Responsible AI for Digital Cooperation in the Mediterranean Higher Education

OCCASIONAL PAPER

How is AI shaping teaching and learning in Mediterranean Higher Education?

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Editors

Javiera Atenas, University of Suffolk. United Kingdom

Cristina Stefanelli, UNIMED - Mediterranean Universities Union. Italy

Contributors

Naouel Abdellatif Mami, Mohamed Lamine Debaghine, Sétif 2. Algeria. Algeria

Aicha Adoui, Mohammed V University – Rabat. Morocco

Mohammad AL-Smadi, Office for Digital Learning and Online Education, Qatar University. Qatar

Khaled Almnify, Libyan International Medical University. Libya

Chaima Attafi, Talan international tunisie & ESPRIT (École Supérieure Privée d'Ingénierie et de Technologies). Tunisia

Yani-Athmane Bennai, University of Béjaia. Algeria

Sirine Bouguettaya, University of Calabria, DIMES dept. Italy

Arlet Brufau, Observatory for Ethics in Artificial Intelligence of Catalonia (OEIAC), University of Girona. Spain

Ola Mohamad Fahs, Bahrain Polytechnic. Kingdom of Bahrain

Laura Fedeli, University of Macerata. Italy

Giancarlo Fortino, University of Calabria, DIMES dept. Italy

Mari Cruz García Vallejo, Senior digital education consultant and lecturer in digital education, United Kingdom/Spain

Saed Khayat, An-Najah National University. Palestine

Alexandra Lillo, Observatory for Ethics in AI of Catalonia (OEIAC), University of Girona. Spain

Hesham M Alesawy, Libyan International Medical University. Libya

Besjana Mema, Mediterranean University of Albania, Albania

Allam Mousa, An-Najah National University. Palestine

Samah Feriel Ouatah, Higher National School of Management - Kolea. Algeria

Stamatios Papadakis, Department of Preschool Education, University of Crete. Greece

Francesca Raffi, University of Macerata. Italy

Nevila Rama, Mediterranean University of Albania. Albania

Albert Sabater, Observatory for Ethics in Artificial Intelligence of Catalonia (OEIAC), University of Girona. Spain

Soheil Salha, An-Najah National University. Palestine

Wissam Tawileh, Office for Digital Learning and Online Education, Qatar University. Qatar

Abdelfateh Tebani, Ferhat Abbas Setif 1 University. Algeria

Erarda Vuka, Mediterranean University of Albania. Albania

Peer-Review

Leo Havemann, University College London. UK

Graphics

Elena Chiesa, UNIMED - Mediteranean Universities Union. Italy

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unimed@uni-med.net | www.uni-med.net
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Executive summary

The Responsible Artificial Intelligence for Digital Cooperation in the Mediterranean Higher Education paper offers a comprehensive, multi-level analysis of how Artificial Intelligence (AI) is reshaping higher education (HE) across the Mediterranean region. It bridges the gap between the recommendations of international organisations, such as UNESCO and the United Nations, national AI strategies, and emerging institutional practices. It calls for coordinated, ethical, open, and inclusive AI integration in HE systems to ensure that digital cooperation and transformation are aligned with societal values, educational equity, and sustainable development.

From a policy perspective, it highlights the importance of aligning national AE strategies informed by international frameworks, to ensure that national actions are both globally coherent and locally effective with the operational realities and innovation capacities of HE institutions, promoting human capital development, ethical governance, and sectoral innovation. Noting that these strategies often lack clear implementation pathways within the HE sector, this paper presents a series of recommendations for the creation of national AI–HE coordination mechanisms, the adoption of institutional AI charters, and strategic investment in digital public goods and digital public infrastructure.

On the capacity-building front, it identifies a growing momentum within HE institutions to foster AI literacy, pedagogical innovation, and inclusive digital ecosystems. Case studies from across the region illustrate how universities are embedding AI into curricula, training educators, and promoting interdisciplinary research. Algeria's University 4.0 transition, among others, demonstrates scalable models for institutional transformation. The paper calls for structured capacity-building programmes targeting both students and educators, including micro-credentials, continuous professional development, and support for communities of practice. These efforts must be reinforced by policy environments that recognise HEIs as pivotal actors in national and regional digital transformation.

The paper key findings include:

- **AI is a catalyst for institutional transformation,** with countries like Algeria, Egypt, and Italy embedding AI into national education strategies.
- **Capacity building is a regional priority,** focusing on AI literacy for students, educators, and researchers.
- **Ethical AI use and data governance** are central to policy development, with frameworks like the PIO Model and UNESCO guidelines guiding implementation.
- **Digital cooperation is expanding,** with initiatives supporting multilingual learning, virtual mobility, and cross-border curriculum development.

Crucially, this paper positions HE as a strategic interface between international digital cooperation objectives and national innovation systems, advocating for the co-creation of a **Mediterranean Digital Education Charter** to harmonise ethical principles, data governance standards, and the use of open practices, including Open Data and Open Educational Resources (OER) across borders. By linking global commitments, national priorities, and institutional practices, it outlines a **roadmap** for an open, responsible, inclusive, and future-oriented AI transformation in Mediterranean HE.

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SECTION 1 **STATE OF THE ART**

1.1. Introduction

The Mediterranean region presents distinct social, economic, and cultural challenges that require context-sensitive approaches to Artificial Intelligence in Higher Education. AI development must support educational stability, intercultural dialogue, and the demand for green, low-cost technologies. Responsible AI here means more than efficiency—it requires ethical integrity, avoiding systems that reinforce linguistic, cultural, or religious biases. As global digital transformation accelerates, equitable access to AI education and participation is vital. Ensuring all students can shape and benefit from these technologies is essential. Inclusive, ethical, and cooperative AI practices in HE are key to building a just and resilient digital future for the region.

The *UNESCO Recommendation on Education for Peace, Human Rights, International Understanding, Cooperation, Fundamental Freedoms, Global Citizenship, and Sustainable Development* (2023)[1] offers a comprehensive normative framework for guiding national educational policy and reform. It recognises education as a public good and a critical driver of peace, sustainability, and shared prosperity. The Recommendation underlines the importance of transformative learning, highlighting the need to move beyond traditional approaches to equip learners with values, skills, knowledge, and attitudes that foster empathy, critical thinking, social responsibility, and environmental stewardship. The Recommendation stresses the integration of ethical, cultural, ecological, and technological dimensions, aligning educational transformation with human rights, social justice, climate action, and responsible innovation.

1.2. AI in Education and Responsible Digital Transformation

The Office of the Secretary-General's Envoy on Technology at the United Nations (UN) advocates for a concerted global effort to foster and invest in the development of Digital Public Goods (DPG)[2] . These are defined as open-source solutions designed to contribute to a more equitable world, situated within the broader framework of the Digital Commons[3] . This concept encompasses the collective creation and shared stewardship of information and knowledge.

Through the Global Digital Compact (DGC)[4] , the UN calls for the adoption of shared principles to ensure an open, free, and secure digital future. Open Educational Resources (OER)[5] are a clear embodiment of these principles, offering unrestricted access to high-quality educational content, thereby supporting lifelong learning and advancing educational equity. *The Beijing Consensus on*

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1   UNESCO Recommendation on Education for Peace, Human Rights, International Understanding, Cooperation, Fundamental Freedoms, Global Citizenship, and Sustainable Development https://www.unesco.org/en/legal-affairs/recommendation-education-peace-and-human-rights-international-understanding-cooperation-fundamental

2   Digital public Goods https://www.un.org/techenvoy/sites/www.un.org.techenvoy/files/general/Digital_Public_Goods_Summary_PDF.pdf

3   EU Statement – UN Global Digital Compact: Deep Dive on Global Digital Commons https://www.eeas.europa.eu/delegations/un-new-york/eu-statement-%E2%80%93-un-global-digital-compact-deep-dive-global-digital-commons_en?s=63#:~:text=Digital%20commons%20refers%20to%20the,AI%20libraries%2C%20and%20open%20content.

4   Global Digital Compact https://www.un.org/techenvoy/global-digital-compact

5   OER Definition https://www.unesco.org/en/open-educational-resources#:~:text=Open%20Educational%20Resources%20(OER)%20are,adaptation%20and%20redistribution%20by%20others.

Artificial Intelligence and Education (2019)[6] shapes the current global dialogue on AI's impact on teaching and learning. It advocates for AI systems that enhance human capabilities, reduce inequality, and promote inclusive and equitable education, and highlights the importance of AI literacy for both educators and learners, and calls for robust governance frameworks that protect human rights, privacy, and data security in educational contexts.

This aligns with the UNESCO *Recommendation on the Ethics of Artificial Intelligence* (2021)[7] , which provides a normative framework for the development and deployment of AI systems grounded in human rights, dignity, and environmental sustainability, calling on states to adopt regulatory frameworks that ensure transparency, gender-responsive and inclusive AI design, accountability, and non-discrimination in AI applications, including those used in education.

In this sense DPGs[8] serve as sustainable building blocks for the development of secure, trusted, and inclusive Digital Public Infrastructures (DPI)[9] to facilitate secure, efficient, and seamless interactions among individuals, organisations, and governments supporting countries to achieve the Sustainable Development Goals (SDG)[10] (United Nations Development Programme, 2023; United Nations, 2024).

The Recommendation OER (2019)[11] and OER Dubai Declaration[12] present opportunities to address the challenges and benefits posed by emerging technologies, and to support the ethical and responsible integration of AI into education systems. In alignment with this, the United Nations Secretary-General's Roadmap for Digital Cooperation[13] highlights the importance of promoting OER to ensure equitable access to high-quality educational materials across all geographical and socioeconomic contexts to foster inclusive participation and educational sovereignty.

Responsible Digital Transformation

Digital transformation features prominently across the UNESCO *Recommendation on Education for Peace*[14] , the UNESCO's Recommendation on the Ethics of AI[15] , and the Dubai Declaration on OER 2024[16] particularly in relation to AI, digital technologies, and media literacy. These address both

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6   UNESCO Beijing Consensus on Artificial Intelligence and Education https://unesdoc.unesco.org/ark:/48223/pf0000368303

7   UNESCO Recommendation on the Ethics of Artificial Intelligence https://unesdoc.unesco.org/ark:/48223/pf0000381137

8   UN Digital Public Goods https://www.un.org/digital-emerging-technologies/content/digital-public-goods

9   UN Digital Public Infrastructure https://www.undp.org/digital/digital-public-infrastructure

10   Sustainable Development Goals https://sdgs.un.org/goals

11   UNESCO Recommendation on Open Educational Resources (OER) (2019) https://www.unesco.org/en/legal-affairs/recommendation-open-educational-resources-oer

12   UNESCO. (2024). Dubai Declaration on Open Educational Resources (OER): digital public goods and emerging technologies for equitable and inclusive access to knowledge. https://www.unesco.org/en/dubai-declaration-o-er-2023

13   United Nations Secretary-General's Roadmap for Digital Cooperation https://www.un.org/en/content/digital-coo-peration-roadmap/

14   UNESCO Recommendation on Education for Peace, Human Rights, International Understanding, Cooperation, Fundamental Freedoms, Global Citizenship, and Sustainable Development https://www.unesco.org/en/legal-affairs/recommendation-education-peace-and-human-rights-international-understanding-cooperation-fundamental

15   UNESCO Recommendation on the Ethics of Artificial Intelligence https://unesdoc.unesco.org/ark:/48223/pf0000380455

16   UNESCO. (2024). Dubai Declaration on Open Educational Resources (OER): digital public goods and emerging

the potential and the risks of digitalisation, calling for education systems to integrate digital and information literacy, safeguard ethical considerations, and mitigate the impacts of disinformation and surveillance, highlighting the importance of AI governance mechanisms that are transparent, inclusive, and human-centred.

An opportunity to advance this agenda, is to prioritise digital transformation strategies that promote open infrastructures, for example, the *Dubai Declaration on Open Educational Resources* (OER) (2024)[17] reinforces the commitment to the 2019 *UNESCO OER Recommendation*[18], calling for strengthened national policies that embed open education, promoting OER as a foundational element for inclusive education, digital equity, and lifelong learning. The Dubai Declaration calls governments to develop and fund interoperable DPI[19] that support the co-creation and sharing of multilingual, culturally relevant, and accessible OERs calling for transformative learning ecosystems.

Furthermore, as outlined in the 2021 UNESCO *Recommendation on Open Science*[20], governments are called to ensure that publicly funded research to be openly available, usable, and reproducible, thus strengthening the link between scientific knowledge and critical pedagogical engagement promoting curricula and teaching that are informed by current, evidence-based, and inclusive perspectives on global challenges.

Finally, the *Global Digital Compact*[21] further outlines shared principles aimed at securing an open, free, and safe digital future for all. Given the transformative potential of OER[22], educational stakeholders can champion the responsible innovation and implementation of technologies, ensuring OER remain accessible, inclusive, and equitable. Furthermore, collective efforts are required to demystify technological change, fostering inclusive environments that prioritise the well-being of humanity. This includes advancing education for peace, building sustainable digital ecosystems, and actively working to prevent the deepening of social inequalities and the digital divide through the avoidance of discriminatory or exclusionary practices[23].

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technologies for equitable and inclusive access to knowledge. https://www.unesco.org/en/dubai-declaration-o-er-2023

17   UNESCO. (2024). Dubai Declaration on Open Educational Resources (OER): digital public goods and emerging technologies for equitable and inclusive access to knowledge. https://www.unesco.org/en/dubai-declaration-o-er-2023

18   UNESCO Recommendation on Open Educational Resources (OER) (2019) https://www.unesco.org/en/legal-affairs/recommendation-open-educational-resources-oer

19   UN Digital Public Infrastructure https://www.undp.org/Mediteral/digital-public-infrastructure

20   UNESCO Recommendation on Open Science https://unesdoc.unesco.org/ark:/48223/pf0000379949

21   Global Digital Compact https://www.un.org/digital-emerging-technologies/global-digital-compact

22   Accessible Open Educational Resources (OER) https://unesdoc.unesco.org/ark:/48223/pf0000380471

23   Convention on the Rights of Persons with Disabilities https://www.un.org/disabilities/documents/convention/convoptprot-e.pdf

Inclusive digital learning ecosystems and AI

The United Nations' DGC[24] for equitable digital infrastructure, and from the *Transforming Education Summit (*2022)[25] . Inclusive digital learning ecosystems must prioritise the development of critical data and AI literacy alongside media and information literacy, equipping learners to navigate the complex sociotechnical landscape of the digital age. In the face of disinformation, algorithmic bias, and widening digital divides, education must empower individuals to critically engage with digital systems and contribute to shaping inclusive, rights-based digital futures.

This demands international cooperation in building equitable knowledge societies, reaffirming education as a public good that advances human dignity, planetary wellbeing, and democratic participation. Current global education agendas advocate for open, rights-based digital infrastructures that resist the privatisation of core services and uphold transparency, accessibility, and equity. These agendas align with the *Sustainable Development Goals* (SDGs), particularly SDG 4, by supporting education for sustainable development (Target 4.7), lifelong learning (4.3), inclusion and equity (4.5), and safe learning environments (4.a). Values-based education is central to advancing global citizenship, gender equality, and human rights, ensuring all learners are equipped to participate meaningfully in just and sustainable digital societies.

Emerging technologies are and will continue to change the education landscape, and while these should aim at enhancing the accessibility, quality, and equity of educational resources and to narrow the gap in educational opportunities to learners, this needs to acknowledge the needs of each region in terms of cultural richness, in alignment with the *UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expression* (2005).[26]

The *UNESCO Beijing Consensus on Artificial Intelligence and Education* (2019)[27] highlights the potential of AI to transform education through innovative, responsible, and human-centred approaches, while building skills for future labour markets and societies. In the Mediterranean region, advancing this vision requires enhanced digital cooperation to support not only the adoption but also the development of technologies tailored to regional needs, safeguarding people and ecosystems. As technological change accelerates, it is essential to strengthen capacities for sustainable, accountable, and adaptable educational models. Continuous investment in capacity-building is crucial to ensure that teaching and learning remain relevant, inclusive, and resilient in the face of ongoing digital transformation.

In light of these developments, a human-centred approach is essential to achieving the goals set out in the UN Commons Agenda[28] , particularly:
- **Commitment 1: Leave no one behind**, which promotes digital inclusivity, and
- **Commitment 7: Improve digital cooperation**, which advances the concept of the Digital Commons as a global public good and supports the realisation of the Sustainable Development Goals (SDGs)[29] .

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24   UN Global Digital Compact https://www.un.org/digital-emerging-technologies/global-digital-compact
25   Transforming Education Summit https://www.un.org/en/transforming-education-summit
26   2005 Convention on Diversity of Cultural Expressions https://www.unesco.org/creativity/en/2005-convention
27   Beijing Consensus on Artificial Intelligence and Education (2019) https://unesdoc.unesco.org/ark:/48223/pf0000368303
28   Our Common Agenda – Report of the Secretary-General https://www.un.org/en/content/common-agenda-report/assets/pdf/Common_Agenda_Report_English.pdf
29   Sustainable development goals https://sdgs.un.org/goals

The UN Roadmap for Digital Cooperation[30] outlines a global strategy to ensure that digital technologies serve as a force for good, highlighting priorities such as universal connectivity, digital inclusion, the promotion of digital public goods, capacity-building, and the safeguarding of human rights online. It calls for multi stakeholder collaboration to build an inclusive, secure, and equitable digital future. The HE sector can play a role in advancing this vision by leading innovation in ethical digital technologies, and fostering digital literacy and skills development through, cross-border collaboration, shaping sustainable, human-centred digital ecosystems that align with the Roadmap's commitment to "leave no one behind."

Figure 1: UN Roadmap for digital cooperation

UN Roadmap for Digital Cooperation

8 — **Effective Cooperation**
Establishing frameworks for global digital collaboration.

7 — **Trust and Security**
Enhancing measures to protect against cyber threats.

6 — **AI Cooperation**
Facilitating responsible international collaboration on AI.

5 — **Human Rights Protection**
Safeguarding privacy and freedom of expression online.

4 — **Capacity-Building**
Enhancing skills to effectively engage with digital technologies.

3 — **Digital Inclusion**
Addressing barriers to digital access for vulnerable populations.

2 — **Digital Public Goods**
Encouraging the development and sharing of open-source digital resources.

1 — **Universal Connectivity**
Ensuring safe and affordable internet access for everyone by 2030.

Made with ⚡ Napkin

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30   UN Roadmap for Digital Cooperation https://www.un.org/en/content/digital-cooperation-roadmap/

1.3. AI Landscape in Higher Education

The integration of Artificial Intelligence in Higher Education is transforming teaching, learning, research, and institutional governance worldwide. AI is increasingly employed to personalise learning through adaptive content, automate feedback, facilitate language translation, and support learning analytics. Universities also utilise AI to enhance operational processes, including admissions, academic advising, curriculum design, and predictive modelling for student success. However, the rapid implementation of these technologies raises important concerns regarding ethics, data governance, equity, and the preparedness of educators and students to engage critically and effectively with AI systems.

Internationally, organisations such as UNESCO are leading efforts to develop policy and competency frameworks that support the ethical, inclusive, and rights-based adoption of AI in education. National strategies across the EU, Canada, and parts of the Mediterranean and Africa emphasise AI literacy, responsible data practices, and ongoing professional development. While some higher education systems are advancing in these areas—investing in AI-related curricula, infrastructure, and interdisciplinary research—others face significant barriers including limited funding, infrastructure gaps, and lack of ethical oversight. To ensure AI contributes to democratising knowledge, coordinated cross-sector collaboration is essential, preventing the deepening of existing educational inequalities.

AI Literacy Frameworks and Competency Building

As AI becomes an integral part of HE curricula, developing AI literacy frameworks is critical. UNESCO's AI Competency Framework for Teachers and OECD (2024) Balancing Human Teachers and AI in Education[31], provide a comprehensive structure for educators to understand the various competencies required to teach AI concepts effectively. These competencies range from basic understanding of AI technologies to advanced knowledge of ethical implications and AI's societal impact.

- **Developing AI Competency in Educators:** AI literacy is not only for students but also for teachers. Educators need professional development to effectively incorporate AI into teaching and learning.
- **Student AI Competencies:** AI literacy for students involves critically analysing AI systems, understanding their ethical implications, and designing responsible AI solutions. To prepare for the future workforce, students need skills in managing big data, protecting privacy, and developing ethical AI models that consider AI's broader social impact.
- **Capacity Building for AI in Education:** To facilitate the widespread integration of AI in education, capacity building initiatives are essential. HE institutions, especially in developing regions, need to invest in building the technical infrastructure and training the next generation of educators. This involves both formal education through degree programs and informal learning through professional development workshops, online courses, and peer learning groups.

Using open data in education to train AI algorithms offers students real-world opportunities to apply their learning, preparing them for careers in the AI and data science fields. These applications

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31   OECD (2024): Balancing Human Teachers and AI in Education: A Discussion Paper from Ethical, Legal and Social Perspectives https://www.oecd.org/content/dam/oecd/en/about/projects/edu/education-2040/global-forum-m/6th-global-forum/Kei_Kano_Balancing_between_Teacher_Agency.pdf

align with emerging educational frameworks, such as UNESCO's AI in Education guidelines[32] , which emphasise the ethical and responsible use of AI technologies for pedagogical purposes.

Learning Analytics and AI-Driven Insights

AI's role in Learning Analytics enables the extraction of valuable insights from anonymised student interaction data with digital tools and content. This capacity can significantly enhance the learning process and offer actionable insights into how teaching practices can be optimised.

- **Data Analysis in Learning:** AI can be used to analyse patterns of student engagement in various learning platforms, such as content interactions or completion rates. For instance, AI can flag areas where students may be struggling with certain topics or content types, allowing educators to adjust their teaching methods to better support student needs.
- **Personalised Learning:** AI tools can suggest personalised learning paths for students based on their interactions, engagement levels, and performance, helping to foster more tailored educational experiences. This is in line with UNESCO's AI competency framework, which advocates for AI's use to support personalised, student-centred learning.

The integration of responsible learning analytics into education fosters data-driven decision-making while protecting student privacy and ensuring ethical standards are met. As AI ethics and privacy concerns are increasingly integral to educational practices, it is critical to implement AI in a way that promotes fairness, transparency, and inclusivity.

Automated Translation and Global Collaboration

The potential of AI in facilitating automated translation and multilingual content accessibility within the realm of OER is a crucial advancement for HE. The adoption of AI-driven tools for multilingual translation enables global collaboration and knowledge sharing, which is essential in an increasingly globalised educational landscape.

- **Language Translation:** AI can automatically translate educational materials into multiple languages, ensuring that OER is accessible to diverse student populations. By offering content in various languages, AI helps bridge language barriers, thereby promoting inclusive education.
- **Robotics and AI for Multilingual Education:** The use of educational robots that support multiple languages enhances robotics education in multilingual classrooms. AI-powered robots can offer interactive learning experiences in various languages, making STEM education more accessible to students from different linguistic backgrounds.

According to UNESCO's AI and Education Strategy[33], AI's role in making education accessible to all is one of the foremost priorities. This includes fostering multilingual capabilities and ensuring that language does

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32   UNESCO. (2022). AI and the Future of Education: Policy Landscape and Competency Frameworks. https://en.unesco.org/ai-education

33   UNESCO. (2020). AI in Education: Challenges and Opportunities. https://en.unesco.org/ai-education/challenges

not become a barrier to learning, which is especially crucial in regions with diverse linguistic communities.

Improving Accessibility through Captioning and Audio Support

AI's role in improving accessibility is particularly impactful in addressing the diverse needs of students. AI-driven tools are now capable of providing real-time captioning and audio support, making educational content more inclusive for students with disabilities, particularly those with hearing or visual impairments.

- **Automatic Captioning:** AI can automatically generate captions for video content, enabling students with hearing impairments or those who struggle with audio content to access the material. This technology supports inclusive learning environments by ensuring that all students can engage with multimedia content.
- **Speech-to-Text and Text-to-Speech Tools:** AI-powered speech recognition tools can convert spoken language into written text, and text-to-speech tools allow students to listen to written content. These features are vital for learners with visual impairments or those who benefit from auditory learning.

1.4. AI in the Mediterranean Region: Policy Landscape, Priorities, and Cooperation

The Mediterranean region has witnessed a progressive uptake of AI as part of broader digital transformation agendas. While timelines and priorities differ across countries, many began engaging with AI formally in the early-to-mid 2010s, often through digital economy or innovation frameworks before launching dedicated AI strategies.

Early efforts generally focused on raising awareness, exploring AI's potential, and investing in digital infrastructure. Countries such as Egypt, Jordan, and Türkiye led initial regional efforts with formal strategies and investments, while others like Lebanon and Malta developed advisory frameworks and ecosystem-building plans. In several cases, early steps also included AI ethics discussions or draft regulatory frameworks, often informed by international best practice.

The AI Policy and Strategy Landscape in the Mediterranean

The region exhibits diverse levels of AI policy maturity. Some countries have established national strategies, charters, or governance mechanisms, while others remain at the exploratory or developmental stage.

Southern Mediterranean

- **Algeria** has developed in 2020 an AI Action Plan[34] organised into six pillars. Research and innovation; Skills; Infrastructures and datasets; Investment and ecosystem; Regulations and policies and Priority sectors
- **Egypt** has a comprehensive National AI Strategy[35] , focusing on human capacity, ethical frameworks, and AI for development. It also issued a Charter for Responsible AI, promoting fairness, transparency, and accountability.
- **Jordan** adopted a forward-looking Artificial Intelligence Strategy (2023–2027)[36] centred

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34   Algeria AI action plan https://aicouncil.dz/
35   Egypt National AI Strategy https://mcit.gov.eg/en/Publication/Publication_Summary/9283
36   Jordan's Artificial Intelligence Strategy and Implementation Plan https://www.modee.gov.jo/ebv4.0/root_storage/en/eb_list_page/40435648.pdf

on legal frameworks, education, and public-private partnerships. It also launched an Ethics Charter for AI.

- **Lebanon** published several key documents including a national advisory strategy[37], ethical guidelines, and proposals for a National AI Authority, despite limited resources and political instability.
- **Morocco** has proposed a strategy[38] focusing on AI in education, health, and agriculture, supported by the Digital Morocco 2020 framework and recent smart governance initiatives and a national roadmap for developing an AI Ecosystem.
- **Tunisia** has an AI strategy[39], showing commitment to regional partnerships and pilot projects in AI for agriculture, health, and governance.
- **Palestine** does not yet have a formal AI strategy[40] but they do have an action[41] plan but has engaged in advocacy and critical analysis, particularly around human rights and algorithmic harm.
- **Libya and Syria** lack publicly available national AI policies, likely due to internal conflict and institutional instability.

Southern Europe

- **Albania** has developed Digital Agenda 2022–2026[42] which explicitly incorporates advanced technologies like AI to enhance public services, cybersecurity, and digital infrastructure, aiming for "anytime, anywhere" e-governance through platforms like e-Albani
- **Cyprus** has developed a national AI strategy[43] focusing on digital innovation, research, and sectoral applications, particularly in education and health.
- **France** was one of the first European countries to publish an AI strategy[44] with its AI for Humanity plan in 2018[45], updated under its National Strategy for AI (2021–2025). France also has proposed an AI education & training development plan[46] aiming at supporting a large number of formations in AI at all levels.
- **Greece** launched its AI Blueprint in 2024[47], focusing on regulatory frameworks, digital innovation, and education. It proposes flagship national AI projects and promotes international collaboration.
- **Italy** has an established National AI Strategy[48] aligned with the **EU AI Act[49]** and recently

37   Artificial Intelligence Strategy for Lebanon https://www.unescwa.org/events/artificial-intelligence-strategy-lebanon
38   Morocco AI strategy https://www.add.gov.ma/ecosysteme-dedie-a-lintelligence-artificielle-prioritaire
39   Tunisia AI Strategy https://www.anpr.tn/national-ai-strategy-unlocking-tunisias-capabilities-potential/
40   Palestine Data Strategy https://menaobservatory.ai/en/regional/14
41   Palestine:Adapting the science landscape for artificial intelligence https://council.science/wp-content/uplo-ads/2025/02/AI-Paper-Case-Study-Palestine_V2.pdf
42   Digital Agenda of Albania 2022–2026 https://dig.watch/resource/digital-agenda-of-albania-2022-2026
43   Cyprus' National Strategy for Artificial Intelligence https://www.gov.cy/dmrid/en/documents/national-strate-gy-for-artificial-intelligence/
44   France's National AI Strategy https://www.enseignementsup-recherche.gouv.fr/fr/la-strategie-francaise-en-intelli-gence-artificielle-49166
45   AI for Humanity plan https://www.inria.fr/sites/default/files/2021-06/PNRIA-Flyer_National_EN.pdf
46   AI education & training development plan https://oecd.ai/en/dashboards/policy-initiatives/http:%2F%2Faipo.oecd.org%2F2021-data-policyInitiatives-27288
47   A Blueprint for Greece' s AI Transformation https://foresight.gov.gr/en/studies/A-Blueprint-for-Greece-s-AI-Tran-sformation/
48   Italy's AI strategy https://www.agid.gov.it/en/news/the-italian-strategy-for-artificial-intelligence
49   EU AI Act https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai

approved a law enabling investments of up to €1 billion to support AI innovation. Ethical and legal safeguards, particularly around AI misuse, are also emphasised.

- **Malta**'s National AI Strategy[50] 2030 is based on three pillars: public and private sector AI adoption, start-ups support, and education. Enablers include ethical governance, infrastructure, and workforce upskilling.
- **Spain** launched its National Strategy for Artificial Intelligence (ENIA)[51] positioning AI as a central pillar of Spain's Digital Agenda 2024. It prioritises ethical development, public sector adoption, research excellence, and citizen digital literacy.
- **Türkiye** published a comprehensive National AI Strategy (2021–2025)[52] with goals such as increasing AI's GDP contribution and fostering international cooperation. The strategy also includes provisions for legal reform and economic transformation.

AI for Economic Development and the Public Good

A growing number of Mediterranean countries are prioritising the application of AI to enhance public services and advance national development goals. This includes efforts to improve healthcare, education, transport, and agriculture through the deployment of AI technologies. In Malta and Greece, AI is being integrated into public sector reform and service delivery—Malta with a focus on smart government initiatives, and Greece using AI to optimise infrastructure and citizen services.

Egypt and Tunisia frame AI as a lever for socio-economic transformation. Egypt links AI development with its Vision 2030 goals, aiming to modernise sectors like public health and logistics, while Tunisia's strategy includes digital transformation across public administration and economic development planning.

Morocco and Algeria are applying AI in agriculture, education, and healthcare, aligning with sustainable development aims and efforts to increase public access to services. Meanwhile, France and Spain embed AI into wider digital and green transition agendas. France channels significant public investment into AI for health and environment, while Spain's ENIA strategy highlights AI as a means to reduce regional inequalities, enhance education and healthcare access, and support green innovation.

Regulatory and Legal Frameworks for AI

The Mediterranean region increasingly recognises the need for clear and adaptive legal frameworks to govern the responsible use of AI. Countries like Italy, Jordan, Türkiye, and Lebanon are either implementing or actively developing AI-specific regulations. Italy's 2024 legislative reform introduces provisions to criminalise harmful AI use, reinforcing legal accountability and user protection. Jordan and Lebanon are also advancing legal mechanisms for AI governance, with Lebanon proposing an independent National AI Authority.

Malta has taken a distinctive regulatory approach, offering a voluntary AI certification scheme aligned with EU principles, enabling companies to demonstrate ethical and trustworthy AI practices. Türkiye includes regulation as one of its six strategic pillars, embedding oversight and compliance into the broader innovation strategy. France plays a leading role in EU-wide regulation efforts and

50   Malta' National AI Strategy https://mdia.gov.mt/national-strategies/malta-ai-strategy-and-vision/
51   Spain's National Strategy for Artificial Intelligence https://portal.mineco.gob.es/RecursosArticulo/mineco/ministe-rio/ficheros/National-Strategy-on-AI.pdf
52   Türkiye's National AI Strategy (2021–2025) https://cbddo.gov.tr/en/nais

is implementing the EU AI Act while continuing to influence international AI governance debates. Spain is also closely aligned with the EU AI Act, embedding legal and ethical standards across its public and private sector AI applications.

Ethical AI Governance and Responsible Use

Many Mediterranean countries are also advancing ethical governance frameworks to ensure AI is developed and applied in a responsible, human-centric manner. Egypt leads with a national Charter for Responsible AI that promotes fairness, transparency, and accountability, while Jordan's National Ethics Charter encourages voluntary compliance and self-regulation grounded in public interest.

Lebanon has proposed a National AI Authority to oversee ethical compliance and enforcement, paired with updated legal frameworks. Malta offers a distinctive approach through an AI certification programme and an ethics advisory body that aligns closely with EU values on trustworthy AI. Italy's new legislation (2024) imposes legal accountability for misuse and reinforces ethical oversight at national level. Greece, similarly, embeds ethics directly within its AI policy blueprint, emphasising trust and transparency as foundational values.

Türkiye incorporates ethical AI within one of its six strategic pillars, explicitly linking responsible governance with long-term innovation goals. In France, the "AI for Humanity" strategy positions ethics at the centre of national efforts, with initiatives for explainability, inclusion, and regulatory leadership within the EU. Spain's AI strategy includes a strong emphasis on algorithmic transparency, citizen rights, and compliance with the EU AI Act, making ethical regulation a cross-cutting dimension of all AI applications

Human-Centred Capacity Building in AI

Across the Mediterranean, a shared priority is emerging around strengthening AI-related human capacity. Several countries, such as Egypt, Jordan, and Türkiye, are making systemic investments in AI education and skills development. Egypt has taken a particularly comprehensive approach, embedding AI learning at all education levels, from primary awareness campaigns to specialist technical training. Jordan has embarked on wide-ranging educational reforms that encompass AI literacy, professional development, and national training programmes.

In the European South, Italy, Greece, and Malta have made human capital a cornerstone of their AI strategies. Italy's approach includes strong alignment between industry and academia, while Greece views AI education and research as central to its broader digital transformation. Malta stands out for integrating AI into both academic and vocational education streams, ensuring broader inclusivity in capacity development.

Lebanon, despite ongoing political and economic challenges, has prioritised AI awareness and training for its multilingual, tech-savvy youth, focusing on curriculum reform and capacity building. Similarly, France and Spain have embedded robust educational initiatives within their national strategies. France has heavily invested in postgraduate training and public-private research partnerships to scale AI talent. Spain's ENIA (National Strategy for AI) includes programmes to increase digital literacy and professional upskilling, with dedicated funding for AI learning pathways.

1.5. Digital Cooperation and Capacity Building

Digital cooperation - both intra-regional and international - is a notable and growing dimension of AI policy in the Mediterranean:

- **International Collaboration:** Egypt, Italy, Türkiye, and Greece explicitly promote international partnerships. Egypt and Jordan are engaged in UNESCO and OECD AI initiatives, while Italy plays a key role within the EU's AI Act and G7 discussions.
- **Euro-Mediterranean Partnerships**: Mediterranean EU member states (Italy, Greece, Malta, Cyprus) serve as bridges between North Africa, the Middle East, and the European AI ecosystem, offering joint opportunities such as the D4D Hub[53] and the the EBSOM project[54] .
- **Capacity Building Initiatives:** Egypt has launched national AI training programmes. Jordan is supporting AI through its digital skills roadmap. Malta has integrated AI modules into secondary and tertiary education, while Türkiye has invested in national AI institutes.
- **Ethical Governance Exchange:** Lebanon's guidelines, Egypt's charter, and Jordan's ethics code reflect shared values and potential for further collaboration on AI ethics and human rights frameworks.
- **Regional Gaps**: Fragile states such as Palestine, Libya and Syria remain outside formal regional cooperation frameworks, although there is potential for civil society or diaspora-led initiatives to foster capacity building and digital diplomacy.

Capacity-Building Strategies by Country

Below we present a table showcasing a comparative overview of national AI capacity-building efforts across Mediterranean and nearby countries. Each entry highlights strategic priorities, education and workforce development, and key initiatives that foster AI literacy, research, and innovation. Governments are increasingly embedding AI into public policy, academia, and industry, reflecting diverse stages of maturity, from early awareness-building to advanced research ecosystems. The table aims to illuminate the regional landscape of AI education and capacity building, providing a foundation for cross-country collaboration and knowledge sharing.

Table 1: Capacity-Building: Examples & Initiatives

Country	Capacity-Building Focus	Priorities and Initiatives
Albania	Early-stage integration and institutional capacity building	- Draft National AI Strategy under development, focusing on digital skills and ethical AI use. - Partnerships with universities for pilot AI courses and digital innovation hubs. - Support from international donors (e.g., UNDP, EU) to promote AI for public services and entrepreneurship.

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53   D4D Hub https://d4dhub.eu/
54   EBSOM project https://south.euneighbours.eu/news/roadshow-digitalization-and-artificial-intelligence-euro-me-diterranean/

Algeria	National AI action plan and ecosystem development	- National AI Council coordinates AI initiatives. - Focus on capacity building through academic institutions and industry collaboration. - Development of AI research hubs and training programs.
Cyprus	National AI strategy focused on multi-sectoral development	- Cyprus National Strategy for Artificial Intelligence outlines AI integration across education, industry, and public administration. - Emphasis on AI research, skills development, and innovation ecosystem.
Egypt	Multi-level education and training	- Integration of AI in university curricula (e.g., Cairo University Faculty of AI). - Training of public servants in AI fundamentals. - Organisation of hackathons and innovation competitions to engage youth.
France	Comprehensive academic expansion in AI education	- Strategic objective to double AI graduates by 2025. - Targets: 2,000 bachelor's, 1,500 master's, 200 doctoral AI students annually. - Investment in AI institutes and interdisciplinary AI research clusters.
Greece	Education reform and public sector training	- "Digital Skills for All" initiative includes AI components. - University AI labs and PhD incentives. - Flagship AI projects in civil service.
Italy	Workforce upskilling and innovation incentives	- Funding vocational AI training via the National Recovery and Resilience Plan (PNRR). - Support for university-industry AI collaboration. - Specialised AI training for public administration personnel.
Jordan	Education, training, and ecosystem development	- AI-focused educational programmes. - AI training for government employees. - Jordan Open-Source Association workshops promoting AI literacy.
Lebanon	Curriculum reform, training, and research	- Embed AI in school/university curricula. - Public awareness campaigns. - Promote public-private training hubs.
Malta	Targeted education, certification, workforce development	- AI in primary and secondary school curricula. - AI apprenticeships and STEM career pathways. - National AI Certification Programme to assure workforce competencies.

Morocco	AI ecosystem development and capacity building	- National AI strategy focusing on AI research, skills, and industrial applications. - Prioritises capacity building through education and innovation hubs.
Palestine	Advocacy-focused, early-stage capacity building	- Promotion of digital rights and AI societal impact awareness. - Emphasis on digital literacy and local research amid occupation context.
Spain	AI education ecosystem expansion and research investment	- National AI Strategy (ENIA) expanding AI education. - Support for AI research centres, master's programmes. - Funding for doctoral research and public admin AI training. - Participation in European AI Excellence Centres.
Tunisia.	Early-stage, through international collaboration	- Pilot AI research initiatives with universities. - Participation in African Union and EU digital skills programmes. - Community AI workshops with NGOs.
Türkiye	National coordination for AI talent	- "AI Talent Programme" by Digital Transformation Office. - Scholarships and academic incentives. - Collaboration to boost AI R&D.

1.6. Policy Landscape of AI in Higher Education

The policy landscape for AI in HE is rapidly advancing, however, most of the policy frameworks are related to academic misconduct instead of capacity building. UNESCO's Recommendation on the Ethics of Artificial Intelligence (2021)[55] outlines a framework for how AI should be integrated into education systems globally. The key policy goals focus on:

- Ensuring that AI systems are transparent, fair, and inclusive.
- Promoting AI in ways that enhance educational access, equity, and sustainability.
- Developing ethical standards for the development and implementation of AI technologies in education to safeguard student privacy and data security.

AI policies must also emphasise the importance of teacher training and curriculum development to ensure that educators are equipped to teach AI concepts responsibly. Additionally, nations are drafting their own AI strategies, integrating AI literacy into curricula, and expanding opportunities for international cooperation in AI education.

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55 UNESCO. (2021). Recommendation on the Ethics of Artificial Intelligence https://www.unesco.org/en/artificial-intelligence/recommendation-ethics

Responsible AI Literacies for the HE Sector: An Introduction

As AI reshapes the contours of knowledge, governance, and the labour market, HE institutions have a critical role to play in equipping learners with the literacies needed to navigate, shape, and critique AI systems responsibly. Beyond technical proficiency, students must develop the capacity to think ethically, act collaboratively, and lead with integrity in a digitally interconnected world.

UNESCO's Recommendation on the Ethics of Artificial Intelligence (2021)[56] and its Guidelines for AI and the Futures of Learning (2022)[57] provide a foundational framework for this transformation, emphasising the need for inclusive, human-centred, and rights-based approaches to AI in education. AI literacies in HE must therefore go beyond coding and data analytics; they must cultivate the skills and dispositions needed to contribute to education for peace, social justice, and sustainability in rapidly evolving global labour markets.

This involves integrating digital cooperation as a core competency: the ability to work across borders, disciplines, and cultures in the responsible design and deployment of AI. Open data, open research, and multilingual AI interfaces enable learners and educators to participate in collaborative knowledge production, while also supporting inclusive innovation ecosystems. Equally, AI literacy in HE is central to preparing students for the future of work, where interdisciplinary, ethical, and agile digital skills will be increasingly in demand.

Technical Literacies for Responsible AI

Developing technical competencies in AI involves more than coding or data handling; it entails equipping students to contribute ethically and effectively to innovation, research, and practical problem-solving. A robust foundation in data analysis and visualisation is critical. Students should gain proficiency in data cleaning and pre-processing to work confidently with real-world data. Advanced visualisation skills enable them to present complex findings with clarity, while strong interpretive skills support evidence-informed decisions. Equally essential is a grounding in statistical analysis and machine learning. Students must understand core statistical methods and a range of ML algorithms, acquiring the ability to evaluate models and apply quantitative reasoning across disciplines. These skills underpin responsible and informed AI innovation.

AI ethics and responsible data use are also central. Students should understand fairness, bias mitigation, transparency, and privacy, and be equipped to critically assess AI systems. Additionally, familiarity with open research and data management is vital. Students should adopt open data practices, ensure reproducibility, and develop collaborative workflows, preparing them for team-based innovation in transparent, research-driven environments.

- **Foundational Data Skills**: Students should be trained in data wrangling, statistical analysis, and data visualisation using open data from sectors such as public health, transportation, and climate. This prepares them to develop socially relevant AI solutions—for example, using transport data to build mobility apps or leveraging health data for pandemic preparedness. Initiatives such as the European Open Data Portal or data.gov offer valuable resources for practical learning.

56   UNESCO (2021). Recommendation on the Ethics of Artificial Intelligence. https://unesdoc.unesco.org/ark:/48223/pf0000380455

57   UNESCO (2022). Guidance for Generative AI in Education and Research. https://unesdoc.unesco.org/ark:/48223/pf0000386692

- **Machine Learning and Model Evaluation**: A robust understanding of machine learning algorithms, model validation, and interpretability is crucial. Capacity-building efforts, such as UNESCO's AI Competency Framework for Educators, stress the need for HE to embed algorithmic transparency and fairness into technical training.
- **Ethical and Legal Dimensions:** Students must understand principles of data protection (e.g., GDPR), algorithmic bias, and the implications of facial recognition, surveillance, and automated decision-making systems. Engagement with tools such as the AI Fairness 360 toolkit supports critical awareness and ethical AI development.
- **Open Science and Data Management:** Responsible AI requires proficiency in data stewardship and reproducible research. Students should learn to publish datasets with clear metadata, use open licenses, and apply version control tools like GitHub. Training aligned with the FAIR Data Principles and platforms such as Zenodo can promote open, collaborative research practices.

Social Literacies: Cooperation, Inclusion, Citizenship and Justice

The social dimension of AI literacy calls for the development of ethical, collaborative, and inclusive capacities in students, beyond technical competence. It requires engagement in interdisciplinary and cross-cultural collaboration, enabling students to contribute meaningfully to global AI innovation. As advocates for AI literacy and data ethics, students should promote transparency, social justice, and responsible AI practices. Equally important is their role in advancing open data and open research, fostering inclusive knowledge ecosystems through policy engagement and institutional leadership. Critical thinking is fundamental; students must reflect on the societal impacts of AI, question data practices, and understand how AI can reinforce or challenge power dynamics. Inclusive AI development is also key, requiring attention to equity, accessibility, and cultural sensitivity in system design and deployment. These competencies position students as ethical leaders capable of shaping a just and inclusive AI future through informed decision-making and active participation in evolving digital landscapes.

- **Digital Cooperation and Interdisciplinary Collaboration:** AI development increasingly requires collaborative work across disciplines and borders. Students should be engaged in international hackathons, open source projects, and joint challenges—such as those run by UNESCO's AI and the Rule of Law programme or AI4D Africa—to practice cross-cultural dialogue and equitable innovation.
- **Education for Peace and Social Justice**: AI can reinforce biases or be harnessed to promote peace. Literacy initiatives should include projects using natural language processing for detecting hate speech or using AI in transitional justice processes. Courses should integrate ethical dilemmas and real-world case studies involving social harm or bias, fostering students' capacities to reflect critically on the political economy of AI.
- **Labour Market and Civic Readiness:** AI literacy must prepare students for evolving labour markets and civic engagement. This includes awareness of AI's impact on job automation, hybrid skills, and lifelong learning needs. HEIs can support this through micro-credentialing in AI ethics, digital project management, or responsible data innovation. Programs such as the OECD AI and Jobs Initiative[58] offer insights into aligning curricula with changing job markets.
- **Advocacy and Community Engagement:** Students should be equipped to promote open, ethical AI practices within institutions and communities. Supporting student-led

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58 OECD (2021). AI and the Future of Skills (AI-WIPS). https://www.oecd.org/employment/emp/ai-and-the-future-of-skills.htm

digital rights groups or involvement in open data advocacy (e.g., with Open Knowledge Foundation) can build agency in shaping inclusive technology policy.

Evaluation and Impact Assessment in AI Systems

Students should also be literate in evaluating and assessing the impact of AI technologies. This includes conducting post-deployment monitoring of AI systems, applying AI accountability frameworks, and leading impact assessments to ensure that AI contributes positively to society. Critical engagement with AI must include the capacity to evaluate, audit, and anticipate its impacts over time.

- **Post-deployment Monitoring and Feedback Loops:** Students should learn to monitor AI systems for unintended consequences, using tools such as model cards or datasheets for datasets. Practical coursework could involve reviewing the outcomes of an AI-based admissions tool or learning analytics platform.
- **Impact Frameworks and Standards:** Training should cover impact assessment frameworks such as the IEEE Ethically Aligned Design or the EU's Assessment List for Trustworthy AI (ALTAI), enabling learners to conduct risk assessments and propose mitigation strategies.
- **Reflexive and Participatory Approaches:** Learners should be introduced to participatory methods for evaluating AI impact, engaging affected stakeholders in decision-making. This aligns with UNESCO's call for inclusive governance of AI[59] , particularly in contexts with marginalised or underrepresented communities.

Figure 2: Summary of AI skills

AI Skills

Technical Skills
Foundational tools and methods

AI Skills and Evaluation
Core competencies for AI development

Evaluation and Impact Assessment
Measuring AI's societal effects

Social Skills
Collaborative and ethical practices
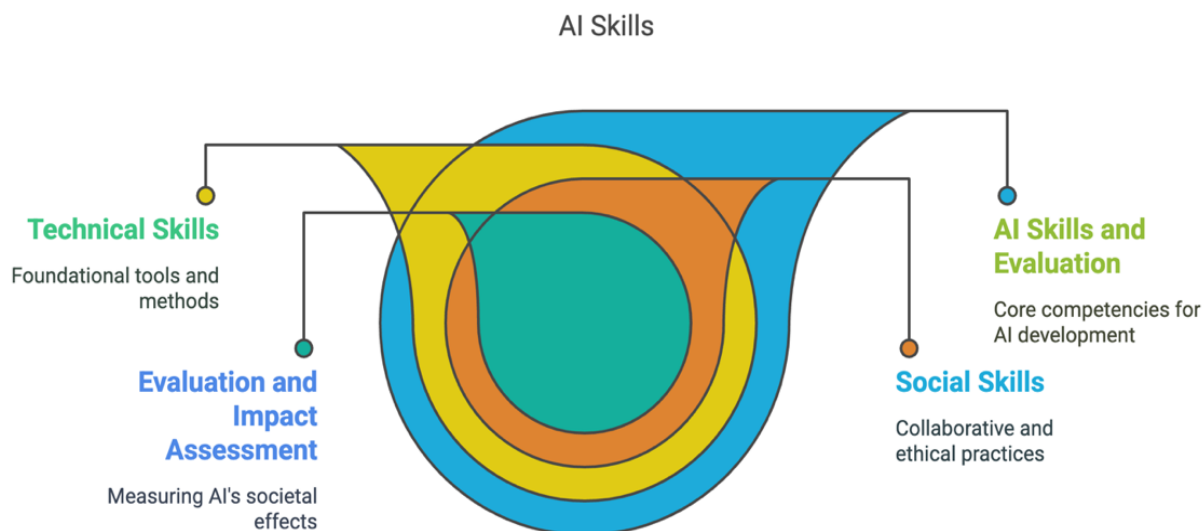
Made with Napkin

59   UNESCO (2021). Recommendation on the Ethics of Artificial Intelligence. https://unesdoc.unesco.org/ark:/48223/pf0000380455

SECTION 2 CASE STUDIES

2.1. Overview

This section presents **16 case studies** from across Southern Mediterranean and Southern European countries, offering a diverse snapshot of how AI is being explored and implemented. These case studies span a wide spectrum of focus areas, including AI ethics, public administration, and capacity development, demonstrating the strategic use of AI to meet varying national priorities. The examples draw on a rich mix of platforms, institutional settings, and sectoral applications, reflecting the adaptability of AI across educational, governmental, and innovation ecosystems.

In addition to these regional examples, we include two further case studies from the Kingdom of Bahrain and Qatar. These illustrate transferable practices and policy models that could be readily adapted and adopted across the Mediterranean, offering valuable insights for countries seeking to accelerate their AI strategies through tested, scalable approaches.

Cases are presented in alphabetical order by country, and include the level, type and target audience of the initiative.

Case 1: The Role of Artificial Intelligence in Albanian Higher Education: A Comparative Perspective on the Use of ChatGPT

Keywords: *ChatGPT; artificial intelligence; higher education; longitudinal comparison; digital transformation.*

Nevila Rama, Erarda Vuka, and Besjana Mema. Mediterranean University of Albania. Albania
nevila.rama@umsh.edu.al, erarda.vuka@umsh.edu.al, besjana.mema@umsh.edu.al

Nevila Rama is Vice-Rector at the Mediterranean University of Albania, specialising in international relations, diplomacy, and security studies. She earned her Ph.D. in Security Studies and Diplomacy from the State University of Library Studies and Information Technologies in Sofia, Bulgaria, in 2012 and became a professor in public communication in 2016. Since 2014, she has overseen academic processes and curriculum development at the university and previously served as Dean of the Faculty of Legal and International Relations. With over 20 years of teaching experience, she is Executive Director of the "Mesdheu" Center, a research think tank engaged in international projects and initiatives.

Erarda Vuka holds a Ph.D. in Informatics from the University of Tirana, specialising in real-time Data Warehouse optimisation. Since 2011, she has been active in academia and currently leads the Information Technology Department at the Mediterranean University of Albania. Beyond teaching, she serves as an external expert in data analysis and business intelligence for companies like EgeaConsult and GoToSale. Her research focuses on data analysis, AI, distributed systems, and non-stationary time series, with publications in Scopus-indexed journals. She also has expertise in system architecture, database management, cloud computing, and software integration.

Besjana Mema Dr. Mema is a full-time lecturer at the Mediterranean University of Albania. She earned her PhD in Information Management Systems from the European University of Tirana in 2017, following undergraduate and Master's studies in Natural Sciences at Aleksander Xhuvani University. Her research covers education, standardisation, graph theory in computer science and tourism, and information systems management. She has published 18 journal articles, presented 24 conference papers, participates in five COST ACTION projects, and is deputy coordinator of the EU-funded DIGITCHRESHE project.

Level of initiative: Institutional
Type of Initiative: Policy Implementation; AI Literacy Guides; Conferences/Seminars/Workshops; AI-enhanced Teaching & Learning Practices
Target audience: Students; Academics

Rationale & Background

The initiative undertaken by the Mediterranean University of Albania focuses on the comparative analysis of the use, perception, and institutional integration of ChatGPT within Albanian HE between 2023 and 2025. This initiative is built upon a multidimensional framework that incorporates research, capacity building, academic dissemination, and policy dialogue to promote responsible AI adoption in teaching and learning environments.

At the core of the initiative is a data-driven study conducted through a structured questionnaire, distributed to both students and lecturers from Mediterranean University of Albania. The instrument was designed based on validated models such as the Technology Acceptance Model (TAM) and included both closed-ended and open-ended questions. In total, 246 valid responses were collected in 2025, building on a baseline of 120 responses from 2023. The collected data were subjected to a comprehensive set of statistical analyses including descriptive statistics, chi-square tests, logistic regression, and exploratory factor analysis. Additionally, a thematic analysis was applied to qualitative responses to identify emerging concerns and expectations related to ChatGPT use.

Description of the Initiative

Parallel to the research component, the initiative included several academic and institutional activities aimed at disseminating results and engaging stakeholders. Academic seminars were organised within the university to present the findings to faculty members and students. These events served as platforms for raising awareness about the educational potential and ethical concerns of using AI tools like ChatGPT. The results were also presented at national and regional conferences, stimulating dialogue on policy formulation and pedagogical reform.

In response to the identified gaps in training and institutional support, the initiative developed a pilot AI literacy workshop tailored for faculty, introducing the functionalities of ChatGPT, case-based teaching scenarios, and critical considerations for evaluating and moderating AI-generated content. The workshop materials included interactive exercises, ethical dilemma discussions, and a user manual designed specifically for educators in the Albanian context. This hands-on capacity-building activity aimed to empower lecturers with practical strategies for integrating AI into their teaching while maintaining academic integrity.

To further support institutional alignment, the initiative proposed a set of preliminary policy guidelines to the university leadership. These guidelines address responsible use of AI tools in coursework, transparency in AI-aided assignments, and mechanisms for monitoring academic integrity. Although not yet formally adopted, the proposal sparked constructive dialogue and laid the groundwork for the development of a university-wide policy on AI integration.
Moreover, the initiative emphasised collaboration and peer-learning through roundtable discussions and co-design sessions. These activities gathered feedback from both students and faculty to co-create practical strategies that reflect the real needs and constraints of Albanian HE institutions. The co-creation approach ensured inclusivity and increased the relevance of proposed actions, illustrating

a holistic approach to AI integration by combining empirical research, educational innovation, policy engagement, and inclusive dialogue to inform institutional strategies and national educational reforms toward more ethical and effective AI use in HE.

Table 1: AI and ChatGPT in HE – Usage and Perceptions

Category	Key Findings
User Profile	*76.5% Students, 17% Lecturers, 6.5% Other*
Field of Study/Work	*61.4% Sciences, 32.5% Social Sciences*
Use of ChatGPT in Education	*70.9% have used ChatGPT in educational contexts*
Usage Frequency	*48.9% use it only for specific tasks, 24.1% several times a week*
Main Purposes	*48.3% for academic research/info retrieval, 35.5% for writing*
Impact on Understanding	*59.6% report positive/very positive impact*
Change in Study Methods	*50.6% say ChatGPT influenced how they study*
Change in Teaching Methods	*53.3% report positive/very positive impact*
Main Benefits	*34.5% value time-saving, 22% material creation, 17.7% analytical skills*

Table 2: Challenges, Concerns, and Future Perspectives

Category	Key Findings
Perceived Data Security	*Only 14.7% feel "very secure"; 35.1% lack information to judge*
Main Challenges	*35.2% cite lack of ethical/copyright knowledge, 21.6% verification issues*
Institutional AI Policies	*67.8% don't know if such policies exist at their universities*
Training Needs	*60.1% believe formal training is (very) necessary*
Future Impact on Higher Education	*29.1% expect development of new learning methods, 26% see transformative impact*
Other AI Tools Used	*Most mention Google or Copilot; some none*

Outcomes & Impact

This study included a sample of 248 students and lecturers. The aim was to analyse the use and impact of ChatGPT in 2025 compared to 2023. The data revealed a significant increase in the frequency of ChatGPT usage for academic purposes, particularly for content creation, information retrieval, and task completion.

Users, especially students, reported noticeable benefits in terms of improved comprehension and language skills, while lecturers provided more reserved evaluations. Despite the rise in usage and awareness, the hypothesis regarding full institutional integration of the technology (H4) was not fulfilled. Only a small portion of participants stated that the university had clear policies or guidelines concerning the use of AI in teaching and learning.

The lack of institutional structure generates uncertainty around AI use, increases the risk of misuse, and offers insufficient support for staff professional development. In this context, several urgent policy measures are recommended:

- The development of clear ethical guidelines for AI use in education;
- Integration of training modules for both students and academic staff;
- The establishment of a dedicated academic unit to oversee and support AI tools within the university.

Links & Additional Resources

Pyetësor për vitin 2025: Ndikimi i ChatGPT në Arsimin e Lartë në Shqipëri https://docs.google.com/forms/d/1Z6nL2-aKmpyBVGQwCoBHc707wPSKHqTvQpK6xujrK94/edit

Case 2: From Vision to Practice: Implementing Algeria's AI Strategy 2020–2030 and the Transition to University 4.0

Keywords: *Capacity-building; AI Literacy; Policy Roadmap*

Naouel Abdellatif Mami, Mohamed Lamine Debaghine, Sétif 2. Algeria
dr.abdellatifnaouel@yahoo.fr

Naouel Abdellatif Mami is the Vice-Rector at Mohamed Lamine Debaghine Sétif 2 University, holding a Ph.D. in Psychopedagogy and Foreign Language Teaching. She is a leader in international research, and has coordinated major projects such as ABDEM, Dire-MED, and ESAGOV, recognized by the European Commission. She leads an AI-based English teaching initiative with the University of Leeds and represents Algeria in several global academic bodies. Prof. Mami also heads national educational reforms, including the shift to University 4.0, and promotes women's roles through the Algerian Women's Foundation. Her research spans digital education, human rights, and socio-ecological transitions in higher education.

Level of initiative: National
Type of Initiative: Capacity-building courses; AI Literacy Guides; AI-enhanced Teaching & Learning Practices
Target audience: Academics; Institutional leaders; Doctoral researchers.

Rationale & Background

AI is increasingly redefining HE systems around the world by enabling personalized learning, automating administrative functions, and supporting data-driven academic planning. In Algeria, this global shift has been strategically embraced through the launch of the **National Strategy for Research and Innovation in Artificial Intelligence** (2020–2030), developed by the Ministry of HE and Scientific Research in collaboration with national and international experts (MESRS, 2020).

This case study examines the implementation and impact of the strategy within the Algerian HE sector, focusing on institutional capacity building, innovation ecosystems, and human capital development. It also highlights the pivotal role of the **National Commission for the Transition to University 4.0**, (N. Abdellatif Mami, [Internal Report], (2025) which oversees the integration of AI and digital tools across universities. Despite facing challenges related to infrastructure and skills gaps, Algeria's AI-driven HE agenda marks a significant step toward building a knowledge-based economy and preparing a future-ready generation.

This case study seeks to analyse how Algeria's AI strategy is transforming the HE landscape. It aims to:
- Evaluate institutional readiness and infrastructure development for AI integration,
- Explore how research and innovation capacities are being strengthened,
- Assess the role of universities in preparing students for an AI-influenced labour market.

It also emphasises the role of the **National Commission for the Transition to University 4.0**, which was established to guide Algerian universities through this digital transition. By exploring

key initiatives, achievements, and ongoing challenges, this case study contributes to a better understanding of how Algeria is building institutional and human capacity for AI in HE. Algeria's **National Strategy for Research and Innovation in Artificial Intelligence (2020–2030)**, launched in December 2020 under the Ministry of Higher Education and Scientific Research, reflects a national commitment to becoming a regional leader in AI and the knowledge economy. Developed with input from over 150 Algerian AI experts, including diaspora members, the strategy focuses on enhancing national capabilities through education, training, and research. It aims to support socio-economic development in key sectors such as health, energy, transport, HE, and digital technologies, while accelerating public service digital transformation.

Structured around six pillars—human capital, scientific research and innovation, digital infrastructure and data governance, ethical and regulatory frameworks, industrial and entrepreneurial ecosystems, and international cooperation—the strategy adopts a holistic approach. Key initiatives include the creation of AI-focused institutions like ENSIA, development of research centres and AI labs, and promotion of applied research across sectors. Ethical AI governance and national data protection are central to the strategy, ensuring alignment with international standards. By integrating AI across sectors and fostering robust innovation ecosystems, Algeria seeks not only to build academic excellence but to position itself as a regional hub for AI research, application, and governance.

Description of the Initiative

Algeria's National Strategy for Research and Innovation in Artificial Intelligence (2020–2030) outlines a transformative role for HE driving AI-led national development. It sets out three key goals: **capacity building, university–enterprise collaboration,** and the creation of **innovation ecosystems.**

Capacity building focuses on developing AI competencies across all levels of tertiary education. This includes integrating AI into undergraduate, master's, and doctoral programs, creating specialist degrees in areas like machine learning and AI ethics, and training faculty in AI pedagogy. Flagship institutions such as the École Nationale Supérieure de l'Intelligence Artificielle (ENSIA) provide state-of-the-art infrastructure to support AI education and research. International collaboration, especially with the Algerian diaspora, ensures alignment with global standards, while digital platforms support hybrid and remote learning.

University–enterprise collaboration seeks to bridge the gap between academic training and market needs. Co-designed curricula, internships, and dual training systems are promoted, particularly in strategic sectors like health, energy, agriculture, and mobility. Platforms such as Algeria Venture and university-based incubators foster start-ups, support technology transfer, and help commercialize academic research.

Innovation ecosystems are to be developed through AI hubs, interdisciplinary research centers, and maker spaces. These ecosystems aim to tackle local challenges using AI, including food security, water management, and smart governance. Entrepreneurial culture is encouraged through hackathons and innovation competitions, while open science practices and international partnerships support knowledge exchange.

- Overall, the strategy positions Algerian universities as catalysts for digital innovation and socio-economic transformation, in line with national priorities for inclusive, ethical, and sustainable AI deployment.

The *National Strategy* is underpinned by a multi-layered implementation framework designed to align academic, governmental, and industrial stakeholders. Central to this is the *White Paper on AI*, which provides practical guidance for embedding AI across sectors. Key mechanisms include **national AI research networks** that connect universities and research centers, enabling interdisciplinary collaboration and engagement with diaspora experts. **Digital infrastructure upgrades**—such as high-performance labs, cloud platforms, and AI-enabled virtual learning environments—support scalable education and research, with standardized doctoral curricula integrated into platforms like Moodle. **Funding streams** provide support for theses, pilot projects, and public-private partnerships to drive applied innovation. Finally, the strategy builds **talent pipelines** through AI-focused curricular reforms, research competitions, international exchange programs, and initiatives to attract diaspora expertise. Together, these mechanisms aim to foster a thriving AI ecosystem and position Algeria as a leader in digital transformation and innovation.

Reference Guide for the Early-Stage Training of Doctoral Students: Programming Fundamentals and Techniques

The Ministry of Higher Education and Scientific Research (MESRS) in Algeria has launched a strategic initiative to enhance early-stage doctoral training by integrating programming fundamentals and AI techniques, supporting the national agenda of digital transformation and research excellence. The programming fundamentals program equips doctoral students across disciplines with computational thinking, algorithmic problem-solving, and practical skills in Python and open-source tools. It features a modular design tailored to diverse academic backgrounds: Humanities and Social Sciences students focus on foundational modules, while Science and Technology students engage with advanced programming applications. The curriculum blends lectures, workshops, case studies, and projects, delivered through a hybrid model combining online and in-person instruction. Qualified faculty and standardized instructor training ensure quality and consistency.

Complementing this, the Referential for Initial Training in AI Techniques addresses advanced competencies in machine learning, deep learning, and data science, critical for innovative research aligned with Algeria's scientific priorities. The AI program emphasizes mastery of open-source AI frameworks (TensorFlow, PyTorch, Scikit-learn), ethical AI usage, advanced data visualization, and the integration of AI-powered academic tools (e.g., Grammarly, Turnitin). Structured over two semesters, it combines theoretical instruction with practical workshops, supported by modern infrastructure and expert faculty. The program's four pedagogical axes focus on open-source tools, AI-enhanced learning, AI-driven data analysis, and AI applications for research challenges.

Figure 1. Training objectives aligned with national priorities

Training Objectives Aligned with national Priorities

Open-Source AI Tools
Emphasizes accessible tools for reproducibility and collaboration.

AI Frameworks
Provides hands-on training in TensorFlow, PyTorch, and Scikit-learn.

Data Visualization
Builds skills in data representation for clear communication.

AI Concepts
Ensures understanding of machine learning and data science theories.

Research Applications
Encourages AI use for data analysis and knowledge extraction.

Ethical AI Usage
Addresses data privacy, fairness, and transparency in AI applications.

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Pedagogical Axes Supporting the HE Research and Innovation Goals

The training is organised around four main axes, each contributing to the Ministry's goal of preparing researchers capable of leading innovation in Algeria:

- **AXIS I: Open-Source AI Tools:** Familiarises students with free, collaborative software, fostering transparency and ethical software use.
- **AXIS II: AI-Enhanced Learning and Communication:** Introduces AI tools that improve scientific writing, document research, and critical analysis, supporting the national push for academic excellence and integrity.
- **AXIS III: AI-Driven Data Research and Analysis:** Develops advanced skills in data science and AI modelling, essential for innovative research aligned with MESRS's research quality objectives.
- **AXIS IV: AI Applications for Research Problem-Solving:** Focuses on applying AI techniques to domain-specific challenges, reinforcing the Ministry's strategic objective of linking research outputs to societal needs.

Figure 2. Application Areas

Application Areas

Open-Source AI
Utilizing open-source AI tools — 1

Enhanced Learning
AI improves learning and communication — 2

Data Research
AI drives data research and analysis — 3

Problem-Solving AI
AI solves research related problems — 4

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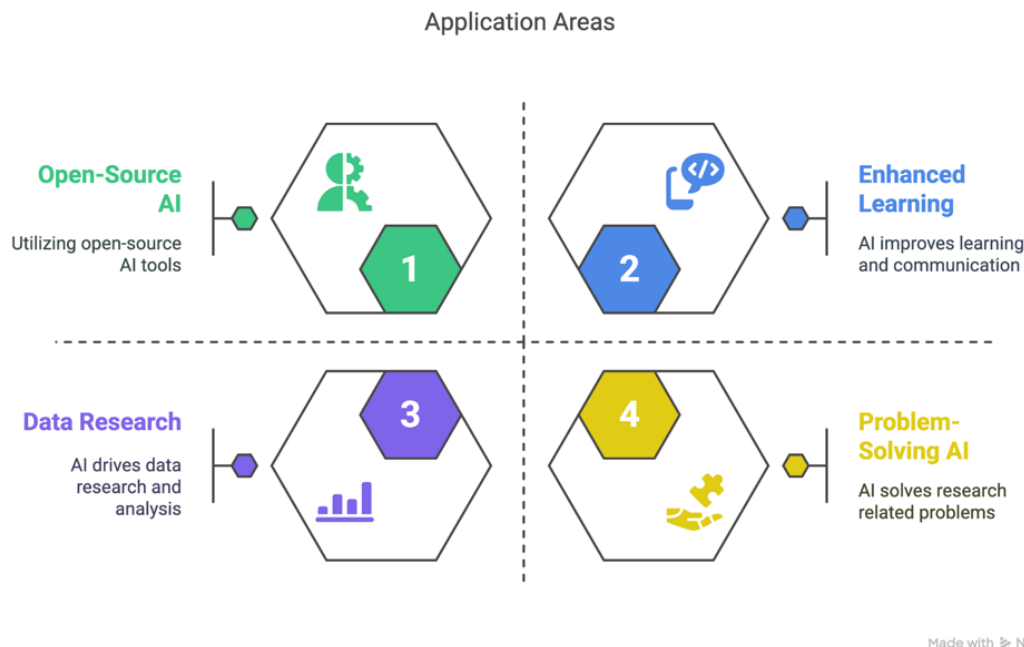
To operationalise its ambition of transforming Algeria's HE system into a smart, agile, and globally connected ecosystem, the Ministry of Higher Education and Scientific Research developed and adopted the Master Plan for the University 4.0 Transition (Schéma Directeur de la Transition Universitaire 4.0). This guiding document is a strategic and operational blueprint that places AI at the core of institutional reform across all disciplines, including science, technology, humanities, and social sciences.

The Master Plan is aligned with the National Strategy for Research and Innovation in Artificial Intelligence (2020–2030), and lays out a phased, systemic, and cross-sectoral approach to achieving smart universities that are digitally sovereign and internationally competitive.

Outcomes & Impact

Algeria's Ministry of Higher Education and Scientific Research is advancing a comprehensive strategy to transform its HE system through AI, aligned with national research and innovation goals. The training framework is built on four pedagogical axes: promoting open-source AI tools for ethical, transparent software use; integrating AI to enhance learning, scientific writing, and critical analysis; developing advanced AI-driven data research skills; and applying AI to solve real-world research problems. This equips doctoral students with essential AI competencies to foster responsible, internationally competitive research.

Central to this transformation is the University 4.0 Master Plan, a strategic blueprint embedding AI at the heart of institutional reform across all disciplines. The plan's 4.0 Matrix Framework enables universities to benchmark progress across infrastructure, pedagogy, governance, and internationalization, guided by clear KPIs and maturity levels. A national Work Plan, developed with broad stakeholder input, sets phased milestones and evaluation criteria focused on digital readiness, AI integration in teaching, interdisciplinary collaboration, and quality assurance.

Despite progress, challenges remain: uneven digital infrastructure, a shortage of AI-trained faculty, and cultural resistance within traditional faculties. However, these are countered by opportunities such as leapfrogging into digital maturity, mobilizing Algeria's global scientific diaspora for collaboration, and employing AI to improve systemic inefficiencies like academic scheduling and employability forecasting.

International cooperation is emphasized as essential for Algeria's digital ambitions. Partnerships with African, European, and Asian institutions, alignment with UNESCO and OECD standards, and creation of regional AI education platforms aim to position Algeria as a continental AI hub, strengthen the nation's technological sovereignty and economic diversification.

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Case 3: Teaching Smarter: Leveraging AI for Better Learning Outcomes

Keywords: *Artificial Intelligence; Innovation; Education; EdTech; Digital Learning*

Abdelfateh Tebani, Associate Professor, Ferhat Abbas Setif 1 University. Algeria
abdelfateh.tebani@univ-setif.dz

Abdelfateh Tebani is an Associate Professor at the Faculty of Economics, University of Setif 1, and a certified trainer in entrepreneurship and IT. He also teaches English and Turkish, with expertise in Business, Medical, and Technical English. Passionate about AI in education, he has led workshops on integrating AI tools into teaching. As a founding member of the "Esaboura" platform, he actively promotes digital learning and educational innovation. With over 15 years of experience, Dr. Tebani stands out as a dynamic academic bridging language education, technology, and entrepreneurship in Algeria.

Level of initiative: Institutional; Course-level
Type of Initiative: Capacity-building courses; AI Literacy Guides; Assessment Methods; Conferences/Seminars/Workshops; AI-enhanced Teaching & Learning Practices
Target audience: Students; Academics

Rationale & Background

The initiative "*Teaching Smarter: Leveraging AI for Better Learning Outcomes*" aims to address the growing need for digital transformation and AI integration in Algerian HE. The project first took shape during the TESOL International Conference held in December 2024 in Algiers, in collaboration with World Learning. As a speaker in this event, I shared insights and practical strategies on the application of AI tools in language teaching and learning. This event served as a catalyst for future actions, engaging a diverse audience of over 300 participants, mostly composed of teachers and university students.

The initiative responds to the urgent demand for capacity-building in AI literacy among educators and learners. With AI increasingly impacting all sectors, the lack of awareness and structured implementation in education was seen as a barrier to progress. The workshop was designed to empower faculty and students with the necessary knowledge and skills to responsibly adopt AI in their teaching and learning practices.

The success and positive feedback from participants encouraged broader institutional engagement. This initiative contributed to policy dialogue and momentum, leading the Algerian Ministry of HE to consider integrating AI in Education as a formal subject within the national university syllabus, marking a significant step forward for embedding responsible AI use across educational institutions in Algeria.

Description of the Initiative

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The initiative encompasses a multifaceted program designed to enhance AI literacy and integrate AI tools into HE teaching practices. The starting point was a high-impact workshop presented during the TESOL International Conference in Algiers, in collaboration with World Learning. The workshop titled "Teaching Smarter: Leveraging AI for Better Learning Outcomes" attracted over 300 participants, including university instructors, pre-service teachers, and students.

- Hands-on Training Sessions on AI-powered educational tools such as ChatGPT, magic school, Google studio, and generative AI for academic writing.
- Interactive demonstrations showing how to personalise learning, generate teaching materials, and create assessments using AI.
- Group Projects encouraging participants to develop AI-enhanced lesson plans.

Resources used:

- AI literacy guides tailored for language teachers and EMI university instructors.
- Case-based learning materials.

The initiative has since been replicated in other universities, including Setif 1, Msila, and Algiers 2, expanding the reach of training to hundreds more. It also inspired the development of a dedicated online resource center via the Esaboura platform, co-founded by the lead trainer.

Outcomes & Impact

The initial training reached over 300 participants across Algeria. Feedback was overwhelmingly positive, with participants highlighting the relevance, practicality, and accessibility of the content. The majority reported improved confidence in using AI tools for both teaching and academic tasks. The impact extended beyond individual learning:

- Institutional awareness increased significantly, with many faculties initiating discussions on embedding AI practices in their curricula.
- The Algerian Ministry of Higher Education has officially considered the integration of AI in Education as a subject in the national university syllabus — a major policy-level outcome linked to the initiative's momentum.
- Replication of the workshops in other universities has trained hundreds more educators and students since the initial conference.
- The initiative sparked collaborations with local EdTech startups and international partners interested in scaling similar models across the region.

This initiative has laid foundational steps toward building an AI-literate academic community in Algeria, with scalable potential across the Mediterranean region.

Links & Additional Resources:

- TESOL DZ – Conference 2024: https://tesoldz.org/speakers-and-trainers/
- Esaboura eLearning Platform: https://esaboura.com
- Trainer LinkedIn: https://www.linkedin.com/in/abdelfateh-tebani-2366a0139/

Case 4: AI Applications Day at the University of Béjaia

Keywords: *Artificial Intelligence, Applications, Mediterranean, Higher Education, Awareness*

Bennai Yani-Athmane, University of Béjaia. Algeria
yaniathmane.bennai@univ-bejaia.dz

Bennai Yani-Athmane is a professor-researcher in computer science and Director of the AI House at the University of Béjaia, Algeria, leading initiatives for AI popularisation, training, and support. Passionate about practical and responsible AI applications, he actively supports faculty, students, and local partners in promoting innovation and ethics in AI.

Level of initiative: Institutional
Type of Initiative: Policy Implementation; Conferences/Seminars/Workshops
Target audience: Students; Academics; General public

Rationale & Background

AI is profoundly transforming economic and social sectors worldwide, including HE. The AI Applications Day organised at the University of Béjaia aimed to raise awareness among the university community and the general public about the many practical AI applications in key areas such as health, smart agriculture, natural language processing (NLP), and biometric recognition. This initiative addresses the urgent need to democratise AI knowledge while tackling the ethical and socio-economic challenges it raises, particularly the risks AI poses to certain professions. By fostering dialogue among researchers, educators, students, and curious citizens, the event aimed to encourage responsible and informed AI adoption in the Mediterranean region, thereby strengthening digital cooperation in HE.

Description of the Initiative

The AI Applications Day held on April 16, 2025, at the University of Béjaia gathered approximately 300 participants from academic circles, students, and the interested general public. It was co-organised by the Department of Computer Science, the Faculty of Exact Sciences and the Vice Rectorate in charge of external relations and the AI House, featuring a series of lectures covering several key topics:

- Natural Language Processing (NLP), presenting advances and applications in text understanding and generation.
- Precision agriculture, demonstrating how embedded AI can optimise agricultural yields in the Mediterranean region.
- Biometric iris recognition, explaining the technologies and their security applications.
- AI applied to medicine, illustrating its contributions to diagnosis and patient monitoring.

Each lecture was followed by exchanges and an open debate on the social impacts, notably the risks related to AI-driven job transformations.

Educational materials were distributed, and the sessions were live-streamed via the University's WebTV on Facebook, ensuring broader outreach. Special emphasis was placed on popularisation and accessible pedagogy, aiming to make AI understandable and appealing to a diverse audience.

Figure 1. Conference attendees.

Outcomes & Impact

The event attracted a large audience, reflecting the growing interest in AI in the region. Feedback was very positive, with strong enthusiasm expressed during debates and calls for similar future events.

This gathering contributed to:

- Strengthening AI knowledge and responsible use skills within the university community.
- Raising awareness of ethical and social issues related to AI integration, especially regarding employment.
- Enhancing cooperation among university stakeholders and encouraging regional collaboration.
- Establishing the AI House as a reference center for AI training and popularisation in the Mediterranean.

The live broadcast via WebTV reached an even wider audience beyond physical attendees, amplifying the initiative's impact.

Links & Additional Resources

University of Béjaia WebTV on Facebook: https://www.facebook.com/share/p/1DkESz4Ldg/

Case 5: AI-Powered Pedagogy: Measuring its Impact on Learning Outcomes - Case study of Algeria

Keywords: *higher education, teaching quality, educational artificial intelligence, Bloom's taxonomy, University 4.0*

Ouatah Samah Feriel, Higher National School of Management - Kolea. Algeria
samahouatahsb@gmail.com

Samah Feriel Ouatah is an independent researcher and Pedagogical Quality Manager at HIS University, committed to innovation in teaching and academic excellence. A graduate of the Higher National School of Management ENSM in Kolea Algeria, her master's research focused on the impact of AI-based educational tools on HE quality. She founded a start-up to promote financial literacy through creative pedagogical approaches and previously led a university incubator supporting students entrepreneurship. With teaching experience integrating digital tools, she now seeks a PhD on "Best Practices in University Governance in the Era of AI", aiming to explore AI's role in strategic decision-making and quality education.

Other contributors to this case study
- **Bouchetara Mehdi (Assistant Professor at ENSM kolea)**
- **Saba Amine (Assistant Professor at ENSM Kolea)**

Level of initiative: Course-level
Type of Initiative: Assessment Methods; AI-enhanced Teaching & Learning Practices
Target audience: Students; Academics

Rationale & Background

The initiative AI-Powered Pedagogy: Measuring Its Impact on Learning Outcomes in Algerian Private Universities aims to explore the transformative role of AI in enhancing teaching and learning practices in HE. As universities worldwide integrate digital tools into their academic systems, the use of AI in pedagogy offers promising opportunities - especially in contexts where educational quality and personalization remain key challenges.

Purpose and Objectives

The experimental study assesses how AI-based educational tools—such as adaptive learning platforms, AI tutors, and intelligent feedback systems—can influence student engagement, comprehension, and academic performance. By introducing AI-enhanced teaching methods in selected private Algerian universities, the initiative aims to generate empirical evidence on their effectiveness compared to traditional pedagogical approaches.

Challenges Addressed

The project addresses several pressing challenges in Algerian HE:
- A lack of personalized learning experiences due to overcrowded classes and rigid curricula
- Limited teacher capacity to provide timely and individualized feedback
- A need for scalable innovations that improve learning quality without increasing operational costs

Significance

This initiative is among the first in Algeria to systematically evaluate the pedagogical impact of AI tools within the private HE sector. It aligns with global trends in University 5.0 thinking—where education systems become more intelligent, adaptive, and data-driven.

By providing concrete insights into how AI technologies affect learning outcomes, this study will inform institutional strategies, faculty training programs, and policy frameworks for AI integration. Ultimately, the project contributes to building a more agile and quality-focused HE system in Algeria, better equipped to meet the demands of the digital age and prepare students for a rapidly evolving labor market.

Description of the Initiative

The initiative encompasses several interconnected components designed to effectively integrate AI into HE. Here's a detailed outline of the key components:

Activities and Programs:

- Experimental studies comparing traditional teaching methods with AI-enhanced approaches.
- Pilot testing with 20 students to validate and refine experimental protocols
- Structured classroom sessions implementing both conventional and innovative AI-supported teaching methods.
- Development of interactive lesson plans and case simulations through the AI platform EDUAIDE .
- Systematic assessment through pre and post-intervention questionnaires.
- Real-time feedback collection using QR code-based systems.
- Specialized modules focusing on logistics and international trade within management programs.

Resources and Tools:

- Advanced AI Platform (EDUAIDE) for generating interactive content and assessments.
- Analytical software suite including IBM SPSS Statistics 25 and Microsoft Excel 365.
- Structured evaluation instruments (Likert-scale questionnaires aligned with Bloom's taxonomy).
- Comprehensive educational modules covering various business disciplines.
- Detailed documentation including experimental protocols and assessment tools.

Implementation Strategies:

- Systematic experimental protocol with control and experimental groups
- Careful technology integration process including teacher training
- Structured data collection methodology using multiple instruments
- Matched group design to minimize bias
- Consistent teaching methodology across different sessions

Assessment and Evaluation Framework:

- Robust reliability testing using Cronbach's Alpha (threshold > 0.6)
- Comprehensive statistical analysis including:
  - Student's t-tests for group comparisons
  - Levene's test for variance equality
  - Detailed descriptive statistics

- Performance evaluation across all levels of Bloom's taxonomy
- Mixed-method assessment combining quantitative metrics with qualitative feedback

Training and Development:

- Comprehensive teacher training programs on AI tool implementation
- Student orientation sessions for tool familiarization
- Continuous improvement mechanisms based on feedback
- Technical support infrastructure
- Digital literacy development programs
- Focus on responsible AI usage

The initiative employs a methodical approach to ensure successful implementation, with each component carefully designed to support the overall objective of enhancing educational quality through AI integration. The combination of rigorous assessment methods, comprehensive training programs, and robust technological tools creates a framework that promotes both effective learning and responsible AI use in HE. This systematic approach allows for continuous evaluation and improvement while maintaining focus on measurable learning outcomes and pedagogical effectiveness.

Figure 1: Comparison of traditional and innovative method results by ability
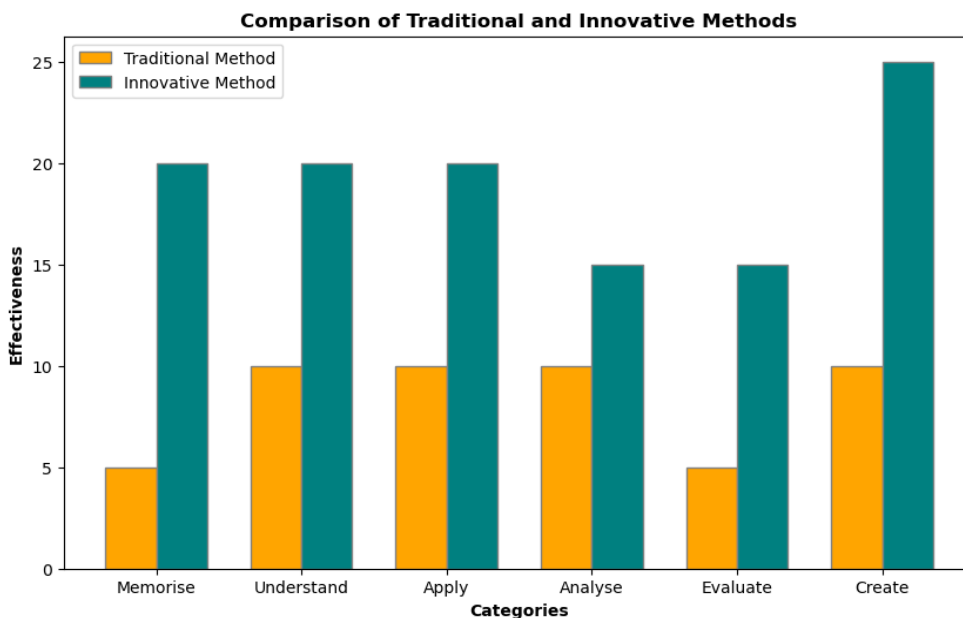
Source: The author

Table 1. Testing Protocol

Phase	Step 01	Step 02	Step 03	Step 04	Conclusion
Phase 01: "Pilot test"	Set test objectives	Integrate the IAED tool into the course	Distribute the questionnaire and collect feedback	Process results	Revise and adjust experiment parameters.
Phase 02: "Experimenting with traditional teaching methods"	Run the course using traditional teaching methods	Distribute the questionnaire and collect feedback	Process results		Move on to the next phase
Phase 03: "Experimenting with innovative teaching methods using IAED"	Explain the importance of the EDUAIDE user manual to teachers.	Generate teaching resources and activities using EDUAIDE	Distribute the questionnaire to students	Process the data collected	Compare the two methods

Source: The author

Outcomes & Impact

Based on the documented results, the initiative has demonstrated significant measurable outcomes across multiple dimensions. Here are the key quantifiable results:

Participation and Implementation:

- Total study participation: 50 students (evenly split between control and experimental groups)
- Initial pilot testing: 20 students

Learning Outcomes and Engagement:

- Overall improvement in learning outcomes: 151% increase with AI tools
- Student preference: 98% of students preferred innovative teaching methods
- Statistical significance: p-value < 0.001 in comparing traditional vs. innovative methods
- Average performance scores: 4.0196 for innovative methods vs. 3.3878 for traditional methods

Specific Skill Development Improvements (Traditional vs. AI-Enhanced):

- Memorization capability: Increased from 8.2% to 40.8% feeling fully capable
- Understanding: Improved from 30.6% to 43% feeling capable
- Application skills: Rose from 18.4% to 38.8% feeling fully capable
- Analysis capability: Increased from 18.4% to 30.6% feeling fully capable
- Creation skills: Significant improvement from 18.4% to 44.9% feeling completely capable

Student Satisfaction:

- 98% of students acknowledged the positive impact of AI tools on their learning
- Significant reduction in students feeling incapable across all learning dimensions
- Mean difference of -0.63185 between traditional and innovative methods, with a confidence interval of [-0.87339, -0.39032], indicating statistically significant improvement

These results using bloom's taxonomy framework demonstrate substantial improvements across all measured metrics, with particularly strong gains in higher-order thinking skills like creation and analysis. The statistical significance of these improvements ($p < 0.001$) provides robust evidence for the effectiveness of the AI-enhanced teaching methods. These results were validated using IBM SPSS Statistics 25 and Microsoft Excel 365.

Links & Additional Resources

For those interested in learning more, accessing materials, or contacting contributors, here are some useful references and resources:

- EDUAIDE Platform: https://eduaide.ai
  (Access to AI-powered lesson planning and assessment tools)
- ISO 21001 Educational Organizations Management Standard:
  https://www.iso.org/standard/66266.html
  (Framework for quality management in education)
- United Nations Sustainable Development Goal 4 (Quality Education):
  https://sdgs.un.org/goals/goal4
  (Global context for inclusive and equitable education)

Case 6: The Impact of AI tools on enhancing students' conceptualization of visual storytelling in the Storyboarding course at higher education institutions

Keywords: *Storyboarding, Digital Drawing, Visual Storytelling, Artificial Intelligence*

Ola Mohamad Fahs, Bahrain Polytechnic. Kingdom of Bahrain
ola.fahs@polytechnic.bh

Ola Mohamad Fahs is a full-time Lecturer, holding 15 years of Teaching experience at the HE Level, with relevant industry expertise. Holding a master's in Corporate Branding & Design from the Lebanese University, Lebanon. An Associate Fellow (AFHEA), Advance HE, UK.

Level of initiative: Course-level
Type of Initiative: AI-enhanced Teaching & Learning Practices
Target audience: Students

Rationale & Background

The Storyboarding course is a Level 7 elective course offered during the second academic semester to second-year bachelor's degree students enrolled in the Web Media Program at the School of Creative Media at the Bahrain Polytechnic. The Storyboarding course has three must-pass assignments:

1. **Case study:** Aim to enhance students' theoretical background about the multiple types of storyboarding, such as motherboards, Thumbnail storyboards, playboards related to gaming and other mobile applications, including their key elements, visual language, Linear and non-Linear plots, exposition, rising action, climax, falling action and resolution, and other necessary key factors that govern storyboards.

2. **Script Writing:** Aim to deepen students' practical skills in formulating scripts under two script genres: Movie script and Comic Books script, and the students, later, should choose one genre to formulate their stories.

3. **Final Storyboard:** Aim to polish students' practices and skills in creating digital scenes for their movie scripts or digital panels for their comic book scripts.

The overriding teaching philosophy is based on a student-centered approach and developing learner autonomy. Integral to this is the blended learning approach, face-to-face facilitated hours (lessons, lectures, tutorials, practical activities) using Problem-Based Learning (PBL) in which the tutor promotes research and discovery of information from a variety of sources, including books, journals, videos, websites, video games, and other related sources, such as contemporary storyboarding artists work, real live-action storyboards, Manga and comic books samples and previous graduates submissions. During the repetitive course delivery in previous academic semesters, the tutor observed some skill limitations among the students in creating professional digital storyboards that conform to industry standards.

Therefore, AI was embedded in multiple class activities and the third assignment to better assist the students in gaining skills in digitally conceptualizing and representing their handmade sketches, providing them with tools related to current technology trends.

Description of the Initiative

Multiple activities that permit the students to use AI tools and help them digitally formulate their visuals in the storyboarding course were introduced. The tutor stated that students' choice of a preferred AI tool could extend to other unlisted tools that students could find more suitable or familiar with. The listed tools are: Openart.ai, Boords.com, Ai Dungeon, Ideogram, Playground, and AI Comic Factory. The students were asked to choose only one tool (or another unlisted) to complete the given activity.

Samples of these activities are as follows:

Activity One - Comic Panels:

You have a Superhero you like the most, or you have one imaginary Superhero:

    A.   In a group of 2, write a new comic story and create panels for your story (do not imitate existing stories). The script should not exceed 5 pages, conform to standard comic book script writing.

    B.   Create 10 panels for your story.

Measurements:

- Panel: 10 x 10 cm.
- Extended Overlapping panel: 14 x 10 cm
- Small Overlapping panel: 5 x 5 cm

 Refer to one of the listed AI tools to formulate your panels. You can choose any unlisted AI tool you are familiar with.

Figure 1. Activity 1 - Comic Panels

Assignment

Comic Panels

You have a Superhero you like most, or you have one imaginary Superhero:

a. In a group of 2, write a new comic story sand create panels for your story (do not imitate existing stories)

b. You must create 10 panels for your story

Measurements
Panel: 10 × 10 cm
Extended Overlapping panel: 14 × 10 cm
Small Overlapping panel: 5 × 5 cm

- Refer to one of the listed AI tools to formulate your panels. You can choose any unlisted AI tool you are familiar with

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Activity Two - Game Playboard:

Create a suitable Playboard for a game inspired by the movie IT by doing the following:

A.   Decide on the Persona's look, walk, collecting items, attack, defense, jump, run, and death visual.
B.   Create a suitable game environment with at least 4 levels, each Level has 2 visuals.
C.   Decide on the buttons' shapes (play, level, Next, Music, setting)
D.   Write the synopsis of these Levels by explaining what the player will experience in this game, the mechanics, and the gameplay.

Review the PPT for Week 10 to get informed about UX storyboarding. Refer to one of the listed AI tools to formulate your boards. You can choose any unlisted AI tool you are familiar with.

Figure 2. Activity 2 - Game Playboards

3. Activity Three – Movie Storyboard:

Write a new script, in the form of a Movie script, for the ending scenes of the Titanic movie (do not elaborate on a full new story):

A.   Twist the incidents to create a new ending direction and refer to the key elements when writing the script.
B.   Then create the storyboard for the new ending of the Titanic Movie. • Refer to one of the listed AI tools to formulate your scenes. You can choose any unlisted AI tool you are familiar with.

Moreover, the use of AI is introduced in Assignment Three, Final Storyboard, as follows: **A3 Final Storyboard**

Task: Using the Story plan developed in Assignment 2, you must digitally design a complete Storyboard.

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Instructions:

A.   Produce the final storyboard based on developing the visuals from Assignment 2, covering the entire script.
B.   Apply the styles and techniques of your chosen format (Movie or Comic Book) as outlined in Assignment 2.
C.   Refer to one of the listed AI tools to formulate your scenes. You can choose any unlisted AI tool you are familiar with.

Figure 3. Assignment 3 - Final Storyboard

BAHRAIN POLYTECHNIC بوليتكنك البحرين

Tutor: Ola Fahs 5.013
ola.fahs@polytechnic.bh

Task: A3 – Final Storyboard Worth: 35% – Must Pass
Using the Story plan developed in Assignment 2, you must digitally design a complete Storyboard.
a. Produce the final storyboard based on developing the visuals from Assignment 2, covering the entire script.
b. Apply the styles and techniques of your chosen format (Movie or Comic Book) as outlined in Assignment 2.
c. Refer to one of the listed AI tools to formulate your scenes. You can choose any unlisted AI tool you are familiar with.
Deliverables:
Due on 15th May 2025, at 11:55 P.M, Submit on Moodle as 1 PDF file. Add the cover sheet and Table of contents to avoid losing marks:
1. Your assignment should be presented as a final storyboard. There is no specific word count.
2. Plagiarism in any form, and any section will not be accepted.
Check the **Rubric** for more details on how marks are awarded.
General Assessment Submissions guidelines – First_name_Family name_ID. A1_WM/2025.

Outcomes & Impact

The newly introduced changes in the Storyboarding course activities and final assignment underwent a rigorous academic discussion between the tutor, the line manager, and the Head of School, before their release, to maintain a high level of course alignment with the learning outcomes, industry, and new technology trends. The Activities and the final assignment's new versions were revised multiple times until their final content was approved.

During the second academic semester of the current academic year, 2024-2025, the total number of registered students in the Storyboarding course is 31 students distributed in two sections. The delivery of the course is twice per week over 12 teaching weeks, extending from the period from 16th of February 2025 to 22nd of May 2025.

A total of 31 submissions of the third assignment – Final Storyboard, are divided into: 18 students submitted Movie Storyboards = 58% out of 31 students' submissions 13 students submitted comic books = 42% out of 31 students' submissions

The students' grades are divided as follows:

- 5 students received an A grade = 16% out of 31 students
- 24 students received a B grade = 77% out of 31 students
- 2 students received a C grade = 7% out of 31 students
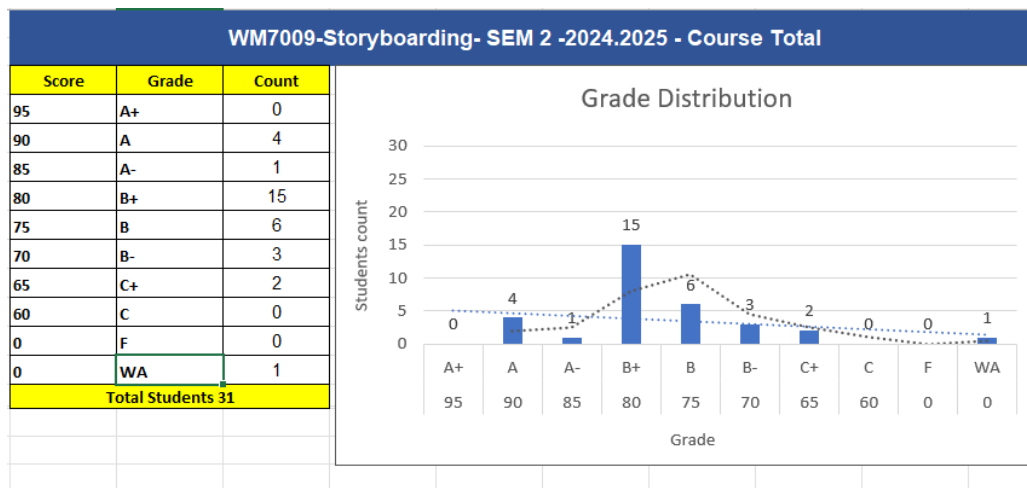- 1 Student Withdrew from the course for personal reasons

The results did not show any failing grade (F), as seen in the graph below:

Table 1

WM7009-Storyboarding- SEM 2 -2024.2025 - Course Total		
Score	Grade	Count
95	A+	0
90	A	4
85	A-	1
80	B+	15
75	B	6
70	B-	3
65	C+	2
60	C	0
0	F	0
0	WA	1
Total Students 31		

Grade Distribution chart showing students count by grade: A+ (95) = 0, A (90) = 4, A- (85) = 1, B+ (80) = 15, B (75) = 6, B- (70) = 3, C+ (65) = 2, C (60) = 0, F (0) = 0, WA (0) = 1.

These results indicate the success of the newly introduced method of using AI tools in the activities and the final assignment. During the course delivery, the students embraced the use of AI in the activities, considering it would facilitate formulating the final storyboard assignment. AI tools helped the students, who lacked digital drawing skills, achieve better results in visual storytelling related to the course. As stated in the statistics, the Storyboarding course's overall results, which are reflected in the students' submissions, were not observed in previous academic years.

Links & Additional Resources

Bahrain Polytechnic website: www.polytechnic.bh

List of AI tools links:
- Open Art Ai: https://openart.ai/create
- Boords: https://boords.com/ai-storyboard-generator
- AI Dungeon: https://aidungeon.com/
- Ideogram: https://ideogram.ai/login
- Playground: https://playground.com/
- AI Comic Factory: https://aicomicfactory.com/

Case 7: Integrating Generative Artificial Intelligence into Preschool Education: A University-Level Course for Future Educators

Keywords: *Generative AI, Early Childhood Education, Teacher Training, Higher Education, Educational Innovation*

Stamatios Papadakis, Department of Preschool Education, University of Crete. Greece
stpapadakis@uoc.gr

Stamatios Papadakis is an Assistant Professor in Educational Technology at the University of Crete, Greece, specialising in AI, computational thinking, and educational robotics for early childhood and primary education. His extensive publications cover digital pedagogy, mobile learning, and teacher training. Actively engaged in European and international research projects, he serves on editorial boards and scientific committees. Recently elected President of EU Code Week, his work focuses on integrating innovative technologies with inclusive, developmentally appropriate teaching practices.

Level of initiative: Course-level
Type of Initiative: Capacity-building courses; AI-enhanced Teaching & Learning Practices
Target audience: Students

Rationale & Background

The integration of AI in education is rapidly transforming teaching and learning practices, yet its application in early childhood education remains relatively unexplored. In response to this gap, the initiative. The course Generative Artificial Intelligence in Preschool Education was developed as an innovative elective within the Department of Preschool Education at the University of Crete. Aimed at pre-service early childhood educators, it focused on introducing students (preservice teachers) to the foundational concepts, tools, and pedagogical applications of generative AI within the context of early childhood learning.

The aim of the initiative was to enhance students' digital competence and critical understanding of emerging AI technologies, with a strong emphasis on ethical, age-appropriate, and pedagogically sound practices. The course addressed several challenges, including the lack of structured training for early childhood educators in AI use, concerns about the responsible integration of AI tools in classrooms, and the need to foster reflective, informed, and innovative teaching practices in an evolving digital society.

By embedding generative AI within a teacher education programme, this initiative promoted responsible AI use, critical engagement with algorithmic tools, and culturally responsive pedagogical strategies, encouraging students to explore creative and meaningful ways to utilise AI to support inclusive learning, storytelling, visual creation, and differentiated instruction in preschool settings.

This initiative contributes to broader efforts in Mediterranean and European HE to prepare future educators not only as users but as informed mediators of AI technologies, which continues to shape educational systems, equipping pre-service teachers with both technical understanding and pedagogical insight is essential for fostering ethical, innovative, and effective digital learning environments.

Description of the Initiative

The initiative combined theoretical foundations with hands-on engagement to cultivate digital literacy, critical thinking, and pedagogical creativity in relation to emerging AI tools.

The course was delivered over a full academic semester and structured around three interconnected pillars:
1. Foundational AI literacy,
2. Critical and ethical perspectives on AI in education, and
3. Creative applications of generative AI for preschool learning.

Students were introduced to key concepts in AI, machine learning, large language models (LLMs), and generative models (text-to-image, text-to-text, and speech synthesis) through academic readings, lectures, and multimedia content. A major focus was placed on demystifying generative AI through practical engagement, exploring a range of tools including ChatGPT, DALL·E, and other user-friendly generative platforms. They were guided to evaluate each tool's relevance, affordances, limitations, and ethical considerations—particularly regarding data privacy, bias, inclusivity, and the developmental appropriateness of content for young children.

The pedagogical approach was rooted in active and reflective learning. Students participated in collaborative projects where they designed digital educational materials for preschoolers using generative AI tools. Examples included storytelling prompts, visual narratives, educational games, and differentiated instructional resources that incorporated age-appropriate AI-generated content. Emphasis was placed on aligning outputs with early learning goals (e.g., language development, creativity, early literacy, and social-emotional learning).

The course also included AI literacy guides in the form of handouts and scaffolded assignments to support the gradual development of skills. Guest lectures and seminar discussions were integrated to provide diverse perspectives from the fields of AI, education, and child development. To assess learning outcomes, a portfolio-based assessment method was adopted. Students curated their work throughout the semester, including reflective journals, group projects, prototype learning resources, and a final pedagogical proposal. The reflective elements encouraged students to articulate their evolving understanding of responsible AI use and its implications for early childhood pedagogy.

Throughout the course, ethical and policy dimensions were interwoven with technical skills. Students engaged in discussions around UNESCO and European Commission guidelines on AI in education, focusing on equity, transparency, and digital responsibility. This not only reinforced theoretical understanding but also empowered students to become advocates for ethical digital integration in their future classrooms.

The initiative exemplified AI-enhanced teaching and learning practices in HE. It fostered a holistic approach to integrating generative AI into teacher education, ensuring that students developed both competence and confidence in utilising these tools responsibly and creatively within the unique context of preschool education.

Figure 1. Example of practice
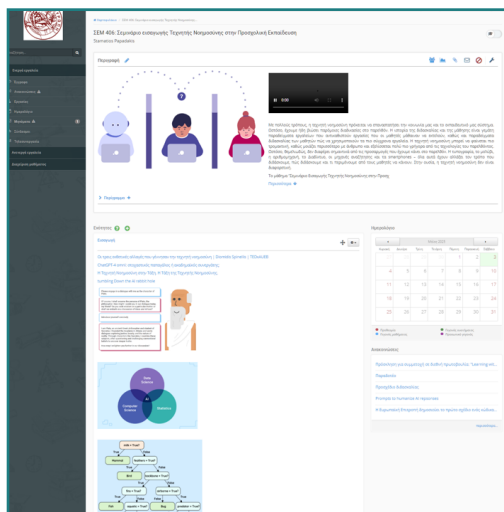
Outcomes & Impact

The course yielded significant pedagogical and institutional outcomes. Throughout the semester, the course attracted strong student interest and engagement, with consistently high participation in weekly lectures, hands-on workshops, and collaborative learning activities.

Students demonstrated clear growth in their understanding of AI concepts, particularly concerning ethical considerations, pedagogical integration, and the creative use of generative tools in early childhood education. Formative feedback revealed that the majority of participants felt better equipped to critically assess AI applications and to design age-appropriate, inclusive learning experiences.

A key outcome of the course was the completion of an original learning scenario by each student. In this final assignment, students were required to design and present a comprehensive educational activity for pre-schoolers, integrating AI tools (e.g., text-to-image generators, conversational AI) alongside traditional and digital pedagogical approaches. These scenarios emphasised not only the use of technology but also child-centered learning principles, creativity, and responsible digital engagement. Many projects involved storytelling, problem-solving, or exploration activities in which preschool children were introduced to basic AI concepts through play and interaction.

The quality of these scenarios reflected both technical competence and pedagogical maturity, with several being selected for presentation in an internal faculty seminar. This sparked broader interest in the initiative among colleagues and led to discussions about integrating similar practices across other courses.

At institutional level, the initiative contributed to curriculum development efforts aimed at enhancing digital literacy and AI awareness within teacher education. It also aligned with European and national strategic priorities promoting ethical, inclusive, and innovative uses of AI in education.

Links & Additional Resources

Course homepage on the University of Crete eClass platform (restricted access): https://eclass.edc.uoc.gr/courses/PTPEU469/

Case 8: Generative AI for Education: Current Practices and Future Directions

Keywords: *Capacity-building; AI Literacy*

Sirine Bouguettaya and Giancarlo Fortino, DIMES dept. University of Calabria. Italy
sirine.bouguettaya@dimes.unical.it, giancarlo.fortino@unical.it

Sirine Bouguettaya: She is a PhD candidate at the University of Calabria, Italy, specializing in the integration of Generative Artificial Intelligence into education. Her interdisciplinary research explores how Multi-Agent Systems and Reinforcement Learning can be combined with GenAI tools to personalize learning, predict student behaviors, and enhance teaching processes. She holds a Master's and Bachelor's degree in Computer Science from the University of Guelma, Algeria, with thesis work focused on intelligent educational platforms and the secure monitoring of learning in digital environments. Her research contributions include studies on blockchain-enhanced learning systems, adaptive educational social networks.

Giancarlo Fortino: He is Full Professor of Computer Engineering at the DIMES Dept. of the University of Calabria.His main research interests are IoT, AI and wearable computing.He is an IEEE Fellow and the only Italian highly cited researcher by Clarivate in Computer Science in 2020-2024.He authored over 750 articles in top-level venues. On GS, he has 30K citations and an h-index=85. He is the EiC of the IEEE Press Book Series on Human-Machine Systems.He is the CEO of SenSysCal Srl, a Unical spinoff on IoT systems.

Level of initiative: Institutional
Type of Initiative: AI Literacy Guides; AI-enhanced Teaching & Learning Practices
Target audience: Academics; Students

Rationale & Background

The DIMES Department at the University of Calabria has been actively engaged in mapping and evaluating Generative Artificial Intelligence (Gen AI) tools to support both students and educators in using these technologies responsibly. As Gen AI continues to reshape the educational landscape, it brings forward transformative possibilities such as personalized learning, enhanced student engagement, and automated content creation. These innovations offer exciting opportunities to enrich teaching and learning practices. However, they also introduce complex challenges, including ethical concerns, equitable access, and alignment with educational goals. In response, the DIMES Department has undertaken a comprehensive review of current Gen AI applications in education, drawing from recent academic literature to identify key trends, implementation barriers, and areas requiring further research. Their work emphasizes the importance of a balanced and thoughtful approach to Gen AI integration, ensuring that its adoption supports inclusive, ethical, and pedagogically sound practices. This initiative aims to equip stakeholders educators, students, and policymakers with the knowledge and tools needed to navigate the evolving educational environment responsibly and effectively. Through this effort, the University of Calabria contributes to shaping a future where AI enhances learning while upholding academic integrity and social responsibility.

Description of the initiative

The DIMES Department at the University of Calabria has launched a strategic initiative focused on mapping Gen AI tools to promote responsible engagement and innovation in education. Recognising the transformative impact of AI across sectors, particularly in education, this initiative aims to provide a structured understanding of how Gen AI can be effectively and ethically integrated into teaching and learning environments.

This mapping exercise explores the capabilities of Gen AI tools such as ChatGPT, Gemini, Copilot, and DeepSeek, which have demonstrated significant potential in generating human-like text, images, and code. These tools are reshaping educational practices by enabling personalized tutoring, real-time feedback, and automated content creation. However, their integration also raises critical concerns around ethics, equity, overreliance, and the potential erosion of creativity.

The DIMES Department's work is guided by three core research questions:

1. What are the current applications of Gen AI in education?
2. What challenges arise in its use and integration?
3. What are the future directions for Gen AI in educational contexts?

By synthesizing insights from recent literature and practical experimentation, the initiative provides a comprehensive overview of Gen AI's role in education. The goal is to support educators, students, and policymakers in navigating this evolving landscape with clarity and responsibility. Through this initiative, the University of Calabria contributes to shaping inclusive, innovative, and ethically grounded educational ecosystems powered by AI.

Overview

The DIMES initiative to map Gen AI tools in education, with a focus on fostering responsible engagement and innovation. This initiative is a comprehensive mapping exercise aimed at identifying, categorizing, and evaluating Gen AI applications that enhance teaching and learning while addressing ethical, pedagogical, and accessibility concerns.

Gen AI is revolutionizing education by enabling highly personalized, learner-centered experiences. These tools analyze student data to adapt content dynamically, supporting diverse learning needs and promoting inclusion. For instance, Gen AI can generate accessible materials for students with disabilities or from varied cultural backgrounds, ensuring equitable access to education.

Key areas of application include:

- **Personalised Learning:** Tools like GPTutor tailor content to individual learning styles and goals, increasing motivation and relevance.
- **Dynamic Learning Paths:** AI systems adjust instruction in real time based on student progress, enhancing comprehension and retention.
- **Educational Inclusion:** Natural language processing and multimedia synthesis help create content that is accessible across linguistic and cultural boundaries.
- **Automated Content Creation:** Gen AI generates quizzes, lesson plans, and interactive materials, streamlining instructional design.
- **Assessment Automation:** Intelligent systems provide instant feedback and grading, supporting formative assessment.
- **Interactive Tutoring:** Tools like CodeTutor simulate human tutoring, promoting independent learning.

- **Curriculum Design Support:** AI assists educators in crafting emotionally engaging and structured learning pathways.
- **Multimedia and Language Tools:** Gen AI adapts content difficulty and format to suit varied learner profiles.

Through this initiative, DIMES is equipping educators and institutions with the insights and tools needed to integrate Gen AI responsibly, ensuring that innovation in education remains inclusive, ethical, and effective.

Figure 1. GenAI Applications
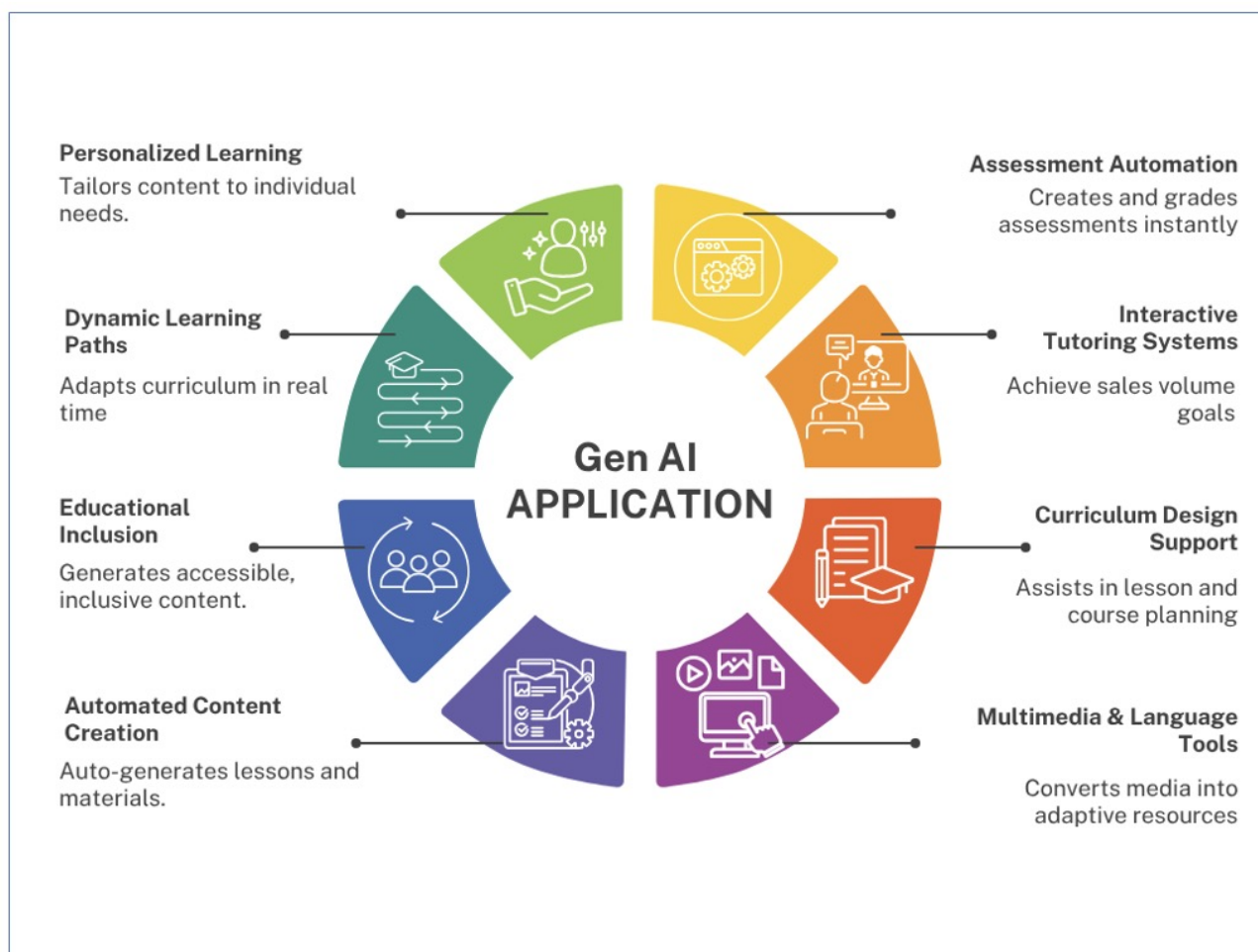
Challenges of Integrating Generative AI in Education

The integration of Gen AI in education presents transformative potential, but it also introduces a range of complex challenges that must be addressed to ensure its responsible and effective use. The DIMES Department at the University of Calabria, through its mapping initiative, has identified several key concerns that educators and institutions must navigate.

One major issue is **inaccuracy and bias.** Gen AI models can produce factually incorrect or misleading outputs known as "hallucinations" due to biases in their training data. These inaccuracies can misinform learners, especially those without subject-matter expertise, and may include fabricated references or statistics, undermining academic integrity.

Ethical and academic integrity risks are also prominent. Students may misuse Gen AI tools to complete assignments without proper attribution, raising concerns about plagiarism and the erosion of critical thinking and creativity.

Another limitation is the **lack of emotional intelligence**. While Gen AI can simulate human-like language, it lacks empathy and contextual awareness, making it less effective in roles that require emotional sensitivity, such as mentoring or culturally responsive teaching.
Privacy and data security pose additional risks. Gen AI systems often rely on large datasets, which may include sensitive personal information. This raises concerns about data protection, surveillance, and unauthorized use of students' intellectual work.

Finally, **overreliance on AI** can hinder the development of essential skills. As students increasingly depend on AI for tasks like writing or coding, there is a risk of diminishing their capacity for independent thought, problem-solving, and lifelong learning.

Future Directions for Gen AI in Education

The future of Gen AI in education is poised to evolve from experimental use to becoming an integral part of teaching and learning. The DIMES Department at the University of Calabria identifies several key directions that will shape this transformation, emphasizing responsible, ethical, and pedagogically sound integration.

- One major advancement will be the development of **personalized, controllable, and interpretable AI tutors**. These systems will allow learners and educators to guide AI outputs based on learning goals, complexity, and style, offering tailored feedback and adaptive learning pathways.
- **Ethical and regulatory frameworks** will be essential to address concerns around bias, privacy, and fairness. Future research must focus on AI literacy, algorithmic transparency, and interdisciplinary safeguards to ensure responsible use.
- **Teacher professional development** will also be critical. Gen AI can support educators in content creation and performance analysis, but training is needed to help them integrate these tools effectively and ethically.
- The shift toward **human–AI collaboration** will redefine AI as a co-creative partner rather than a mere automation tool. This will require intuitive interfaces and hybrid learning environments that foster critical thinking and problem-solving.
- To ensure effectiveness, **methodological foundations** must be strengthened. Rigorous evaluation frameworks, global standards, and testing environments will support scalable

and responsible implementation.
- **Interdisciplinary collaboration** among educators, AI developers, and policymakers will be key to designing practical, inclusive, and scalable solutions.
- Finally, **security and robustness** must be prioritized to prevent misuse, especially in high-stakes areas like assessments and admissions.

Also, we highlight critical technical and ethical concerns including bias, model robustness, data security, and the lack of standardised methodologies. Ultimately, the integration of Gen AI presents a promising opportunity to reshape education into a more inclusive, personalized, and emotionally responsive learning ecosystem.

Case 9: Fostering Inclusive AI in Mediterranean Higher Education: A Case Study on Chatbot-Mediated EFL Instruction

Keywords: *Artificial Intelligence; Universal Design for Learning; Accessibility; Inclusive Education; English as a Foreign Language*

Francesca Raffi and Laura Fedeli, University of Macerata. Italy
f.raffi@unimc.it, laura.fedeli@unimc.it

Laura Fedeli is a full professor in Didactics and Special Pedagogy at the University of Macerata, Italy. She holds an MSc in Instructional Technology and Distance Education (USA) and a PhD in E-Learning, Knowledge Management, and Psychology of Communication. Her research focuses on Universal Design for Learning, teacher training, instructional design, and educational technology with an emphasis on inclusive practices. Key publications include analyses of ICT in special needs teacher training and teachers' perceptions of technology for inclusion.

Francesca Raffi is Associate Professor of English Translation at the University of Macerata and Honorary Fellow at the University of Liverpool. Co-director of the international Master's course in Accessibility to Media, Arts and Culture (AMAC), her research covers re(translation), linguistic and sensorial accessibility, and reception studies. Actively involved in accessibility projects, she coordinates the national UNITE project at Macerata, exploring chatbot-based systems for inclusive EFL teaching through the Universal Design for Learning framework to improve accessibility and learning outcomes.

Level of initiative: Institutional; Faculty; Department; Course-level
Type of Initiative: Capacity-building courses; Policy Implementation; AI Literacy Guides; Assessment
Methods; Conferences/Seminars/Workshops; AI-enhanced Teaching & Learning Practices
Target audience: Students; Academics; Institutional leaders

Rationale & Background

This initiative explores the pedagogical potential of AI-powered chatbots in university-level English as a Foreign Language (EFL) instruction, through the lens of the Universal Design for Learning (UDL) framework. It arises in response to the increasing demand for inclusive, adaptable, and accessible educational environments in HE, particularly for students with disabilities, specific learning disorders, and other forms of neurodiversity (ANVUR & CNUDD, 2020). As AI tools such as chatbots gain popularity in academic settings, there is a pressing need to assess their alignment with inclusive teaching principles and their capacity to support diverse learners.

The initiative is part of the Italian national research project UNITE, which promotes digital and inclusive innovation in education through the integration of emerging technologies. Specifically, the study investigates how AI-based dialogue systems can be designed and evaluated in accordance with UDL principles—offering multiple means of engagement, representation, and action/expression—to meet the varied needs of EFL learners.

A key output of the project is the development of the Chatbot Accessibility Guidelines, designed to

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assess the inclusiveness of AI-driven chatbots used in language learning. These guidelines respond to concerns regarding usability, accessibility, emotional engagement, and potential cognitive overload or bias in chatbot interactions. Drawing from established research in chatbot design (Johari & Nohuddin, 2021; Borsci et al., 2022; Silva & Canedo, 2022) and digital accessibility (Stanley et al., 2022), they provide educators and instructional designers with actionable criteria for evaluating AI tools.

In the broader Mediterranean and European context of responsible AI adoption, this initiative contributes to the ethical integration of educational technologies. It emphasises equity, learner diversity, and pedagogical integrity, ensuring that technological innovation in HE fosters—not hinders—access and inclusion.

Description of the Initiative

The initiative focuses on the pedagogical and inclusive potential of AI-powered chatbots in university-level EFL instruction, aiming to align their design and implementation with UDL principles. At the heart of the initiative is the development of the Chatbot Accessibility Guidelines, a structured tool grounded in UDL that offers evaluative criteria for the inclusive use of AI-based chatbots. These guidelines are designed to assess the extent to which chatbots support diverse learner profiles, particularly in relation to engagement, clarity of interaction, adaptability, cognitive accessibility, and user control. Each descriptor maps onto the three pillars of the UDL framework - multiple means of engagement, representation, and action and expression - ensuring a comprehensive and learner-centered evaluation model.

The development of the guidelines was informed by an applied study involving university students enrolled in EFL courses. Participants interacted with two conversational agents—ChatGPT 3.5 and Pi.AI—through task-based language learning activities. After these sessions, students completed a post-task questionnaire assessing perceived levels of cognitive load, emotional engagement, accessibility, and potential discomfort or bias during the interaction. These findings provided qualitative and quantitative insights into the affordances and limitations of chatbot-mediated language learning, which were directly integrated into the guideline refinement process.

To ensure theoretical rigor and practical applicability, the guidelines were further validated through consultation with CAST (Center for Applied Special Technology), the organisation responsible for developing and disseminating the UDL framework internationally. This collaboration ensured alignment with current accessibility standards and educational best practices. Beyond the research dimension, the initiative includes a strong capacity-building component. Internal training sessions and targeted workshops were organised for faculty, instructional designers, and teaching assistants. These activities aimed to enhance AI literacy, promote awareness of ethical and inclusive practices in the use of AI, and foster critical reflection on how emerging technologies can reshape language teaching and learning. Also, the initiative produced a set of AI Literacy Guides tailored to foreign language educators, providing practical strategies for integrating AI tools like chatbots into course design, emphasising accessibility, learner autonomy, and pedagogical alignment. The guides are designed to be scalable and adaptable across different institutional contexts and languages.

Finally, the project contributes to institutional policy dialogue by offering recommendations and dissemination materials to inform department- and faculty-level strategies on inclusive digital innovation. These outputs aim to inspire further initiatives and cross-disciplinary collaborations on responsible AI use in education.

Taken together, the initiative not only advances research on inclusive chatbot design but also fosters institutional change through training, policy support, and the co-construction of knowledge between researchers, educators, and students.

Table 1: Chatbot Accessibility Guidelines – Key UDL-Based Criteria

Principle	Example Guideline	Priority
Multiple Means of Engagement	*Encourages active participation.*	*2*
Multiple Means of Engagement	*Allows flexible instructional content aligned with student needs.*	*2*
Multiple Means of Engagement	*Provides action-oriented feedback with relevant examples.*	*3*
Multiple Means of Engagement	*Adapts outputs to learner skills and objectives.*	*4*
Multiple Means of Engagement	*Helps learners develop internal coping strategies.*	*4*
Multiple Means of Representation	*Presents content in multiple formats (text, audio, etc.).*	*5*
Multiple Means of Representation	*Supports linguistic and cultural diversity.*	*4*
Multiple Means of Representation	*Ensures clarity and accessibility of chatbot language.*	*4*
Multiple Means of Representation	*Includes multimodal inputs to enhance understanding.*	*3*
Multiple Means of Action & Expression	*Allows students to respond using different formats (text, audio, etc.).*	*4*
Multiple Means of Action & Expression	*Supports alternative ways to complete tasks.*	*3*
Multiple Means of Action & Expression	*Provides scaffolding for task completion.*	*3*
Multiple Means of Action & Expression	*Includes tools for tracking progress and self-reflection.*	*3*

Table1 summarises the key principles of the chatbot accessibility checklist developed within the UNITE project. The checklist is grounded in the UDL framework and is organised around its three core pillars: Multiple Means of Engagement, Representation, and Action & Expression. Each guideline reflects how AI-powered chatbots can be evaluated and designed to support inclusive, accessible, and personalised learning experiences for EFL students. The priority score (1–5) indicates the relative impact of each criterion on accessibility, as assessed by the project team and validated in collaboration with CAST (Center for Applied Special Technology, USA).

Outcomes & Impact

The ongoing initiative has already yielded significant preliminary results, laying the groundwork for future institutional adoption and wider educational impact.

At its core is a quasi-experimental study involving 326 Italian university students (aged 19–25) enrolled in EFL courses. Participants varied in proficiency (beginner to advanced) and included students with disabilities and learning disorders, ensuring a diverse and representative sample. Each completed three interactive tasks—small talk, open-topic conversation, and role play—using ChatGPT 3.5 and Pi.AI. Afterward, they filled out a questionnaire on emotional engagement, clarity, cognitive load, and inclusiveness. The responses directly informed the development of the Chatbot Accessibility Guidelines, aligning learner feedback with evaluative criteria.

Although still under refinement, early feedback on the guidelines suggests their potential for assessing chatbot inclusivity. Plans are in place to pilot them in two more departments next year, in collaboration with university inclusion and innovation offices.

Concurrently, the initiative includes training workshops for instructors, teaching assistants, and instructional designers. These will explore both the pedagogical opportunities and ethical issues tied to AI integration in EFL teaching. Themes include Universal Design for Learning (UDL), accessible AI tool evaluation, chatbot-based task design, and strategies to prevent algorithmic bias. Participants will reflect on their practices and co-create inclusive, AI-supported learning scenarios. Beyond training, these workshops will serve as communities of practice, promoting dialogue on responsible tech use and fostering inclusive innovation across departments.

A potential institutional outcome is the use of the guidelines by Disability Services to train tutors in supporting students' use of AI for study, review, and exams. The initiative thus aims to influence both research and policy, ensuring equitable, responsible implementation of AI in HE.

Links & Additional Resources

PRIN UNITE Project https://site.unibo.it/unite/en

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Case 10: SIR – An AI-Driven Registrar Transforming Student Services at LIMU

Keywords: *AI in education, student services, digital enrolment, administrative automation, Mediterranean universities*

Khaled Almnify, and Hesham M. Alesawy, Libyan International Medical University. Libya
khaled_alminfy@limu.edu.ly

Khaled Almnify E-learning Coordinator and Head of AI Integration in the Law Program at LIMU, responsible for embedding AI technologies into both academic and administrative processes. Specialised in leveraging responsible AI to enhance digital transformation in HE.
Hesham M Alesawy Deputy Registrar for Academic Process Engineering and Digital Transformation.

Level of initiative: Institutional
Type of Initiative: Policy Implementation; Conferences/Seminars/Workshops; AI-enhanced Teaching & Learning Practices; AI-enhanced Administrative Services
Target audience: Students; Academics; Administrators

Rationale & Background

Libyan International Medical University (LIMU), a distinguished private institution in Libya, has consistently demonstrated a commitment to educational excellence across its diverse programs. This dedication extends to providing cutting-edge student support services, encompassing critical areas such as admissions, enrolment, registration, and engagement in social and cultural activities. However, LIMU's registrar's office has historically faced challenges in managing the recurring demands of student registration cycles.

Manual processes placed significant strain on administrative staff, often requiring extended registration periods. These inefficiencies led to long processing times, increased data entry errors, and heavy administrative burdens. Students experienced long queues, delayed interview scheduling, and inconsistent communication, while those with special needs—such as visual impairments—faced additional barriers to accessing registration services equitably.

Acknowledging the imperative for a more streamlined, inclusive, and scalable solution to address these persistent challenges, the registrar's office at LIMU proactively sought innovative approaches, leading to the development and implementation of SIR (Student Information and Registration), an AI-powered registration assistant, to automate a multitude of repetitive administrative tasks, significantly enhancing the responsiveness of student services and improving the accuracy of critical student data. The implementation of this intelligent system was specifically aimed at mitigating problems, offering tangible benefits to both the university staff and the student body by fostering a more efficient, user-friendly, and accessible registration experience.

Description of the Initiative

The SIR is an AI-powered system developed by LIMU to automate and streamline the student

admission and registration process. SIR represents a strategic leap toward smart digital transformation, replacing traditional manual procedures with a scalable, responsive, and inclusive system that serves both students and administrative staff.

Key Components and Activities

SIR functions as an autonomous AI agent capable of executing core registration procedures with minimal human oversight. The system integrates Natural Language Processing (NLP), Optical Character Recognition (OCR), decision-rule engines, and API-based interoperability to deliver a seamless user experience.

Upon accessing the system, students are welcomed with an interactive prompt—"How can I help you?"—that launches the registration journey. Once a student selects their preferred academic program, SIR presents the admission criteria and full tuition breakdown. Students then submit personal information and upload required documents, which are automatically verified using OCR and rule-based checks.

Once verified, student data is stored securely, and the system schedules an interview within 4–5 minutes. Interview notifications are dispatched via SMS, WhatsApp, and email. The system then generates a structured report for review by the admissions committee. If the application is accepted, SIR sends the decision and automatically suggests alternative programs in case of rejection. Upon admission, SIR issues a student ID, generates the course schedule based on academic calendars and faculty availability, and informs relevant departments.

Resources and Tools Used

SIR leverages open-source AI models and university-hosted infrastructure to ensure data privacy and cost-effective scalability. It integrates with the university's existing information systems and communication APIs. The system also includes accessibility features like text-to-speech and speech-to-text to accommodate visually impaired users.

Strategies and Implementation

The implementation strategy was phased, starting with a pilot in the Faculty of Law. Continuous monitoring, feedback loops, and performance analytics guided iterative improvements. Key design principles included multilingual support (Arabic, English, French), policy alignment with GDPR, and AI ethics (human-in-the-loop oversight for borderline decisions).

Notable Innovations

- Multitasking AI: SIR handles inquiries, registration, scheduling, and document processing in parallel.
- Smart Scheduling: Automatically books interviews and sends reminders.
- Academic Schedule Integration: Sends class and exam reminders, reducing absenteeism.
- Alternative Pathways: Recommends programs when initial admission fails.
- Accessibility by Design: Empowers inclusive engagement through voice interaction.

SIR has proven to be a transformative force in LIMU's digital strategy, reducing registration time to under five minutes per student, enhancing data accuracy, and increasing students. LIMU maintains active cooperation agreements with Misurata University and additional partner institutions in Italy, Turkey, and Egypt. These partnerships form a solid basis for exploring future integration of the SIR system, thereby strengthening digital cooperation and the exchange of expertise in responsible AI across Mediterranean HE institutions.

Figure 1. SIR interface
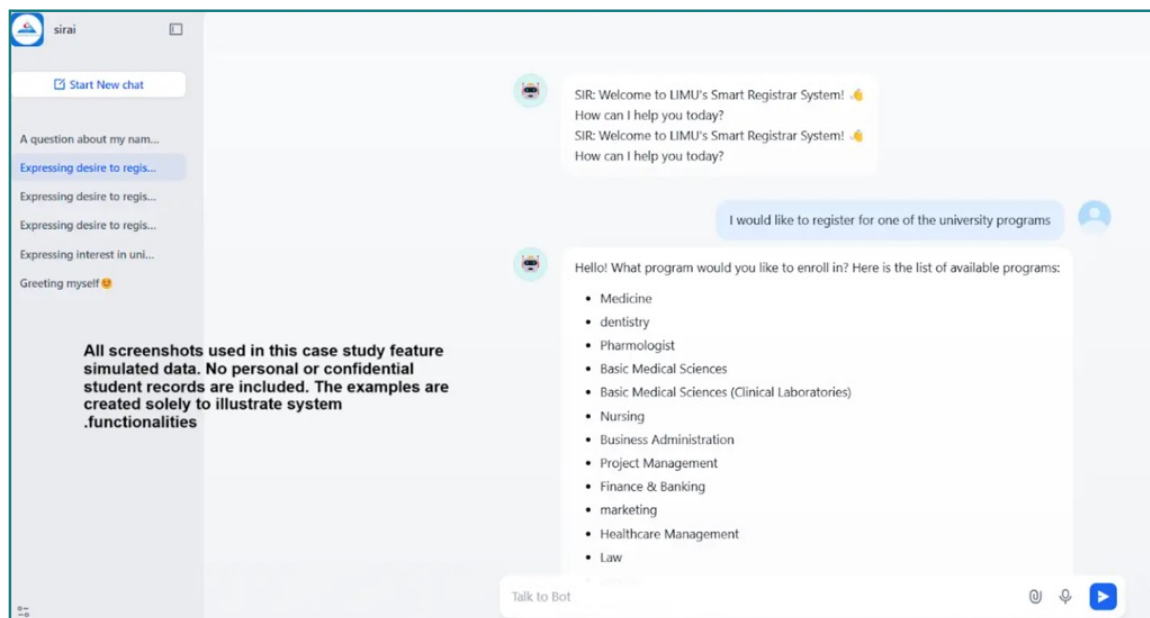
Responsible AI & Ethics

SIR adheres to the EU GDPR and UNESCO's Recommendation on the Ethics of AI. All personal data are encrypted at rest (AES-256) and in transit (TLS 1.3), with retention limited to the statutory five-year academic archive [Data-Protection Policy v2.3, Jan 2025]. Transparency is ensured through an explainability dashboard that records every rule-engine decision and salient LLM tokens for audit. Fairness is monitored via quarterly bias reports comparing admission outcomes across gender, region, and disability status; the most recent audit showed parity within ±1.8 % [Equity Audit, Mar 2025]. A standing AI Oversight Committee (registrar, legal counsel, student representative) reviews borderline cases and can override automated rejections, guaranteeing a human appeal path. Accessibility guidelines (WCAG 2.1 AA) steer interface updates, aligning technological advancement with inclusive, responsible practice.

Outcomes & Impact

The deployment of the SIR system at LIMU has yielded substantial and measurable results in terms of operational efficiency, student engagement, and institutional readiness for digital transformation. One of the most notable achievements was the drastic reduction in registration processing time— to under five minutes per student—demonstrated during system-wide testing phases. This outcome significantly reduced administrative burden and improved service delivery speed and accuracy.

In the Law Program specifically, SIR was not used for registering new students but played a vital role in supporting current students through intelligent academic guidance. Between July and December 2024, the system handled over 1,200 student inquiries, averaging more than 200 interactions per month. These inquiries primarily addressed lecture schedules, examination dates, and academic requirements. By automating these interactions, SIR reduced students' dependency on email communication and wait times, while enhancing the consistency and clarity of responses. Student feedback reflected high levels of satisfaction: a post-semester survey revealed a 92% approval rate, with an average response rating of 4.7 out of 5. Students appreciated the system's fast replies,

accuracy, and availability at any time.

In addition, absenteeism among Law Program students decreased by 30%, attributed to SIR's automated reminders for lectures and exams delivered via WhatsApp and email. Institutionally, the system promoted inclusive access through voice-based interaction features and ensured alignment with GDPR-compliant data practices. These impacts affirm SIR's potential as a scalable, responsible AI solution—not only for LIMU's university-wide adoption but also as a model adaptable across Mediterranean HE institutions aiming to modernise student service delivery.

Lessons learned and scalability

During the trial period in the College of Law, three key lessons were learned.

1. Adopting users requires continuous training preparation. Although the chat interface seemed intuitive, session analytics showed that 12% of students made a mistake in uploading documents due to file format; "One minute explainer video" workshops and built-in help links solved the problem and reduced errors to 3% (Support logs, November 2024).
2. Data quality is the basis of smooth operation. It turned out that 18% of the triple name fields in Arabic did not match the passport, disrupting automatic verification. Added a normalisation algorithm for names and an internal alert list with which the conflict rate was reduced to 4% (Verification Report, December 2024).
3. Integration with existing systems is just as important as the accuracy of algorithms. SIR initially encountered a difference in date formats between the acceptance database and the table system (DD/MM/YYYY vs. ISO-8601), so a centralised format converter was adopted before the second phase was launched.

In terms of scalability, SIR is built according to Containerable stratigraphic architecture Each layer (conversation, OCR, scheduling) is published as a standalone service and adjusted to a variable instance count by college. This design allows the addition of new faculties once the program definition and integration points are provided, without redeploying the entire system.

Links & Additional Resources

Registrar's Page https://limu.edu.ly/registrar

Case 11: AI and the Ethics of Knowledge Production: A Mediterranean Perspective

Keywords: *Responsible AI, Epistemic Justice, Higher Education, Mediterranean Cooperation, AI Ethics*

Aicha Adoui, Mohammed V University - Rabat. Morocco
aichaadoui@gmail.com

Aicha Adoui is a researcher specialising in internationalisation and international education, focusing on the intersection of soft power diplomacy and higher education. With a background in education and communication studies, she offers an interdisciplinary approach. An experienced trainer and education practitioner, she applies her research practically. Her expertise spans intercultural, business, and oral communication. Her research interests include internationalisation, education, technology and intelligent systems, intercultural communication, and international relations, aiming to bridge academia and practice.

Level of initiative: Individual initiatives and faculty efforts
Type of Initiative: Capacity-building courses; Conferences/Seminars/Workshops; AI-enhanced Teaching & Learning Practices
Target audience: Students; Academics; Institutional leaders

Rationale & Background

This case proposes a Mediterranean model for responsible AI integration in HE, grounded in ethical awareness, regional collaboration, and epistemic justice. Across the Mediterranean, AI is reshaping research and teaching, but its adoption raises pressing questions around ethics, equity, and digital sovereignty. Focusing on Mohammed V University (Morocco) and Politecnico di Milano (Italy), this case critically examines the use of AI tools- including large language models, plagiarism detection software, and data-mining platforms- in knowledge production and circulation.

These technologies, while offering efficiency and scale, operate within politically sensitive and unevenly resourced environments, where their implementation may reinforce existing power asymmetries. Our analysis explores how AI literacy and ethical practices are embedded in faculty development, student engagement, research supervision, and institutional policies. It highlights how the dominance of AI systems developed outside the region shapes not only access but also epistemic agency, curricular autonomy, and educational priorities. By bridging experiences from North and South Mediterranean institutions, this case advocates for a locally grounded, ethically conscious approach to AI in academia- one anchored in inclusivity, transparency, and cross-border solidarity. It argues for a reimagined digital future that empowers Mediterranean institutions as co-creators of knowledge, not passive adopters of external technologies.

Description of the Initiative

At Mohammed V University (UM5) in Rabat, Morocco, there's a growing trend of fostering AI skills and ethics among faculty and students. Accordingly, UM5 helps researchers and educators critically use tools such as Turnitin, ChatGPT, or ResearchRabbit. Indeed, they enhance scholarly productivity; however, they raise ethical concerns where the resources regarding the integration of AI and research

ethics are somewhat limited. This paper encourages discussion on the impact of AI-generated content and bias in plagiarism detection tools on Arabic scholarly work when those tools were developed primarily for systems in the English language. The paper describes how to develop an ethical mindset for AI based on local cultural values and includes aspects of epistemic justice.

The data collection method relied on Survey Data (UM5 – Mohammed V University). The target population was 150 students from the Faculty of Law and Economics, split into three major branches: Public Law in Arabic, Public Law in French, and Private Law in French. I have also conducted interviews with 6 faculty members. The sampling technique relied on convenience sampling (both survey and interviews), where students were handed the survey at the end of one of their classes in order to fill, this ensured more students were engaged in actively responding and were given a chance to engage directly in terms of the questions in the survey. The data collection tool was a structured questionnaire consisting of closed-ended and open questions designed to assess:

- Familiarity with AI tools
- Frequency of AI tool usage in academic settings
- Perceptions of AI tools' benefits and ethical concerns
- Awareness of local perspectives in AI systems
- Attitudes toward data ownership and consent in AI-based research
- Method of Distribution: The survey was distributed during the last class of the semester, with all 150 students responding to the questionnaire.
- Analysis: The responses were quantitatively analyzed using descriptive statistics to identify trends in student attitudes and usage patterns, followed by thematic analysis for qualitative insights from open-ended questions.

The data collected at Politecnico di Milano, Italy relied on Website Analysis. Data related to AI-related ethics courses, programs, or initiatives offered at the Politecnico di Milano in Italy, specifically focusing on AI ethics training or courses available through Polimi Open Knowledge (POK). Data was collected by reviewing publicly available resources on POK portal, which offers MOOCs related to AI ethics. The focus was on:

- Course outlines and curricula that discuss AI ethics, fairness, and governance.
- Ethical frameworks covered in AI-related courses, such as governance and policy issues, privacy, and accountability.
- The inclusion of case studies on AI application in digital medicine, sustainability, and cybersecurity.

Outcomes & Impact

Students from UM5 have responded very favorably; particularly in the context of Arabic-language research. Students at UM5 have indicated a greater awareness of how AI tools may unintentionally reinforce biases or exclude particular knowledge systems. The ethical integration of AI into the local educational system without sacrificing indigenous knowledge or viewpoints has drawn more attention. The AI ethics workshops in the region, which are now a crucial part of staff and student training on research ethics, have also received praise from the faculty members interviewed. The scope of these important conversations has expanded beyond AI-focused programs as some faculty members have started incorporating talks about AI ethics into their own courses.

The ethical initiatives implemented by Polimi and UM5 have resulted in notable modifications to

their curricula and policies. At UM5, the discussions on a new policy project that makes ethical AI a must for each research program, especially the ones that deal with AI tools, was developed as an outcome on training over AI technologies use (mainly post-Blockchain training). The policy project would ensure that UM5 research conforms to global best practices of ethical AI use by providing a framework for data security and epistemic justice, besides informed consent. UM5 has also started to reshape its graduate curriculum with AI literacy. This is so that students in various fields get not just a technical competence for AI, but ethical capacities that go hand in hand with these in a global South context.

Students are aware of the bigger picture of AI in education through their concern for bias, fairness and privacy. Yet, knowing about AI ethical issues, there is a problem with the lack of instruction on this matter. They want to have the local perspective on AI tools, which means they believeAI is, to some extent, still not ready for the context (in terms of language, culture, and epistemology). Instead, a more inclusive process should be held to create AI tools taking into account the peculiarities of students in the MENA, Mediterranean, and Global South. Finally, the fact that the majority of students are worried about gaining more control over their data underlines the need for definite rules regarding data and consent in the context of education so that privacy is respected. Schools and universities should think about how to make these tools available to their students, who are willing to learn more about their implications, but who also need to use them responsibly.

Table 1: Recommendations

Recommendation	Description
1. Increase Exposure to AI Tools	Integrate tools like ChatGPT, Turnitin, and Scite into more courses and provide practical training sessions.
2. Integrate AI Ethics into the Curriculum	Formalize instruction on ethical use of AI, addressing issues like bias, fairness, and privacy.
3. Include Local Knowledge and Context	Ensure AI tools reflect local and regional perspectives, particularly within the MENA context.
4. Address Data Ownership and Consent	Establish clear policies on data use, ensuring student awareness and control over their personal data.

A multidimensional strategy for the responsible AI integration in HE is captured in the recommendations in Table 1. Universities can bridge the gap between student curiosity and experience by exposing them to a vast array of AI tools through practical and useful applications. including ethics in the curriculum ensures that students will be critical thinkers who can understand the repercussions of these technologies, not just users. Additionally, making AI tools applicable in view of indigenous knowledge can help achieve epistemic justice and promote relevance, especially in the MENA region. Lastly, in order to encourage trust and protect the digital rights of students, it is necessary to have clear policies regarding consent and data labeling. When implemented simultaneously, these strategies can help to create a student body that is skilled, competent, and ethical in the era of intelligent machines.

Links & Additional Resources

- UM5 Main Website: https://www.um5.ac.ma/um5/
- Polimi Open Knowledge (POK) AI Ethics MOOC: https://www.pok.polimi.it

Case 12: Leveraging Artificial Intelligence to Enhance Cooperation and Practical Learning in Mediterranean Higher Education

Keywords: *Artificial Intelligence, Mediterranean, Higher Education*

Saed Khayat, Soheil Salha and Allam Mousa, An-Najah National University. Palestine
saed.khayyat@najah.edu, ssalha@najah.edu, allam@najah.edu

Saed Khayat has extensive experience in education and digital transformation projects. He specializes in water quality, water reuse in irrigation, and advanced soilless culture technologies, focusing on precision irrigation. He led the WaSec project (598480-EPP-1-2018-1-PS-EPPKA2-CBHE-JP) and excels in innovation tools and pedagogical methods, particularly in higher education reform. Beginning his career as TVET manager at the Palestinian Ministry of Higher Education, he contributed significantly to TVET sector reform and strategy development in Palestinian HEIs..

Soheil Salha is an Associate Professor of Curriculum and Instruction specializing in Educational Technology. His research covers mathematics teaching and learning, curriculum development, teacher education, online learning, AIED, early childhood education, Item Response Theory, and STEM. He teaches PhD, MA, and BA courses in Mathematics and Technology Education, research, statistics, and assessment. Experienced in instructional design, active learning, e-portfolios, and authentic assessment, he has contributed to EU projects on practicum, professional development, TVET, AI, and action research.

Allam Mousa is a researcher and academic with over 28 years of experience in Electrical and Electronics Engineering. Holding B.Sc., M.Sc., and Ph.D. degrees, his expertise spans radio frequency, wired and wireless communications, signal processing, and encryption. He is also skilled in quality assurance in higher education and institutional planning. Currently, he focuses on applying immersive technology in training and education, with several related publications.

Level of initiative: Institutional
Type of Initiative: Policy Implementation; AI-enhanced Teaching & Learning Practices
Target audience: Students; Academics; Institutional leaders

Rationale & Background

The Mediterranean region—connecting Europe, North Africa, and the Middle East—hosts a rich and diverse network of HE institutions (Colombo et al., 2021). Yet, despite shared cultural and economic ties, regional cooperation in HE remains fragmented, often hindered by political, logistical, and linguistic barriers (Castañer, & Oliveira, 2020). UNIMED (2021) pointed to countries such as Italy, Spain, Tunisia, Jordan, and Palestine facing similar challenges: growing graduate unemployment, outdated curricula, and limited access to practical, cross-border learning experiences.

Need for Regional Cooperation

The European Union and neighboring countries have launched several initiatives to foster HE cooperation in the region (e.g., Erasmus+, ENI CBC MED, and Union for the Mediterranean). However, these efforts often struggle to scale or sustain due to administrative complexity, lack of mutual

recognition, and insufficient digital integration. In this context, the need for more agile and intelligent tools to support collaboration, credit transfer, and practice-based learning has become urgent.

Description of the Initiative

As Mediterranean HE institutions face mounting pressures from youth unemployment, skill mismatches, and regional disparities, the potential of AI to transform cross-border cooperation and educational outcomes becomes increasingly clear. This case examines how AI can serve as a catalyst for inter-university collaboration, curriculum alignment, and real-world practice integration in the Mediterranean region—spanning Southern Europe, North Africa, and the Levant, from qualitative and comparative lens supported by real-world examples, stakeholder inputs, and secondary data from institutions across Southern Europe, North Africa, and the Levant, to collect different kinds of data and deliver different kinds of answers and responses.

AI technologies enable new models of inter-university collaboration that go beyond traditional mobility or paper-based partnerships, through mechanisms through which AI facilitates practical cooperation among Mediterranean HE institutions. Through case studies, stakeholder interviews, and evidence-based recommendations, the study highlights AI's role in creating multilingual learning environments, streamlining credit recognition, optimising academic mobility, and aligning educational pathways with labour market needs.

The findings suggest that a regional strategy anchored in AI-supported cooperation can not only improve quality and accessibility in HE but also strengthen the region's social cohesion and economic resilience.

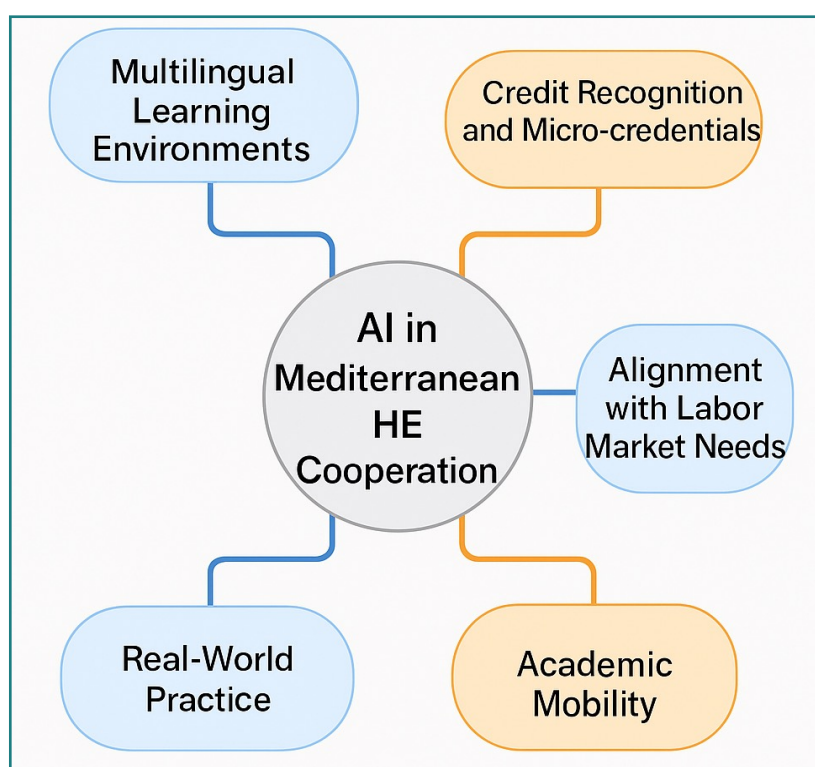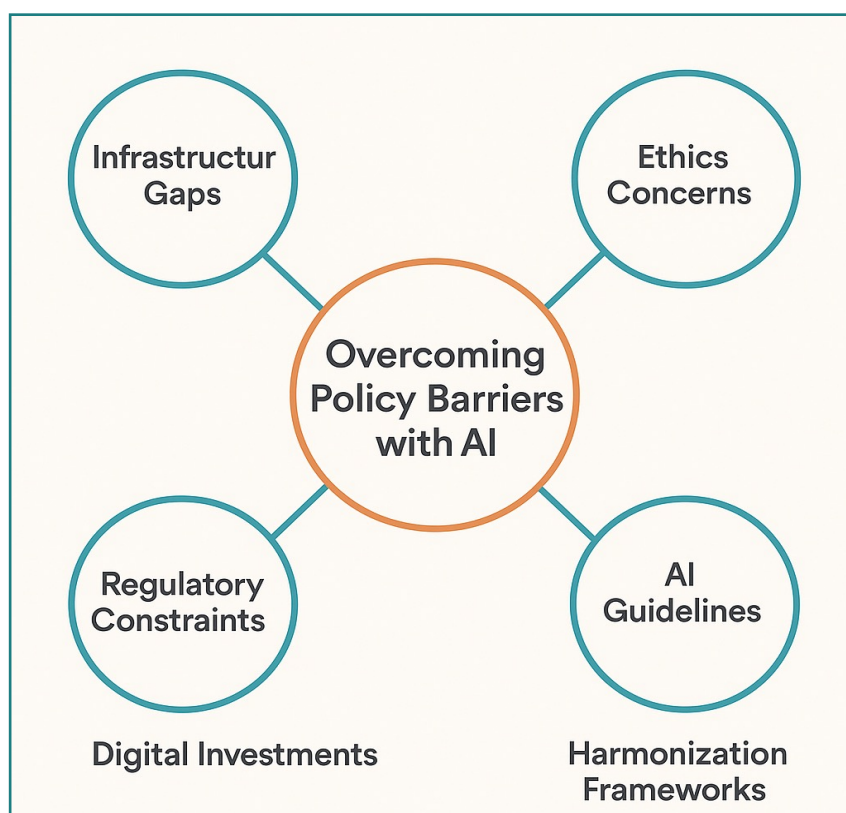*Figure 1: Conceptual Model – AI in Mediterranean HE Cooperation*

Figure 2. Overcoming Policy Barriers with AI

Outcomes & Impact

To capitalise on the potential of AI for enhancing cooperation and real-world learning in Mediterranean HE, a coordinated and inclusive policy framework is needed. Below are strategic recommendations for institutions, governments, and regional networks.

Establish a Mediterranean AI Cooperation Framework

- Develop a regional AI education charter under the Union for the Mediterranean or Erasmus+ South Mediterranean window.
- Include common ethical standards, data-sharing agreements, and open technology licenses to encourage institutional adoption while maintaining trust.

Promote Interoperable Micro-Credentialing Systems

- Support the development of AI-powered regional platforms for micro-credentials that align with national qualification frameworks.
- Encourage bilateral or multilateral pilot projects between universities to recognise AI-verified learning achievements across borders.

Incentivise Joint Industry-Academia Curricula

- Provide funding and matchmaking for AI-enabled curriculum co-design involving universities, SMEs, and startups across the region.
- Establish AI-backed vocational hubs within universities to test and refine real-world learning modules in sectors such as agri-tech, energy, and digital health.

Build Digital Infrastructure and Faculty Capacity

- Invest in shared infrastructure for AI in education, such as regional cloud computing, language processing tools, and open data repositories.
- Support training and certification for academic staff in the use of AI tools for virtual mobility, adaptive learning, and skills assessment.

Facilitate Inclusive Virtual Mobility

- Adopt AI-assisted platforms that allow students and staff from politically or economically constrained areas to participate in regional initiatives.
- Recognise virtual internships and online collaborative projects as credit-bearing components within degree programs.

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Case 13: A Holistic Approach to Responsible AI Use in Higher Education – The GAIDL Framework

Keywords: *Generative AI, Digital Learning, Higher Education, Capacity Building, Ethics*

Mohammad AL-Smadi and Wissam Tawileh, Qatar University. Qatar
malsmadi@qu.edu.qa, wtawileh@qu.edu.qa

Mohammad AL-Smadi is an Associate Professor of Computer Science with a Master's from the University of Jordan and a Ph.D. from Graz University of Technology. He served at Jordan University of Science and Technology as Assistant Dean and founding director of the Center for E-Learning. Since 2022, he leads Qatar University's Office for Digital Learning and Online Education. He has over 70 publications and contributes to national committees on online education and K-12 digital skills curricula. His name has appeared in the 'List of Top 2% Researchers/Scientists of the World' in a Stanford study and Elsevier report in the year 2022.

Wissam Tawileh: holds a B.Sc. in Engineering from Damascus University in Syria, a M.Sc. in Information Management and IT from University of Hildesheim, and a PhD in Business Information Systems from Technical University of Dresden in Germany. His academic and professional experience covers wide areas of Online Education such as Virtual Mobility, AR/VR, E-Assessment, Social Learning Analytics, and Virtual Collaborative Learning. He received multiple awards for his internationalization initiatives and community services. In 2023, Dr. Tawileh joined Qatar University's Office for Digital Learning and Online Education as the Section Head for Online Education Research and Development.

Other contributors to this case study

Nabeel Albashiry: Senior Faculty Development and Digital Learning Support Specialist: Continuing Professional Development (CPD) design and implementation.

Haifa Belhadj: Section Head of Instructional Design and Digital Learning Development & Support: Quality-oriented course design and continuous evaluation.

Level of initiative: Institutional
Type of Initiative: Capacity-building courses; Policy Implementation; AI-enhanced Teaching & Learning Practices; Governance and Strategic Planning
Target audience: Academics; Institutional leaders

Rationale & Background

Innovations in GenAI have the potential to transform education in multiple ways. When thoughtfully implemented, these technologies can enhance student engagement, enrich the learning experience, and streamline instructional design and content creation processes. However, integrating generative AI into educational settings presents significant challenges. Key considerations include maintaining academic integrity, safeguarding student privacy, ensuring objective assessments, and addressing the digital divide to provide equitable access to AI technologies. Developing a comprehensive framework for integrating generative AI in digital learning and online education can help educators,

administrators, and policymakers navigate these challenges and effectively adopt GenAI technologies.

As the academic knowledge base on AI applications in education grows rapidly, educational institutions may struggle to navigate established best practices, understand implications for their own educational purposes, and develop and implement feasible strategies and guidelines for effectively integrating AI into their teaching and learning practices. This initiative aims to systematically address the question: what are the strategic areas of intervention for successful integration of GenAI in digital learning?

The proposed framework for integrating GenAI in Digital Learning (GAIDL) consists of six components, each with multiple dimensions, serving as a guide for educational institutions exploring AI-augmented teaching and learning. These components cover various aspects to ensure responsible use of AI-powered tools in digital learning, including updating policies and organizational structures, designing and redesigning curricula, developing ethical guidelines, fostering a community of practice around AI ethics, ensuring data privacy and security, and engaging relevant stakeholders. The framework significantly contributes to responsible AI use in HE by empowering institutions and individuals to make informed strategic decisions, build relevant capacities, and take compliant practical actions.

Description of the Initiative

The GAIDL Framework is the cornerstone of the initiative to purposefully integrate generative AI in HE and empower faculty to leverage AI power in digital teaching processes. Focusing on effective, ethical, and responsible use, a key component of this initiative is the awareness raising and capacity building of educators on the potentials and limitations of innovative AI tools and applications for education. This is systematically integrated in the Digital Teaching Competency Framework (DTCF) developed at Qatar University's Office for Digital Learning and Online Education (DLOE) in alignment with the UNESCO AI Competency Framework for Teachers (AICFT) and with particular attention paid to local context and needs.

The implementation efforts of this initiative encompass a wide range of activities at different levels, including awareness sessions, training programs, community events, academic collaborations, and industrial insights. The following examples illustrate the multifaceted endeavour to promote and support responsible AI use at the university:

- **Online Training Programs:** A collection of self-developed and carefully curated online courses on AI educational skills and methods is offered to faculty members in both Arabic and English. Completing these flexible learning programs leads to certification from reputable universities, international organizations, and top tech companies.
- **Onsite Training Workshops:** Interactive workshops on various AI tools for teaching, learning, and research are regularly organized for faculty members, researchers, and senior students featuring scholars, instructional designers, educational technologists, and quality assurance experts from both academia and industry.
- **High-Level Conferences:** The Annual Digital Learning and Online Education Forum brings together international thought leaders and key stakeholders to showcase the latest innovations and discuss current and future developments. The focus is on disruptive technologies like generative AI and their potential and risks for HE in the region and worldwide.

- **Applied Research Projects:** Beyond regular Continuing Professional Development offerings, the systematic integration of generative AI in the educational process is investigated and piloted in multiple interdisciplinary research projects. These projects include empirical studies that lead to evidence-based practical recommendations for educators, leadership, and policymakers.
- **International Collaborations:** To keep pace with global technological and pedagogical advancements, learn from established best practices, and facilitate knowledge exchange, collaboration opportunities with international partners and peers are continuously explored and acquired. These include collaborative grant applications, joint research initiatives, and scientific contributions and participation in the community.

This initiative benefits from diverse expertise and offers a space for synergies, particularly in the Arab region, where HE institutions share common or similar needs, priorities, concerns, and resources regarding the adoption and responsible use of AI in their academic programs and practices.

Figure 1. The Generative AI in Digital Learning (GAIDL) Framework.
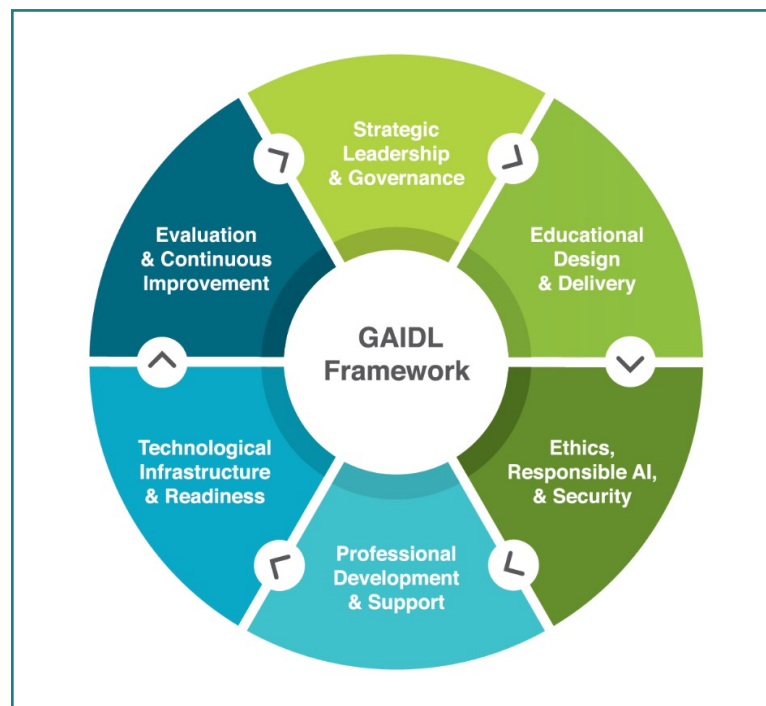
Outcomes & Impact

The Office for Digital Learning and Online Education at Qatar University has made significant progress in promoting the responsible use of AI in education. These efforts have had a considerable impact in a relatively short time, including:

- **Outreach:** Engaging over 500 academics through various events, workshops, and communications.
- **Training**: Qualifying more than 300 faculty members on diverse topics related to AI in education.
- **Research**: Participating in multiple ongoing interdisciplinary, grant-funded applied research projects on integrating AI in HE.

Links & Additional Resources

- **The GAIDL Framework:** M. AL-Smadi and W. Tawileh. 2024. "A Framework for Integrating Artificial Intelligence in Digital Learning," in proceedings of the 27th Conference on Communities in New Media (GeNeMe), Dresden, Germany: 25-27.09 2024, pp. 262–272. In press. https://tinyurl.com/GAIDL2024
- **The DTCF Framework:** N. M. Albashiry, H. Belhadj, and M. AL-Smadi. 2024. "A Digital Competency Framework for University Teachers: Towards Agile and Sustainable Curriculum." Pp. 1491–1494 in ASU International Conference in Emerging Technologies for Sustainability and Intelligent Systems (ICETSIS). https://doi.org/10.1109/ICETSIS61505.2024.10459701
- **Alignment with UNESCO AICFT Framework:** W. Tawileh. 2025 "Developing Ethical AI Competencies: Empowering Educators and Students for a Responsible Future", presented on „Life@Lab 2 – Horizons of AI Research in Higher Education" symposium, 13.02.2025, Dresden, Germany. https://tinyurl.com/GAIDL2025

International Events:

- First DLOE Forum: "The Future of Higher Education in the Era of Generative AI" https://tinyurl.com/DLOE2024
- Second DLOE Forum: "The Future of Digital Educational Content in the Age of AI" https://tinyurl.com/DLOE2025

Research Projects:

- Strategic Integration of Generative Artificial Intelligence in Qatar Higher Education Institutions: Case of Engineering and Business Education https://innolight.qrdi.org.qa/projects/41972
- Integrating Generative Artificial Intelligence into Health Professions Education: Ethical and Practical Insights for Educational Institutions in Qatar https://innolight.qrdi.org.qa/projects/42166

Case 14: Responsible AI in the Mediterranean Higher Education through the PIO (Principles, Indicators and Observables) Model

Keywords: *AI ethics; responsible AI; self-assessment tool; compliance; education*

Alexandra Lillo, Arlet Brufau, and Albert Sabater, Observatory for Ethics in Artificial Intelligence of Catalonia (OEIAC), University of Girona. Spain
albert.sabater@udg.edu, dir.oeiac@udg.edu

Alexandra Lillo is a Lawyer specialised in AI regulation and International and European law and human security. She is leading the AI and health focus at OEIAC from a legal and human rights perspective.

Arlet Brufau is a Legal expert on civil law (Catalan & Spanish) and the social impact of AI. She is leading the AI and education focus at OEIAC from a legal and human rights perspective.

Albert Sabater is a Doctor in Social Statistics that researches social systems, inequalities and responsible and ethical AI. He is leading the development of assessment tools at OEIAC for incremental improvements of AI and broader structural change.

Level of initiative: Institutional
Type of Initiative: Policy Implementation; AI Literacy Guides; Assessment Methods; Conferences/Seminars/Workshops; AI-enhanced Teaching & Learning Practices
Target audience: The PIO Model is addressed to everyone, including public and private organisations that have an interest in the design, development or deployment of AI technologies, and to all people who are using, buying or are recipients of AI systems.

Rationale & Background

The PIO Model is a pioneering self-assessment tool to advance towards AI ethics and responsible AI by taking into account the most up to date legislative requirements, ethical standards and policy recommendations. This self-assessment tool consists of a comprehensive checklist that includes a series of questions formulated in a way that anyone who develops, manages or directs a project involving data and AI systems can easily understand and apply. The checklist is organised around seven key ethical principles:

1. transparency and explainability;
2. fairness and equity;
3. security and non-maleficence;
4. accountability and responsibility;
5. privacy;
6. autonomy;
7. sustainability.

Methodologically, the model starts with so-called zero questions that reflect basic ethical aspects to be considered and that are further elaborated within the PIO Model. The next step consists of a pre-

assessment that allows the user to know the established risk (or risks) category associated with an AI system according to the EU Artificial Intelligence Regulation (AI Act).

However, one of the key features of the PIO Model is that the AI Act is not the only legal framework that has been taken into account for the design and implementation of the model. It also includes, among others, data protection regulations and fundamental rights requirements. All questions include a clear and comprehensive justification, including the legal requirements and ethical standards in which they are based, plus examples where appropriate.

Through the checklist that any stakeholder (developer, deployer or user) in the Mediterranean HE can examine the level of ethical and legal compliance of an AI system in relation to the seven OEIAC principles. When the self-assessment is finished, a series of metrics are generated, such as global metrics, a matrix of risks and a summary list with points for improvement and recommendations.

Description of the Initiative

The PIO Model is one of the key initiatives of the Observatory for Ethics in Artificial Intelligence of Catalonia (OEIAC) to promote a culture of applied AI ethics and responsible AI in HE and beyond and to ensure that AI development and deployment align with societal values, legal standards, and human rights.

More specifically, the PIO Model facilitates compliance with current norms and regulations on risks associated with AI through a comprehensive verification process. It is also a tool to identify appropriate or inappropriate actions and raise awareness to the quadruple helix through ethical and responsible uses of data and AI systems. In addition, it aligns with the growing international adoption of ethical principles and high-level standards in the design, implementation and use of data and AI systems.

The PIO Model operates under the Ethics and Society axis of the Catalan Strategy on Artificial Intelligence (CATALONIA.AI) and the UdG2030 Strategic Plan: The Sum of Intelligences of the University of Girona, where the Chair-Observatory for Ethics in AI is located. The PIO Model is part of five strategic lines of action.

1. **Research on the ethical, social, and legal impacts of AI,** where our interdisciplinary team studies and evaluates risks such as bias, privacy issues, and accountability gaps. This research also informs policy recommendations and ensures alignment with the European Union's regulation on AI such as the AI Act.
2. **The strategic line involves establishing guidelines and best practices,** where the PIO Model provides a structured approach to AI governance for both the public and private domains.
3. **Knowledge transfer and AI literacy,** thus aiming to increase awareness of the importance of applied AI ethics and responsible AI for policymakers, businesses, and the general public. Within this context, several activities are carried out such as a seminar series on topics related to the principles of the PIO Model, as well as workshops, conferences, and the promotion of pedagogical resources which center on AI literacy and education. This initiative also helps demystify AI ethics and integrate responsible practices into academic and professional training.
4. **International collaboration**, where the OEIAC engages with organisations around the

world to exchange tools and best practices such as the PIO Model.

5. **Practical implementation and capacity building** to ensure that the PIO Model is applied both ex ante and ex post of AI. This means that there are evaluations performed at lab stage and in real-world settings with the PIO Model.

For this purpose, OEIAC conducts hands-on training sessions with the PIO Model to enable businesses and government agencies to undertake our comprehensive checklist to master basic and advanced knowledge in AI ethics and responsible AI.

Figure 1: Global results
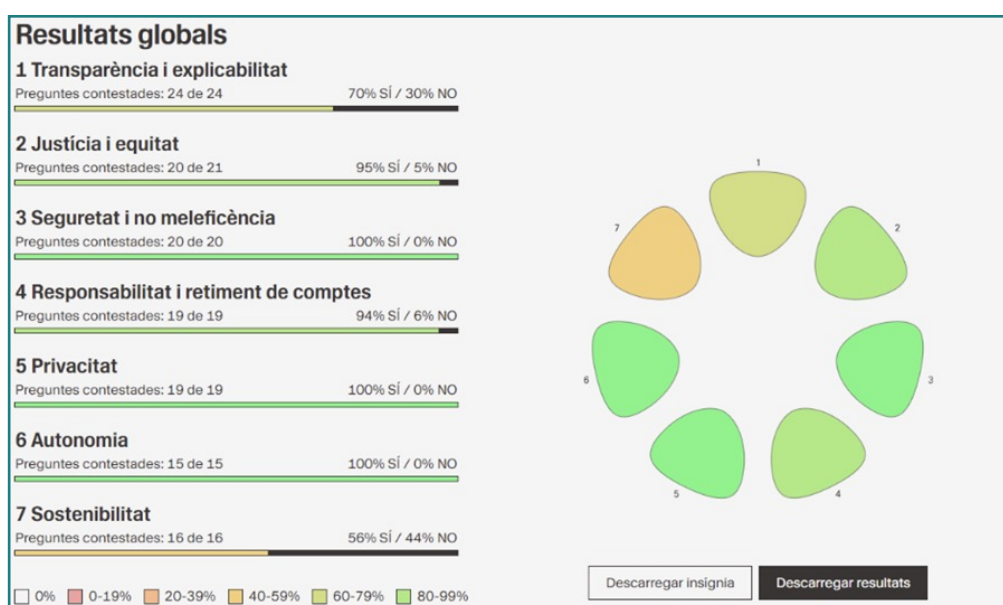
Global Results

- Transparency and Explainability: Questions answered: 24 of 24
  70% YES / 30% NO
- Justice and Equity: Questions answered: 20 of 21
  95% YES / 5% NO
- Safety and Non-maleficence: Questions answered: 20 of 20
  100% YES / 0% NO
- Responsibility and Accountability: Questions answered: 19 of 19
  94% YES / 6% NO
- Privacy: Questions answered: 19 of 19
  100% YES / 0% NO
- Autonomy: Questions answered: 15 of 15
  100% YES / 0% NO
- Sustainability: Questions answered: 16 of 16
  56% YES / 44% NO

Risk matrix

The risk matrix is a tool to get a snapshot of the level of risk by severity regulatory or AI Act and the likelihood of acting on it. The values in each box represent the negative responses provided according to the severity and probability mentioned. This information is also used for improvement points.

Probability by taking action

- Very high
- High
- Neither high nor low
- Low
- Very low

Table 1: Risk matrix

PROBABILITAT DE PORTAR A TERME UNA ACCIÓ	SEVERITAT SEGONS LA NORMATIVA O AI ACT		
	Mínima	Limitada	Alta
Molt alta	1	0	4
Alta	2	0	4
Ni alta ni baixa	1	0	0
Baixa	1	1	2
Molt baixa	0	0	0

Outcomes & Impact

Since its release in June 2024, the PIO Model has been used widely and is currently being implemented by the Government of Catalonia (Generalitat de Catalunya); the Central Government in Barcelona (Provincia de Barcelona); leading city councils in the Catalan region, such as Barcelona and Girona; the Chambers of Commerce of Barcelona, Tarragona, Girona and Lleida; Cercle Tecnologic; and several companies and universities, including the University of Girona. It is also employed by developers of AI systems, researchers and students who are embarking on subjects related to AI systems and/or AI ethics.

Links & Additional Resources

Web: OEIAC – Observatory for Ethics in Artificial Intelligence of Catalonia
Report: https://dugi-doc.udg.edu/handle/10256/26104
(catalan version)

Case 15: Developing Learners' AI Competencies through Assessment: Strategic Approaches

Keywords: *AI, GenAI, HE, assessment design, assessment strategies, teaching*

Mari Cruz Garcia Vallejo, Digital education consultant, United Kingdom/Spain
maricruzgarciavallejo@gmail.com

Mari Cruz García Vallejo (SFHEA, SCMALT, MSc, MEng, ITIL, Cllr) is a digital education consultant and senior fellow at Advance HE. She researches and teaches generative AI to enhance learning and teaching in higher education. Mari Cruz has worked with universities across Europe and the UK, including Heriot-Watt and the School of Medicine of the University of Dundee. As an affiliated lecturer, she teaches Generative AI at ULPGC and contributes to the AI Pedagogy Project at metaLAB@ Harvard. She also blogs on Substack @maricruzgarciavallejo.

Level of initiative: Institutional
Type of Initiative: AI Literacy Guides; AI-enhanced Teaching & Learning Practices
Target audience: Academics; Institutional leaders

Rationale & Background

The module "Estrategias de integración de la IA Gen en la evaluación para desarrollar competencias en IA" (Strategies for Integrating Generative AI into Assessment to Develop AI Competencies) is delivered as part of the Plan de Formación de Docentes y Personal Investigador (PFDI) 2021–2025 at the University of Las Palmas de Gran Canaria (ULPGC).

This is a 1 ECTS module designed to equip teaching staff with a pedagogical and theoretical foundation for integrating GenAI into assessment practices, with the aim of fostering AI competencies and student creativity in HE. The module was developed in response to the growing need to train teaching staff at ULPGC (academics, postdocs, PhD students and other staff with teaching contracts) in understanding AI literacies and competencies, and to support the acquisition of new pedagogical perspectives on emerging reference frameworks and ethical models for integrating GenAI into assessment.

It introduces innovative strategies and approaches for embedding AI into assessment practices at both the course and programme levels.
The module comprises 25 study hours and is delivered using a blended learning methodology, combining:

- Synchronous online sessions, which promote participation and social learning, and
- Asynchronous online activities, designed for individual study and to reinforce the theoretical concepts introduced during the synchronous sessions.

Description of the Initiative

The module considers three dimensions for the introduction of AI in assessment:

- **Assessment with AI:** GenAI is conceived as a support tool for both the participant (teacher and assessor) and the students.
- **Assessment of AI:** Students' AI competencies and literacy are evaluated—for example, by assessing their technical knowledge, their interaction with a specific GenAI tool, or their critical reflection on the initial outputs provided by GenAI.
- **Assessment for AI:** The design of the assessment promotes the development of AI competencies in students.

The module learning outcomes are:

- To acquire a pedagogical understanding of the concept of "AI training."
- To develop a basic understanding of the competencies included in such training.
- To acquire a pedagogical understanding of the different assessment strategies depending on the role assigned to students.
- To develop new assessment strategies that enable the development of AI competencies and student creativity.
- To acquire a theoretical understanding of the foundations of "authentic assessment," "assessment for learning," and "assessment as learning."

To cover the learning outcomes, the module was structured as 8 self-contains units that cover the following topics:

1. What does the term "AI competencies" mean? Main reference frameworks for AI competencies.
2. The impact of AI on assessment: Academic integrity and intellectual authorship.
3. The role of students in traditional assessment methods and strategies for integrating Generative AI.
4. New assessment methods to foster students' AI competencies: Assessment for learning.
5. A five-dimensional framework for the integration of AI in authentic assessment.
6. The creation of AI scales based on the Bloom Taxonomy adapted to AI
7. New reference frameworks for the integration of AI into assessment:
   - The PAIR framework (Problem, Assessment, Interaction, Reflection)
   - and the AIAS scale (AI Assessment Scale).
8. Recommendations for ethically integrating Generative AI into assessment.

The module also includes a final summative assessment, in which participants are required to submit a proposal for an assessment method that incorporates AI, based on any of the strategies and approaches explored during the course.

Figure 1. Original materials in Spanish
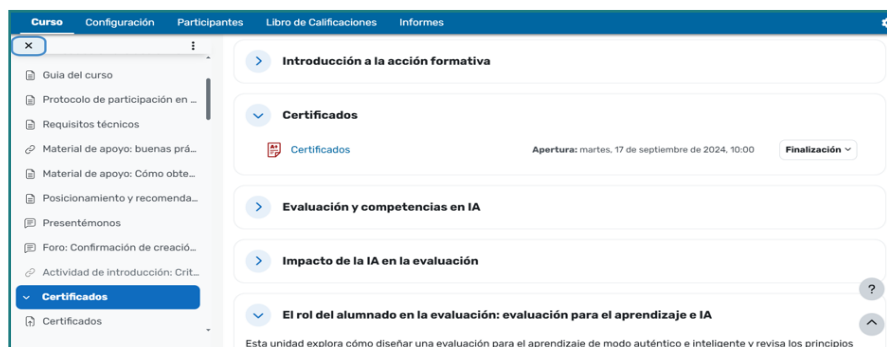
Outcomes & Impact

- The module was delivered for the first time during the 2024–2025 academic year.
- An initial presentation took place in Semester 1 (November–December 2024), and a second presentation is scheduled for June–July 2025.
- Each presentation accommodates 25 participants.
- The first cohort provided very positive feedback in the final course evaluation survey. The module received an average score of 4 out of 5 across key areas such as course content, design, and delivery.
- Participants particularly valued the practical relevance of the module, noting that it helped them adapt and apply new assessment strategies—especially those involving GenAI—within their own teaching contexts. Many highlighted the usefulness of the frameworks and examples provided, which enabled them to reflect critically on their current practices and begin implementing more innovative, student-centered approaches to assessment.

Links & Additional Resources

- Contributor profile: https://aipedagogy.org/authors/mari-cruz-garcia-vallejo/

Course resources released in English by the course contributor under a CC license:

- A five-dimensional framework for the integration of AI in authentic assessment https://gamma.app/docs/Completed-A-design-guide-for-the-integration-of-AI-in-authentic-a-pk4t1pbzr3h5tm8
- Christmas crackers: How to integrate GenAI in assessment https://open.substack.com/pub/maricruzgarciavallejo/p/christmas-crackers-how-to-integrate?r=2hh1eq&utm_campaign=post&utm_medium=web&showWelcomeOnShare=false
- An Evaluation Framework for LLMs That Considers Social Justice: https://open.substack.com/pub/maricruzgarciavallejo/p/an-evaluation-framework-for-llms?r=2hh1eq&utm_campaign=post&utm_medium=web&showWelcomeOnShare=false

Case 16: AI-Powered Educational Assistant for Enhancing Academic Collaboration and Digital Cooperation at ESPRIT

Keywords: *Responsible AI, Educational Technology, AI Literacy, Digital Cooperation, Academic Research*

Chaima Attafi, Talan International Tunisie & ESPRIT (École Supérieure Privée d'Ingénierie et de Technologies). Tunisia
chayma.attafi@esprit.tn

Chaima Attafi is a Software engineer specialising in AI and educational technologies, with experience leading AI-focused workshops and research initiatives in HE contexts. Passionate about applying responsible AI practices to foster ethical, innovative, and collaborative solutions for learning and academic development. Actively engaged in projects promoting AI literacy, digital cooperation, and capacity building across educational communities in the Mediterranean region.

Level of initiative: Institutional
Type of Initiative: AI Literacy Guides; Conferences/Seminars/Workshops; AI-enhanced Teaching & Learning Practices
Target audience: Students; Academics; Institutional leaders

Rationale & Background

Mediterranean research students, particularly those carrying out academic writing, are affected by disinformation and unverified news, often relying on non-peer-reviewed or dubious sources. This exacerbates issues caused by the extensive application of large language models (LLMs), such as plagiarism, excessive focus on AI-generated content, and insufficient critical analysis, aggravated by insufficient AI literacy in the Mediterranean region. All these issues harm research quality and graduates' employability, which are essential for Mediterranean economies. ESPRIT and Talan address these demands with a multi-agent AI-driven study assistant that ensures access to validated articles via DOI authentication, promotes responsible use of AI, enhances research writing, and promotes online collaboration. Aligning with UNESCO's AI ethics and regional priorities (e.g., UNIMED's focus on HE innovation), the project aims to create an excellence model for ethical, agent-based AI solutions in academic settings.

Description of the Initiative

The initiative was a collaboration between **ESPRIT** and **Talan**, aimed at developing an AI-powered educational assistant to enhance research writing and academic collaboration. Leveraging LLMs, the assistant offers paraphrasing support, citation suggestions, writing feedback, and real-time responses to academic queries. To promote responsible AI use, I organised workshops for students and faculty introducing AI fundamentals, ethical principles, and practical demonstrations. Participants engaged with the tool through real-world scenarios such as refining thesis drafts, verifying citation formats, and addressing academic integrity, while discussing AI's limitations and potential risks.

The initiative answers a growing call for the ethical use of AI tools in academic environments. As AI-generated content and tools like large language models (LLMs) spread, students and faculty are grappling with how best to utilize and do so ethically. Misuse issues ranging from plagiarism, over-reliance on AI, and lack of critical analysis highlight the need for structured guidance.

As a reaction, ESPRIT and Talan partnered to develop an AI-powered education assistant to support research writing, facilitate academic collaboration, and encourage AI literacy. The assistant is overseen by a multi-agent system, with each agent delivering specific educational and ethical characteristics:

- **Science Watch Agent:** Monitors new scientific articles, updates, and news. , delivering trustworthy academic content in real-time to keep students informed. using DOI verification via CrossRef APIs to ensure credible, peer-reviewed sources, reducing misinformation risks.
- **Chat with AI Agent (RAG-based):** Supports article summarization, Q&A, and fact-checking with DOI verification for transparent, ethically sourced answers. Enables interaction for summarizing articles, and providing transparent, ethically sourced answers. Supports voice input, visual explanations, and Q&A for accessibility.
- **AI Writer Agent:** Assists users in developing research articles from academic writing conventions (IEEE, APA, Harvard, etc.). It includes custom bibliographies and citation styles with live fact-checking for scientific precision. Users can even export articles in LaTeX format for formal publication.
- **Presentation Generator Agent (in development):** Will create slide presentations from academic articles to facilitate knowledge sharing.

Figure 1. AI research & writing assistance

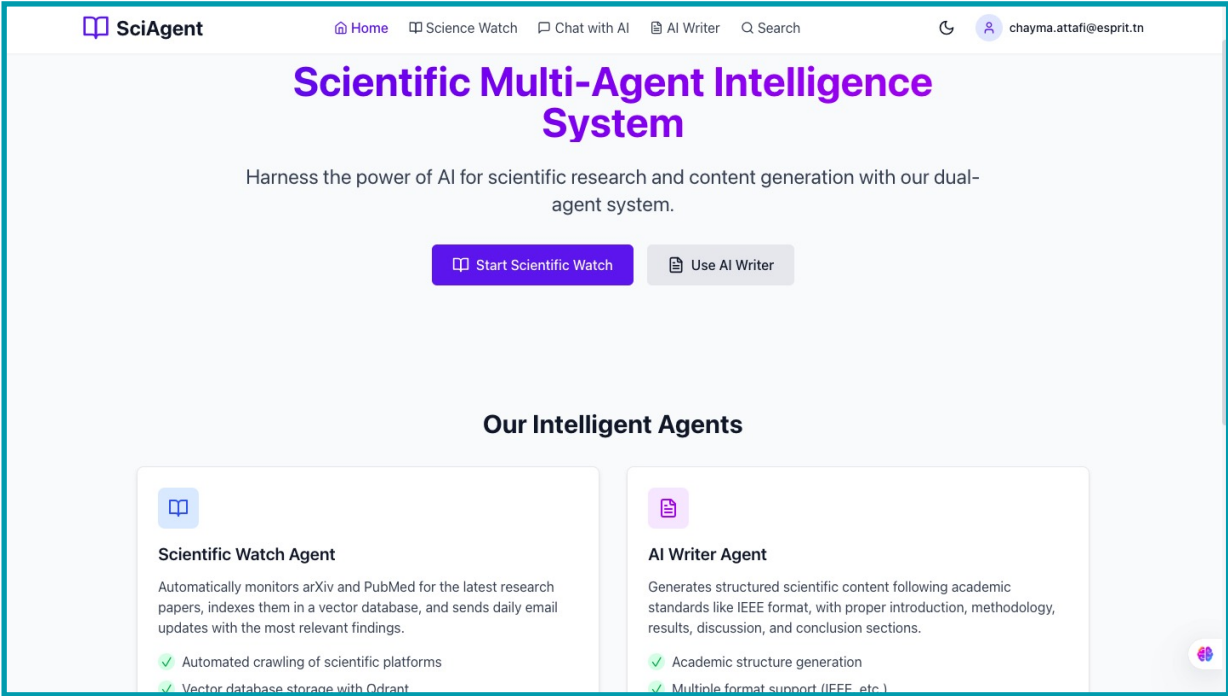Figure 2. *Scientific multi-agent system*

Figure 3: *Scientific watch agent*
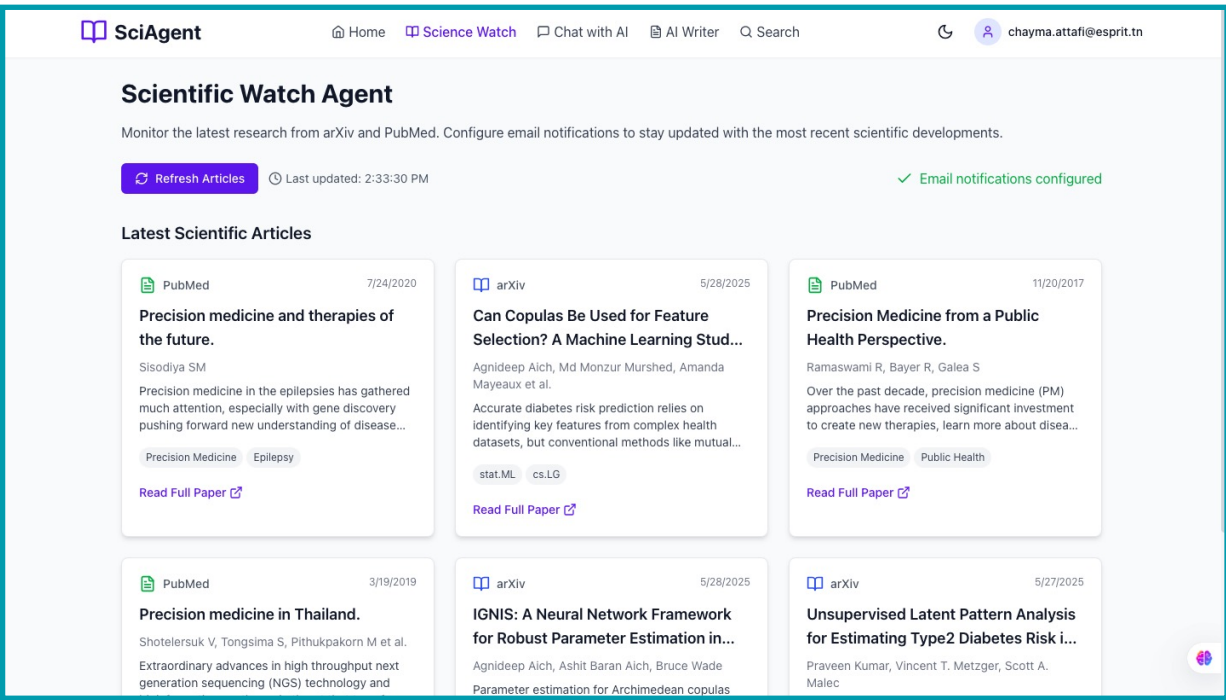
Figure 4: AI writer

Outcomes & Impact

The initiative aims to train 200 students and 30 faculty, with a pilot targeting 50 students to improve paper quality by 30% (scores), and increase completion rates by 20%. Surveys will assess 90% literacy improvement. The AI literacy guide is expected to reach 300 downloads, with workshop recordings accessing 500+ users. Institutional adoption (80% departments) and UNIMED pilots in Tunisia and Algeria will drive regional impact.

The initiative demonstrated that responsible AI integration requires both technological tools and ethical education. Its impact extended beyond immediate users, influencing institutional conversations on AI policy, teaching practices, and research support infrastructure.

Ethical Framework

DOI verification and fact-checking ensure transparency and accuracy, with decision logs for auditability. . An AI Ethics Committee oversees agent outputs, supported by a human appeal process. WCAG 2.1 AA compliance enhances inclusivity. The pilot will validate 95% DOI accuracy and zero data breaches.

SECTION 3
ROADMAP

3.1. Review of institutional strategic priorities in the Higher Education Euro-Mediterranean sector

This section synthesises a range of AI-related educational initiatives from the case studies. It outlines patterns in institutional commitment, pedagogical integration, and capacity-building for AI literacy. These initiatives collectively demonstrate growing recognition of AI's transformative potential, though disparities in scale, resources, and implementation persist across countries.

Highlights

- **Level of Initiative** (40%): Most initiatives are institutionally led, showing strong top-down engagement.
- **Type of Initiative** (35%): Capacity-building dominates, reflecting the need to upskill educators and students.
- **Target Audience** (25%): Students are the primary focus, though faculty and academics are increasingly included.
- **Ethical Focus** (20%): Responsible AI use, data privacy, and fairness are central to many initiatives.
- **Policy Gaps** (15%): Many institutions still lack formal AI policies, indicating a need for structured governance.

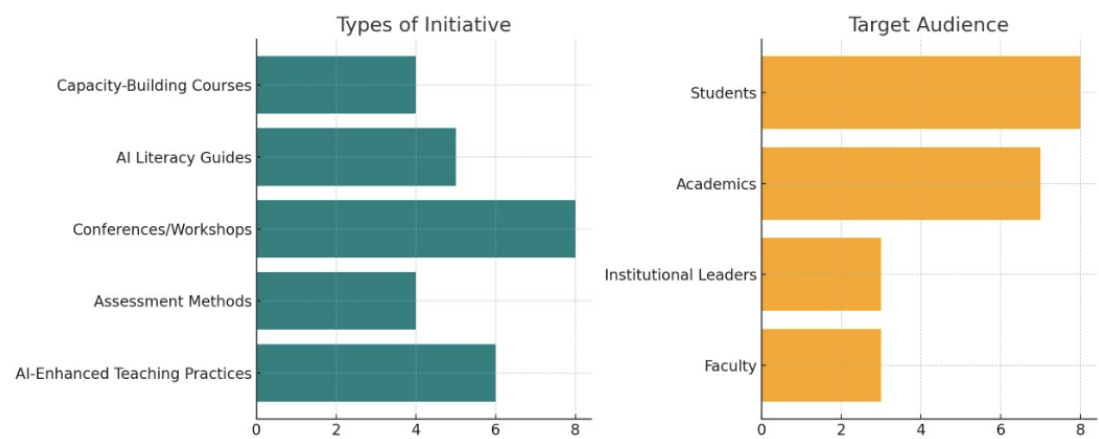*Figure 3: Types of initiatives and target audience*

Table 2: Key stakeholders and priority areas

| Stakeholder	Priority Area
Learners	AI literacy, ethical use, creativity, inclusion
PhD Students	Research tools, data analysis, AI ethics
Educators	Pedagogical integration, assessment design, CPD
Institutional Leaders	Policy frameworks, infrastructure, strategic planning

Key Insights

- **Strong Institutional Momentum:** Most initiatives were launched at the institutional level, often driven by educators or innovation units within universities.
- **Pedagogical Focus:** Emphasis was placed on course-level integration, particularly in language education, early childhood education, and academic writing.
- **Capacity Building:** Numerous workshops, training programmes, and literacy guides were implemented, aimed at both students and faculty.
- **Ethical Awareness:** Several projects incorporated ethical considerations, privacy, bias, and regulatory compliance into training and tool development.
- **Policy Influence:** Some initiatives sparked policy dialogue (e.g., Algeria, Albania), influencing curriculum development and institutional guidelines.

Regional priorities

1. **AI as a Catalyst for Institutional Transformation:** AI is driving systemic change, showing how AI is being embedded into national education reform, governance, and strategic planning.
2. **Ethics and Equity are Central Themes:** Across nearly all case studies, ethical AI use, data privacy, and fairness are recurring concerns. Institutions are increasingly integrating AI ethics into curricula, developing guidelines (e.g., the PIO Model), and promoting epistemic justice - especially in underrepresented regions like the MENA.
3. **AI for Inclusion and Accessibility:** Projects like the UNITE chatbot initiative in Italy and the AI-powered registrar at LIMU in Libya demonstrate how AI can support inclusive education. These tools are designed with Universal Design for Learning (UDL) principles and accessibility features, benefiting students with disabilities and diverse learning needs.
4. **AI-Enhanced Assessment and Feedback:** Innovative assessment strategies are emerging, such as portfolio-based evaluations, AI-assisted feedback, and authentic assessment models. These approaches are helping educators personalise learning and measure higher-order thinking skills more effectively.
5. **Cross-Border and Regional Cooperation:** AI is enabling new forms of academic collaboration across the Mediterranean. Initiatives support multilingual learning environments, credit recognition, and virtual mobility, addressing long-standing barriers to regional integration in HE.
6. **AI for Administrative Efficiency:** AI is being used to streamline administrative processes, as seen in LIMU's SIR system. This not only improves operational efficiency but also enhances student experience and institutional responsiveness.
7. **Emerging Role of AI in Research Training:** Doctoral training programmes in Algeria and Spain are incorporating AI tools for data analysis, academic writing, and research ethics. This reflects a shift toward preparing researchers for AI-intensive academic environments.
8. **Scalability and Replicability:** Several initiatives (e.g., Esaboura platform, AI literacy workshops) have been replicated across institutions and countries, showing strong potential for scalability. This is crucial for building regional AI capacity.

Figure 4: Regional Priorities
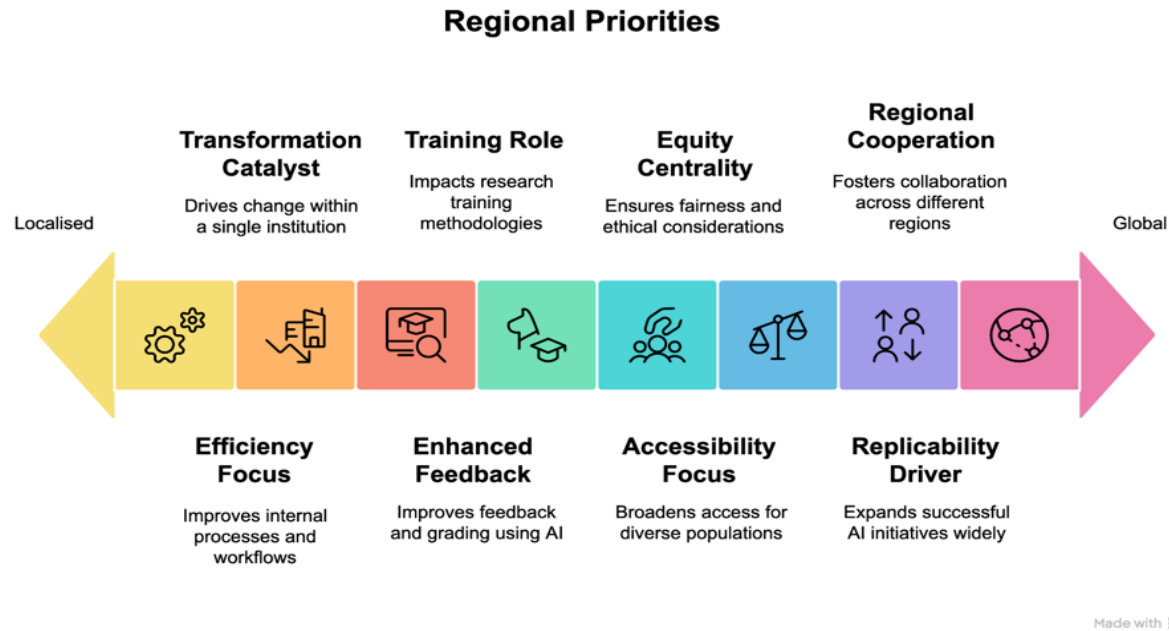
National Priorities vs. Higher Education Priorities

The comparative analysis of national AI strategies and HE sector priorities across Mediterranean countries reveals both alignment and divergence in focus areas. National strategies often emphasise macro-level goals such as economic development, digital transformation, public sector modernisation, and ethical governance. For instance, Algeria's national AI strategy prioritises research, innovation, and infrastructure development, while Egypt focuses on human capacity building and ethical frameworks. These national agendas are typically framed within broader socio-economic objectives, including sustainability, public service delivery, and international competitiveness.

In contrast, HE institutions tend to focus more on micro-level implementation, particularly in curriculum development, AI literacy, and pedagogical innovation. Universities in countries like Italy and Spain are embedding AI into teacher training, assessment practices, and interdisciplinary research. While national policies provide the strategic direction, to operationalise these goals through targeted initiatives such as AI-enhanced learning environments, doctoral training programs, and inclusive education models. The comparative table below showcases the different priorities, which in order to be addressed may need for stronger coordination mechanisms to ensure that institutional efforts are both informed by and contribute to national AI ambitions.

Table 3: National AI Priorities vs Higher Education Sector Priorities

Country	National AI Priorities (from Policies/Strategies)	Higher Education Sector Priorities
Albania	Digital government, Digital economy, Citizen participation and transparency, Education and digital skills, Cybersecurity and resilience	Research, capacity building, academic dissemination, and policy dialogue to promote responsible AI adoption in teaching and learning environments
Algeria	Research & innovation, infrastructure, ethics, priority sectors (health, agriculture)	AI literacy, curriculum integration, University 4.0 transition, doctoral training
Egypt	Human capacity, ethical frameworks, AI for development	AI in curricula, public servant training, hackathons, research centres
Jordan	Legal frameworks, education, public-private partnerships	AI training for educators, ethics charter, open-source workshops
Morocco	AI in education, health, agriculture; smart governance	Innovation hubs, AI research, capacity building
Tunisia	Regional partnerships, pilot projects in agriculture, health, governance	AI workshops, EdTech collaboration, curriculum reform
France	AI for Humanity, education & training, research excellence	Postgraduate AI training, interdisciplinary research, ethics integration
Italy	EU AI Act alignment, €1B investment, ethical safeguards	AI in teacher training, curriculum development, policy alignment
Spain	Digital agenda, ethical AI, citizen digital literacy	AI in assessment, doctoral training, inclusive education
Malta	AI adoption in public/private sectors, education, start-up support	AI in school curricula, certification programs, workforce development
Lebanon	Advisory strategy, ethics guidelines, National AI Authority proposal	Curriculum reform, public awareness, multilingual AI training
Palestine	Advocacy, digital rights, early-stage capacity building	Digital literacy, local research, inclusive AI education
Libya	Not formalised due to conflict	AI-driven registrar system (SIR), inclusive student services
Greece	AI blueprint, regulatory frameworks, education, international collaboration	AI in preschool education, curriculum innovation, teacher training
Türkiye	AI GDP contribution, legal reform, international cooperation	AI talent program, national institutes, academic incentives

Recommendations for Capacity Building

Capacity building in AI for learners and educators is a cornerstone of sustainable digital transformation in higher education. For learners, the focus is on developing foundational AI literacy, critical thinking, and ethical awareness. Recommendations include integrating AI modules across disciplines, promoting project-based learning using real-world datasets, and offering micro-credentials in AI tools and data science. These approaches not only prepare students for the evolving labour market but also empower them to engage with AI technologies responsibly and creatively.

For educators, capacity building involves professional development in AI pedagogy, ethical integration, and curriculum co-design. Training programs should equip faculty with the skills to use AI for enhanced learning opportunities, formative assessment, and inclusive teaching. Establishing communities of practice and fostering collaboration with industry partners can further enhance educators' ability to align teaching with emerging technological trends. These efforts ensure that educators are not only consumers of AI tools but also active contributors to shaping AI-enhanced educational ecosystems.

Table 4: Recommendations aligned with National Priorities

Recommendation	Description	Alignment with National Priorities
AI Literacy Modules	Introduce foundational open AI courses across disciplines	Supports national goals for digital skills and workforce readiness
Project-Based Learning	Use open datasets (e.g., transport, health) for AI projects	Aligns with sectoral AI applications (e.g., agriculture, health)
Ethics & Inclusion Training	Embed AI ethics, bias awareness, and cultural sensitivity	Reinforces national charters and UNESCO guidelines
Micro-Credentials	Offer stackable credentials in AI tools, ethics, and data science	Supports flexible, lifelong learning pathways
Professional Development	Train faculty in AI tools, pedagogy, and ethics using Open Education approaches	Aligns with national strategies for teacher upskilling
AI-Enhanced Assessment	Use AI to develop literacies through assessment	Supports innovation in teaching and learning
Communities of Practice	Foster peer-led AI teaching networks	Encourages institutional collaboration and policy co-creation
Curriculum Co-Design	Collaborate with industry and society to align AI curricula with labour market and societal needs	Supports national economic transformation goals

3.2. A roadmap for Digital Cooperation in the Mediterranean HE sector

This report aims at offering a timely and policy-relevant roadmap for aligning Mediterranean HE systems with the evolving global digital governance landscape. It does so by translating the principles and priorities of key international frameworks, such as the UNESCO Recommendations on AI, OER, and Education for Peace, the UN Global Digital Compact, and the Sustainable Development Goals (SDGs), into actionable strategies for institutions, governments, and regional networks.

At the heart of the roadmap is a commitment to the values enshrined in the 2023 UNESCO Recommendation on Education for Peace, Human Rights, International Understanding, Cooperation, Fundamental Freedoms, Global Citizenship, and Sustainable Development. The report's emphasis on inclusive AI literacy, multilingual OER, and ethical digital transformation promotes AI systems that are human-centred, culturally responsive, and accessible to all learners.

National, Institutional, and Regional Priorities

This roadmap also operationalises the principles of the UNESCO Beijing Consensus on Artificial Intelligence and Education (2019), which calls for AI to enhance human capabilities and reduce educational inequalities. Through the case studies, the report demonstrates how AI can be responsibly integrated into curricula, academic development, and institutional governance, particularly in under-resourced or linguistically diverse contexts. This is further supported by the UNESCO Recommendation on the Ethics of Artificial Intelligence (2021), which underpins the report's proposals for institutional AI charters, ethical assessment tools, and participatory governance mechanisms.

In terms of digital cooperation, this roadmap aligns with the UN's vision of Digital Public Goods and the Global Digital Compact. It advocates for the development of open, interoperable, and multilingual digital infrastructures, such as regional repositories for AI tools, datasets, and OERs, that serve as shared assets for inclusive innovation and capacity building. These infrastructures are not only technical enablers but also expressions of digital solidarity, ensuring that all countries in the region can participate in and benefit from the investments in digital transformation.

The roadmap has a strong focus on open education, grounded in the UNESCO Recommendation on OER (2019) and the 2024 Dubai Declaration on OER. It calls for the co-creation of culturally relevant, accessible, and openly licensed educational content, and for the integration of OER into national and institutional strategies. This is complemented by the UNESCO Recommendation on Open Science (2021), which informs the report's proposals for open data practices, FAIR research infrastructures, and collaborative doctoral training programs.

Finally, the roadmap contributes directly to the implementation of the UN Sustainable Development Goals, particularly SDG 4 (Quality Education), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 17 (Partnerships for the Goals), as well as the UN Secretary-General's Roadmap for Digital Cooperation. It does so by advancing a regional model of AI integration that is ethical, inclusive, and cooperative, and by positioning HE as a key actor in building resilient, rights-based digital societies, as articulated in different national AI strategies that promote digital transformation, human capital development, and ethical governance, through the integration of DGP and open practices into these strategies across various levels of maturity.

Table 5: National Priorities on Digital Cooperation & AI Alignment with Digital Public Goods & Open Education

Country	National Priorities on Digital Cooperation & AI	Alignment with Digital Public Goods & Open Education
Algeria	AI Action Plan includes infrastructure, skills, and innovation ecosystems	University 4.0 strategy promotes open-source tools, doctoral AI training, and shared digital platforms
Egypt	National AI Strategy emphasises capacity building and ethical AI	Strong focus on public sector training and open data; OER and AI literacy initiatives emerging
Italy	National AI Strategy aligned with EU AI Act; €1B investment in innovation	Institutional support for inclusive AI tools, OER, and open science practices
Tunisia	AI strategy includes pilot projects and regional partnerships	Community-based AI workshops and NGO-led OER initiatives support grassroots digital cooperation
Spain	ENIA strategy promotes ethical AI, digital literacy, and research excellence	Active participation in European AI and OER networks; strong open science infrastructure
Jordan	AI strategy includes legal frameworks and public-private partnerships	AI literacy and open-source workshops supported by national digital skills roadmap

Towards a Mediterranean Digital Education Charter

In alignment with the UN Digital Cooperation Roadmap, digital cooperation in the Mediterranean region is vital for addressing shared challenges and leveraging collective strengths. A key strategy is the development of a Mediterranean Digital Education Charter, which would establish common ethical standards, data-sharing protocols, and open licensing frameworks. This charter could serve as a foundation for regional collaboration, ensuring that AI tools and curricula are culturally relevant, linguistically inclusive, and aligned with regional development goals.

Other strategies include promoting virtual mobility and virtual exchange through AI-assisted platforms that support multilingual learning and credit recognition. Shared digital infrastructure, such as regional repositories for AI tools and open educational resources, can enhance interoperability and reduce duplication of effort. Joint academic programs and regional forums on AI in education can further facilitate knowledge exchange and policy alignment. These strategies not only strengthen regional integration but also position the Mediterranean as a collaborative hub for responsible and inclusive AI in HE.

To effectively and responsibly harness the potential of AI in HE, robust policy frameworks are essential. One key recommendation is the establishment of national AI-HE coordination councils to align the efforts of ministries, universities, civil society and industry stakeholders. These councils can facilitate the development of institutional AI charters that define ethical use, data governance, and academic

integrity standards. Such policies should be informed by international frameworks like the UNESCO AI Ethics Recommendation and the EU AI Act, ensuring global alignment and local relevance.

Additionally, investment in digital public infrastructure is critical. This includes cloud computing capabilities, multilingual AI tools, and accessible digital platforms. Policies should also support the creation of AI research and innovation hubs within universities, fostering interdisciplinary collaboration and applied research. Public-private partnerships should be incentivised to co-design curricula and provide real-world learning opportunities. Together, these policy measures can create an enabling environment for AI integration that is ethical, inclusive, and innovation-driven.

Towards advancing a Mediterranean Digital Education Charter, Governments and HE stakeholders should consider the following elements to align international guidance, national and institutional priorities in order to promote responsible co-governance frameworks that advance regional capacities in the HE sector.

1. Establish Regional and National Governance Frameworks

1.1. Develop a Mediterranean Digital Education Charter

- Create a shared regional framework to align responsible, ethical principles, data governance, and AI literacy standards.
- Integrate international instruments such as:
  - **UNESCO Recommendation on the Ethics of AI**
  - **UNESCO Recommendation on OER**
- Ensure AI systems used in education are inclusive, rights-based, and transparent.

1.2. Establish AI-HE coordination Councils at the national level

- Facilitate alignment between ministries, universities, and industry.
- Ensure that national AI strategies are translated into curricula, funding priorities, and innovation ecosystems for the Higher Education sector.

1.3. To ensure successful operationalisation, countries and institutions are encouraged to:

- Develop **implementation strategies** at national and regional level.
- Invest in **shared monitoring and evaluation tools** for progress tracking.
- Encourage **multi-stakeholder engagement** in policy design and implementation.
- Secure **regional and international funding** to support coordinated actions.

2. Institutionalise Responsible, Ethical, Transparent, and Inclusive AI Governance

2.1. Define clear policies on:

- Responsible and ethical AI use
- Academic integrity and transparency
- Alignment with national and international regulatory frameworks (e.g. **GDPR, EU AI Act, OECD AI Principles**).

2.2. Embed Ethical frameworks into institutional culture

- Integrate AI ethics into academic programmes and codes of conduct.
- Use models such as: **PIO Model** (People, Impact, Outcomes), National AI ethics frameworks

2.3. Adopt institutional data governance frameworks ensuring:

- Transparent Data Use and Protection
- Compliance with data protection laws
- Transparent use of AI in assessments and student services
- Regular audits and ethical reviews

3. Advance Open Infrastructures, Resources, and Data Sharing

3.1. Promote Digital Public Goods and Infrastructure

- Invest in **interoperable, multilingual, open-source platforms** as digital public infrastructure.
- Develop co-governed **regional repositories** of AI tools, open data, OERs
- Co-develop regional AI applications addressing context-specific challenges (e.g., multilingual education, climate resilience).

3.2. Support Open Educational Resources, Open Science, and Open Data as digital public goods

- Promote co-creation of accessible, culturally relevant OERs.
- Encourage open licensing and multilingual publishing.
- Leverage open data in teaching and research across disciplines.
- Harmonise existing policies and strategies in education, science and digital transformation to maximise the potential of open resources as digital public goods to advance skills in society.

4. Build Capacity through Regional Collaboration

4.1. Align regional capacity-building priorities

- Establish a shared regional roadmap for AI capacity-building targeting Learners, Educators, Institutional leaders
- Coordinate cross-border professional development and micro-credentialing systems.
- Leverage **centres of excellence** and **digital innovation hubs** to scale successful models.

4.2. Promote contextualised Capacity-Building

- Empower Open Education, Open Data and Open Science stakeholders to co-participate in AI development, use, and critique.
- Support capacity-building in underserved regions through locally adapted OERs and toolkits.

5. Foster Responsible AI Research, Innovation, and Partnerships

5.1. Establish responsible research and innovation hubs

- Promote the adoption of **FAIR** principles for open science and data sharing.
- Encourage interdisciplinary collaboration (STEM, health, social sciences and humanities).
- Fund interdisciplinary university-based AI centres.

5.2. Foster Public-Private-Academic partnerships

- Incentivise co-designed curricula, work-integrated learning, and applied research.

- Align academic AI initiatives with national development priorities areas.

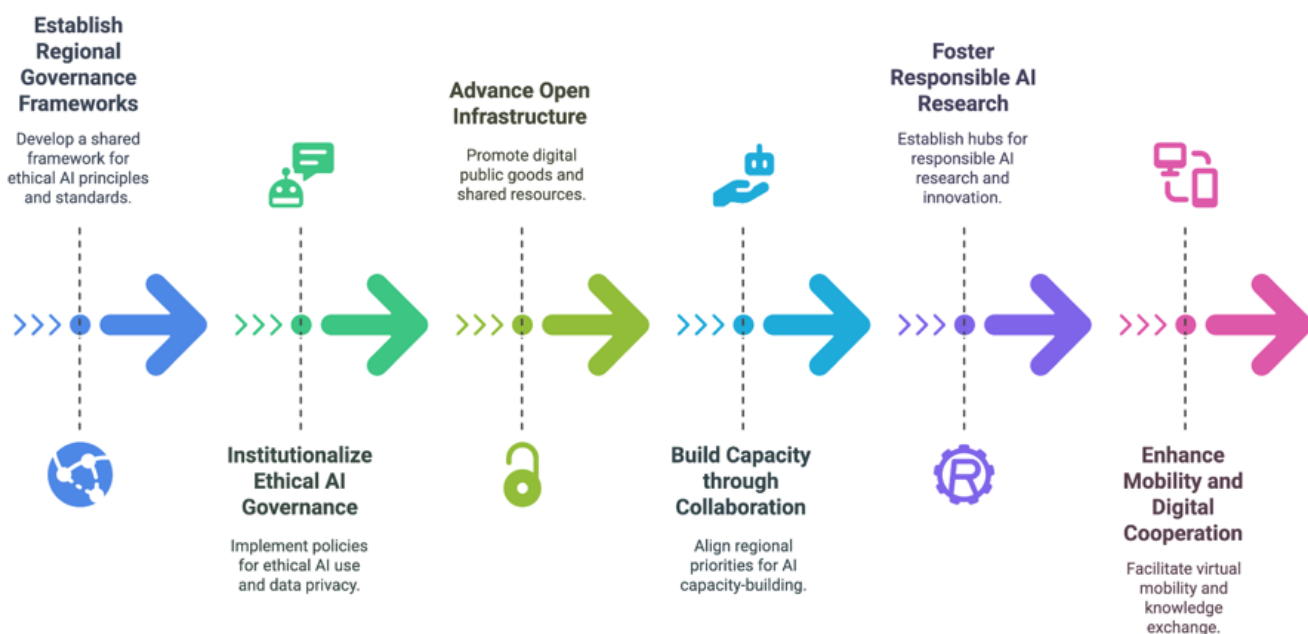## 6. Enhance Mobility and Digital Cooperation

6.1. Facilitate Inclusive Virtual Mobility and Virtual Exchange.

- Use AI-powered platforms to enable Virtual exchanges, joint degrees and regional credit recognition.
- Prioritise equitable access for vulnerable students and staff including from crises-affected areas.

6.2. Institutionalise knowledge exchange and policy dialogue

- Establish an **annual Mediterranean Forum on AI in Higher Education** for sharing research, innovation, and policy updates.
- Develop a **Regional Observatory** to monitor AI adoption trends, Ethics and compliance, Capacity-building progress.
- Foster long-term **digital cooperation** among Mediterranean countries to promote collective intelligence and shared educational futures.

Mediterranean Digital Education Charter

Establish Regional Governance Frameworks
Develop a shared framework for ethical AI principles and standards.

Advance Open Infrastructure
Promote digital public goods and shared resources.

Foster Responsible AI Research
Establish hubs for responsible AI research and innovation.

Institutionalize Ethical AI Governance
Implement policies for ethical AI use and data privacy.

Build Capacity through Collaboration
Align regional priorities for AI capacity-building.

Enhance Mobility and Digital Cooperation
Facilitate virtual mobility and knowledge exchange.

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