PAIDEIA

MINDS AND MACHINES UNITE
THE AI SYMPOSIUM

The challenges of AI: The curriculum for teachers in the PAIDEIA project

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From where we started….

The first phase of the Paideia project is dedicated to investigating two aspects of artificial intelligence applied in schools:

- Teachers' perceptions of the impact that AI may have on the future of their profession and teaching in general.
- The impact that Artificial Intelligence could have on the main fundamental pedagogical theories that are today the cultural reference of teacher training in Europe.
- The analysis of the state of the art of studies on artificial intelligence in education and an in-depth examination of the content of these studies.
- Analysis of the national , European and international policies

The aim is to provide a fundamental answer to a question that will then constitute the content of Paideia's basic research:

How is AI being used in education in PAIDEIA countries?

From where we started….

The different phases and areas of research outlined above can be considered as an essential element before moving on to the actual objective of the project, which is to include the subject of Artificial Intelligence in the teacher training curriculum.

In this presentation we will therefore address two issues:
The first is to present an analysis of the state of the art of studies on artificial intelligence in education and the national policies in course or programmed.

This Paper has in fact already been published and was the subject of a survey coordinated by the University of Dublin in collaboration with all the project partners.

The second element is related to a brief analysis of the approach that the project intends to offer to the prospect of a teacher training curriculum that intends to address the topic of Artificial Intelligence.
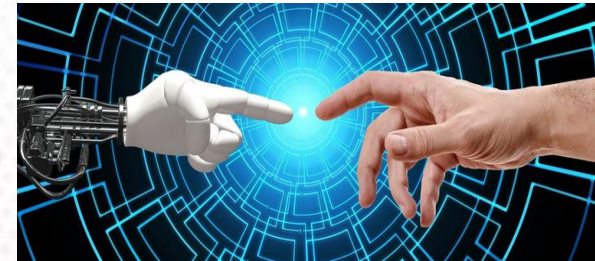
Analysis of academic literature

We investigated the **Extent, Nature, Range** of peer reviewed published academic literature with regards to AI and education in PAIDEIA countries
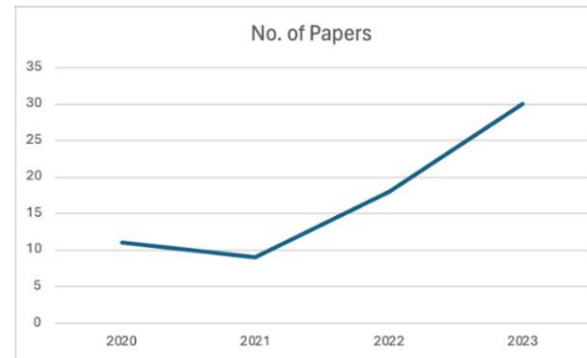
Figure 1: Year of Publication

Table 4: No. of Papers per PAIDEIA Country

| PAIDEIA Country	No. of Papers
Belgium	3
Bulgaria	3
Ireland	4
Italy	12
Malta	3
Spain	25
Türkiye	30

Majority of papers (68) are empirical in nature (i.e. capture or/and analyse data) with the remaining 7 papers being conceptual in nature.

The highest proportion of papers was published in 2023 (30 papers). Q1 2024: 7 papers (almost same as full year of 2021)

Analysis of the academic literature - AI Teaching Purposes

Sector
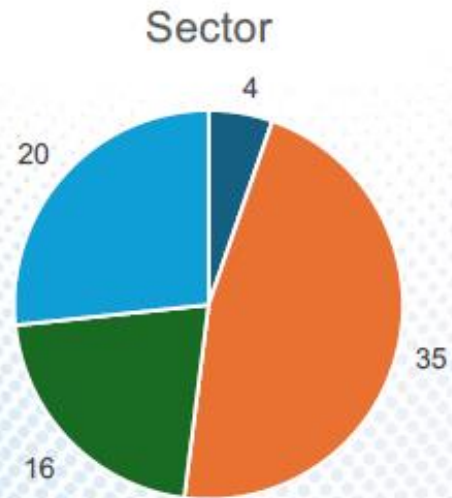
- Primary
- Post-Primary/Secondary
- Primary AND Post-Primary/Secondary
- ITE

Participants
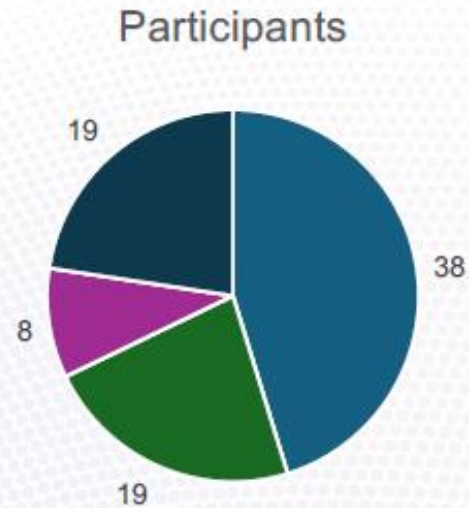
- Pupils/Students
- Teachers
- Pupils/Students AND Teachers
- ITE Students

Subject / Subject Area	No. of Papers
STEM/Science/Mathematics	22
Linguistics/Languages/Language Learning	10
Computer Science	9
Programming/Robotics	4
Social Studies, History, Technology, Instructional Technologies/Information Technologies, Art, PE, Geography, Music, Media Literacy, Economics, and Ethics/Religion	<= 3
Introduction to AI [S33]	1

Some published papers considered **AI for teaching purposes** that found over twenty functionalities for which teachers used AI tools, with the most common functions being obtaining information and finding answers to queries, creating exercises, tasks or homework, and generating texts and exploring vocabulary acquisition with the aid of AI for pronunciation, and found that AI-supported speech recognition pronunciation instruction methods considerably boosted students' word memory capacities.

Several papers explored the use of chatbots and found that this form of AI can make a positive impact on students' learning in particular about how the chatbot allowed them to learn new information, gave immediate responses to questions, increased their interest, and was accessible outside of the classroom.

Policy Analysis

21 policies from/provided by PAIDEIA Partner Countries have been analyzed

Cross-Country Comparative Analysis of Policies: (some) Key Points

- A primary goal across the policies in all seven countries is enhancing education through AI.

- All countries stress the importance of developing digital skills among students and teachers.

- Ensuring ethical AI use and maintaining transparency are central themes.

- Need for mechanisms and support for ongoing professional learning to ensure teachers can adapt to AI technologies

- Effective resource allocation and funding mechanisms are crucial for successful AI initiatives

Country	Policies for Analysis
Belgium	*Verantwoorde AI in Het Vlaamse Onderwijs: Een Collaboratief Proces Van Ontwikkeling Tot Gebruik (2024)*
Bulgaria	1. *Bulgarian Ministry of Education guidelines for the use of AI in the education system (2024)* 2. *National Development Program BULGARIA 2030 (2020)* 3. *Concept of Development of Artificial Intelligence in Bulgaria by 2030 (2020)* 4. *National Strategic Document with vision and goals of the policy for Digital Transformation 2020-2030 (2020)* 5. *Innovation Strategy for Smart Specialisation of the Republic of Bulgaria 2021-2027 (2021)* 6. *National Programme for increasing digital skills of teachers and students (2021)*
Ireland	1. *AI - Here for Good: A National Artificial Intelligence Strategy for Ireland (2021)* 2. *Digital Strategy for Schools to 2027 (2022)*
Italy	1. *Strategia Nazionale per l'Intelligenza Artificiale (2020)* 2. *Programma Strategico Intelligenza Artificiale 2022-2024 (2021)* 3. *Piano Triennale per l'informatica nella Pubblica Amministrazione. Edizione 2024-2026 (2023)* 4. *Piano Scuola 4.0* 5. *La Scuola A Prova Di Privacy (2023)* 6. *Progetto DIG4Future (2021)*
Malta	1. *Malta: The Ultimate AI Launchpad - A Strategy and Vision for Artificial Intelligence in Malta 2030 (2019)* 2. *National eSkills Strategy 2022 - 2025 (2022)*
Spain	1. *Estrategia de Inteligencia Artificial 2024 (2024)* 2. *National Strategy for Artificial Intelligence (2020)* 3. *La Intel·Ligència Artificial En L'educació: Orientacions i Recomanacions Per Al Seu Ús Als Centres (2024)*
Türkiye	*Turkish National Artificial Intelligence Strategy 2021-2025 (2021)*

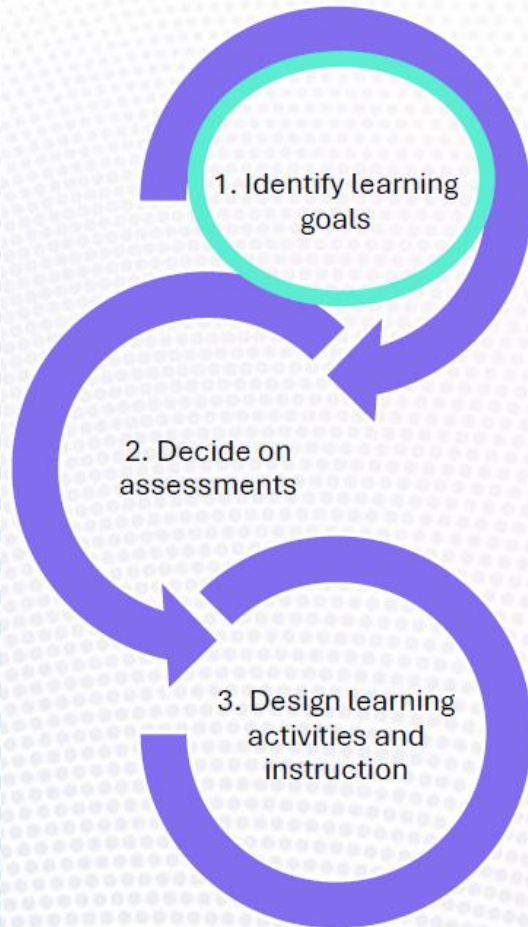| Policy No.	Policy Details
European Policy 1	Guidelines for teachers and educators on tackling disinformation and promoting digital literacy through education and training. European Commission (2022).
European Policy 2	Artificial intelligence and education: A critical view through the lens of human rights, democracy and the rule of law. Council of Europe (2022).
European Policy 3	AI report by the European Digital Education Hub's Squad on artificial intelligence in education. European Commission (2024).
International Policy 1	Guidance for generative AI in education and research. UNESCO (2023).
International Policy 2	AI and education: A guidance for policymakers. UNESCO (2021).
International Policy 3	Policy guidance on AI for children. UNICEF (2021).

(some) Key Points

Policies highlighted a number of potential aspects regarding AI that might be included in a curriculum. For instance:

(i) incorporating AI-related content within and across subjects to promote interdisciplinary learning,

(ii) provision of instructional strategies and tools which enable teachers to leverage AI to enhance the learning experience,

(iii) the use of AI tools for personalised learning and assessment,

(iv) the application of AI for contexts beyond education (i.e. societal impact and relevance, work-related considerations, etc.),

(v) ethical implications with regard to AI, such as responsible AI usage, transparency with regard to AI, issues relating to privacy and AI, and so on.

Co-funded by the European Union

Recommendations from the analysis

• focus on the applied aspect of AI content rather than the theoretical aspect (but there is a need for both)

• emphasise the connection between AI and society to ensure an authentic learning experience

• use student-centred approaches, such as collaborative learning, project based learning, problem-based learning, 'learning by doing', etc.

• be adaptable so that lower and higher performing students can be included in the learning processes

• Keep everyone in the loop (school management, students, teachers, parents, etc.)

• AI competence framework – need to have the basics and need to be modular so to allow an ongoing professional learning

Creation of the PAIDEIA AI&ED competency Framework

1. Identify learning goals

2. Decide on assessments

3. Design learning activities and instruction

Teacher Training Spiral curriculum is based on the methodological approach inspired by Instructional Design

Backward Design (Mc Tighe & Wiggens, 2005)

Creation of the AI&ED competency Framework: some issues

1. The **EduComp is being reviewed** in order to integrate the AI-dimension. *"We expect the new version of DigComp in late 2025."*

2. **Unesco** launches two AI **competency frameworks** (first week of September):

For students: it articulates the knowledge, skills and attitudes students should acquire to understand and actively engage with AI in a safe and meaningful manner in education and beyond.

For teachers: define the knowledge, skills and attitudes that teachers should possess to understand the roles of AI in education and utilize AI in their teaching practices in an ethical and effective manner.
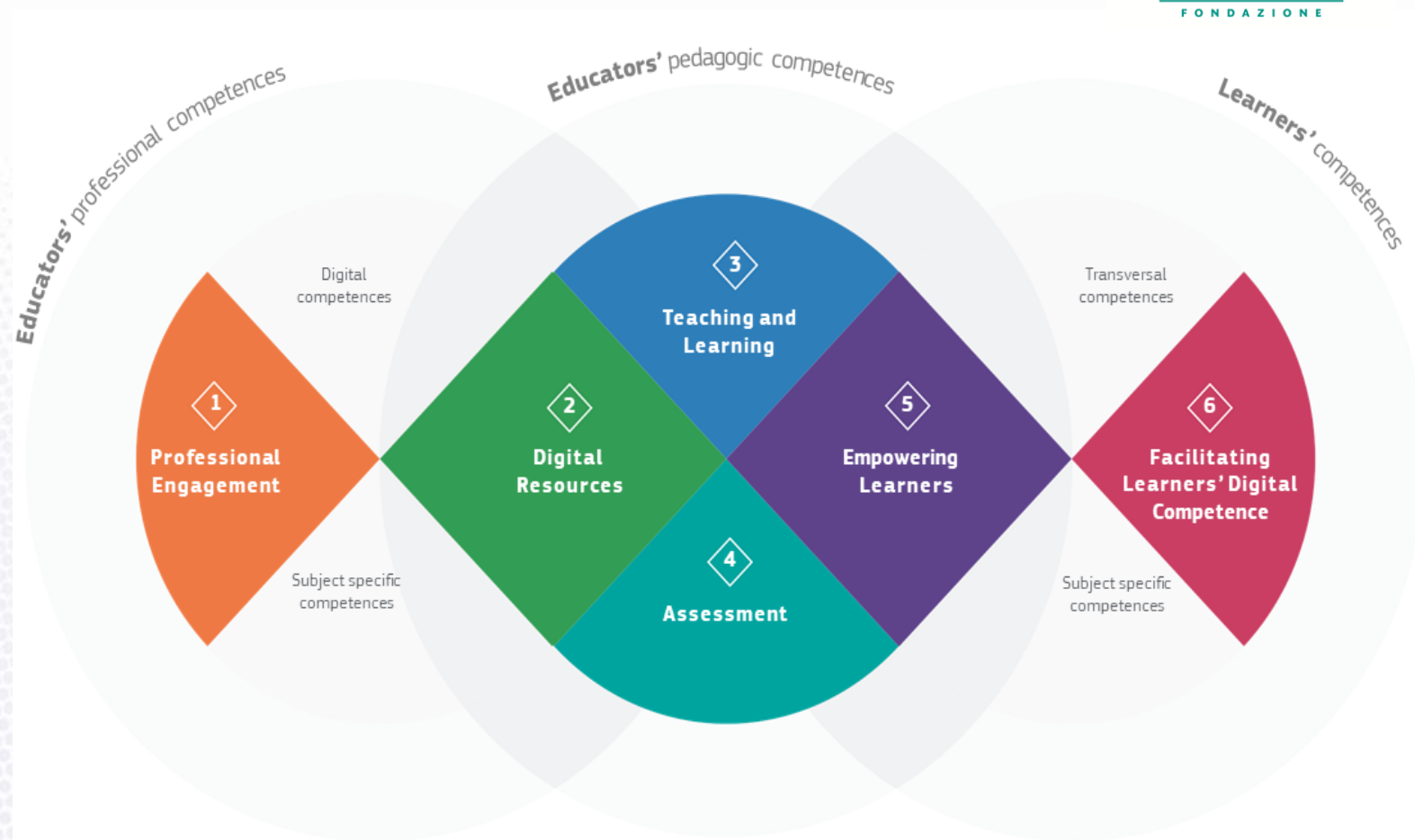
Competency aspects	Progression levels		
	Understand	**Apply**	**Create**
• Human-centred mindset	• Human agency	• Human accountability	• Citizenship in the era of AI
• Ethics of AI	• Embodied ethics	• Safe and responsible use	• Ethics by design
• AI techniques and applications	• AI foundations	• Application skills	• Creating AI tools
• AI system design	• Problem scoping	• Architecture design	• Iteration and feedback loops

Aspects	Progression		
	Acquire	**Deepen**	**Create**
1. Human-centred mindset	Human agency	Human accountability	Social responsibility
2. Ethics of AI	Ethical principles	Safe and responsible use	Co-creating ethical rules
3. AI foundations and applications	Basic AI techniques and applications	Application skills	Creating with AI
4. AI pedagogy	AI-assisted teaching	AI–pedagogy integration	AI-enhanced pedagogical transformation
5. AI for professional development	AI enabling lifelong professional learning	AI to enhance organizational learning	AI to support professional transformation

Overcoming the issues….

We created an addendum to the existing Frameworks defining specific proficiency statements

1. linked to the levels of the existing DigCompEdu-Framework

2. linked to different types of AI-users ('persona's)

3. linked to the learning goals of each unit of the curriculum/training course

Educators' professional competences

Educators' pedagogic competences

Learners' competences

Digital competences

1 Professional Engagement

Subject specific competences

2 Digital Resources

3 Teaching and Learning

4 Assessment

5 Empowering Learners

Transversal competences

6 Facilitating Learners' Digital Competence

Subject specific competences

Some inspirational takeaways

Clarify concepts

Teaching & Learning with AI as a pedagogical innovation

Focus on challenges in AI-driven education

Ethical Considerations and Social Responsibility

Digital competence and technical skills

Critical literacy and media literacy

Inclusive education and accessibility

Assessment

Clear structure and flexibility

Practical Application

Continuous Professional Development

Empowerment Through AI Tools
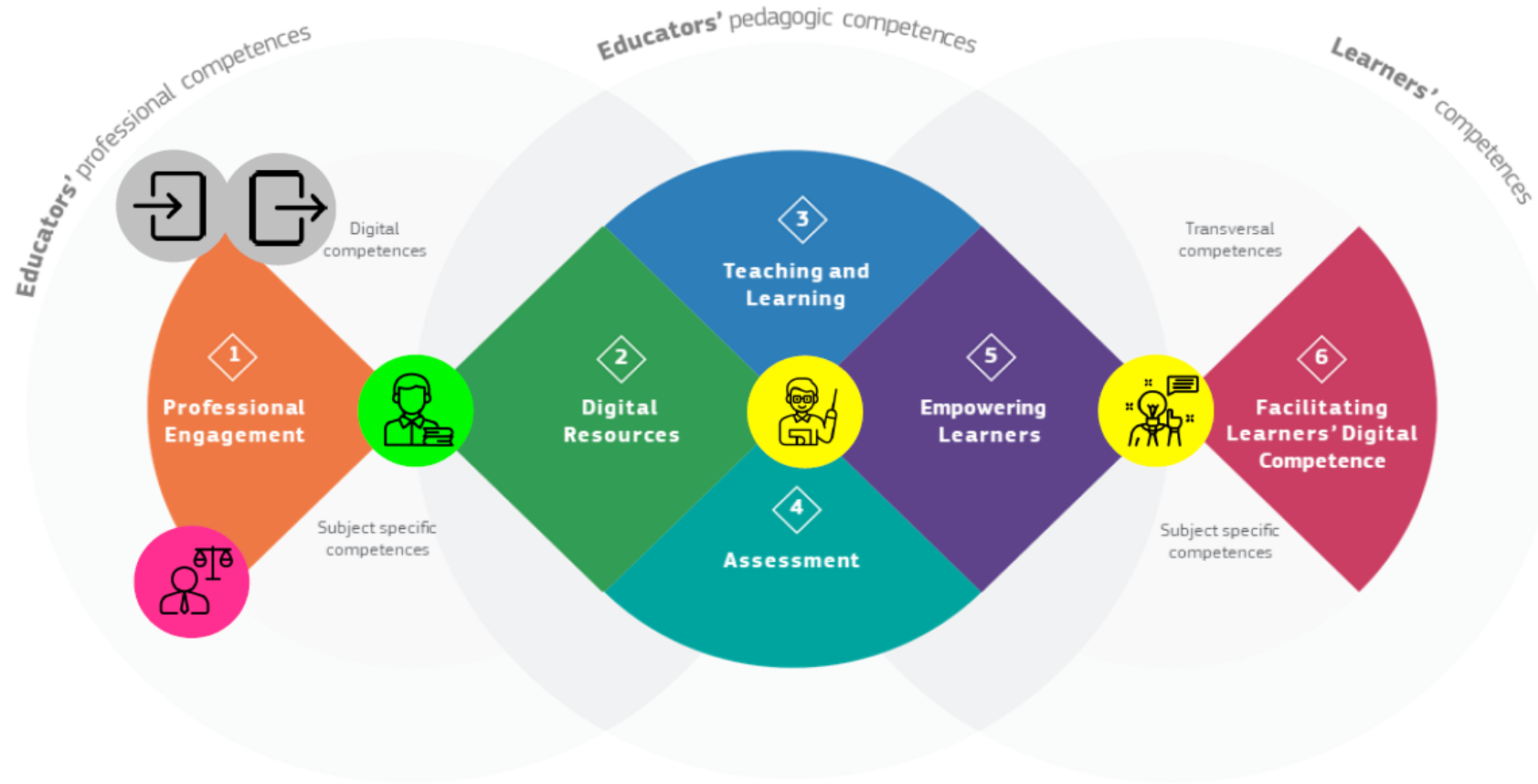
Balancing AI and Human Input

Authentic learning experiences with real-life problems and meaningful learning experiences

Interdisciplinary learning experiences

Make the teaching and the learning interactive and collaborative/cooperative

PAIDEIA AI&ED competency Framework

PAIDEIA AI&ED Curriculum

A curriculum focused on teaching and learning enhanced by human-centered AI

Unit 1
Intake and self reflection

Unit 2
Basic awareness of AI

Understanding AI

A1   A2

AI explorer

Unit 3
Impact of AI in Teaching & Learning

3.1 Teaching with AI

B1

AI teacher

3.2 Guiding students how to learn with AI

B2

AI guide

Unit 4
Ethical and legal use of AI

Using AI responsibly

B2

AI expert

test   test   test

The AI continuum   *Teacher-led AI*   *Teacher & student-led AI*

Unit 5
Outboarding and self evaluation

PAIDEIA AI&ED Curriculum – the Units

Unit 1: Intake and self reflection

Orienting and profiling teacher readiness to use AI	
/	Learning goals 1. **Exploring** the AI&Edcomp Framework. 2. **Reflecting** upon the teacher's readiness to use AI.

Unit 2: Basic Awareness of AI

Understanding AI	
AI explorer (A1/A2)	Learning goals 1. **Knowing** what AI is, its basic concept(s, and its potential. 2. **Understanding** how an AI system works, and the benefits and limitations of AI in education. 3. **Understanding** the need for human oversight. 4. **Exploring** AI-enhanced resources available for professional development, communication, and education. 5. **Applying** AI insights in real-life contexts. 6. **Engaging** in self-paced learning through AI-focused educational platforms.

PAIDEIA AI&ED Curriculum – the Units

Unit 3: Impact of AI in Teaching & Learning

Unit 3.1: Teaching with AI	
AI teacher (B1)	**Learning goals**
	1. **Exploring** the affordances and pitfalls of AI for teachers in education.
	2. **Understanding** how AI impacts the educational vision, the curriculum & learning goals, the assessment, and the learning activities of specific subject matters.
	3. **Knowing** how to use AI as a teacher assistant (while designing and implementing lessons, assessing, providing feedback, differentiating,....) in specific subject matters.
	4. **Applying** AI tools and techniques to enhance teaching while designing and implementing lesson plans for specific subjects.
	5. **Engaging** in continuous professional AI development and/or professional learning communities.
Unit 3.2 Guiding students how to learn with AI	
AI guide (B2)	**Learning goals**
	1. **Exploring** the affordances and pitfalls of using AI as a student.
	2. **Knowing** how to teach our students basic AI concepts, fostering initial digital literacy.
	3. **Knowing** how to teach our students to enhance their learning with AI
	4. **Understanding** how AI literacy can be developed among students through:
	• modelling the use of AI in specific subject matters.
	• coaching/guiding students in enhancing learning strategies with AI.
	• helping students to apply AI tools offering support for special needs.
	• reflecting with students on ethical awareness in the use of AI
	• providing clear guidelines on the use of AI in assignments, assessments, and learning.

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PAIDEIA AI&ED Curriculum – the Units

Unit 4: Ethical and legal use of AI

Using AI responsibly	
AI expert (B2)	Learning goals 1. **Exploring** AI's societal impacts and ethical use in classrooms. 2. **Understanding** legal considerations related to AI. 3. **Knowing** the relationship between AI and disinformation. 4. **Applying** ways to tackle misuses of AI.

Unit 5: Outboarding and self evaluation (certificate)

Outboarding on teacher readiness to use AI	
/	Learning goals 1. **Self evaluating** the teacher's readiness to use AI based upon the AI&Edcomp Framework.

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"The computer is not an intelligent machine that helps stupid people; rather, it is a stupid machine that only works in the hands of intelligent people."

Umberto Eco

CENTRO STUDI VILLA MONTESCA
FONDAZIONE

Thank you for your kind attention!

Fabrizio and Maria Rita

More about PAIDEIA project

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