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Position Paper

AI and Digital Competence through Higher Education

Coimbra Group Employability Working Group

Digital technologies, especially generative Artificial Intelligence (AI), present both opportunities and challenges, fundamentally impacting our society, economy, and workforce. Digital competence is essential to harness these technologies' potential and address their challenges.

The European Commission's Union of Skills emphasises the need for enhancing foundational skills alongside digital and AI-related competencies to drive Europe's digital and industrial transitions. Geopolitical shifts, demographic changes and rapid technological advancements pressure education systems to keep pace with knowledge development. Research-based education is crucial for leveraging scientific discoveries and innovation.

Europe faces a growing skills gap, particularly in AI, digitalisation, and automation. These fields require new skill sets, not only in the STEM fields, but in most, if not all, professions. Preparing individuals for a constantly evolving job market requires a strong focus on developing these competencies.

In the digital transition, key competencies such as AI ethics, critical thinking, creativity, and problem-solving are crucial. It is essential to be aware of the risks and trade-offs associated with the use of generative AI, including data protection, intellectual property rights, compliance with data protection and AI regulations, and the human, environmental and political impacts of these technologies. While these tools offer significant advantages in terms of competitiveness and economic benefits, their potential drawbacks must be carefully considered. Therefore, a multidisciplinary, research-based approach is necessary.

Our key recommendations for AI and digital competence are:

- Strengthened support from European Funding Sources
- Investing in high quality teaching
- Implementing a real lifelong learning approach
- Recognising the core role of higher education
- Facilitating policy dialogue on trade-offs between benefits and challenges linked to the deployment of AI in education

The importance of research-based education

The ability to address this challenge depends on equipping the workforce with future-ready skills while ensuring that higher education institutions (HEIs) play a central role in the Union of Skills. HEIs are responsible for educating new graduates and supporting lifelong learning, upskilling, and reskilling across industries.

HEIs are uniquely positioned to shape the future skills agenda. By fostering cross-border collaboration, advancing AI education through a scientific approach, research-driven learning, and developing innovative models for skills development, HEIs can help Europe remain at the forefront of technological progress. Investing in AI-related competencies is crucial for securing Europe's role as a leader in the digital age.

Basic digital and AI competence for all

Digital and AI competencies go beyond the proper use of digital tools and platforms. They also encompass advanced thinking skills like analysing, evaluating, and creating with tools. Several European frameworks, including those by UNESCO and the EU, provide excellent guidance.

Implementation and adoption of AI in education should prioritise fairness, safety, reliability, privacy, security, transparency, explainability, accountability, environmental aspects, social well-being and human-centricity, in line with the AI Act and UNESCO frameworks.

Educational institutions face challenges, including pressure on teachers and students to adopt new technologies and addressing reluctance to change. Students and staff need a safe digital infrastructure to test and learn, which should be accessible to all. Understanding the evolving nature of technical knowledge within a skills ecosystem is essential, requiring a reconsideration of academic education that emphasises learning processes and experiences.

Success will be measured by leveraging AI's capabilities while preserving human-centred educational values and ethical considerations. Students and staff must become aware of responsible AI principles and acquire the necessary foundational knowledge in ICT, data, and AI. These core digital and AI competencies should cultivate AI-literate citizens and responsible leaders in a technology-driven world.

Career centres can also play a crucial role in preparing students and graduates for a working world where AI skills are crucial. This includes teaching basic AI skills and responsible use of AI, refreshing existing skills, integrating AI-related topics into career counselling, and developing specific workshop concepts.

Field-specific digital and AI skills

Digitalisation transforms disciplines and professions, not only in their execution but also in their methods, challenges, and solutions. AI tools have various applications across fields: in medicine, they improve diagnostics and patient care; in law, they automate tasks like document review; in finance, they enhance audits and data analysis; in geography, they advance GIS and remote sensing; in engineering, they improve design processes and 3D printing; in education, they personalise learning and assessments; and also in arts and

humanities, they offer diverse applications. To succeed in the labour market, candidates need knowledge about digitalisation's impact on their fields.

Teacher and educator training programs offered by higher education institutions are vital in preventing digital exclusion, beyond the sector itself. Redesigning study programs to include digital knowledge specific to each discipline is a challenge, requiring expertise and capacity across institutions. Achieving this requires investment, cooperation, and continuous training of teaching staff. Advances in digital fields are constant, requiring flexible accreditation processes.

Integrating digital and AI competencies specific to each field in study programs is essential for preparing students for the evolving labour market. With significant investments, institutional cooperation, and a commitment to continuous training, higher education can lead the digital transformation of society.

ICT and STEM specific approaches

The EU and member states focus on fields like ICT and strengthening STEM education to address today's digital system challenges. Europe relies on external digital systems and infrastructure, posing significant security and data protection risks. Upgrading systems and developing new solutions need more digital technology experts, prioritised by the EU and national governments.

Higher education institutions continually update their programs in line with technological advancements. Coimbra Group (CG) universities offer programs combining digital technologies with other disciplines, educating students in ICT fields such as digital security, software development, data science, AI, and information systems. These popular programs require significant investments to maintain quality, without neglecting other essential disciplines. Ensuring diverse and qualified applicants for technology studies is crucial.

Mathematics is key for technology studies, highlighting the importance of success in primary and secondary education. CG universities support a holistic approach, spanning early to higher education. Strengthening mathematics education is a vital investment in Europe's future technological capacity, alongside expanding technology study programs.

Re-skilling and up-skilling

While students often have advanced digital and AI skills, there is a need for train-the-trainer initiatives to help educators keep pace. It is also crucial to provide affordable continuing education for the existing workforce, especially for small and medium-sized enterprises and the cultural sector, which may lack resources. Developing digital technology skills is a priority for the EU and member states. Advantages include improving the adaptability and productivity of employees, improving retention and well-being, promoting innovation and growth, improving collaboration and communication. Incentives for collaboration between higher education and relevant sectors can ensure access to quality skills development.

The demand for continuing education increases, risking the rise of informal, low-quality offers that are not quality assured. Ensuring the availability of research-based, responsible, and quality-assured re-skilling and up-skilling is vital, particularly for teachers in schools, VET, and adult education.

Teaching staff

European higher education is undergoing a rapid transformation under the influence of digitisation, AI, and the growing demand for transversal skills such as critical thinking and adaptability. However, teachers and researchers face major challenges: increased workloads, a lack of training in digital tools, and persistent inequalities between institutions. If Europe does not support this transition in a structured way, it risks deepening educational divides and undermining the attractiveness and global competitiveness of its universities.

- Adapting pedagogical practices to AI, without a structured framework.
- Training teachers in AI and digitalisation, despite a lack of resources.
- Recognising time for innovation and continuing professional development.
- Effective evaluation in a digital context.
- Linking research, innovation, and teaching.
- Reducing the digital divide and ensuring inclusion.
- Fighting information overload and disinformation.

Administration and digital services in HE

The potential for automation using AI in HEIs is immense. AI can enhance the effectiveness and quality of services by streamlining administrative tasks, enabling personalised learning experiences, and higher quality services for staff and students. However, leveraging AI for these advancements necessitates substantial investments in both skills and service innovation. Staff must be equipped with the necessary digital competencies through targeted training programs, while institutions must prioritise the development and integration of cutting-edge technologies. Without such investments, the promise of AI-driven improvements may remain unfulfilled, and the disparities within the educational sector may be exacerbated. Furthermore, students and learners are likely to become accustomed to instant feedback and personalised services in their daily lives where they, to an increasing extent, are exposed to AI based tools. A failure to keep up with developments may lead to a disengagement of students and learners in the future.

Summary and Recommendations

Digital competence requires comprehensive and impactful actions to meet the scope of the challenge. It includes both transversal, field-specific, as well as ICT and STEM-specific approaches. Furthermore, a real lifelong learning approach is required to target learners of all backgrounds, at all levels, recognising the role of teachers in all sectors. To meet the challenge of digital transformation, we recommend:

- Strengthened support from European Funding Sources

The EU should invest in AI and digital skills recognising the multifaceted nature of the skills gap. Erasmus+ Key Action 2 offers several appropriate tools such as Cooperation Partnerships, Erasmus Mundus Joint Masters and Alliances. These funding instruments should be strengthened in the future programme, and more funding is needed to support more projects and to award larger grants to ensure impactful contributions to the challenge. Equally, other instruments such as the Digital Europe Programme and Horizon Europe should be utilised to support continued investments in digital and AI skills and research on skills and pedagogical innovation. More targeted actions should also be considered to address the need for AI in teaching.

- Investing in high quality teaching

We need focused efforts to address the skills of teaching staff at all levels. Building on existing funding instruments and platforms such as Erasmus+ and the European Digital Education Hub, we need to ensure a comprehensive approach to upskilling teaching staff to efficiently address the opportunities and challenges digital technologies present in their field and the labour market. Teachers are key for ensuring relevant skills for students and learners. Furthermore, to ensure high quality teaching offers in AI-related topics, quality assurance mechanisms are crucial to prevent bias, and to support the responsible use of digital technologies. Economic motivation may lead to traditional stakeholders gaining significant influence.

- Recognising the role of career competencies

Career centres or career services at universities can play an important role in transversal skills development including AI and digital competence and is an important mediator between the world of work and education. Career centres or other forms of provision of career management skills should be acknowledged in the European skills agenda.

- Implementing a real-lifelong learning approach

It is crucial to ensure relevant competence for the existing workforce. Investing in the provision of affordable and quality assured offers is key. Funding instruments must be fit for purpose in terms of continuous education, and there must be scope to explore various formats such as micro-credentials and other formats depending on the needs of the learners.

- Recognising the core role of higher education

We need research-based education that leverages scientific discoveries and innovation. Furthermore, higher education has a key role in educating and up-skilling teachers at all levels, as well as other lifelong learners.

- Investing in administration and digital services in HE

Similar to other public services, there is a potential for better and more effective service delivery. The EU, Member States and institutions need to invest in digital skills and digital innovation capacity to reap this potential.

- Facilitate policy dialogue

It is still challenging to balance the economic potential of technological innovations and the labour market demands for putting the technology to use, against challenges such as geopolitical issues, the concentration of power, personal protection, critical thinking and human development. We recommend that the European Commission take a coordinating role in facilitating policy dialogue to ensure a balanced approach and awareness of risks linked to both open or overly restrictive approaches.

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