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The strong and united voice of universities of science and technology in Europe

Input note

Topic:	Skills and competences for the era of AI: Perspectives on higher education from universities of science and technology
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To:	EU member states and the EU institutions
From:	CESAER

Introduction

CESAER, the strong and united voice of universities of science and technology in Europe, welcomes the growing attention at European and national level to artificial intelligence (AI) in education and to the skills and competences needed to use it effectively and responsibly, including through the Irish EU Presidency's work on the forthcoming Council conclusions on skills and competences to engage with artificial intelligence (AI). As AI reshapes our societies, including disciplines, professional roles and skill requirements, universities have a crucial role in preparing students for a rapidly changing future while safeguarding strong foundational knowledge, disciplinary expertise, critical thinking, judgement and metacognitive skills that remain essential.

Universities of science and technology, through their deep integration of education, research and innovation, are at the forefront of understanding and shaping the role of AI in knowledge acquisition and creation across disciplines, particularly in fields of strategic importance for Europe. AI presents both opportunities and challenges for higher education: the central question is how to equip students with the knowledge, skills and competences they need as technologies, disciplines and professions continue to evolve. This requires not only AI literacy, but the disciplinary expertise and human judgement needed to understand when, why and how AI should be used, taking account of students' differing prior experiences of AI. Integrating AI-related competences also requires choices about curriculum priorities. Curricula cannot simply expand each time new competences emerge; universities instead consider what should be added, adapted or deprioritised, while maintaining foundational and disciplinary knowledge.

The capacity to adapt and continue learning will become increasingly important throughout graduates' careers, increasing the importance of lifelong learning and universities' role in research-based upskilling and reskilling. At the same time, the current urgency around AI and related swift developments should not obscure that its implications for education, disciplines and professions will unfold over the longer term. Universities need space to adapt iteratively, drawing on accumulating evidence about changes in working life and on research-based disciplinary understanding, rather than responding through short-term or one-size-fits-all approaches.

Current AI capabilities change not only what students need to learn, but also how they develop and demonstrate their own competence. Teaching and learning processes should remain at the forefront, with AI used where it adds educational value grounded in research and pedagogy. AI can support and augment learning, but it can also encourage cognitive offloading or create an 'illusion of knowing', without

developing the underlying knowledge or competence. Universities therefore seek to ensure that the integration of AI does not displace productive intellectual effort, independent thinking or meaningful interaction between students and educators, and among students. This requires continuous and responsible experimentation, grounded on stronger evidence on what actually improves learning and on where AI can support or hinder the development of knowledge and competences. Keeping teaching and learning at the centre requires sustained investment in people, staff time and institutional capacity. Experience demonstrates that redesigning curricula and assessment for the age of AI requires additional time and expertise, while any potential workload reductions from AI-supported teaching and supervision so far remain unclear and largely hypothetical. These demands on universities come at a time when universities in many countries face budget cuts and erosion in national funding. Responding effectively to AI therefore requires sufficient and predictable investment in teaching capacity, staff time for curriculum and assessment redesign, support services and appropriate infrastructure.

Secure, equitable and responsibly governed AI infrastructure for higher education and research should be treated as a strategic European asset. Affordable access to high-quality, secure and responsibly governed AI tools and infrastructure increasingly requires coordination and investment beyond individual institutions, while unequal access risks widening disparities between students, institutions and countries. European and national approaches should also take account of the environmental impacts of AI infrastructure and use.

Drawing on case studies from CESAER Members and exchanges with university leaders and experts, this note identifies six areas where European and national action can create enabling conditions for higher education to respond most effectively and responsibly to AI. This input note is published ahead of the planned Council conclusions on skills and competences to engage with artificial intelligence (AI) and aims to contribute to wider European policy developments in this area. It builds on CESAER's earlier positions on artificial intelligence (June 2025), research and technology infrastructures (June 2025), Union of Skills (June 2025), digital education (November 2020), sustainable funding (March 2020), and the white paper Engineer of the Future (April 2024), and complements CESAER's position 'Strengthening STEM education for Europe's scientific and technological future' (November 2026).

AI is evolving rapidly, raising fundamental questions about the future of higher education, including how universities organise and deliver education, develop competences and assess learning. It affects not only the way students learn and deliver their tasks. It influences discipline-specific course content at an unprecedented pace. At the same time, much of the learning process that happens outside university is beyond the role of the university. Recognising AI's wider implications for research and innovation and for society in general, this input note sets out the perspectives and recommendations of universities of science and technology on AI in higher education. As AI continues to develop, sustained experimentation and evidence-building will be essential to understand its implications and ensure that existing approaches can evolve as appropriate.

Recommendations

We call on the EU member states and the EU institutions, within their respective spheres of competence and with due regard for university autonomy and academic freedom, to:

Integrate AI competences while safeguarding strong foundations and transversal competences

- Support higher education institutions, including financially and through enabling legislative and policy frameworks, in integrating AI literacy and discipline-specific AI competences into curricula, learning outcomes and continuing education where appropriate and in ways suited to disciplinary and educational contexts. Distinguish between the different purposes of learning about AI, learning with AI and, where relevant, developing specialist AI expertise, while safeguarding strong foundational knowledge, disciplinary expertise and essential human capabilities including creativity, problem-solving, critical thinking, independent judgement and metacognitive skills as technologies, disciplines and professions evolve.

Keep competence development and pedagogical purpose at the centre

- Create enabling conditions for higher education institutions to adapt teaching and assessment in line with intended learning outcomes as AI capabilities and use evolve. Ensure that relevant policies and support measures enable AI to enhance, rather than substitute for, the learning processes through which students develop and demonstrate their own knowledge, skills and competences.
- Support higher education institutions in adapting assessment, including financially and through enabling legislative and policy frameworks, so that students can meaningfully demonstrate what they know and can do, and that intended knowledge, skills and competences are assessed appropriately. As AI becomes an increasingly embedded part of learning and professional practice, approaches to assessment and academic integrity should distinguish between appropriate AI-supported work and uses that undermine students' ability to demonstrate their own knowledge, skills and competences. Expectations concerning students' use of AI in assessed work should be clear and proportionate to the role AI is permitted to play, taking account of the relevant disciplinary and educational context, while remaining sufficiently adaptable as technologies and patterns of use evolve.

Strengthen human and institutional capacity

- Support higher education institutions, including financially, in strengthening the human and institutional capacity needed to develop students' AI-related competences and to adapt teaching and learning responsibly, including through sufficient staff time, continuous professional development that helps educators understand evolving student uses of AI and their implications for learning, and access to appropriate pedagogical and technical expertise. Ensure that relevant policy and funding measures provide the flexibility, resources and organisational capacity needed to support curriculum and assessment redesign, bottom-up experimentation, coordination of approaches at institutional level, and evaluation and scaling effective practices as technologies evolve.
- CESAER reiterates its call for sustainable university funding, including a commitment to establish and achieve a public investment target for higher education benchmarked against the world's leading performers. At European level, CESAER calls for at least €200 billion for FP10 and €60 billion for Erasmus+ for 2028–2034, with predictable and protected programme budgets. These European

investments should complement increased and sustained national funding for the people, services and infrastructure universities need to fulfil their missions.

Build evidence on competence development and strengthen European knowledge-sharing

- Promote and adequately resource research, institutional pilots, responsible experimentation and systemic evaluation of how AI affects the development of students' knowledge, skills and competences, including the conditions under which AI-supported approaches add educational value or may hinder learning.
- Support dialogue between higher education institutions, employers and professional communities to strengthen understanding of how professional roles and competence needs are evolving.
- Facilitate European peer learning and knowledge-sharing on evidence, educational resources, effective practices and approaches that have not worked, taking account of different disciplinary and institutional contexts. Use existing European networks and cooperation frameworks, including European University Alliances and Erasmus+, to support experimentation, peer learning and dissemination.

Treat secure and equitable AI infrastructure as a strategic European asset

- Address inequalities in access to high-quality, secure and responsibly governed AI infrastructure so that higher education institutions, staff and students can develop and apply AI-related competences under equitable and safe conditions. Ensure that the protection and responsible use of student data underpin trust in AI-supported learning environments.
- Support shared European infrastructure, building on existing university capabilities, to strengthen Europe's AI capabilities and reduce strategic dependencies. Promote cooperation on procurement to improve equitable access, security, affordability and the availability of tools suited to higher education and research. Ensure that these efforts also address interoperability, appropriate institutional control over data and systems, fair supplier terms, access to professional support and sustainable financing across the full infrastructure lifecycle, so that institutions can sustainably operate, govern and use AI infrastructure for education and research. Take account of the environmental sustainability of AI infrastructure and use.
- Delivering strategic autonomy through sustainable investment is essential to strengthening Europe's position in AI, as elaborated in a dedicated CESAER position published on 30 June 2025. The objective must be to ensure that educators, students, researchers and innovators choose European AI tools because of their excellence and fitness for purpose, not because they are restricted from using AI tools developed elsewhere. This requires a continent-wide approach to European AI tools that embraces long-standing, like-minded partners across Europe, both within and beyond the EU.

Provide clear and adaptable guidance for responsible AI use

- Provide clear, coherent and proportionate guidance for higher education institutions on the application of the AI Act and other relevant legal and regulatory requirements to the use of AI in higher education, including data protection, information security, transparency, human oversight and

accountability. Provide sufficient legal certainty for universities while ensuring that guidance can adapt as technologies, their use and regulatory interpretation evolve.

- Support higher education institutions, including financially and through clear legislative and policy frameworks, in developing responsible approaches that enable students and staff to use AI critically and responsibly, including developing the capacity to recognise and address potential biases in AI systems. Encourage appropriate involvement of students in the development, implementation, and evaluation of AI-supported approaches in teaching and learning. Avoid unnecessarily prescriptive approaches and allow adaptation to technological developments and diverse disciplinary and educational contexts.

Conclusion

AI is rapidly transforming education, teaching and assessment, as well as the disciplines and professions for which universities prepare their graduates. Responding effectively will require agile, evidence-based approaches that can evolve alongside technological change and enable graduates not only to adapt to change, but to help shape it responsibly.

Universities of science and technology have a particular role in this transformation: through the close integration of science and technology-focused education, research and innovation, they develop the disciplinary expertise, critical thinking and human judgement needed to engage with swift technological change, while educating the scientists, engineers and innovators who contribute to the development and responsible shaping of future technologies.

The implications extend far beyond education itself. AI is emerging as a transformative technology across science, industry, healthcare, energy, transport, public services and society more broadly. European ambitions to deploy AI at scale therefore depend on a corresponding expansion of Europe's scientific and technological capabilities and talent. Universities of science and technology are central to this effort: they educate specialist AI talent while equipping future scientists, engineers and innovators across disciplines with the knowledge and competences to develop, apply and critically engage with AI.

An ambition of this magnitude cannot be delivered through marginal increases in university funding. If Europe is serious about harnessing AI at scale and substantially increasing the number of people equipped with advanced scientific, technological and AI-related competences, it must also invest at scale in the universities expected to provide them. This requires substantially strengthened and sustainable investment — at European, national and regional levels — in the people, teaching capacity, research and educational environments and infrastructure on which Europe's future scientific and technological capabilities depend.

CESAER stands ready to contribute the expertise and experience of universities of science and technology by convening its Members, sharing evidence and good practices, and supporting dialogue with European and national policymakers through relevant European cooperation frameworks

More information and contact

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