

Guide on the Use of

ARTIFICIAL INTELLIGENCE IN EDUCATION



SPANISH MINISTRY OF EDUCATION, VET AND SPORTS

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1. INTRODUCTION

Artificial intelligence (AI) has emerged as one of the most transformative technologies of our time and its influence extends to virtually all the fields we know. From healthcare to agriculture to transport to entertainment, AI is present in a variety of ways, optimising processes, improving efficiency, and enabling innovation on an unprecedented scale, sometimes inadvertently and without us even being aware that we are using it. However, the fast advance of AI also poses significant challenges, ranging from ethical concerns about privacy and safety to questions about its impact on employment and inequality. As we continue to explore the possibilities of AI, it is crucial to address these dilemmas and to ensure that technology is being used for the benefit of humankind.

Focusing on education, which is the primary target of this guide, AI also promises to revolutionise the way we teach and learn. From the personalisation of learning to the automation of administrative tasks, AI offers new opportunities to improve efficiency and equity. Throughout this guide we will explore how AI is transforming education, examining its current and future applications, as well as its ethical and social implications.

1.1. WHAT IS AI?

AI can be defined as the development of computer systems that can perform tasks that would normally require human intelligence, such as machine learning, environmental perception of the environment, reasoning and decision making. It aims to mimic human cognitive ability to solve problems, adapt to new situations and improve with experience.

According to Nuria Oliver PhD in her book *“Inteligencia Artificial, naturalmente” (Artificial Intelligence, naturally)*¹, AI systems can be classified into three categories based on their level of competence:

- **Narrow AI**, also known as weak AI. These systems are designed to perform specific tasks within a limited domain. While they can outperform humans in a specific task, such as recognising speech or processing text, they lack the ability to generalise or perform a wide variety of tasks.
- **General AI**, also known as strong AI. These systems have the ability to understand, learn and solve problems similar to humans in a wide variety of domains. This is one of the major goals of AI research, for which there is still a long way to go.
- **Artificial Superintelligence**. This term, firstly introduced by philosopher Nick Bostrom, refers to the development of systems that would have a higher intelligence than human intelligence, although this is a controversial concept.

¹https://portal.mineco.gob.es/RecursosProducto/mineco/ministerio/ficheros/libreria/Inteligencia_artificial_naturalmente.pdf



1.2. AI IN EVERYDAY LIFE

Today, AI is redefining the reality in which we live, transforming many aspects of our daily lives. The following are some of the areas in which AI has come on the scene, significantly impacting the way we interact with the world around us.

- **Healthcare:** AI is being used to optimise hospital management and improve medical care by facilitating data management, enabling remote care, personalising treatment, supporting medical treatments, research or providing home care through decision support systems and virtual carers.
- **Finance:** banks are using AI to improve customer service, predict market trends, manage risks more efficiently, automate financial processes, detect fraud more accurately, personalise services for individual customers, and optimise internal operations.
- **Industry:** AI in industry uses data to optimise processes, prevent failures and improve efficiency. It is applied in production, predictive maintenance, quality control and logistics. It also offers productivity improvements and cost reduction.
- **Transport:** AI uses data to optimise routes, improve safety and reduce congestion. It is applied in fleet management, autonomous navigation systems, demand forecasting and predictive maintenance.
- **Public administration:** In public administration, AI uses data to optimise processes, improve decision-making, reduce congestion, and increase efficiency. It is applied in resource management, public policy analysis, citizen care and crime prevention.
- **Retail:** AI is revolutionising retail by enabling personalisation of the shopping experience, improving efficiency in the stock management and distribution logistics. It also optimises customer segmentation and marketing strategies, detects fraud, improved transaction security and facilitates the automation of administrative and customer service tasks.
- **Education:** AI is transforming education in areas such as the personalisation of learning, development of learning content, optimisation of assessment processes and efficient management of administrative tasks.
- **Environmental conservation:** AI is playing a key role in environmental monitoring and in climate change monitoring and prediction, intelligent management of natural resources, urban planning, biodiversity conservation, efficiency in waste management and landfill clean-up.
- **Intelligent personal assistants:** these assistants are gaining ground and changing the way we interact with technology by providing quick answers to our questions, performing everyday tasks such as making phone calls or controlling connected home devices.
- **Smart cities:** AI is optimising the use of resources, reducing energy consumption and improving the quality of life of citizens. These cities use technologies such as sensors and smart management systems to monitor traffic, air quality, water and energy use.



In summary, AI has become a catalyst for innovation and progress in a number of areas of our lives and its ability to process vast amounts of data and learn from it has enabled significant advances in efficiency, personalisation and decision making in key sectors. It is to be expected that, as this technology advances, it will continue to impact a myriad of industries and sectors, creating new opportunities and challenges.

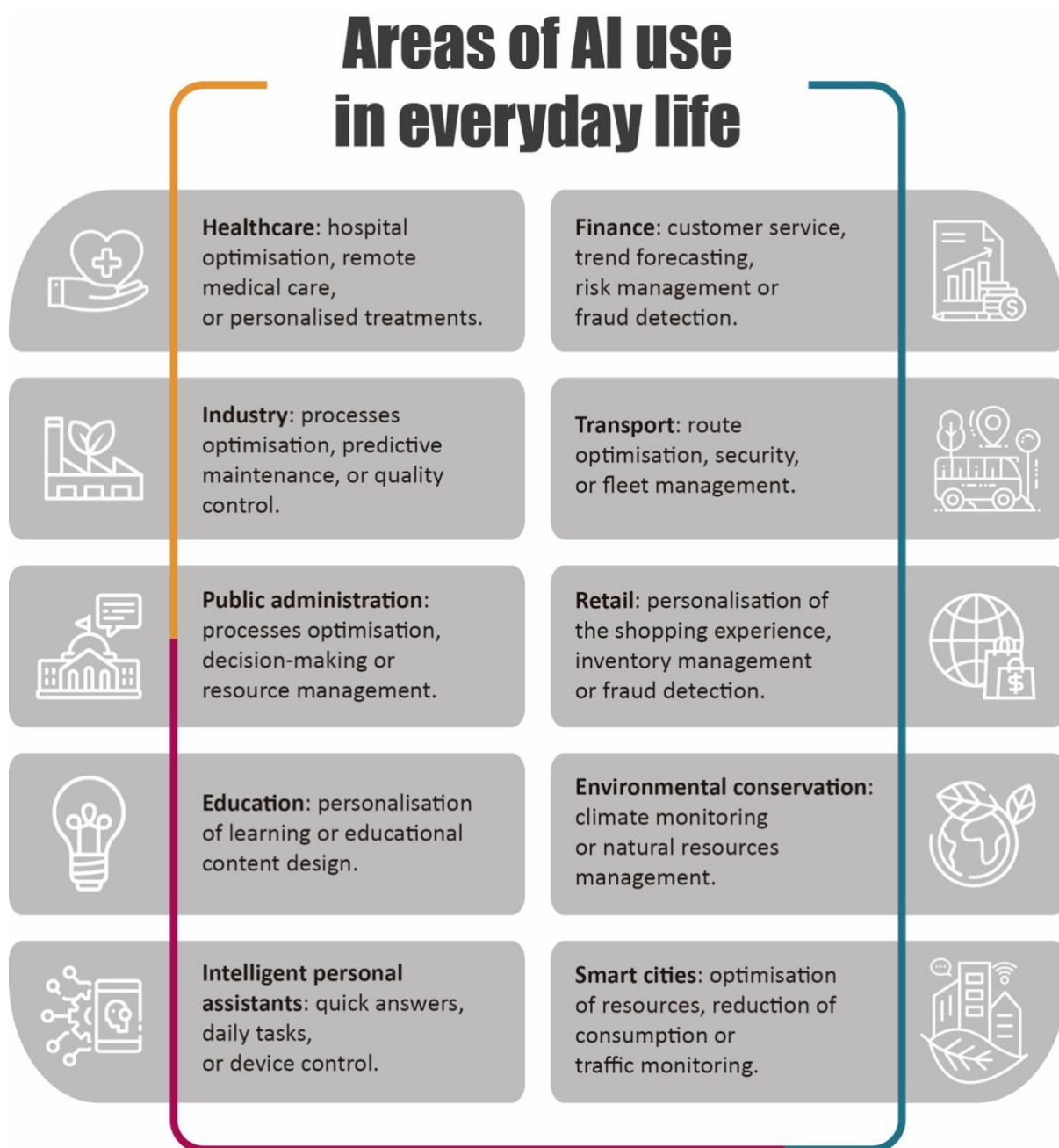


Illustration 1. Areas of AI use in everyday life (INTEF, 2024).



1.3. AI IN EDUCATION

In the field of education, AI is also beginning to expand, and AI tools are starting to be integrated in areas such as personalised learning, virtual tutoring, automation of administrative tasks, data analysis and the development of educational resources. Moreover, AI is currently included in the official curricula of formal education levels and specific training is being developed to equip teachers with the necessary tools for this technological advance.

The possibilities offered by AI for teaching and learning represent an unprecedented opportunity to create dynamic and stimulating learning environments that inspire our students to be more curious, more creative and more critical in their search for knowledge, as defined by Kai Fu Lee in *AI 2041: Ten Visions for Our Future*. Maintaining this perspective and attitude as teachers will allow us to assess technology from a pedagogical perspective, guaranteeing that its implementation in the classroom will provide added value. It is therefore essential that the entire school community gains knowledge about AI and understands how it works and its potential applications in order to take advantage of its benefits and mitigate its risks in the educational, social and professional contexts. This includes concerns about the privacy of our students' data, possible biases, or fairness of access to this technology.

These concerns about fostering fair, ethical and inclusive use of AI in education include such important aspects as taking gender equality into account; overseeing ethical, transparent and verifiable use of data and algorithms in the educational context; and constant monitoring, evaluation and research of this fast-growing technology. These are the cross-cutting areas addressed in the *Beijing Consensus on Artificial Intelligence and Education*² that should be kept in mind when discussing AI in education.

In short, the integration of AI in education represents an opportunity to improve teaching and learning processes, but it also requires an ethical and responsible approach to ensure that this technology benefits all learners in an equitable and fair manner.

It is therefore increasingly necessary to establish and define a regulatory framework that respects and protects fundamental rights while fostering an environment for the continuous and sustainable development of AI. These efforts bring together experts and are materialised in developments such as the *Regulation of the European Parliament and of the Council laying down harmonised rules in the field of Artificial Intelligence (Artificial Intelligence Regulation)*³ and amending certain Union legislation in Europe or the *National Artificial Intelligence Strategy in Spain*⁴. Both are clear examples of documents that seek to guarantee the use of AI systems that comply with legal, safe, ethical, and reliable standards.

In view of what has been said so far, there is no doubt, as María Moliner [an influential Spanish lexicographer] has stated, that education continues to be the key to progress. Thus, when we talk about preparing ourselves for this technology, we are not only talking about those

² <https://unesdoc.unesco.org/ark:/48223/pf0000368303>

³ <https://data.consilium.europa.eu/doc/document/PE-24-2024-INIT/en/pdf>

⁴ <https://portal.mineco.gob.es/RecursosArticulo/mineco/ministerio/ficheros/National-Strategy-on-AI.pdf>



technical skills that are directly related to its use, such as mathematics, statistics or programming, but also about fostering critical and reflective thinking that helps our society to understand the implications that this technology brings with it.

It is essential that we address these implications from the earliest stages of our education system. They will undoubtedly require teachers to be the first professionals to adapt to this change, taking responsibility for knowing and understanding AI in order to educate and guide the citizens of tomorrow.



REMEMBER

- AI applications in education offer opportunities to create dynamic learning environments and stimulate student curiosity, creativity, and critical thinking, but they also require an ethical and responsible understanding of the technology to ensure its fair and equitable implementation.
- It is crucial to establish regulatory frameworks that protect fundamental rights and promote the sustainable development of AI, as exemplified by the Artificial Intelligence Regulation in Europe and the National Artificial Intelligence Strategy in Spain, to ensure that the technology is used in a safe, ethical and reliable manner.



2. POSSIBILITIES AND APPLICATIONS OF AI IN EDUCATION

In this section we will explore various possibilities and applications of AI in education to guide students, teachers, schools and educational administrations in the process of integrating AI in an ethical and responsible way.

For this purpose, and understanding that there is no single path, we have taken as a reference the report *Use Scenarios & Practical Examples of AI Use in Education*⁵, by the European Commission, where three different but interconnected aspects of teaching and learning of AI systems are deployed. We refer to:

- **Teaching for AI**, which entails the development and acquisition of skills and competences relevant to the challenges and opportunities that AI brings. For example: understanding biases in data, using computational thinking to solve problems, or thinking critically about data protection.
- **Teaching about AI** is a more technical approach that manifests itself in understanding and applying AI-related knowledge in order to use AI effectively and contribute to the development of new tools and technologies in the field. For example: programming a simple AI-based solution to understand how it works.
- **Teaching with AI** involves the integration of AI in the learning environment to enhance the teaching-learning process. For example: using personalisation, management or resource and content generation tools.

At this point, and in order to maximise the benefits of AI in education, it is essential not only to identify the areas where AI can be beneficial, but also the ethical and responsible adoption of these approaches by students, teachers, schools and administrations. They all have a crucial role to play in building an educational future where AI is not only a technological tool, but also a driver for holistic development and lifelong learning. By harnessing the unique capabilities of AI, we can significantly improve the educational experience and better prepare the next generations for the challenges of the digital world.

This aim, set out in the *European Commission's Ethical guidelines on the use of artificial intelligence and data in teaching and learning for educators (AI)*⁶ already reflected that AI can be used in different ways to support teaching and facilitate learning. Specifically, it suggests four AI use-cases categorised as: Student Teaching, Student Supporting, Teacher Supporting and System supporting.

⁵ <https://www.indire.it/wp-content/uploads/2023/06/Use-Scenarios-and-Practical-Examples-of-AI-Use-in-Education-3.pdf>

⁶ <https://op.europa.eu/en/publication-detail/-/publication/d81a0d54-5348-11ed-92ed-01aa75ed71a1/language-en>



Based on these four use-cases, three profiles are specified in which educational agents and students use AI systems to support the teaching, learning and assessment process. These are:

- **Student profile**, as a creator and as a consumer.
- **Teacher profile**, creation of resources, personalisation of learning, assessment, management and automation of processes.
- **Profile of the school or educational administration**, virtual learning environment, educational or professional guidance, administrative management and process automation.

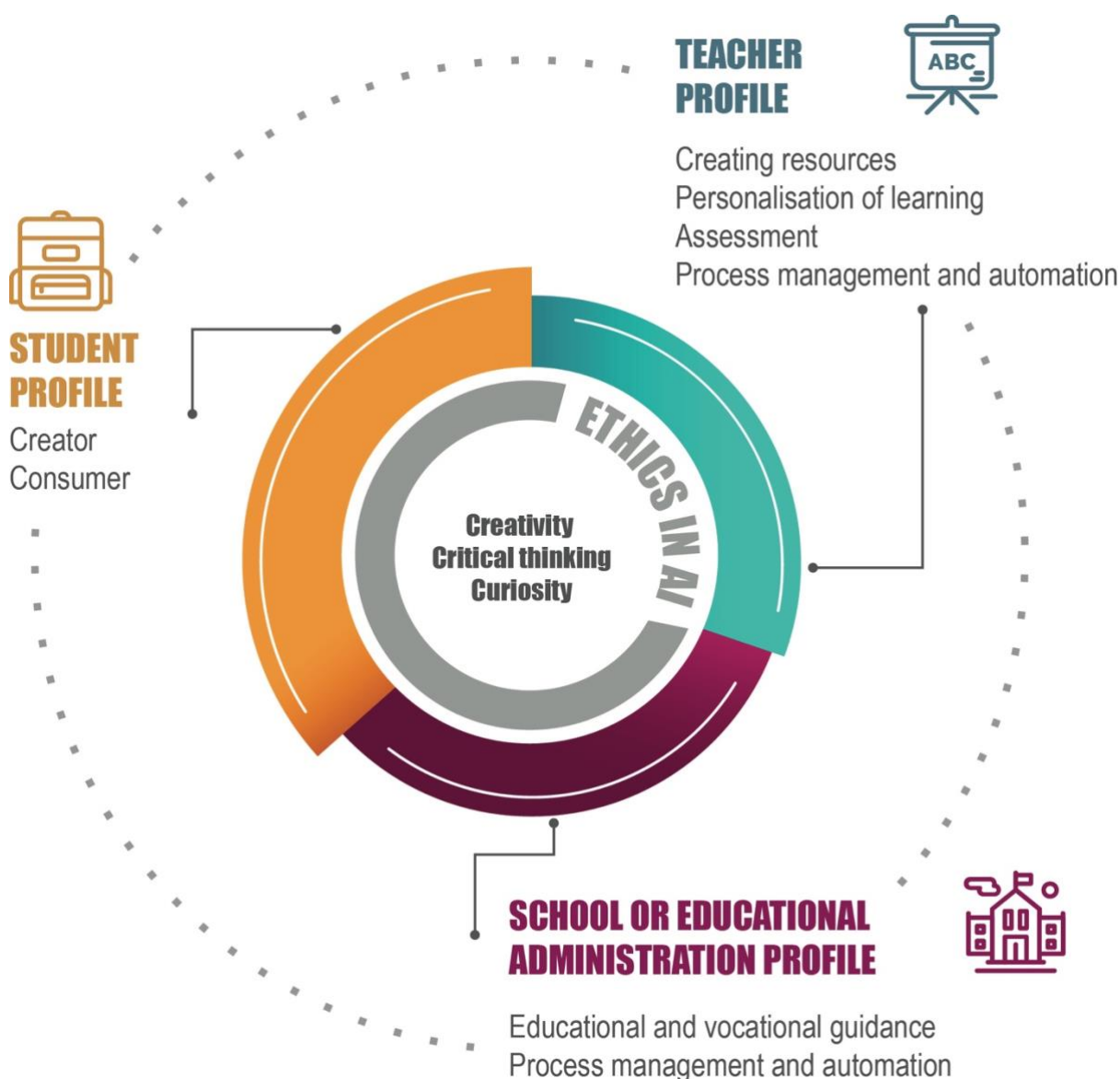


Illustration 2. Profiles of use-cases of AI in education (INTEF, 2024).

2.1. STUDENT PROFILE

The integration of AI in education presents a number of opportunities for learners, but also poses significant challenges that need to be addressed to ensure a successful educational experience that maximises the benefits of AI for students' learning and holistic development.

CHALLENGES AND LIMITATIONS

- **Lack of competence.** With the emergence of AI in the classroom, we are facing a situation where our students have not yet reached a good level of competence in AI. This could be due to several factors, such as the lack of content dedicated exclusively to AI in the curriculum, the absence of training and opportunities for practice and experimentation, as well as the scarcity of spaces for collaboration and knowledge sharing among students.
- **AI access gap.** The digital divide is exacerbated by the lack of access to technological devices and connectivity in many households, making it difficult for them to participate in online education and take advantage of AI tools for learning. This disparity in access to technology deepens educational inequalities and perpetuates digital exclusion, limiting opportunities for development and academic success for these students.
- **Over-reliance on AI tools for learning.** There is a risk that students become dependent on AI tools for problem solving, which could reduce their critical thinking skills and limit their creativity and autonomy in the learning process. Furthermore, it could lead to a reduction in interaction with other teachers and/or students, negatively affecting the development of their social and emotional skills.
- **Vulnerability of students' personal data.** In an AI-driven educational environment, the collection and handling of personal student data is inevitable. However, if this data is not properly managed, it could be exposed to privacy and security risks, compromising their future work or personal lives.
- **Limitation of heterogeneous and diverse approaches.** Algorithms used in AI tools may introduce biases in the content presented, affecting learners' ability to develop a complete and balanced understanding of the world around them.
- **Lack of quality and accuracy of AI-generated content.** The use of generative AI tools, such as text or image generation systems, can lead to the creation of low-quality or even erroneous materials. This could be detrimental to the learning experience of students.

PREVENTIVE MEASURES AND STRATEGIES

- **Encourage autonomy and critical thinking.** It is crucial that as teachers we provide students, taking into account their maturity level, with a solid grounding in the



fundamentals of AI before they start using AI tools (**teaching for AI**), and then focus on teaching them a more technical approach so that they can understand and apply AI tools in their daily practice (**teaching about AI**). This involves balancing the use of technology with activities that promote reflection, critical thinking, problem solving and creativity. Skills that will be especially useful for critical evaluation of AI-generated content.

- **Establish specific data protection policies for our students.** Educational institutions should implement a firm regulatory framework that addresses a variety of issues related to AI, including data privacy, algorithmic transparency, fairness and accountability. These policies should be a specific measure of general data protection policies.
- **Design inclusive and equitable AI systems.** Developers of educational AI tools should work to eliminate algorithmic bias and ensure that the content presented to learners reflects the diversity of perspectives and approaches in our society. To this end, conducting regular audits can help identify and address potential algorithmic biases, thus ensuring a fair representation of the content displayed.
- **Facilitate loan of devices and recycling systems in schools.** It is important that as a society we continue to prioritise investment in education as an essential part of our economic policies. However, as it is sometimes the case, this support or investment is not always forthcoming. At this point, an organisation in small communities can provide more immediate and punctual help to those students who are in some kind of vulnerable situation. Examples of this practice include: recycling and refurbishing of devices, loans, public-private partnerships or small-scale school-run donation programmes.

In the following section, we will define practical uses of how students can use AI in the learning process, without losing sight of the challenges and solutions outlined above, to create an enriching and safe learning environment in our classrooms.

2.1.1. STUDENTS AS CREATORS

Today, it is relatively easy to access AI-based applications or programmes for content creation or generation. In the school environment, as some of the teachers' experiences show, students use it mainly to perform and simplify their tasks. The next step would be for students not to limit themselves to AI content generation, but to take advantage of all angles of this technology. Some examples or situations of use include:

- **Learning about AI**, where students could design and program a simple AI-based solution to acquire the basic concepts of AI, applying them in a practical context relevant to their learning. Here, we mean that students understand how AI works and can use it to make their own creations. **As an example**, they could create a sorting machine with Machine Learning for Kids or a mobile app with App Inventor.



- **Creating digital content** using AI tools such as automated content generators, educational chatbots or AI-assisted design software. **As an example**, students could create or adapt interactive study materials (summaries, mind maps, infographics, translations into another language), personalised tutorials, presentations or even learning resources based on augmented or virtual reality.
- **Data analysis and predictions using AI tools**, offering students the opportunity to use machine learning algorithms and natural language processing techniques in various fields. **For example**, they could use weather data to predict the weather in a specific region or analyse user opinions on social media to identify emerging trends. These activities not only promote understanding of statistical and mathematical concepts, but also develop critical thinking and problem-solving skills.

2.1.2. STUDENTS AS CONSUMERS

In addition to playing active roles as content creators, learners can also benefit from a variety of AI-powered educational tools and resources in their role as consumers. Examples of this role include:

- **Personalised tutoring programmes** that use AI algorithms to adapt the content and teaching methodology according to the individual needs of each student. In addition, these **adaptive practice tools** automatically adjust the level of difficulty and type of exercises according to the student's progress, allowing students to practice and reinforce specific concepts in an efficient and personalised way. **As an example**, an online platform could be used to provide students with review activities that automatically adjust and adapt according to their level of ability. In this way, a personalised learning pathway would be created for each student.
- **AI-based educational virtual assistants** that provide answers to common questions, offer additional explanations of difficult concepts and provide support in problem solving. **As an example**, a virtual assistant could be created to answer students' questions and queries at any time of the day on different topics, providing detailed explanations and examples relevant to their understanding.
- **Learning management systems (LMS)** to facilitate the administration, delivery and monitoring of learning activities in educational environments through content adaptation, personalised recommendations, progress tracking and/or automation of notifications and reminders. **As an example**, if a student learns best by viewing content, the LMS can prioritise the delivery of multimedia resources rather than long texts.

2.2. TEACHER PROFILE

The expansion of AI in all areas of our society has generated the need for teachers to update and learn about this new paradigm. As teachers explore and incorporate AI-powered tools



into the teaching-learning process, it is necessary to consider the challenges inherent in these technologies to ensure their ethical and effective use.

CHALLENGES AND LIMITATIONS

- **Lack of training.** The rapid evolution of AI can be overwhelming for teachers, especially for those who are unfamiliar with new educational technologies. The need to constantly keep up to date and learning how to use these tools effectively and ethically requires additional training and professional development efforts.
- **Negative impact on the perception of the teaching role.** There is a risk that the autonomy and agency of teachers in schools will be threatened in a world of increasing reliance on AI. As increasing reliance is placed on AI-driven learning personalisation, management and assessment systems, teachers may find themselves relegated to a secondary role, diminishing their ability to make pedagogical decisions.
- **Data privacy and security.** The use of AI tools in the classroom involves teachers handling large amounts of student data. It is essential that teachers understand and comply with data privacy regulations to protect their students' confidential information and ensure a safe learning environment. In addition, once the data has been collected, teachers need to make an objective and professional interpretation to ensure proper decision-making.
- **Biases, lack of quality and diversity in AI-generated content.** As mentioned above with learners, there is a risk that materials and resources automatically created by generative AI tools may contain errors or biases, which could negatively influence the learning experience. In addition, it should be noted that recommendation engines may favour certain types of content over other, limiting learners' exposure to a variety of educational resources.
- **Inaccuracies in assessment.** Automated assessment systems, which are not subject to teacher review, have limitations when it comes to correctly assessing complex or creative responses. This is already recalled by the *Artificial Intelligence Regulation*⁷, which considers AI systems intended to be used to assess learning outcomes to be high risk.

STRATEGIES AND PREVENTIVE MEASURES

- **Encourage further education and training.** According to the European Schoolnet report *Teacher professional development in the age of AI*⁸, there is a need for teachers to develop a variety of competences around AI. This implies that teachers, technical advisors, trainers, management teams, and education policy officers are trained in the basic concepts of AI (teaching about AI), equipped with the skills to deal with the

⁷ <https://data.consilium.europa.eu/doc/document/PE-24-2024-INIT/en/pdf>

⁸ <http://www.eun.org/documents/411753/11183389/EUNA-Thematic-Seminar-Report-V5.pdf/b16bf795-b147-43ac-9f58-4dd1249b5e48>



challenges of using AI (teaching for AI) and prepared for its application in the educational context (teaching with AI). These continuing education and training programmes can include workshops, online courses, seminars, and accessible educational resources to equip teachers with the necessary skills to integrate AI effectively into their pedagogical practices. At the same time, collaboration among teachers should be promoted to share good practices for integrating these tools into the educational environment.

- **Promote a balance between teacher autonomy and technological innovation.** Educational institutions and government agencies should consider a balanced approach to the use of AI in the classroom, while preserving teacher autonomy and professional judgment. This can be achieved through institutional policies that ensure that pedagogical decisions remain in the hands of teachers, while using AI tools as complementary resources to enhance the teaching-learning process.
- **Ensuring data privacy and security.** We have previously discussed the importance of implementing durable privacy and security measures to protect the confidentiality of student data. However, it is crucial to highlight the need to train teachers in the use and analysis of such tools to ensure accurate and effective data interpretation. This data can guide the teacher, but should never replace the teacher's judgement as an educator.
- **Diversify and review content.** Teacher review of content generated by AI tools is essential to ensure diversity and quality of content. Collaboration with educational experts and content developers can also be used to ensure the availability of a wide range of resources that meet clear quality criteria.
- **Comply with the established requirements for AI assessment systems.** The requirements set out in the *Artificial Intelligence Regulation* include the need for accurate and representative data, consideration of the application context, carefully addressing biases in data processing, ensuring transparency in the operation of systems, and providing human oversight to ensure rigorous assessment. In this context, it is essential to understand that automated assessment offers additional efficiency and benefits, although the results obtained must be analysed by teachers to ensure integrity, fairness and transparency in the educational process and, in turn, be complemented by other more traditional assessment methods that enable the assessment of complex or creative responses.

By addressing these challenges and applying these solutions, teachers can maximise the potential of AI to improve the quality of education and enrich the learning experience of their students.



2.2.1. RESOURCES CREATION

Teachers play a key role in creating effective and stimulating educational materials for students. AI, especially generative AI, offers tools and technologies that can enhance the creation of these resources. Examples of these resources include:

- **Automated content generators** that enable the generation of educational materials such as quizzes, exercises, activities, videos, simulations, games, multimedia presentations, schedules, and learning scenarios. These resources can be adapted to different learning styles and facilitate the understanding of complex concepts. As an example, a text adapted to the needs of the students could be created automatically, taking into account variables such as the number of characters, subject matter, font, difficulty, inclusion of images, organisation into paragraphs, among other aspects, in order to address specific content effectively.
- **Adaptation of content to different languages**, making educational materials accessible to all students from different linguistic and cultural backgrounds. As an example, a teacher could use a machine translation system to translate an information circular from the original language into the native language of the student and his or her family.

2.2.2. PERSONALISATION OF LEARNING

Personalisation of learning is a pedagogical approach that seeks to adapt the educational process to the individual needs of each learner. AI offers tools and techniques that allow teachers to personalise learning more effectively. The following are some of the ways in which teachers can use AI to personalise learning:

- **Analysis of learner data.** This involves collecting, processing and analysing data on student performance, learning preferences and other relevant student factors. Predictive models can help teachers identify patterns and trends in student data, enabling them to anticipate and adjust their pedagogical approach to meet individual needs. **As an example**, a classroom learning management system would allow teachers to collect data on each student's progress, automatically generate a report and thus identify specific student difficulties in order to offer personalised support.
- **Content recommendation systems.** These systems use AI algorithms to suggest specific educational resources and learning activities that are personalised, relevant and appropriate to their individual needs. As an example, an online educational platform using an AI-based recommendation system can create personalised learning pathways that are aligned to the interests and skill level of the learner.

2.2.3. ASSESSMENT

Assessment is an essential process in teaching and learning and new AI tools and systems can facilitate this task through personalisation and automation. At this point it is necessary for



teachers to know how the systems or tools they are using in the classroom work, in order to be able to make informed and justified decisions. Some examples of the use of AI in assessment are:

- **Automated, immediate and personalised feedback.** Available AI systems provide specific and personalised feedback for each student. These systems allow teachers to identify areas of improvement in their students and automatically offer suggestions for activities so that students receive the attention and support they need to reach their full potential. **As an example**, an online educational platform using AI can give immediate feedback to students on their answers to given questions. If a student makes a mistake, the system not only helps them identify the error, but also provides a detailed explanation and suggestions for correcting it.
- **Automated assessment using AI algorithms** to correct tests, exams and assignments quickly and efficiently. These systems can analyse written answers (multiple choice or essays, for example), providing accurate results in a short time. **As an example**, a teacher could use an automated assessment system to correct multiple-choice tests. The system scans the student's answers, compares them with the correct answers and automatically generates the corresponding scores.

2.2.4. ADMINISTRATIVE MANAGEMENT AND AUTOMATION OF PROCESSES

In addition to their primary role in the teaching-learning process, teachers also play an important role in managing various aspects of the educational environment. AI can be a valuable tool to facilitate and optimise these management tasks. Some areas where these tools can be harnessed include:

- **Communication with families** through automatic updates, event reminders or personalised messages. AI can facilitate communication with families by allowing teachers to keep families informed about their children's academic progress and important events at the school. **As an example**, an automated communication system could send text messages or emails to families to remind them of meeting dates, important events, or school information.
- **Automatic generation of reports and administrative documents** using predefined templates and natural language processing systems. This reduces the burden on teachers and administrative staff, allowing them to spend more time on educational and student support tasks. **As an example**, such academic management systems would use AI to automatically generate grade reports, report cards and other administrative documents. It could also be used to organise and optimise tutorial hours with students or to collect useful information for these meetings.

2.3. SCHOOLS OR ADMINISTRATIONS PROFILE

The integration of AI in the education sector represents an opportunity to transform the way we teach and learn, but it also poses complex challenges for the management and



improvement of educational institutions and administrations (Coccoli et al., 2016; Lawacki-Richter et al., 2019).

In this sense, and beyond the adoption of advanced tools, questions arise about teaching autonomy, equity of access, data protection and the quality of educational content. All of these are challenges that administrations and schools must address in a thoughtful and durable manner in order to successfully navigate this new educational paradigm, ensuring that AI genuinely enriches the learning experience of students.

CHALLENGES AND LIMITATIONS

- **Resistance to change.** One of the main challenges facing schools or educational administrations when integrating AI is resistance to change on the part of some teaching and/or administrative staff. The introduction of new technologies, as has happened on so many occasions, can lead to fears of job obsolescence or the perception that AI will replace the teacher, rather than complement their work.
- **Digital divide and equitable access.** The current reality shows us that, despite the efforts being made by schools and educational administrations, we can still find situations of disadvantage in terms of access to technological resources and also significant differences in the digital competences of students, resulting from disadvantaged social and economic environments. These differences become even more prominent when it comes to the adoption of AI-based technologies.
- **Lack of evidence.** There is still a lack of empirical evidence on the effectiveness of AI in improving learning. At this point and being such a recent technology in its application in education, there is not enough research to determine whether AI or what types of AI applications are more effective in different educational contexts in the medium or long term.
- **Lack of digital skills in our society.** The families of our students are a fundamental pillar in the life and development of schools and educational administrations. Therefore, when deploying and implementing AI-based systems, we must consider that many families have limited access to technology and/or may need support in accompanying their children's learning. In addition, there are emerging movements that raise concerns about the use of screens, privacy and data security when using AI tools.

PREVENTIVE STRATEGIES AND MEASURES

- **Professional development programmes.** Implementing training programmes on how to effectively use AI tools in the classroom (workshops, online courses and educational resources) would be a necessary first step to increase the self-confidence of administrative and teaching staff. In addition, it would be necessary to promote a culture of innovation and continuous learning that encourages the exploration and adoption of new technologies, including AI. This may involve the creation of safe



spaces for experimentation and exchange of ideas, as well as the recognition and reward of efforts.

- **Investment in technology infrastructure.** Prioritising investment in technology infrastructure in all schools, especially those in disadvantaged areas, is essential to ensure equitable access to technology tools and resources. This means providing high-speed internet access, appropriate computing devices or subsidy programmes to help low-income families acquire the necessary technology. There is also a need for both schools and administrations to work together to make the best use of resources (up-to-date inventories, loan and exchange programmes, or the urgent identification of needs).
- **Research and continuous evaluation.** Research and schools or administrations do not always go hand in hand, and a large number of high-impact publications do not reflect the impact in the classroom. On the contrary, many classroom problems are not analysed with sufficient rigour or resources. Therefore, there is a growing need for close collaboration between schools, administrations and universities so that research results can influence and enrich educational policy and practice related to AI. An example of such a praxis could include conducting pilot studies in different educational contexts to determine which AI applications are most effective and how to best integrate them.
- **Digital literacy programmes.** Digital literacy programmes for students, families, and teachers to improve their digital competences and understanding of AI should include courses on online safety, data privacy, responsible use of technology and basic programming skills. In addition, it is important to provide resources and support for families to accompany their children in digital learning and to understand the benefits and risks associated with the use of AI-based tools.
- **Transparency and ethics in the use of AI.** Promoting transparency and ethics in the development and use of AI applications in education involves ensuring data privacy and security, fairness and non-discrimination when implementing AI algorithms. It is also important to involve all stakeholders, including teachers, students, families, and communities in discussions about the responsible use of AI in education.

2.3.1. CAREER AND EDUCATIONAL ADVICE

Career and educational advice is a crucial aspect of the work of schools and administrations. In this respect, AI can play a significant role in providing tools and resources to facilitate more personalised and effective guidance.

- **Recommendation and career guidance systems** that provide students with educational and career options, taking into account factors such as labour market demands, industry trends or career growth opportunities. **As an example**, an AI system could suggest specialisation options in emerging fields such as data analytics



or cybersecurity to a student interested in programming, based on their skills, interests, labour demand or market trends.

- **Simulations, presentations and interviews** to help students practice their professional skills and improve their preparation for the labour market. In this sense, it is necessary to reinforce the idea that an AI system does not have the capacity to sense or empathise. **As an example**, these tools can be used to increase a student's confidence and skills by simulating or reproducing real-world scenarios, such as job interviews or business presentations.
- **Professional networking platforms** to connect students with mentors, industry professionals or alumni who can provide guidance and support in their professional development. Through the use of matching algorithms, these platforms can identify potential connections between students and professionals based on common interests, educational paths or work experience. **As an example**, a student interested in engineering could contact an experienced engineer who could provide career advice or share practical experiences from the field.

2.3.2. MANAGEMENT AND AUTOMATION OF PROCESSES

AI can be a powerful tool to facilitate the management of various aspects related to students, teachers, or the automation of school processes to meet future demand. Some examples of use are:

- **Teacher timetabling and tasks allocation**, taking into account individual preferences, workload, skills or time availability. **As an example**, a timetabling system can take into account teachers' preferences, availability or weekly assignments to schedule or cover an absence from school.
- **Analysis of demographic trends** to understand enrolment projections, allowing for forward planning to meet future student demand. This allows schools to prepare adequately, adjusting infrastructure, resources, and educational programmes to meet the future needs of the student body. **As an example**, an AI system can be cross-referenced with regional databases to access birth or migration rates for individual school districts to plan investment in infrastructure, resources, or teachers.
- **School analysis and evaluation** by processing large amounts of information, such as test results, satisfaction surveys, participation and attendance data. This can be used to provide administrative staff with an in-depth understanding of school performance and effectiveness or to identify areas for improvement to assist with informed decision-making on educational policies and practices. **For example**, an AI system can identify patterns in test results that indicate the need for specific interventions in particular curricular areas.



3. ETHICS AND THE USE OF DATA

As AI becomes embedded in society, and more specifically in education, concerns arise about its ethical impact and the need for appropriate regulation. It cannot be otherwise, as AI algorithms can influence decisions and behaviours in subtle but powerful ways, raising questions about individual autonomy and responsibility delegated to machines.

This influence raises ethical dilemmas that various institutions are addressing, with the aim of creating an educational ecosystem where AI is used responsibly, safely and to the benefit of all.

In this sense, and taking into account published recommendations, the **top ten requirements for the good use of AI** should contain, address or provide a solution to ethical dilemmas such as:

1. **Appropriate and timely integration.** AI must be used for the common good of humanity and avoid harming or damaging people or the environment.
2. **Transparency and awareness.** AI systems must be transparent in their operation and decisions, allowing people to understand how they work and why they make certain decisions.
3. **Fairness and non-discrimination.** We must develop and use AI systems in a fair and equitable manner, avoiding any discrimination or bias towards specific individuals or groups.
4. **Durability and security.** AI systems must be robust and secure, protected against attacks that could put individuals or society at risk.
5. **Privacy and data protection.** AI must respect people's privacy and protect their personal data, ensuring its responsible and ethical use.
6. **Human supervision.** AI should be under human supervision, ensuring that people retain control over its development and use, and that no autonomous decisions are made that could negatively affect society.
7. **Human compatibility.** AI must be designed to be compatible with human values and dignity, respecting people's autonomy, freedom, and privacy.
8. **Promotion of social welfare.** AI should be used to promote social welfare and sustainable development, contributing to the solution of global problems such as poverty, climate change and disease.
9. **Collaborative learning.** When implementing an AI system or tool, the participation of different actors should be encouraged to ensure different perspectives and values.
10. **Reflection and anticipation.** There should be a continuous assessment of the ethical and social impact of AI, anticipating possible future risks and challenges, and promoting an open and transparent dialogue between all stakeholders.

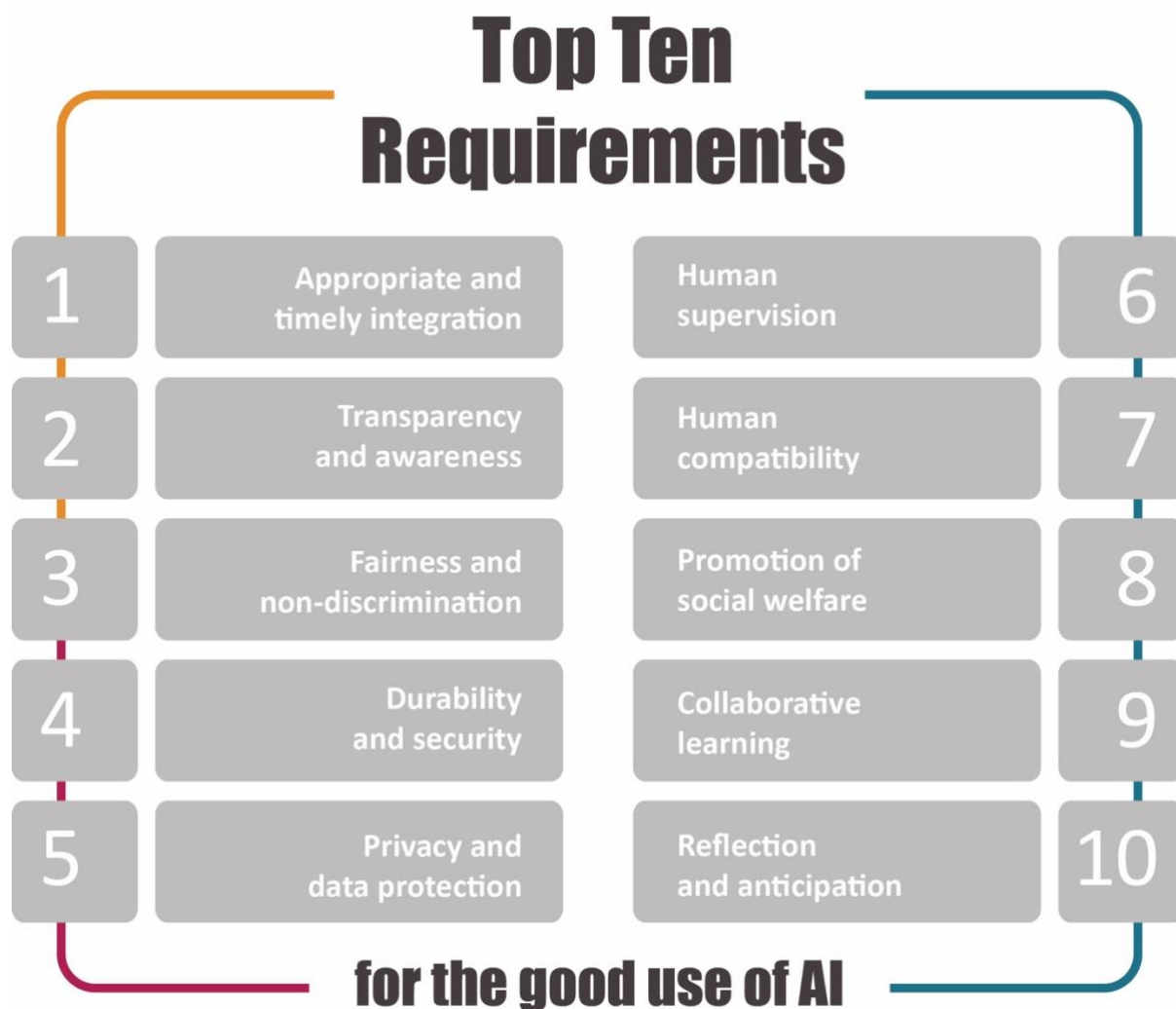


Illustration 3. Top Ten Requirements for the Good use of AI (INTEF, 2024).

These set of values, actions and principles, already included in existing recommendations and regulations, such as the *Recommendation on the Ethics of Artificial Intelligence* from UNESCO⁹ or the *Ethical Guidelines on the Use of Artificial Intelligence and Data in Teaching and Learning for Educators*¹⁰ from the European Commission, should serve as a guide for all actors involved in this process: teachers, students, educational institutions, technology companies and public administrations.

However, AI is a constantly evolving field, and existing ethical guidelines need to be adapted to new technological developments. A continuous effort is needed on the part of the responsible institutions and organisations to update and create new rules that respond to the challenges that arise.

⁹ <https://unesdoc.unesco.org/ark:/48223/pf0000381137>

¹⁰ <https://op.europa.eu/en/publication-detail/-/publication/d81a0d54-5348-11ed-92ed-01aa75ed71a1/language-en>



3.1. PRACTICAL SUGGESTIONS FOR DEALING WITH ETHICS AND AI WITH YOUR STUDENTS

3.1.1. ALGORITHMS BIASES

It is a fact that AI algorithms can be affected by biases (social, racial, gender). Therefore, it is important that both teachers and students are aware of this fact and work actively to mitigate its impact on decision-making.

- **Sample activity:** analysis of case studies.
- **Description:** present students with real cases where algorithmic biases have had a negative impact on society. For example, cases of discrimination in recruitment processes or access to financial services.

3.1.2. DEEPFAKES

The creation of false content through deepfakes is a threat to the authenticity and integrity of information. Teachers and students need to be taught to discern between truthful and false information, and to develop analytical and critical thinking skills.

- **Sample activity:** workshop on creating and detecting deepfakes.
- **Description:** students will learn how to create deepfakes using online tools and will then be challenged to identify these false contents in images, audios and/or videos created by other classmates.

3.1.3. TECHNOLOGICAL DEPENDANCE

It is important to promote a balanced use of AI, where technology is a tool that enhances learning, but does not replace it. In addition, the development of social and emotional skills is fundamental for the comprehensive education of students.

- **Activity:** digital disconnection.
- **Description:** suggest to your students a period of time (for example, a day or a week) during which they limit the use of technological devices, with the aim of promoting reflection on the practice of use.

3.1.4. PRIVACY AND DATA SAFETY

The protection of students' personal information is a fundamental right that must be guaranteed at all times. It is important that, in addition to ensuring policies and strategies in this sense, we work with them so that they are aware and responsible when it comes to handing over their personal data.

- **Activity:** infographic on the safe use of data on social networks.
- **Description:** hold a collaborative debate among students to make them aware that mobile devices and social networks are not just toys. Produce an infographic with the main conclusions of the debate.

3.1.5. EQUITY AND INCLUSION

AI should be a tool that enhances equity in education and does not increase inequalities. It is necessary to ensure that all students are aware of the existence of the technological gap and reflect on the need for equal opportunities in AI, regardless of their origin or socio-economic status.

- **Activity:** designing a manifesto.
- **Description:** after viewing technical and audiovisual material that provides information and clarity on the concept, students will reflect on the consequences of the technology gap and how important it is for our society to mitigate the negative consequences. They will then draw up a manifesto that they can send to their local educational or local administration.

3.1.6. SUSTAINABILITY

AI has become a key technology for the development of various industries, with exponential growth in recent months. However, the training and execution of AI models has a major impact on energy consumption and the carbon footprint of our planet. It is essential that students understand both the opportunities and responsibilities of using AI in relation to the environment.

- **Activity:** green hackathon.
- **Description:** organisation of an event where programmers, designers, entrepreneurs and other technology professionals meet with members of the educational community to create a green technology space. This event would lead to a meeting where workshops and talks on technology and the environment are organised, providing a platform for learning, collaboration, and networking. Projects can be evaluated by a jury of technology and sustainability experts, and prizes can be awarded to the most innovative solutions with the greatest impact.



REMEMBER

- These are just a few ideas, and all activities can be adapted to different educational levels and contexts.
- It is important that the activities are motivating and that they encourage participation.
- Critical reflection and discussion are essential for students to learn how to make responsible decisions in relation to AI.

4. CONCLUSIONS

AI is emerging as a transformative technology that influences virtually every aspect of our daily lives. As we have explored throughout this guide, its applications are diverse, ranging from healthcare and finance to environmental conservation and transport.

In education, AI promises to revolutionise teaching and learning through personalised learning, virtual tutoring, automation of administrative tasks, data analysis and the development of educational resources. However, it is essential that the entire education community gains knowledge about AI in order to mitigate its risks and ensure ethical and responsible use. One possible approach is the one recommended by the European Commission to integrate AI in an ethical and responsible way: teaching for AI, teaching about AI and teaching with AI. These approaches not only enhance the educational experience, but also prepare the next generations for the challenges of the digital world.

However, despite its ability to streamline processes and improve efficiency, this advancement also raises ethical and social challenges, including concerns about privacy, security or inequality. Therefore, a continuous effort is needed to update and create new rules that respond to emerging challenges, ensuring that AI benefits everyone in an equitable and fair manner.

In this sense, it is important to consider aspects such as gender equality, transparency in the use of data and algorithms or a constant evaluation of this technology, among other aspects. The implementation of regulations such as the *Artificial Intelligence Regulation* in Europe and the *National Artificial Intelligence Strategy* in Spain underline the importance of a regulatory approach that protects fundamental rights and promotes a sustainable development of AI.

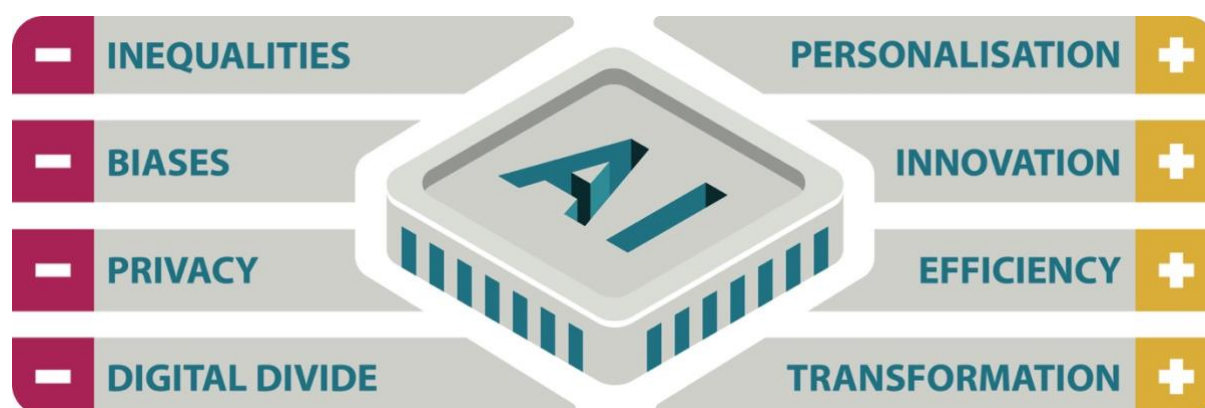


Illustration 4. AI in balance (INTEF, 2024).



5. GLOSSARY

This glossary lists key AI terms and concepts, which either appear in the body of the document or in the provided links to external documents.

- **Algorithm:** A set of step-by-step instructions used to solve a problem or perform a specific task in an AI system.
- **Classification algorithm:** A type of AI algorithm used to categorise data into different predefined classes or categories.
- **Chatbot:** A computer programme that uses AI to simulate a human conversation through text or voice.
- **Complexity:** The diversity of data types, from text and images to real-time sensor-generated data, creates a complex environment that requires more advanced approaches to processing and analysis.
- **Clustering algorithm:** A type of AI algorithm used to identify similar patterns or groups in a dataset without predefined categories.
- **Data bias:** The presence of imbalances or biases in the training data used in AI.
- **Decoder:** A part of generative language models that converts an internal representation into human readable and understandable text.
- **Deep learning:** A branch of machine learning that relies on multi-layered artificial neural networks to process data and extract complex features.
- **Ethical AI:** An emerging field that addresses the ethical and social challenges associated with the development and implementation of AI systems.
- **Generative AI:** A field of AI that focuses on creating original content, such as text, images or music, using language models and advanced generation techniques.
- **Large Language Models (LLM):** AI models based on computational models that can understand and generate human language in a coherent and contextual manner.
- **Machine learning (ML):** An AI approach in which machines learn automatically from data and experiences, without being explicitly programmed.



- **Natural language processing (NLP):** A branch of AI that deals with the interaction between machines and human language.
- **Neural network:** A mathematical model that simulates the functioning of biological neural networks.
- **Prompt:** A cue or instruction provided to an AI model to guide its generation of text or response.
- **Reinforcement learning:** A type of machine learning in which an agent learns through interaction with an environment.
- **Strong AI:** A more advanced level of AI that seeks to replicate general human intelligence in a machine.
- **Supervised learning:** A type of machine learning in which the model is trained using labelled examples.
- **Text generation:** The process of creating text automatically using generative language models.
- **Training data:** A set of examples or information used to teach an AI model during the training process.
- **Transferable learning:** The ability of an AI model trained on a specific task to apply the acquired knowledge to a related but different task.
- **Unsupervised learning:** A type of machine learning in which the model is trained using unlabelled examples.
- **Weak AI:** Also known as narrow AI, refers to AI systems designed to perform specific tasks efficiently, but with limited capabilities outside that specific domain.



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ANNEX I. AI IN EDUCATION IN THE SPANISH AUTONOMOUS COMMUNITIES

TITLE	THEME OR ISSUE	AUTHOR AND DATE
CANARY ISLANDS Artificial intelligence (AI) in education.	A guide to familiarise teachers with AI and provide them with guidelines for exploring its use as an educational tool.	School Technology Area from the Canary Islands Regional Department for Education (Government of the Canary Islands, 2024)
	https://www.gobiernodecanarias.org/cmsweb/export/sites/educacion/web/_galerias/descargas/otros/2024_02_29_guia_ia_en_educacion.pdf	
TITLE	THEME OR ISSUE	AUTHOR AND DATE
CATALONIA Guidelines and recommendations for the use of artificial intelligence in schools.	A guide that explores the opportunities and challenges of AI in education, as well as the uncertainties that remain.	Directorate-General for Innovation, Digitisation and Curriculum (Generalitat de Catalunya, 2024)
	https://projectes.xtec.cat/ia/general/orientacions-i-recomanacions-per-lus-de-la-intelligencia-artificial-als-centres-educatius/	



ANNEX II. GOOD PRACTICES FOR THE CLASSROOM

In the following section, we present different learning resources designed by teachers to introduce AI-related concepts in the classroom. These resources cover different educational stages and are aimed at fostering students' digital competence, preparing them to face the challenges of the 21st century.

TITLE	AI in the classroom with Scratch 3.0
DESCRIPTION	A set of video tutorials to learn how to use the Machine Learning for Kids tool and develop AI systems to incorporate them into your digital creations with Scratch 3. These resources will be ideal for reflecting on the technological and ethical scope of AI in our society.
ISCED LEVEL	ISCED 1: Primary Education ISCED 2: Lower Secondary Education. ISCED 3: Upper Secondary Education.
LINK	https://code.intef.es/prop_didacticas/inteligencia-artificial-en-el-aula-con-scratch-3-0/

TITLE	Recycle with AI
DESCRIPTION	This learning resource integrates artificial intelligence and machine learning to promote cleanliness and recycling in the school playground. Using Scratch 3.0 through the <i>LearningML</i> platform, a computational artefact is developed to help differentiate waste generated during recess, promoting environmental awareness and digital literacy.
ISCED LEVEL	ISCED 1: Primary Education ISCED 2: Lower Secondary Education ISCED 3: Upper Secondary Education
LINK	https://code.intef.es/prop_didacticas/recicla-con-ia/

TITLE	Artificial intelligence and The History of Spain
DESCRIPTION	This learning resource presents a fantastic and motivating way to learn about the history of Spain through the use of Machine Learning, Scratch and Quizizz. Students will learn about recent Spanish history in a participatory and motivating way through the use of AI, programming and written and oral presentation skills.
ISCED LEVEL	ISCED 1: Primary Education
LINK	https://code.intef.es/experiencias_aula/inteligencia-artificial-y-la-historia-de-espana/



TITLE	Designing care chats with Watson Assistant: artificial intelligence at the service of people.
DESCRIPTION	This tool allows students to design, build and operate a keyboard <i>chatbot</i> to provide help to families accessing the school's website. Using IBM Cloud's Watson Assistant online service, students will learn how to use artificial intelligence to develop customer service solutions, acquiring skills relevant to today's working world.
ISCED LEVEL	ISCED 1: Primary Education ISCED 2: Lower Secondary Education. ISCED 3: Upper Secondary Education. ISCED 4: Post-Secondary non-tertiary Education.
LINK	https://code.intef.es/prop_didacticas/disenio-de-chats-asistenciales-con-watson-assistant-inteligencia-artificial-al-servicio-de-las-personas/
TITLE	Eva's world
DESCRIPTION	This learning resource invites reflections on how technology, especially robotisation and AI, is transforming the world of work by allowing machines to perform tasks previously done by humans. It raises questions about the impact on human jobs and suggests that, while some jobs could be replaced, technology could also generate new job opportunities.
ISCED LEVEL	ISCED 4: Post-Secondary non-tertiary Education.
LINK	https://descargas.intef.es/recursos_educativos/ODES_SGOA/Bachillerato/Filosofia/El_mundo_de_Eva/index.html
TITLE	My first steps in Python
DESCRIPTION	This resource seeks to introduce Python as a teaching base from an early age, with the aim of preparing students for the labour market, where programming knowledge is becoming increasingly important. Based on previous successful experiences with languages such as Scratch, it is shown that students can develop skills in Python. This programming language is used in the development of AI and machine learning, making it a fundamental tool for the development of digital competence.
ISCED LEVEL	ISCED 1: Primary Education ISCED 2: Lower Secondary Education. ISCED 3: Upper Secondary Education. ISCED 4: Post-Secondary non-tertiary Education.
LINK	https://code.intef.es/prop_didacticas/mis-primeros-pasos-en-python/



TITLE	Practical activities to learn and think about face recognition systems with Scratch Lab Face Sensing.
DESCRIPTION	This resource offers hands-on activities using Scratch Lab Face Sensing to explore machine learning-based facial recognition systems. Students will learn how to program projects using this technology, encouraging critical reflections on its possibilities, limitations and dangers.
ISCED LEVEL	ISCED 2: Lower Secondary Education. ISCED 3: Upper Secondary Education. ISCED 4: Post-Secondary non-tertiary Education.
LINK	https://code.intef.es/prop_didacticas/actividades-practicas-para-conocer-y-reflexionar-sobre-los-sistemas-de-reconocimiento-facial-con-scratch-lab-face-sensing/

TITLE	Controlling a programmable board by voice using an artificial intelligence system
DESCRIPTION	This tool allows a BBC micro:bit board to be controlled using voice commands via an artificial intelligence system. Students will build a machine learning sound model with Teachable Machine and integrate it into a project programmed with Stretch3, giving them the ability to control the BBC micro:bit board in a creative and experimental way. To implement this, experience in creating models in Teachable Machine and follow the instructions provided in the links given are required.
ISCED LEVEL	ISCED 1: Primary Education ISCED 2: Lower Secondary Education. ISCED 3: Upper Secondary Education.
LINK	https://code.intef.es/prop_didacticas/controlar-una-placa-programable-usando-la-voz-mediante-un-sistema-de-inteligencia-artificial/

TITLE	Recommendation at our service
DESCRIPTION	This school project teaches students about AI, especially in the context of machine learning. In this way, they will experiment with demonstrations of recommendation engines and then create their own machine learning model to recommend products. In addition, they will learn about data analysis, predictive algorithms, recommendation systems and reflect ethically on the impact of these technologies in today's society.
ISCED LEVEL	ISCED 4: Post-Secondary non-tertiary Education.
LINK	https://descargas.intef.es/recursos_educativos/ODES_SGOA/Bachillerato/Tel/7B6_SA_Recomendacion_a_tu_servicio/index.html



TITLE	Ethics in Artificial Intelligence: Moral Machine
DESCRIPTION	This lesson plan allows students to explore ethical issues related to artificial intelligence by using dilemmas in an autonomous way. Through the website developed by Scalable Cooperation, Mit Media Lab and MIT, students can reflect on the ethical implications of AI in everyday life. The site provides not only ethical dilemmas, but also useful resources for the classroom, thus contributing to raising students' awareness of these issues.
ISCED LEVEL	ISCED 2: Lower Secondary Education. ISCED 3: Upper Secondary Education. ISCED 4: Post-Secondary non-tertiary Education.
LINK	https://code.intef.es/prop_didacticas/la-etica-en-la-inteligencia-artificial-moral-machine/
TITLE	Can we trust artificial intelligence?
DESCRIPTION	This resource presents an introduction to <i>machine learning</i> using Teachable Machine. Through activities designed for secondary education, students will explore the fundamental concepts of <i>machine learning</i> and experiment with the Teachable Machine application to understand how algorithms work. There will be an activity where students will build a cat and dog classifier, reflecting on the problem of bias in data and the ethical implications of AI in real life.
ISCED LEVEL	ISCED 2: Lower Secondary Education. ISCED 3: Upper Secondary Education. ISCED 4: Post-Secondary non-tertiary Education.
LINK	https://code.intef.es/prop_didacticas/podemos-fiarnos-de-la-inteligencia-artificial/
TITLE	Early medical diagnosis using AI
DESCRIPTION	This learning resource aims to help students understand the impact of AI on society and on improving personal and collective health. To do so, they will learn how to programme, analyse data and use decision trees to diagnose cases of antibiotic resistance.
ISCED LEVEL	ISCED 4: Post-Secondary non-tertiary Education.
LINK	https://descargas.intef.es/recursos_educativos/ODES_SGOA/Bachillerato/IA/Inteligencia_Artificial_I_Diagnostico_Medico/index.html



TITLE	My job in the future
DESCRIPTION	This learning scenario introduces students to the phenomena of robotisation and AI, so that they can make an assessment that includes an analysis of how people will suffer the consequences of these phenomena, while at the same time trying to suggest different economic policy measures that aim to ensure that the economic changes that take place do not increase income inequality and allow states to maintain a level of well-being for their citizens.
ISCED LEVEL	ISCED 4: Post-Secondary non-tertiary Education.
LINK	https://descargas.intef.es/recursos_educativos/ODES_SGOA/Bachillerato/Economia/6I_SA_BACH_E_Mi_trabajo_del_futuro/index.html

TITLE	Good AI practices
DESCRIPTION	Resource bank that includes a large number of good practices (infographics and learning situations) created by students participating in the MOOC "An AI for LEARNING" (INTEF - 2023).
ISCED LEVEL	ISCED 0: Early Childhood Education ISCED 1: Primary Education ISCED 2: Lower Secondary Education. ISCED 3: Upper Secondary Education. ISCED 4: Post-Secondary non-tertiary Education. ISCED 5: Short-cycle tertiary education. ISCED 6: Bachelor's or equivalent level.
LINK	https://code.intef.es/noticias/transformando-la-educacion-buenas-practicas-en-el-mooc-de-una-ia-para-aprender/

TITLE	Classification of toxic and healthy behaviours in a romantic relationship
DESCRIPTION	The application aims to classify toxic and healthy behaviours within a romantic relationship using AI, allowing not only to work on skills in the development of mobile applications and the implementation of AI models, but also to prevent and combat gender-based violence from its earliest origins in adolescence.
ISCED LEVEL	ISCED 4: Post-Secondary non-tertiary Education (VET)
LINK	https://code.intef.es/buenas_practicas_epc/clasificacion-de-conductas-toxicas-y-sanas-dentro-de-una-relacion-amorosa/



TITLE	Learning Machines
DESCRIPTION	This learning resource seeks to introduce students to artificial intelligence (AI), addressing its fundamentals, practical applications and ethical aspects. Through a progressive approach, students first acquire basic concepts through a multimedia book, then apply their knowledge in practical projects using tools such as Scratch and Machine Learning for Kids.
ISCED LEVEL	ISCED 4: Post-Secondary non-tertiary Education.
LINK	https://code.intef.es/buenas_practicas_epc/maquinas-que-aprenden/

TITLE	Application of AI in ocean conservation
DESCRIPTION	This learning resource for sixth grade students in Natural Sciences aims to teach how AI can contribute to marine preservation. Through practical and technological activities, students will explore the field work of scientists in the sea, record data on ocean habitats and learn about the species studied in the Canary Islands. In addition, they will promote oral, written and visual communication to encourage respect for living beings, especially marine species.
ISCED LEVEL	ISCED 1: Primary Education
LINK	https://code.intef.es/buenas_practicas_epc/ai-en-la-conservacion-de-los-oceanos/



ANNEX III. AI IN EDUCATION ORIENTATIONS, GUIDELINES AND RECOMENDATIONS

AT INTERNATIONAL LEVEL

TITLE	SUMMARY	AUTHOR AND DATE
Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for Educators	Ethical guidelines as part of the Digital Education Action Plan (2021-2027) to help educators address misconceptions about AI and promote its ethical use.	European Commission (2022)
https://op.europa.eu/en/publication-detail/-/publication/d81a0d54-5348-11ed-92ed-01aa75ed71a1/language-en		

TITLE	SUMMARY	AUTHOR AND DATE
Teachers' competences in AI	Number 1 report detailing teachers' digital competences needed to harness AI in an ethical and responsible way.	European Commission. European Digital Education Hub. (2023)
https://www.ai4t.eu/wp-content/uploads/2023/08/AI-squad-output_briefing-report-1.pdf		

TITLE	SUMMARY	AUTHOR AND DATE
How to Support Teachers to Use AI in Teaching?	Briefing report No. 2 focused on providing guidance on how to support teachers in the use of AI in teaching.	European Commission. European Digital Education Hub. (2023)
https://resitve.sio.si/wp-content/uploads/sites/7/2023/11/AI-squad-output_briefing-report-2.pdf		

TITLE	SUMMARY	AUTHOR AND DATE
Use Scenarios & Practical Examples of AI in Education	Briefing report No. 3 presents a variety of scenarios and practical examples of AI in education that teachers can draw on as a source of inspiration.	European Commission. European Digital Education Hub. (2023)
https://www.ai4t.eu/wp-content/uploads/2024/01/AI-squad-output_briefing-report-3.pdf		



TITLE	SUMMARY	AUTHOR AND DATE
Education about AI	Briefing report No. 4 presents examples of educational approaches to AI in different countries. Specific cases from Belgium, Ireland, Italy, Spain and Ukraine are analysed. https://resitve.sio.si/wp-content/uploads/sites/7/2023/11/AI-squad-output_briefing-report-4.pdf	European Commission. European Digital Education Hub. (2023)
Influence of AI on Governance in Education	Briefing report No. 5 presents a risk-based approach to assessing and managing the use of AI in education. Different levels of risk are examined, and emerging practices are explored. https://resitve.sio.si/wp-content/uploads/sites/7/2023/11/AI-squad-output_briefing-report-5.pdf	European Commission. European Digital Education Hub. (2023)
AI in Ethics, Human Rights, Law and Educational Data	Briefing report No. 6 addresses the intersection between ethics and AI in education. It examines ethical aspects of AI, relevant national or institutional regulations, guidelines for the application of AI in education and data protection. https://www.ai4t.eu/wp-content/uploads/2024/01/AI-squad-output_briefing-report-6.pdf	European Commission. European Digital Education Hub. (2023)
Teaching with AI – Assessment, Feedback and Personalisation	Briefing report No. 7 explores in depth how AI can adapt to the individual needs of students, improve the learning process and optimise administrative tasks, among others. https://resitve.sio.si/wp-content/uploads/sites/7/2023/11/AI-squad-output_briefing-report-7.pdf	European Commission. European Digital Education Hub. (2023)



TITLE	SUMMARY	AUTHOR AND DATE
(How) is using data for learning ethical?	Document summarising the conclusions of a series of webinars and addressing issues related to the ethical handling of data in educational settings. http://www.eun.org/documents/411753/817341/Data4Learning+-+Summary+-+16.05.2023_final.pdf/7580e185-23be-4788-8421-690490801528	European Schoolnet (2023)

TITLE	SUMMARY	AUTHOR AND DATE
Guidance for generative AI in education and research	Guide that aims to analyse what GenAI is, address ethical and policy issues, suggest measures for regulation, and ensure ethical use. https://unesdoc.unesco.org/ark:/48223/pf0000386693?posInSet=1&queryId=1bdb178-9de5-41b3-a634-7001bf86f8b3	UNESCO (2023)

TITLE	SUMMARY	AUTHOR AND DATE
Inside AI: an algorithmic adventure	Graphic novel about the impact of AI on humanity. https://unesdoc.unesco.org/ark:/48223/pf0000382456	UNESCO (2023)

TITLE	SUMMARY	AUTHOR AND DATE
Recommendation on the Ethics of Artificial Intelligence	Recommendation adopted by all 193 Member States in 2021 and establishing a universal regulatory framework to address ethical issues. https://unesdoc.unesco.org/ark:/48223/pf0000381137	UNESCO (2022)



TITLE	SUMMARY	AUTHOR AND DATE
K-12 curricula: a mapping of government-endorsed AI curricula	Report on the global status of government-supported and internationally available K-12 AI curricula.	UNESCO (2022)
https://unesdoc.unesco.org/ark:/48223/pf0000380602		

TITLE	SUMMARY	AUTHOR AND DATE
AI and education: guidance for policy-makers	This report provides an overview of policy responses, describes three existing approaches and proposes detailed examples for planning AI-related pedagogical policies.	UNESCO (2021)
https://unesdoc.unesco.org/ark:/48223/pf0000376709		

TITLE	SUMMARY	AUTHOR AND DATE
International Forum on AI and the Futures of Education, developing competencies for the AI Era, 7-8 December 2020: synthesis report	Technical summary of the international forum on AI and the futures of education where experts in education and technology were able to discuss AI competences for the futures of education.	UNESCO (2021)
https://unesdoc.unesco.org/ark:/48223/pf0000377251		

TITLE	SUMMARY	AUTHOR AND DATE
Beijing Consensus on Artificial Intelligence and Education	Consensus resulting from the <i>International Conference on AI and Education</i> , advocating the enhancement of human capabilities for sustainable development through AI technology, ensuring equitable access and addressing inequalities.	UNESCO (2019)
https://unesdoc.unesco.org/ark:/48223/pf0000368303		



OTHERS

TITLE	SUMMARY	AUTHOR AND DATE
Hand-On AI Projects for the classroom	Practical AI classroom projects with 5 thematic guides adapted to different levels and areas: Primary Education, Secondary Education, optional subjects, computer science and AI ethics. https://cdn.iste.org/www-root/2021-10/AI%20Ethics%20Guide%20EN.pdf	The International Society for Technology in Education (ISTE) & General Motors (2023)

TITLE	SUMMARY	AUTHOR AND DATE
<i>Los algoritmos a examen: ¿Por qué IA en educación?</i> [Algorithms under scrutiny: Why AI in education]	Reflection guide on the use of AI in education. https://fundaciobofill.cat/uploads/docs/q/z/z/dzp-e40_guia_digital_040123_algoritmos.pdf	Hernando A., Municio A., Vázquez A, Gardó H. & Martínez H. (The Jaume Bofill Foundation, 2022).

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