI tools leads to a lack of understanding of the decisions it makes by individuals. It is important to note that artificial intelligence is not impartial and can produce discriminatory or biased results. This highlights the need for transparency and understandability in how algorithms operate and the data on which they are trained. While ethical concerns should not impede progress and innovation, they should foster opportunities for ethically conducted research and innovation that align AI technologies with human rights, fundamental freedoms, values, principles and moral and ethical considerations.

It is crucial that the development and use of these technologies be guided by sound scientific research and ethical analysis and evaluation. Today, no one can ignore artificial intelligence. No one can claim indifference or disinterest because they do not personally use it. AI has already become an integral part of our lives and plays an important role in making numerous decisions.

Chapter 3

What does artificial intelligence do?

Artificial intelligence language systems have sparked a global controversy and sparked intense debate. One area of particular interest is AI's groundbreaking ability to generate stories, which initially seems very appealing. In fact, this phenomenon is already happening around the world. A man named Tim Boucher from the United States, for example, has astonishingly claimed to have written almost 100 books using artificial intelligence. These books are priced between $2 and $5 and took him between 6 and 8 hours, with some even being produced in as little as 3 hours. As of 2023, Boucher claims to have written a staggering 97 books with the help of AI. However, specialists around the world have begun to raise doubts and pose thought-provoking questions. Yuval Harari raises the question of whether we can imagine a world where AI creates texts, songs, and even TV series. The implications of such a reality are beyond our understanding. The consequences of artificial intelligence dominating and shaping culture are uncertain and potentially profound.

British musician Nick Cave expressed outrage when an artificial intelligence language system, ChatGPT, created a song that he found flawed. Cave argues that songs are born out of human suffering and the intricate internal struggles that come with creating art. "As far as I know," Cave concludes, "algorithms don't feel or suffer." Journalists also point out that AI, which is unaffected by illness, uninterested in pay rises and unconcerned with vacation time, can produce articles that would take humans hours to write in just a few seconds.

These articles are accurate but lack the warmth and wit that human creativity brings. In 2023, Hollywood screenwriters went on strike for the first time in response to

the perceived threat that AI could replace their work. The union, which represents 11,500 screenwriters in the North American audiovisual industry, firmly maintains that art cannot be created by a machine. Filmmaker and screenwriter Eric Heisserer claims that the heart and soul of storytelling would be lost if AI took over. Heisserer further protests against the use of scripts written by union members to train artificial intelligence systems. Among the screenwriters interviewed, only a few can imagine the idea of AI effectively doing their job. However, the mere fact that studios and platforms are willing to explore this possibility is distressing to them. They fear that executives will compromise creativity for the sake of profitability.

Even though AI is capable of doing 99% of a job competently, that doesn't mean it can do it flawlessly. There are certain cases where that remaining 1% can make a significant difference, such as distinguishing between simply serving a customer by selling empanadas (a task a robot can easily perform) and providing companionship to someone who may be feeling lonely.

It is important to recognize that AI has its limitations. AI language systems act as conversational agents, engaging in dialogue, exchanging ideas, generating texts, offering advice, suggesting options, making decisions and influencing our behavior. However, can these capabilities have an impact on democracy? This is a question that experts in the field have attempted to answer. They argue that it could pose a threat to democracies as democracy is fundamentally based on public conversation. Democracy thrives when people converse with each other. If AI were to dominate these conversations, democracy as we know it would cease to exist.

What is required of the industry that creates, designs and promotes artificial intelligence? The organization AI Now and UNESCO have presented some recommendations in their reports:

- First, AI systems need to be transparent to address bias. This includes disclosing where and how AI systems are used and for what purpose.

- Second, companies should conduct extensive testing before launching AI systems to ensure they do not amplify errors or biases caused by faulty data.

- Third, after launch, companies should monitor the use of AI systems in different contexts and communities, and the findings should be academically rigorous and publicly available.

- Fourth, research on AI discrimination and fairness should not focus solely on technical analysis but also consider the social implications of AI use.

- Fifth, companies developing AI should hire experts from a variety of disciplines, including social scientists, to provide a broader perspective on the impact of AI.

- Finally, ethical codes are necessary to guide and oversee AI development, ensuring best practices and outcomes.

It is clear that artificial intelligence plays a significant role in decision-making, raising both positive and ethical concerns. The rapid pace of AI advancement makes it difficult to fully understand its meaning and implications. Education is crucial to addressing this issue as it can help us understand and demand greater transparency in AI. Specifically, education can explore how AI affects schools, the challenges it poses to teaching, and whether a new approach to education is needed in this technological age. The goal is to create a more fair and equitable AI system, and education provides the best opportunity for reflection and analysis.

3.1 Education

AI has created a new problem for those who need to hire future employees. HR departments already know that candidates rely on artificial intelligence to write the traditional cover letter. It is clear that when hiring a candidate, managers can no longer rely on the wording of the text. Traditional evaluation methods are no longer as reliable for reviewing applications. As increased applicants use AI to write cover letters, what value can there be for companies to continue requiring this requirement? If someone can artificially enhance the email they send to a hiring manager, the email becomes meaningless. This is exactly the innovation that Google brought to life from Gmail. This application includes the Help Me Write tool to generate emails solely from the user's description. It is not AI that companies have had to change, but the methods used to evaluate candidates.

So what did hiring managers do? They started thinking about what changes they should make to the way they assess applications. Hiring processes had to change. The goal was to find new ways of assessment that would require candidates to do what AI couldn't do. Which was specific and people-specific. They concluded. AI is capable of storing, organizing, processing, sorting, and writing data, but it lacks critical thinking, it lacks curiosity and imagination, and it is not a source of free creativity. AI only works with the content that those who design it have been fed and trained with.

So recruiters decided to create assessments that required reflection, reasoning, imagination, and creativity from the candidate and reflected their curiosity and concerns. Employers reserve writing for analyzing the cultural capital and critical and creative thinking skills of prospective employees. One female engineer had this to say about the type of questions the company she was applying to asked her during the hiring process: "-In my first interview as a candidate, they surprised me with a question I wasn't expecting. They asked me how many tennis balls fit in a city bus. They also wanted to

know how you got that number. I quickly realized that they didn't care about the final number of balls, which you might otherwise find on the Internet. What the company really wanted to know was my ability to reason to get to the final number (even if the number wasn't correct)."

In an attempt to foster critical thinking and writing skills, one educator assigned her students to create a summary based on a newspaper text she had provided. However, when she began grading the papers, she noticed a discouraging trend: many students had submitted identical summaries. It soon became clear that these uniform summaries were the result of the use of new artificial intelligence systems.

This realization left the teacher feeling disheartened, as her intention was to assess her students' writing skills, but the exercise had become futile. In light of the teacher's situation, it is clear that the transformation brought about by artificial intelligence should not be limited to the hiring process alone; it should also prompt a broader debate on the impact it can have on education.

As society continues to embrace AI, educators, policymakers, and stakeholders must collaborate to establish guidelines and best practices that ensure the effective and ethical integration of AI systems into classrooms. Only then can we truly harness the power of artificial intelligence to improve education while preserving its core principles.

The advent of artificial intelligence has revolutionized the hiring process, but its impact on education is still up for debate. Marta, a dedicated language teacher at a secondary school, wonders whether the education system should also undergo a transformation. This dilemma comes to a head during a faculty meeting, where Marta shares her frustrating experience with her students that day. As technology continues to

advance, educators must face the challenge of finding a balance between leveraging AI to reap its benefits while preserving the fundamental aspects of education.

This balance is crucial to ensure that students do not merely regurgitate information generated by AI systems but are actively engaged in the learning process. Furthermore, it urges us to reflect on the purpose of education itself: is it solely about acquiring knowledge or should it also cultivate critical thinking, creativity and problem-solving skills? While some may argue that AI systems can streamline educational processes such as grading papers, the teacher's experience serves as a cautionary tale. It underscores the importance of authentic assessment and the value of human evaluation in fostering student growth and development. Education is not just about producing uniform results but also about fostering individual talents and skills. This incident raises important questions about the role of AI in education. While it has undoubtedly brought numerous advances to various sectors, its integration into classrooms needs to be carefully considered. This experience highlights the potential drawbacks of relying too heavily on AI systems in education and the need for educators to maintain the integrity of their teaching methods.

A dedicated and knowledgeable History teacher found himself in a thought-provoking situation during a meeting. As the discussion unfolded, he bravely shared an experience that had left him both baffled and intrigued. In his genuine quest to foster critical thinking skills among his students, the professor had assigned them the task of delving into the intricate details of World War II. However, what he received in return was a multitude of assignments that, while impeccably accurate and descriptive, lacked the depth of insight and originality he had expected. Perplexed by the striking similarity of these assignments, the professor could not help but wonder if his students had resorted to utilizing innovative artificial intelligence language systems that have become

increasingly prevalent in today's technological landscape. Despite his best efforts to craft a meaningful and thought-provoking assignment, the professor could not shake the feeling that his instructions had somehow missed their intended purpose in translation, leaving him feeling disillusioned.

The teacher and the professor share the same opinion and it is evident that the two exercises they proposed did not meet the intended objectives. The reason behind this is that AI language systems excel at performing these types of tasks flawlessly. These systems have proven to be incredibly useful tools for summarizing information, composing written papers, and answering various text-based activities. Interestingly, it was the students who discovered the capabilities of AI before their own teachers and quickly turned to this technology to overcome the challenges of their assignments. The impact of language-based AI systems is not limited to a specific region as they have made significant strides across the world by successfully passing final degree exams, getting admitted to prestigious universities, and even completing complex doctoral theses with excellence.

The above experiences reveal deep flaws and shortcomings in the education system rather than attributing them solely to the limitations of AI. A parallel can be drawn with recruitment methods in the corporate world, where the obstacle was not AI itself, but the strict criteria imposed by companies, which required an overhaul to secure employment. Similarly, the problem lies not with AI systems in education, but with the instructions and guidance provided to students. To address this, there is a pressing need for public policies, schools and teachers to explore innovative approaches to schoolwork, examinations and teaching methodologies in general. This would mirror the evolution seen in the recruitment process, where a re-evaluation of traditional practices became imperative.

If we continue to prioritize memorization, copying, and imitation in education, it should come as no surprise that AI excels at tasks such as passing college entrance exams or flawlessly following school instructions. This highlights the urgent need for education to reevaluate its goals, priorities, teaching methods, and assessment techniques. An innovative American teacher tried a different approach by incorporating language-based AI systems into his History class. He assigned his students to use AI technology to draft a report on the history of printing. However, the students soon discovered that the intelligent system lacked information about the origins of printing in Europe or China. The teacher took advantage of this drawback of AI to start a discussion about the limitations of relying solely on AI for accurate and complete data. He emphasized the importance of not blindly accepting the results or answers provided by an app, as they may be incomplete or even false. Additionally, this class provided an opportunity to explore how biases and omissions within AI systems can reinforce prejudices and stereotypes.

In light of these developments, traditional methods for assessing students' writing skills, such as summarizing instructions or commenting on books or newspaper texts, will no longer be effective. It will become increasingly difficult to discern whether a text was written by a student or by an artificial intelligence system. Therefore, as the history of printing classes demonstrates, educators must devise alternative assessment strategies that can counter this dilemma.

To improve students' understanding of artificial intelligence (AI), several school projects have been proposed that involve students evaluating AI systems themselves. These projects aim to analyze how AI works, identify biases or omissions in its responses, and explore the design of the algorithms used.

In one particular project, a teacher instructed his students to use ChatGPT, a language-based AI system, to compile arguments supporting the establishment of a factory in a residential area. The students were then tasked with evaluating the effectiveness of the arguments provided by the AI system and determining whether these arguments could convincingly influence the residents of the neighborhood. To conclude the assignment, the students were required to submit an essay that included their criticisms of the AI system as well as their opinions on the proposed arguments.

By encouraging students to evaluate the responses and outcomes of AI systems, this teacher's activity not only allowed for an analysis of the system's design and function, but also emphasized the importance of understanding its limitations. It is crucial to note that these projects are not intended to wage war on AI or restrict the use of new language systems. Rather, they highlight the need to take responsibility for our own shortcomings rather than trying to slow down technological advancements, as it is akin to trying to block out the sun with our bare hands.

The challenge is not to ban AI, but to surpass its capabilities. We must thoroughly analyze and evaluate AI, focusing also on what it cannot do. Traditional tasks, such as requesting summaries or simple feedback from students, will become obsolete, as AI can easily and accurately complete these tasks. However, this does not mean that specific content should be discarded in education, as it is important to have a certain amount of knowledge. While knowing only the date of World War II or the countries involved should not be the only goal of school assignments. While information is crucial to understanding historical events and the present, it should not be the end goal.

Education must go beyond mere information and foster critical thinking about the implications, consequences and changes resulting from these developments. While AI can answer questions about when, where and who, education delves deeper into why,

what it means and the resulting effects. Consequently, there is a need to reconsider how we assess students. The need to transform current exam formats is not only due to the emergence of AI; it simply highlights the expiration date of traditional exams.

Teachers, like Rebeca Wang, an AI specialist in the United States, have had to adapt their grading methods to accommodate students' use of AI platforms and applications. This adaptation has often required rapid adjustments in the middle of ongoing courses. It's not about robots taking over our jobs, but about us having become accustomed to performing tasks that robots can do for the past 5,000 years. The same applies to education, where we must avoid having students perform robotic work. We must encourage critical thinking, imagination, curiosity, and creativity – all of which are distinct from artificial intelligence.

As mentioned above, if education continues to prioritize memory and specific questions, artificial intelligence will continue to excel in solving exams and assignments. This is the current reality, where students simply copy the first answer they find on a search engine. However, education must go beyond traditional approaches and emphasize critical thinking and creativity, both in the academic field and in the professional world.

A study conducted in 18 countries on different continents has revealed alarming statistics. In almost 20 participating countries, only a mere 2 percent of high school students possess the ability to differentiate the relevance of information found on the Internet. Even South Korea, which has the highest percentage of teenagers with this reflective ability, only reaches 5 percent. This competence is essential for a knowledge-based society, but it is seriously lacking among students.

A survey conducted in Spain among high school students found that more than half of teenagers admitted to not knowing how to search for information efficiently on Google. They also had difficulty identifying reliable information on the web. Similarly, research conducted by Stanford University among 7,800 high school students in the United States revealed that a staggering 82 percent of teenagers cannot distinguish between informative content and sponsored content. They perceive no difference between a newspaper news story and a corporate-sponsored article written by the president of the bank. The research concludes that American high school students lack the skills to differentiate sources on the Internet, making it difficult for them to discern between advertisements, sponsored articles, and news while browsing the web.

In Argentina, a study involving 2,000 teenagers from across the country found that only 2 out of 10 students compare different websites to determine their reliability. Only 3 percent choose a website because it belongs to a recognized institution. In other words, barely 5 percent analyze the source of the information, either by comparing it with other websites or by verifying the existence of its author. For more than 90 percent of students, credibility criteria are extremely poor. They trust sources based on factors such as familiarity, usefulness, well-written content, statistics, or simply because it appears first on Google. Surprisingly, 2 out of 10 teenagers even admit that they are not sure they can trust a source, but they still use it. Thus, 20 percent of students use websites and their content without even considering the authority or reliability of the information provided.

The arguments are equally limited when they have to explain why they would not trust certain information. In their own words, they say: "because the text has many spelling mistakes", "because I detect a serious error in what it says", "because it does not argue well" or "because there are many opinions". Finally, when they are asked what information must be included for them to believe it, they respond with definitions that

are also limited and difficult to justify. They explain that "it must be well written", "it must have good arguments", "it must contain a lot of information" or "when you write it, the question answers exactly what you are looking for".

Adolescents around the world face significant challenges in differentiating between relevant and reliable information on the Internet. Only a small number of them possess the ability to establish criteria for determining reliability, while the majority struggle to articulate valid reasons for considering certain information credible. There are arguments that suggest that young people have always had limitations when seeking information. These limitations include difficulties in asking questions, comparing data, evaluating the source of information, establishing criteria for credibility and forming well-reasoned opinions.

It is important to recognize that technology cannot be blamed solely for the lack of critical thinking skills among its users. These limitations existed long before the Internet came into existence. However, even though technology is not the direct cause of this problem, it has exposed and exacerbated poor critical attitude among teenagers and even adults. The question now arises as to why this concern has become a global problem. How are these current limitations different from those that existed in the 20th century? The answer to this question is multifaceted. While the Internet is not solely responsible for this problem, it has certainly intensified it.

Let's dig into the reasons. The Internet has made access to an endless amount of information incredibly easy. While this accessibility is undoubtedly beneficial, international studies reveal that this abundance of knowledge can actually complicate the search for answers. Constant exposure to information can also hamper decision-making processes. The abundance of information and its easy accessibility, combined with the speed at which it circulates, poses a risk of "infoxication" – an overwhelming amount of

information and noise that can lead to personal and collective confusion. Information saturation is not a new phenomenon. In the first century, Seneca expressed concern about the distraction caused by an excess of books. These concerns were further amplified by the advent of the printing press during the Renaissance. Soon after its popularity rose, concerns arose about publishers rushing to print titles without considering their quality. However, never before have we experienced the rapid circulation of information like we experience today. We are constantly bombarded with data, pseudo-data, rumors and gossip that are passed off as valid information.

Consequently, although the tendency to approach texts with a limited critical mindset is not a recent phenomenon and has been present before the advent of the Internet, the inundation of adolescents and adults with endless information exacerbates the state of confusion and presents significant challenges in discerning the meaning of a text, determining the appropriate content, determining the identity of the author, deciphering his or her interests and intentions, discerning and comparing various points of view, and formulating one's own perspective based on credible and reliable information. This issue, without a doubt, continues to intensify in today's society.

With the advancement of technology and the Internet, the challenges surrounding the dissemination of information have become more pronounced. In the past, tackling a topic involved consulting a limited number of authoritative sources. In the 21st century, however, we are faced with an overwhelming amount of information available on the web, with varying levels of reliability and credibility. This is further complicated by the influence of artificial intelligence (AI), which has the ability to process and store large amounts of data.

While AI language systems can provide answers, they are also susceptible to receiving false information, leading to potentially incorrect results. The creators of these

systems have even expressed concerns about AI being used to spread misinformation. Therefore, it is unwise to rely solely on AI systems for accurate information. The abundance of information also poses a challenge in decision-making. We often believe that more data will lead to better decisions, but there comes a point when an overload of information actually hampers our ability to make sound decisions. This is because we often confuse the available information with the relevant information. Ironically, AI, which was supposed to simplify decision-making, seems to make it more complicated.

Critical thinking and creativity are uniquely human skills that should be prioritized, while AI systems can help gather and organize information. However, to use AI effectively, we must learn to ask the right questions and communicate effectively with these systems. Unfortunately, traditional education tends to prioritize memorization and regurgitation of answers, rather than fostering questioning and critical thinking skills.

The ability to ask questions is not only crucial for critical thinking but is also a fundamental requirement for navigating the Internet. It is important for schools to teach students how to ask more advanced questions that go beyond the typical who, what, where, and when. These higher-level questions are those that begin with why, what implications do they have, what changes do they bring, and what consequences do they generate. These types of questions demand from students a variety of skills, such as reflection, curiosity, inquiry, analysis, inference, anticipation, argumentation, communication, collaboration, evaluation, imagination, creativity, and participation. They require students to use multiple sources to find answers, analyze different arguments and perspectives, seek out opposing viewpoints, question their own ideas, and continue to ask new questions.

Questions also foster teamwork, collaboration, and communication skills. Preparing for the digital world goes beyond knowing how to use a computer; it involves

knowing how to ask the right questions. The power of a simple question can drive progress and change the course of history, just like Albert Einstein's daring question about traveling on a beam of light. Asking questions is the fundamental skill needed to navigate the Internet effectively, as it allows people to play an active role in seeking knowledge, rather than simply memorizing information. Teaching the skill of asking questions is crucial for both teachers and students to think critically and use artificial intelligence effectively.

3.2 Artificial intelligence in the digital age

In today's world, knowing what to ask AI is critical to achieving the desired outcomes. However, it is also important to understand how AI works and its impact, both ethical and unethical. Promoting digital literacy and studying AI as a topic allows people to analyze how algorithms are built and evaluate their influence on daily life. This knowledge allows people to demand transparency and ethical design in AI systems.

Understanding the presence of bias in technology is not simply a luxury, but an essential requirement. It is imperative that we delve deeper into the questions surrounding artificial intelligence and its implications. In the field of education, these inquiries have become topics of analysis, research, and debate within the classroom. Some of the fundamental questions we seek to address include: What knowledge does an artificial intelligence system possess about us as individuals? How does it use this information and to whom does it disclose it?

We also need to consider the extent of the information that tech companies possess about us and the decisions they make based on this data. Who gives these tech companies permission to use the personal information we share online? In addition, we need to explore the influence of tech companies on our decision-making processes. How do they

shape our choices and direct our actions? Beyond that, we should examine the intentions and motives that drive tech companies in developing AI systems. How are these algorithms built? Do they adhere to predetermined ethical guidelines and rules? And what happens when they deviate from these principles? In addition, we need to examine how AI discerns what is relevant to each user and how it arrives at decisions. Finally, we need to consider improving transparency in these uses of AI. Exploring these questions allows us to gain a more complete understanding of technological bias and its implications.

It is worth considering whether an AI system can be designed to serve people, focusing on promoting justice and equality, rather than engaging in practices that exploit and discriminate against people. UNESCO stresses the importance of equipping people with adequate knowledge about AI, as this can empower them and bridge the digital divide, reducing inequalities in access to digital technology caused by the widespread deployment of AI systems. To achieve this, Member States should actively promote the acquisition of fundamental skills for AI education, including foundational literacy, numeracy, digital and coding skills, media and information literacy, critical and creative thinking skills, collaborative teamwork, effective communication, emotional skills and a comprehensive understanding of AI ethics.

To equip people with essential skills for the digital age, it is imperative that education incorporates a comprehensive understanding of digital literacy that goes beyond superficial knowledge. This entails a critical examination of artificial intelligence, delving into its implications and effects on our daily lives. Such literacy should not only address these issues but also analyses them in depth. It is therefore crucial to develop an educational framework that goes beyond the common tendency to idealism and be fascinated by artificial intelligence. Instead, this framework should encourage people to

question and challenge it, fostering the development of critical thinking skills necessary to navigate the complexities of this rapidly evolving field.

Chapter 4

Artificial intelligence and critical thinking

Taking a passive approach, entrusting everyday decisions to artificial intelligence without questioning or being aware of how they are made, poses significant risks. Just as a hammer is only effective when we know how to use it correctly, the same principle applies to all tools, including technological ones such as artificial intelligence. To maximize the benefits of digital media in education, it is crucial that we understand how these tools work and use them critically, rather than simply viewing them as instruments. Simply studying books does not automatically improve our intelligence. In fact, it can even have the opposite effect if we blindly accept everything they present or only read materials that align with our pre-existing beliefs.

In a dynamic and highly technological society that prioritizes information, knowledge, and communication, it is essential to possess fundamental skills such as analysis, interpretation, evaluation, inference, anticipation, problem-solving, forming judgments, decision-making, creativity, communication, teamwork, and active participation. The emergence of artificial intelligence has led us to re-evaluate our understanding of the digital world. It is crucial for us to critically evaluate technology in order to fully utilize its potential, recognize its limitations, and consider the ethical implications of its operations. This critical understanding will enable us to make informed decisions about when, how, and why we should employ technology.

By developing an insightful attitude and perspective towards technology and being more thoughtful and selective in its use, we can actively contribute to the development of a more just society. However, it is evident that most students and society as a whole simply view technology, including AI, as tools without questioning or

reflecting on their impact on everyday decisions. Students and adults alike often rely on AI to address their queries or concerns, whether it is to navigate unfamiliar places, choose a movie, solve problems through virtual assistants, or use facial recognition to unlock their smartphones. To foster a deeper understanding of AI and its various applications, education must transcend this naturalized perspective. Schools and public policies should emphasize teaching students how AI works, its influence on decision-making processes, and its role in shaping our perception of the world and the construction of knowledge and meaning.

Core competencies are so named because they are applicable to all areas of knowledge and are essential for navigating a constantly changing society, work environment, education system and economy. They enable people to adapt and thrive in a dynamic world. UNESCO emphasizes the importance of these competencies in building knowledge in any field, particularly through critical and creative thinking. Critical thinking involves questioning, challenging and analyzing arguments, as well as problem solving and decision making.

Reflective and creative skills are crucial for both personal and virtual life domains. These competencies enable people to learn from others, recognize the value of diverse opinions, engage in constructive debates and enhance their own civic empowerment. They are vital for democratic participation and active citizenship. Furthermore, in the digital landscape, specific skills known as digital competences are required to navigate and use technology effectively. These competences promote responsible and creative use of the Internet, encompassing critical thinking, problem solving, communication and participation.

By possessing transversal digital skills, individuals can critically evaluate the virtual world and interact with it in a reflective and participatory manner. When it comes

to artificial intelligence, digital skills based on critical thinking enable individuals to understand its underlying principles, its functioning, its design, and its impact on decision-making. Overall, digital competencies based on critical thinking enable individuals to develop a deep understanding of AI and its implications.

Artificial intelligence is far from neutral in its operations. It relies heavily on the private information and data it receives, which inevitably shapes its actions. Furthermore, AI tends to operate through generalizations, which can often lead to biases when it comes to classifying and labeling various concepts or individuals. These biases, in turn, can perpetuate existing inequalities within society.

It is crucial to recognize that AI, despite its advances, is fallible. It is a technology created by humans and, as such, is not immune to the flaws and limitations of its creators. We must therefore approach AI with a critical eye, recognizing its potential to both enlighten and deceive us in our understanding of the world. In addition to its role as observer and analyzer, AI also seeks to exert influence over our decision-making processes.

Through its algorithms and recommendations, it strives to shape the decisions we make. However, we must be cautious as these suggestions can be influenced by the biases inherent in the AI system itself. One of the inherent limitations of AI lies in its ability to convert the complexities of our complex universe into a linear and simplified order. This reductionist approach can inadvertently overlook or oversimplify crucial nuances and complexities that exist in our world. Consequently, the view of reality that AI presents to us is not all-encompassing, but rather a particular and sometimes biased perspective.

The topic of teaching AI education revolves around understanding the intricate workings of artificial intelligence and its profound influence on our daily lives. It is

crucial to delve deeper into the mechanisms that drive AI, understanding how it works and operates. Thus, an essential aspect of this education involves learning to assess whether the results generated by AI systems are influenced by biases or discriminatory tendencies. We must develop the skill to determine whether AI is responsibly addressing certain problems or inadvertently perpetuating them. Furthermore, it is imperative to understand the importance of demanding transparency and ethics in the development of the algorithms that power AI. By instilling ethical considerations and ensuring transparency, we can establish a solid foundation for building AI systems, fostering a fair and equitable technological landscape.

The ability to thoughtfully use technologies and AI, as well as effectively analyze and navigate complex situations in the digital realm, are essential skills for individuals to understand and interact with the increasingly screen-dominated reality of the 21st century. These skills empower citizens to effectively address and overcome the diverse problems and challenges of our time, make independent decisions and actively participate in society. Without a solid foundation of digital skills and knowledge, technology, including AI, will simply serve as tools for practical purposes, devoid of deeper understanding or critical engagement.

4.1 Challenges

The creation that emerges from artificial intelligence is always connected to the data, texts and images that have been used to train the system. On the other hand, teachers and students have the ability to create freely using their imagination. This capacity for free creativity, together with critical thinking, is fundamental for education. In addition, curiosity, which AI lacks, is an essential aspect of learning.

Curiosity allows us to question, investigate, discover, and appreciate new things. These qualities, such as critical thinking, ethics, empathy, collaboration, and imagination, are integral parts of education that AI cannot replicate. The question of whether artificial intelligence will replace teachers and eliminate the need for traditional schooling is a common concern in educational settings. However, it is important to recognize that AI cannot replace the essential role of teachers in promoting critical and creative thinking.

AI systems are limited to responding to instructions based on the information they have been trained with and the data they have been fed. Even so-called "new" texts generated by AI are actually compilations of existing information found on various websites. Similarly, AI can create artistic paintings, but only if it has been fed images that align with the user's instructions. It is crucial to recognize that technology and AI should only be used as tools to enhance and complement what makes us human: our creativity, curiosity, hope, ethics, empathy, determination, and ability to collaborate. Education must continue to prioritize these human qualities and use technology as a support tool rather than a replacement for human teachers and the traditional school environment.

This is precisely the aspect that education must prioritize, an aspect that no AI system can offer. What other unique qualities does the school possess? What are the current educational challenges in the face of continuous technological advances?

- First, it is essential to teach students to always strive to be better than machines. If an AI system has the ability to write, it will undoubtedly do it better than us. Alternatively, it will be artificial intelligence itself that makes decisions for us, the consequences of which we have already witnessed.

- Secondly, it is important to teach students how to collaborate effectively with artificial intelligence. Today, there is a growing emphasis on training students as

"co-pilots." This concept is often referred to as "synchronized intelligence," where people and technology work together to create a better world. AI can provide memory and accumulate information, but it is through education that individuals learn to analyze, select, evaluate, and convert this information into knowledge.

- Third, education should prioritize teaching students to construct well-reasoned arguments. It is essential that the arguments students present to support their perspectives on a given topic are not based solely on an AI system. These arguments should be supported by diverse evidence and reflect an ethical point of view. Schools should teach students the importance of comparing sources found on the Internet, including texts that may not agree with their personal beliefs. This challenges students to step out of their comfort zones, listen to and value different viewpoints, and understand that this can lead to new and improved ideas. In a democratic society, diversity expands the possibilities of making new discoveries and adapting to change. Education should break the digital bubbles that confine individuals to their own beliefs, opinions, and ideas, as these bubbles only lead to fragmentation and polarization, as observed above.

- Finally, education must prioritize teaching students how to think. Although this goal is not new, it has become increasingly urgent today. Education must go beyond mere memorization of facts and prevent the accumulation of information from being the primary goal of schooling. AI has a memory superior to that of humans and can accumulate large amounts of information, often more efficiently than people. Therefore, education must go beyond information. It is important to critically analyze the content provided by AI, determining its completeness, accuracy, reliability or falsity. And it is necessary to use this data as a basis for

formulating higher-level questions that promote reflection and require the application of critical thinking skills.

- In today's digital age, it is crucial that education focuses on teaching students the importance of active participation in the public life of their communities. The advent of the Internet has opened up countless opportunities for people to participate, solve problems, and contribute to society. By equipping students with the skills and knowledge to actively participate, education can empower them to make a difference and have a tangible impact on their environment. It is essential that students not only have the opportunity to act, but also understand that their actions matter and can bring about meaningful change. This aspect of education, which emphasizes the value of participation, is something that no artificial intelligence system can replicate or promote. Furthermore, education should also teach students the importance of becoming content creators in this digital age. Since the Internet provides platforms for people to share their thoughts, ideas, and perspectives, it is crucial that education fosters the ability to make one's voice heard. The Internet has democratized the act of creation, allowing anyone to become visible and their ideas to reach a wider audience.

- By teaching students to be content creators, education can empower them to share their unique perspectives, contribute to ongoing conversations, and shape the world around them. Students who engage in digital content creation based on their personal interests and concerns have an incredible opportunity to interact with an unlimited number of people. Additionally, they can develop their skills in collaborating with people they may not even know, exposing themselves to a wide range of ideas and perspectives. This exposure to diverse information enables them to make better-informed decisions. It is crucial that education focuses on

teaching students to critically analyze and evaluate content in the digital world, as well as encouraging them to become innovative content producers themselves.

This is a distinct and significant challenge that the education system must face in today's society. It is imperative that education defines its unique value and purpose. By accepting this challenge and re-evaluating its approach, education can blaze a trail that artificial intelligence will never be able to replicate or surpass.

4.2 Classroom approach to AI

- Make a list of situations in which a doubt, question, problem or concern you had was resolved by a machine. Have you ever wondered how it does it? Why do you think fewer people think about how this works?

- Think about the risks posed by unethical use of AI. Have you experienced any of them? Do you know anyone who has been affected? Can you share an example?

- "It will become increasingly difficult for people to make decisions for themselves as algorithms make decisions for us." Analyze and discuss this concept. Do you agree with this statement? Why? Can you give some examples? Are you concerned?

- Divide into two groups. One group should research and list what the risks of facial recognition systems are. The other group should research and list the benefits of this system. Present each group's results to the class. Then decide which argument is more persuasive. Finally, we will explore how facial recognition is used around the world. Explain and justify: Do you agree with these uses? Artificial Intelligence - Do we need a new education? Artificial Intelligence - Do we need a new education?

- Consider how someone might say, "I know a lot about you." Can you give an example of this personal knowledge that you have felt, lived, or experienced while browsing the web?

- Divide into two groups. One group is in charge of defining all the benefits, facilities, contributions and advances that artificial intelligence brings to everyday life. Another group defines the risks and concerns that AI has created around the world. Present your argument to the entire class. What conclusion will they come to? After analyzing the benefits and risks of AI, what do you think about AI?

- Thinking and designing together the content and focus of an online campaign, including suggestions for ethical design and the use of artificial intelligence.

- Use language-based AI programs to define your position on issues of interest or concern. Ask the system to justify its position. Create a list of arguments that the AI will give to justify its position. Evaluate the effectiveness of those arguments. Did it convince you? Why? Discuss and write a conclusion.

- In groups, develop a discussion on a topic of interest or concern. Then, ask the language-based AI system to generate a rebuttal to your opinion. Evaluate whether the system is correct. Rework your argument incorporating what you think is relevant to you from what the AI has generated.

- Describe your recent internet searches. What would they say about your interests, interests, and preferences? What would someone who knows your web searches say about you? Do you think they define your identity?

- Ask an AI system for advice on a topic that concerns or interests you. Analyze the advice you receive. Was it based on your personal information? Where do you think it got it from? Are you satisfied with the advice you received? Why?

- Confirmation bias is the tendency of people to search and select only information on the Internet that confirms what they already think. Please think about it. What are the risks of people only choosing content that supports their ideas? Do you think this mechanism makes it easier to believe fake news? Think about it: Information about a topic on the Internet. When you search for ideas or opinions, do you read ideas that do not match your own? Why?

- If you use social media, check your profile to make sure you only receive information that matches your interests and opinions. If so, what do you think is the reason? How can I reverse this?

4.3 Restart

In conclusion, as artificial intelligence continues to advance and integrate into our lives, it is crucial that we recognize the need for a new education. This education should prioritize the development of skills that AI cannot replicate, such as critical thinking, creativity, empathy, and ethical decision-making. By doing so, we can ensure that people are prepared to navigate the complexities of an AI-driven world and make informed, responsible decisions. While it is essential to recognize the presence of artificial intelligence in our lives, education cannot afford to ignore its influence.

AI has already started making decisions that impact our lives, shape our behaviors and influence our perspectives on the world. Therefore, it becomes imperative for education to adapt and respond to this technological advancement in order to equip people with the necessary skills to navigate a future where AI is an omnipresent presence. In the face of an increasingly complex, dynamic and ever-changing reality, we have emphasized the importance of acquiring the necessary skills. While it is essential to become proficient in using digital media tools such as Word, Excel and search engines, it

is equally crucial to develop critical thinking skills, a creative mindset and an understanding of technology and the internet. It is vital that we learn to reflect, think and prioritize as these fundamental skills cannot be acquired at a later stage if they are neglected initially.

In this extensive discussion on artificial intelligence, we have delved into its meaning and scope. We have thoroughly examined the ethical and non-ethical aspects of its operation and explored its impact on our daily lives as well as its influence on our decision-making process. In addition, we have also discussed the challenges that artificial intelligence poses for education. The school system has an indisputable responsibility to promote these skills, which are beyond the capabilities of artificial intelligence. Education must rise to the enormous challenge of focusing on areas that AI will never be able to fully address. This includes strengthening reflective and creative skills, fostering critical thinking, encouraging imagination, cultivating curiosity, promoting effective teamwork, fostering empathy, inculcating ethical values, fostering creativity, fostering communication, and encouraging active participation.

Artificial Intelligence (AI) plays an important role in the world we live in, especially when it comes to education. However, its incorporation should not be limited to being just a tool. Rather, it should be studied, analyzed, and debated. Reflection and questioning are necessary to understand its social and human impact, which is so immense that it requires a guiding philosophy. We need to consider what we should do with these technologies and how they will affect us. These questions go beyond mere technical answers and touch on values and visions of what is good.

Education must priorities digital literacy, not only for students but also for teachers. It should empower them to identify, understand and respond to new problems arising in the digital world, including those presented by artificial intelligence. The

question arises whether AI can replace schools, teachers or teaching, but the answer remains consistent: no, as long as education does not rely on outdated methodologies and simplified approaches.

Education must provide added value, avoiding an excessive emphasis on memorization, copying and accumulation. It should not aim to compete with AI capabilities, but rather analyze, debate and complement them. The digital divide is defined by the capacities that individuals have or lack to identify, confront and respond to new problems and questions that arise from the use of the Internet. It is not simply a matter of using the tool, but of understanding it. Education faces the challenge of thinking about technologies rather than simply using them instrumentally. As UNESCO emphasizes, digital literacy empowers students in all areas of life and helps them achieve personal, social, occupational and educational goals. It is a basic right in our digital world and promotes the social inclusion of all nations.

Education should therefore focus on developing digital citizens who understand how the digital environment works and the principles that govern it. They need to analyze the place and role of technologies in society, assess their impact on daily life and understand how they contribute to the construction of knowledge. These citizens should also know how to use these technologies effectively for participation. They should have the ability to navigate complex digital contexts and understand their implications in various aspects of life, such as social, economic, political, educational and work-related.

Conclusions

In the modern digital age, people are willing to give up their personal data in exchange for various forms of gratification. Whether it is to improve physical health or maintain regular contact with loved ones, people often want to ignore the potential risks of revealing personal information. The popularity of social media platforms is another example of this phenomenon, where people willingly reveal sensitive data such as photographs, locations, and personal information in exchange for social recognition and acceptance in the form of likes and comments.

This trend is further reinforced by the staggering sales of smart speakers, which totalled 147 million units in 2019. What is worrying, however, is the fact that a significant number of buyers of these devices are unaware of the extent to which their conversations are recorded and for what this information is used. The collection of data on people's online behavior and personality through social media and search engines is an important and ongoing process. A simple connection to a digital device allows these platforms to gather information about users, including their interests, personality and desires.

Access to unbridled AI not only gives access to a wealth of information but also makes it a source of data, however, there is still a long way to go for ethics in use. This perception has been highlighted by the rise of social media and free apps, where it has become clear that when something is offered for free, it often means that we are being taken advantage of. In exchange for the services these companies provide, we unwittingly contribute to their profits by giving them our attention, which can be sold to advertisers, and data to our individuals, which feeds their algorithms. The same pattern is now being repeated with AI bots, albeit on a larger scale and with new complexity. Although many users do not clearly understand how tech companies use their personal data, they cannot ignore this mechanism. It is important to recognize that technology cannot be blamed

solely for the lack of critical thinking skills among its users. These limitations existed long before the Internet existed. However, even though technology is not the direct cause of this problem, it has exposed and exacerbated the poor critical attitude among teenagers and even adults.

The question now remains as to why this concern has become a global problem. How are these current limitations different from those that existed in the 20th century? The answer to this question is multifaceted; while unsupervised access is not solely responsible for this problem, it has certainly intensified it.

Literature

Anderson, C.W., Bell, E. & Shirky, C. (2014). Post Industrial Journalism: Adapting to the Present. New York: Columbia University Libraries.

Arbeláez-Campillo, DF, Villasmil Espinoza, JJ, & Rojas-Bahamón, MJ (2021). Artificial intelligence and the human condition: Opposing entities or complementary forces? Journal of Social Sciences (Ve), XXVII(2), 502-513.

Beckett, C. (2019). New Powers, New Responsibilities: A Global Survey of Journalism and Artificial Intelligence.

Bostrom, N. (2014). The ethics of artificial intelligence. Frankish, K. & Ramsey, M. Cambridge University Press: The Cambridge handbook of artificial intelligence.

Carlson, M. (2015). The Robotic Reporter: Automated journalism and the redefinition of labor, compositional forms, and journalistic authority. Digital Journalism, 3(3), 416-431.

CSR Observatory. (nd). Corporate social responsibility (CSR).

Diakopoulos, N. (2015). Algorithmic Accountability: Journalistic investigation of computational power structures. Digital Journalism, 3(3), 398-415.

Firat, F. (2019). Robotjournalism. The International Encyclopedia of Journalism Studies, 1-5.

Fromm, E. (2003). Ethics and psychoanalysis. Fondo de Cultura Económica.

Fukuyama, F. (2002). The end of man: consequences of the biotechnological revolution. Madrid: Zeta.

Garrafa, V. (2009). Epistemology of bioethics, Latin American approach. Colombian Journal of Bioethics, 4(1), 277-296.

Glahn, H. (1970). Computer worded forecasts. Bulletin of the American Meteorological Society, 51(12), 1126-1132.

Graefe, A. (2016). Guide to Automated Journalism. Columbia University Libraries.

Hottois, G. (1991). The bioethical paradigm. An ethics for technoscience. Barcelona: Anthropos.

Hume, D. (1748). An inquiry concerning human understanding

Kaku, M. (2011). The physics of the future. Bogotá: Debate.

Kaku, M. (2014). The future of our mind. Bogotá: Debate.

Kurzweil, R. (1992). The age of intelligent machines. Cambridge, MA: MIT Press.

Kurzweil, R. (2005). The singularity is near: When humans transcend biology. Carlos, G. Germany (trans.). Lola Books.

Lassi, A. (2022). Ethical implications of artificial intelligence. Technologies and news production. InMediaciones de la Comunicación, 17(2), 153-169.

Linares, JE (2008). Ethics and the technological world. Mexico: FCE.

Martínez, M. (2009). The new science: Its challenge, logic and method. Trillas.

McCulloch, W.S. & Pitts, W. (1943). A logical calculus of the ideas immanent in nervous activity. Bulletin of Mathematical Biophysics, 5, 115–133.

Morduchowicz, R. (2023). Artificial intelligence: Do we need a new education? UNESCO: France.

Nath, R., & Sahu, V. (2020). The problem of machine ethics in artificial intelligence. Artificial Intelligence and Society, 35(1), 103-111.

Pérez Orozco, B. and Rentería Rodríguez, M. (2018). Artificial Intelligence. INCyTU, 12.

Ríos, S. (1976). Decision analysis. ICE Editions.

Savater, F. (1999). Ethics for Amador. Ariel

Schwartz, R., Dodge, J., Smith, N.A., & Etzioni, O. (2019). Allen Institute for AI, Seattle, Washington, USA. Carnegie Mellon University, Pittsburgh, Pennsylvania, USA. University of Washington, Seattle, Washington, USA.

Simon, H. (1960). The new science of management decision. Harper & Brothers.

UNESCO. (2022). Recommendation on the ethics of artificial intelligence. UNESCO: France.

Verdegay, J.L., Lamata, M.T., Pelta, D., & Cruz, C. (2021). Artificial intelligence and decision problems: the need for an ethical context. Suma de Negocios, 12(27), 104-114.

Villalba Gómez, JA (2016). Emerging bioethical problems of artificial intelligence. Diversitas: Perspectives in Psychology, 12(1), 137-147.

Villasmil, J. (2020). The fragility of human civilizations. Political Issues, 37(64), 10-14.

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