



WP2a1 - Exploratory Report

### Title: "Artificial Intelligence: The Portuguese context, policies and strategy on AI and Education"

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#### Introduction

The teacher training centre "Centro de Formação Dr. Rui Grácio" (Lagos, Portugal) is part of the European team of the ERASMUS+ TE-REG project "Teacher Education Regenerated (TE\_REG) Beyond Competencies. Rethinking and redesigning teacher education curricula in the GenAl era» - Reference no. KA220-HED-CF9D94FC.

Within the scope of this European partnership, we have done research in Portugal to try to understand how digital transformations and IA in recent years have had an impact on national policies, decisions and framework for education and teachers professional practice.

We feel it is important to start by highlighting the important Council of Europe's report 'Artificial Intelligence and Education. A critical view through the lens of human rights, democracy and the rule of law' (Council of Europe, 2022). The report explores, firstly, the application and teaching of AI in Education (AI&ED); secondly, it approaches AI&ED through the lens of the Council of Europe's core values: human rights, democracy and the rule of law, and, thirdly, rather than assuming the benefits of AI for education, it takes a deliberately critical approach to AI&ED, considering both the opportunities and the challenges: 'Throughout, the aim is to provide a holistic view to help ensure that AI empowers and not overpowers educators and learners, and that future developments and practices are genuinely for the common good.' You can find out more about the report at the following link:

https://rm.coe.int/artificial-intelligence-and-education-a-critical-view-through-the-lens/1680a886bd

#### 1. The Portuguese context on Al

In April 2018, Portugal signed the 'European Declaration on Al' during the European Union Digital Day in Brussels. On 25 February 2019, the presentation and public discussion of the national strategy Al Portugal 2030 will take place in Porto, together with the presentation of the OECD 'Science, Technology and Innovation Outlook 2018'.

In the national context, according to the Portugal Digital Mission Structure, Artificial Intelligence technologies should be easily available by 2030 to promote process efficiency and quality of service in companies, public services and for all citizens. This requires investment in Artificial Intelligence training for everyone.

#### 1.1 The National Artificial Intelligence Strategy: Al Portugal 2030

The National Artificial Intelligence Strategy aims to promote research and innovation in this specific area, in favour of its development and application in fields such as public administration, education, training and companies. With this strategic document, Portugal is taking another leading step in its development, in line with the European Commission's directives, which aim to encourage member states to promote the development and use of Artificial Intelligence in Europe. The national strategy is based on 7 pillars of action: Inclusion and Education; Qualification and Specialisation; Thematic Areas for Research and Innovation in European and International Impact; Fundamental Research for the AI of the Future; New Developments and Support Areas in European and International Networks; and Ethics and Security. Here we will highlight the first pillar: Inclusion and Education, which corresponds to the generalised dissemination of AI knowledge, providing the necessary basis for AI education, disseminating STEM knowledge and promoting the early acquisition of programming skills. You can find out more about the strategy at the following link:

https://portugaldigital.gov.pt/acelerar-a-transicao-digital-em-portugal/conhecer-as-estrategias-para -a-transicao-digital/estrategia-nacional-de-inteligencia-artificial/ The authors of the AI Portugal 2030 strategy (INCoDe.2030, 2020) state that it is very important to take into account an educational strategy with an early introduction to the fundamental concepts of Computer Science, complemented by the learning of Information and Communication Technologies (ICT) through their integration into the curriculum of other subjects and they highlight AI in this context, because 'Moreover, given its importance, concepts of AI should also be considered at an early stage of schooling.'(pp.14). The document suggests examples such as:

a) teaching young students, the fundamentals of digital learning and Al through Ciência Viva Clubs located in schools and Science Clubs, taking current global problems from biodiversity or pollution studies as challenges.

b) develop creative/collaborative multimedia content in science, whether on key Science, Technology, Engineering, Maths (STEM) topics, such as human biology and the energy ecosystem, or on Portuguese regions, geography and history, and many other subjects.

c) develop programming skills and take advantage of the high expressiveness of programming languages and platforms to create original and creative content.

In this process, the authors believe that students will not only be able to learn to reason and solve problems digitally, with the use of AI among other resources, but also to create and define new problems based on their creative ability and critical thinking.

### **1.2 AI Digital Inclusion and Education**

Al Digital Inclusion and Education are two of the main axes of Al Portugal 2030, which will boost the Portuguese people's ability to develop digital skills by the end of the next decade. According to INCoDe.2030 (2020, pp. 36) 'the dissemination of generalised knowledge about Al, Digital Inclusion and Education for all is an essential component of Al development. Wider knowledge and skills will make it easier to adapt to changes in professions. Opportunities to broaden the content of qualifications will be integrated into teaching programmes. The aim is to avoid highly specialised skills in an excessively narrow field.'

The country therefore needs to change its digital education strategy, moving from the use of ICT technology to an understanding of the fundamental elements of Computer Science. This knowledge will enable students to tackle a wide variety of problems, developing new digital solutions, as well as providing the necessary basis to support the introduction of Artificial Intelligence content. According to the authors, 'performing this change in the digital education paradigm in schools can only be accomplished by a new initiative totally devoted to promoting change and new practices among teachers in line with the shift from ICT use to Computing competence (i.e. motivate new networks, communities of practice, and grassroot organisations) involving, first and foremost, current ICT teachers, school headmasters, the government, academia and private companies and institutions that understand and share the importance of this change and are available to support it in different ways.' In conclusion, the authors state that the start of such a movement is of the utmost importance to prepare future generations to deal with and compete in a digital and Artificial Intelligence world.

You can find out more about AI Portugal 2030 at:

https://observatorio.incode2030.gov.pt/wp-content/uploads/2022/05/Estrat%C3%A9giaAl2030-1.pdf

#### **1.3 The Digital Transition Action Plan**

The Action Plan for the Digital Transition (Resolution of the Council of Ministers no. 30/2020, 2020, of 21 April: <u>https://files.dre.pt/1s/2020/04/07800/0000600032.pdf</u>) states in its preamble that 'The new digital technologies, such as Artificial Intelligence systems, 5G technology, cloud and proximity computing and the Internet of Things, are, as a whole, one of the main foundations for the energy transition of the economy, in particular the strategic industrial sectors for Portugal and its business fabric.'

Among many aspects of economic and social development, this government plan provides for the development of a programme for the digital transformation of schools, with the creation of a working group led by the government's Education department, which covers the following dimensions:

- The provision of individual equipment adjusted to the needs of each educational level for use in the learning context;

- The guarantee of free mobile connectivity for students, teachers and trainers in the National Qualifications System, providing quality Internet access at school, as well as Internet access anywhere;

- Access to quality digital educational resources (e.g. textbooks, activity books, interactive lessons, interactive tests, exam preparation, performance analysis, diagnosis and proposal of learning paths, progress reports for parents and dictionaries);

- Access to collaboration tools in digital environments that promote innovation in the teaching-learning process, stimulate creativity and innovation, allow remote monitoring of the classroom (especially in cases of illness or special needs) and online collaborative work, bringing the new generations closer to the new paradigms of life in society and the world of work;

- The definition of processes leading to the electronic completion and grading of external assessment tests in a digital environment.

## 1.4. The Ministry of Education's Digitalisation for Schools Programme (PDE)

The Digitisation Programme for Schools (PDE): Aims to promote the integration of digital technologies in schools. The Action Plans for the Digital Development of Schools (PADDE), created under this programme, support the digital transition and are organised into three dimensions: Organisational - Leadership and cooperative work for professional development; Pedagogical - Curriculum development, assessment and pedagogical practices with digital resources; and Technological and digital - Infrastructure, equipment and access to digital environments.

The PDE includes training for teachers and leaders through courses and training workshops in partnership with the School Association Training Centres (CFAE) and Digital Ambassadors (ED). The Digital Teacher Training Plan includes the production of educational resources and initiatives such as the Digital Manuals Pilot Project (PPMD) and the distribution of the 'Digital Kit' by the Digital School. The Digital Education Laboratories (LED) are also part of this programme, supporting learning in all subjects with digital resources. With LED resources and equipment, students can carry out practical activities, research and organise information, model, manipulate variables, carry out experiments, analyse results, automate processes, create artefacts and solutions, among other things, enhancing their learning experience and developing their skills.

To support these pedagogical dynamics, various Learning Scenarios, among other materials, applicable to various disciplinary and interdisciplinary contexts, will be provided to schools so that teachers can use these examples to create/adapt their own scenarios and implement them with their students.

## 1.5. The Digital Teacher Training Plan

The plan includes a strong commitment to training teachers in the digital area, within the framework of the Education Digital Transition Plan. There was significant concern about the need to map the levels of digital competence of Portuguese teachers. This data is seen as a central element in the development of a digitally capable school, where it is understood that teachers are an essential element in innovation and pedagogical development.

The self-assessment tool developed based on the European Digital Competence Framework for Educators (DigCompEdu) - Check-In - as a data collection instrument, was applied to teachers between January and March 2021, in a strategy articulated between the Directorate-General for Education, the Training Centres for School Associations (CFAE) and the University of Aveiro (the entity responsible for developing the study). Following the check-in, between 2020 and 2024, hundreds of training workshops in Digital Capacity Building for Teachers level I, II and III were held nationwide by the CFAEs, a process that is still in force.

In all dimensions, a few train-the-trainer programmes have been designed which are progressively replicated in schools through the trainers of each CFAE. Among the various training programmes, in different areas and themes of digital education, there are courses and workshops focused exclusively on 'AI and Ethics: challenges and opportunities' and 'LED - Digital Education Laboratories', which have involved hundreds of teachers.

The Ministry of Education has also implemented several online training courses 'Will Artificial Intelligence Transform the School?', in MOOC (Massive Open Online Course) format, promoted by the Directorate-General for Education (DGE), involving hundreds of teachers. As well as contributing to the discussion on what is the fascinating world of Artificial Intelligence (AI), the aim was to encourage debate on the challenges and opportunities that AI can provide and, on the other hand, to encourage reflection on the extent to which AI can improve educational processes. The MOOC included the presentation of various examples for integrating this theme into the 'heart' of the school: the classroom. By tackling such an innovative and challenging subject as the use of Artificial Intelligence in Education, the course led to reflection, to pointing out ways forward and to realising that AI will be increasingly present in our lives. DGE website: https://www.dge.mec.pt/noticias/inteligencia-artificial-vai-transformar-escola

#### 2. Challenges and opportunities

To have a look at general discussion in Portugal, this topic will synthesise the main ideas explored by some authors.

Gameiro (2024) discusses the transformative potential and challenges of AI in education, emphasising both opportunities and risks. He highlights the need for critical engagement and ethical reflection: "AI is not a magic solution for all educational problems, but it can be a powerful tool when used with discernment and pedagogical intention." (p. 1). He warns against over-reliance on technology and stresses the irreplaceable value of teachers: "The human dimension of education cannot be replaced by

algorithms; teachers remain fundamental in guiding, motivating, and inspiring students." (p. 2). Gameiro also addresses the importance of digital literacy and the need for schools to adapt: "It is urgent to invest in digital literacy for both students and teachers, so that the integration of AI is truly beneficial and inclusive." (p. 2)

Pinto (2023) explores the ethical and responsible use of AI in education, calling for a commitment to excellence and human rights: "The responsible use of AI in education requires a commitment to ethical principles, transparency, and respect for human dignity." (p. 4). He emphasises the need for clear guidelines and ongoing teacher training: "It is essential to define clear guidelines and provide continuous training for teachers, so that AI is used as an ally and not as a substitute for educational professionals." (p. 7). Pinto also discusses the risks of bias and the importance of safeguarding students' rights: "We must be vigilant regarding the risks of algorithmic bias and ensure that students' rights and privacy are always protected." (p. 9)

Cukurova et al. (2024) provide a European perspective on teacher professional development in the context of AI, stressing the need for new competences and collaborative approaches: "Teachers need to develop not only technical skills but also pedagogical and ethical competences to integrate AI effectively into their practice." (p. 6). They highlight the importance of continuous, collaborative learning: "Professional development should be ongoing, collaborative, and focused on real classroom challenges, enabling teachers to share experiences and co-create solutions." (p. 10). The report also notes the importance of critical reflection: "Critical reflection on the opportunities and limitations of AI is essential to ensure its responsible and meaningful use in education." (p. 13)

Xavier (2024) describes AI as a "silent revolution" in education, with the potential to personalise learning and transform assessment: "Artificial intelligence is quietly revolutionising the classroom, allowing for more personalised learning experiences and innovative forms of assessment." (p. 1). She points to the need for a balanced approach: "The challenge is to find the right balance between technological innovation and the preservation of human values in education." (p. 2). Xavier also calls attention to the risks of exclusion and the importance of equity: "If not carefully managed, the integration of AI could widen existing inequalities; ensuring equitable access must be a priority." (p. 2)

# Synthesis

Across these sources, several themes emerge:

- Al offers significant opportunities for personalisation, efficiency, and innovation in education, but must be implemented with ethical care and human oversight.
- Teachers remain central to the educational process, requiring new forms of professional development that combine technical, pedagogical, and ethical skills.
- There is a strong call for digital literacy, critical reflection, and the safeguarding of fundamental rights and equity.
- The integration of AI in education must be accompanied by clear guidelines, continuous training, and a commitment to inclusivity and human dignity.
- These perspectives collectively advocate for an education system in Portugal—and beyond—that embraces AI as a tool for empowerment, not replacement, and that places human values, equity, and critical thinking at its core.

These perspectives collectively advocate for an education system in Portugal - and beyond - that embraces AI as a tool for empowerment of teachers and learners and that places human values, equity, and critical thinking at its core.

## Conclusions

## The State of AI in Education Policies in Portugal

Portugal has made significant progress in integrating Artificial Intelligence (AI) into the education sector, aligning itself with European strategies and promoting a critical and reflective approach to the impact of these technologies on pedagogical practices and teacher training.

**Strategic Commitment:** Portugal has signed the European Declaration on AI and developed the National Artificial Intelligence Strategy (AI Portugal 2030), which places education as a central pillar. The aim is to ensure the widespread dissemination of AI knowledge from the earliest years of schooling, fostering digital and programming skills.

**Digital Paradigm Shift:** The country recognises the need to move from mere use of ICT to a deeper understanding of the fundamentals of Computer Science and AI, strengthening students' critical thinking and creativity.

**Infrastructure and Resources:** Programmes such as the Action Plan for the Digital Transition and the Programme for the Digitalisation of Schools (PDE) have been implemented to equip schools with devices, connectivity, digital resources, and innovative collaborative environments.

**Teacher Training:** There is strong investment in teachers' digital capacity, with training programmes based on the European DigCompEdu framework and specific courses on AI and ethics, as well as MOOCs that encourage reflection on the opportunities and challenges of AI in the classroom.

**Critical and Ethical Vision:** Inspired by the Council of Europe's report, Portugal adopts a critical stance, valuing human rights, democracy, and the rule of law, and promoting debate on the risks and benefits of AI in education.

### **Recommendations for Future Development Needs**

Despite the progress made, several needs and challenges remain to consolidate and expand the use of AI in education in Portugal:

**1. Generalisation of AI Literacy:** It is necessary to ensure that the teaching of fundamental AI and programming concepts is transversal to all levels of education, including non-STEM subjects, to promote true digital inclusion.

**2.** Continuous and Specialised Teacher Training: Training should be ongoing, adapted to rapid technological changes, and include ethical, pedagogical, and practical aspects of AI. The creation of communities of practice and networks of collaboration between schools, universities, and the private sector is essential for sharing best practices and innovation.

**3. Sustained Curricular Integration:** Al should be sustainably integrated into curricula, not only as a tool but as a subject of study, promoting computational thinking, problem-solving, and creativity.

**4. Evaluation and Monitoring:** It is essential to monitor the impact of the initiatives already implemented, evaluating not only the acquisition of digital skills but also the impact of AI on equity, inclusion, and the quality of learning.

**5. Ethics, Security, and Digital Rights:** The development of clear policies on the ethical use of AI, data protection, and digital security is a priority, ensuring that technology respects democratic values and the rights of students and teachers.

**6.** Support for Innovation and Research: It is important to encourage pilot projects, digital education laboratories, and applied research on AI in real educational contexts, promoting experimentation and local adaptation of technological solutions.

## **Final note**

Portugal seems to be well positioned to develop the integration of AI in education, thanks to a robust national strategy, investment in infrastructure and teacher training, and a critical and ethical approach. However, to ensure that AI is a benefit for all, it is crucial to deepen digital literacy, strengthen continuous training, promote inclusion, and ensure sustained curricular and ethical integration. AI in Portuguese education presents in fact both significant challenges - such as digital inequality, bias, privacy, and teacher preparedness - and powerful opportunities for personalisation, efficiency, inclusion, and skills development. Addressing these challenges with robust policies, ethical frameworks, and investment in teacher training can ensure that AI becomes a catalyst for a more equitable, innovative, and effective education system in Portugal.

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