LIFELONG LEARNING PLATFORM
EUROPEAN CIVIL SOCIETY FOR EDUCATION

```
#!/us/bin/env python3
import torch

def run_experiment():
    """
    ============================
```

WORKING PAPER

AI IN EDUCATION AND TRAINING

Author: Lifelong Learning Platform

Date: October,2026

```
    ============================
    """
    model = torch.nn.Transformer()
    return model.eval()

if __name__== "__main__":
    print(run_experiment())
```

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1 Background

The EU agenda on digital education has been intensifying since the 2010s, with the more structural manifestation representing the launch of the **European Digital Competence Framework** (DigComp) in 2013, and the emergence of the **Digital Education Action Plan** in 2018, followed up by a new Digital Education Action Plan 2021-2027. The Plan's implementation coincided with widespread launch of Generative Artificial Intelligence (GenAI) models which quickly found their applicability in education and training. This massive shift in 2022 caused the EU to focus, within the digital education agenda, more on AI. The most recent update of DigComp, the 3.0 version (2025), includes renewed focus on competences relevant for AI usage. The European Commission and the OECD launched an **AI Literacy Framework**, while the Commission already published **Guidelines on the ethical use of artificial intelligence and data in teaching and learning**, which were updated in **2026**. The Council of the EU, namely the EU Member States, adopted **Conclusions on teachers in the era of artificial intelligence (AI)**, with upcoming **Council Conclusions on AI skills and competences** scheduled for Autumn 2026. These non-binding initiatives come on the backdrop of the EU and Member States simplifying AI rules in a binding legislative simplification action, **Omnibus VII**, entered into force in July 2026. Several resources mentioned above were developed in co-creation with the education and training stakeholders via the **European Digital Education Hub**. It must also be highlighted that policy frameworks are complemented by large scale data collection initiatives, such as **IEA**'s **ICILS** which assesses Grade 8 students' computer and information literacy and computational thinking, or the **OECD 2023 Survey of Adult Skills** which helps policy tailoring by showing how adults differ in proficiency, age, language background, employment and previous education.

The **Lifelong Learning Platform** publishes its Working Paper on AI, to bring together the perspectives of all impacted by it in education and training since **stakeholders must be co-creation partners** on AI, rather than clients using a tool. The Paper looks at **usages of and teaching about AI in the sector**, considering that GenAI is only a part of it. It will **challenge assumptions on AI**, focusing on how AI is taught and used by learners, practitioners, educators, institutions and stakeholders in the sector, and assessing its added value. The paper is developed together with the **LLLPlatform members**, to ensure that their challenges and solutions are spotlighted. On 29-30 June the LLLPlatform membership and stakeholders in education and training - social partners, civil society networks, Member States representatives, EU institutions representatives, and researchers - gathered at the European Parliament for the **LLLPlatform High Level Policy Debate on AI in Education and Training.** The event included co-creation breakout sessions, where members and partners provided input. The final draft was reviewed by the entire membership and a series of partners present at the event, including the European Commission. **The aim is to understand which competences are needed for the safe, ethical, and responsible co-creation and usage of AI, and which competences, absolutely necessary in society, are overlooked due to AI-hype.** Most importantly, this Working Paper will look at AI's impact on **all sectors of learning**, not only on school education, which is currently prioritised by EU policies, highlighting how heterogeneous the EU's population is and what diverse needs there are.

2 Artificial Intelligence's Presence in Education and Training

In the last 40 years, research in Artificial Intelligence in Education (AIEd) grew exponentially[1], with more tools and approaches emerging after the COVID-19 pandemic and the GenAI rise. Though not all uses of the term 'AIEd' refer to all sectors/levels of education and training, in this paper it will be used to cover all of them, with references made to relevant education and training institutions when AIEd implementation is sector-specific.

AIEd is a software using AI features - i.e. computer systems designed to perform complex tasks that typically require human intelligence, by means of recognising patterns and inferring predictions, sometimes with the intent of creating new material from inferred predictions[2] - within education and training to provide a deeper understanding of how learning takes place and improve on it. Initial AI taxonomies focused on its design: **pedagogical models, domain models, or learner models. Pedagogical models were adapted based on knowledge of expertise of teaching**, allowing students to explore an answer before providing 'correct' responses or providing feedback based on students' actions. **Domain models were based on the knowledge of the taught subject**, with exact information on topics such as mathematical operations, laws of physics, etc. **Learner models adapted to the knowledge of the learner,** tailoring content and types of exercises based on learners' previous actions or emotional states[3]. **Later taxonomies classified AIEd based on its intended user: learner-facing, teacher-facing, and system-facing models[4].** Intelligent tutoring systems (ITS) are an example of learner-facing models, adapting materials based on learners' needs, giving feedback, facilitating collaboration with other learners, etc. Teacher-facing models are intended to simplify educators' work, automatising grading, administration, feedback, plagiarism detection, giving up-to-date information on learners, etc. System-facing models pool data from education and training institutions, providing insights on learner- and educator-trends[5]. However, with GenAI's advent the classifications start to blur against each other[6], as recent taxonomies show that most AIEd technologies embedded GenAI[7]. The section below explores generative or predictive AI tools to show benefits and drawbacks, without covering the entire selection of available tools. It will focus on tools with a direct pedagogical/andragogical link, and will not insist on long-term embedded AI solutions such as applications that spell-check, filter emails, etc.

[1] Rose Luckin and Wayne Holmes (2016). Intelligence Unleashed: An argument for AI in Education. LLLP and DLearn (2024). Artificial Intelligence in Education: A Critical Analysis within the European Union Context.
[2] Rose Luckin and Wayne Holmes (2016). Intelligence Unleashed: An argument for AI in Education. UCL Knowledge Lab.
[3] Ibid.
[4] Toby Baker, Laurie Smith, and Nandra Anissa (2019). Educ-AI-tion Rebooted? Exploring the future of artificial intelligence in schools and colleges. NESTA.; Wayne Holmes (2023). The Unintended Consequences of Artificial Intelligence and Education. Education International.
[5] Ibid.
[6] OECD (2026). OECD Digital Education Outlook 2026: Exploring Effective Uses of Generative AI in Education.
[7] Wayne Holmes (2026). Artificial Intelligence in Classrooms: Ethical Dimensions. European Parliament.

3 Artificial Intelligence's Benefits and Drawbacks in Education and Training

To be comprehensive on AI's benefits and drawbacks in education and training is impossible considering the current levels and types of research. This is not to say that the research field has not already provided vast amounts of studies, but rather to underline **the lack of sufficient longitudinal research**[8]. Therefore, **a crucial recommendation from all stakeholders in education and training is to increase the funding and efforts on AI research, and ensure that decisions on AIEd's structural integration are not taken and implemented unless effects have been properly tested, and research provides sufficient evidence on which to base those decisions.**

a. Learners' Understanding and Usage of AIEd

To capture the diversity of usage would be impossible considering the many learners with different styles and also the wide-variety of AIEd available. The **2025 PISA results** analysis pointed to such complexity when trying to link AI usage with academic performance. Students not using AI for specific schoolwork tasks were identified to outperform those that use it regularly for this. When covering usage of AI for general purpose, no discrepancy was identified in terms of academic performance between weekly users and non-users, while frequent AI users can slightly perform better if their use is paired with opportunities to develop AI literacy skills. Much more research will be needed to disentangle the different impacts of AI usage[9].

Nevertheless, a more researched tool is the **Intelligent Tutoring System (ITS)**. ITSs can now provide adapted responses based on learners' previous answers, or even track learners' emotional engagement while learning, identifying when frustration is experienced to provide encouragement. These systems' dynamic approach gets **learners to feel at ease to engage continuously with the tools and ask questions that they might be worried to ask in other contexts.** In latest OECD analyses, **ITSs** could better adapt to partial answers, match learners' needs, have a better memory, and **could even adapt according to Vygotsky's notion of assisting within the learner's Zone of Proximal Development**[10]. ITSs have been classified as reflection partners, cross-domain companions, and motivational interlocutors[11]. The **motivational interlocutor poses serious**

[8] Wayne Holmes (2026). Artificial Intelligence in Classrooms: Ethical Dimensions. European Parliament

[9] OECD (2026). PISA 2025 Results (Volume I).

[10] The Zone of Proximal Development is the gap between what a learner can do independently and what they can achieve with guidance from a "more knowledgeable other" (e.g., a teacher or peer). It represents the ideal learning zone where tasks are challenging but achievable with support.

[11] OECD (2026). OECD Digital Education Outlook 2026: Exploring Effective Uses of Generative AI in Education.

study aimed at learners in a Physics course, learners reported feeling more confident in engaging in learning due to the ITS' constant availability and tailored support[12]. Moreover, the OECD compiled data from various studies showing how certain ITSs overperformed poor quality human mentors or how human tutors struggling in their profession could ensure that their learners significantly increased learning outcomes after augmenting their mentoring methodology with ITSs[13]. This **trains learners to trust machines more, to allow machines to monitor their emotions and provide advice to them as if they would be people, based on how ITSs are currently used[14].**

The risk of AI's anthropomorphisation

AI usage cannot be allowed without educator guidance, without fostering a relationship between educators and learners. Simply providing disclaimers that AI is not human will not make learners trust these tools less, if the support received from ITSs still outweighs the human support they receive. **This is a failure linked to a learning system that is inadequately tailored to their needs, outsourcing responsibilities to technological solutions without considering long-term implications. Anthropomorphising AIEd blurs lines in the relationship that users have with them, creating a surrogate for human interactions.** UNESCO warned against anthropomorphisation, especially for a developing child or young person[15]. Though AIEd's design can correct this, learners have access outside education and training to other GenAI and agentic AI tools[16], which in many cases are designed to maximise profit and users' engagement, via anthropomorphisation, sycophancy, quick gratification, and suggestion features[17]. Since learner supervision within education and training institutions accounts for a small part of learners' general engagement with digital and AI tools, **teaching about AI must come as a precondition to using AIEd in an educational setting.** This ensures that misunderstandings on AI's nature and purpose are debunked and learners know AIEd's limitations. It is imperative that learners grasp the binary, algorithmic and overall technical nature of AI and especially Large Language Models (LLMs).

AI literacy is a derivative of digital literacy, understanding how computers work and appear to "think". Digital literacy can be taught from the earliest age, but it should first be explained and grasped using analogue tools. Computational thinking, for example, starts being developed when a 4-year-old can follow simple instructions by parents/educators on how to sequence putting on their clothes. Ability to discern real from artificial starts from building trusting relationships with adults and peers, having safe spaces to converse about thoughts, and engaging with real-life natural laws which create a reference point for later discernment between artificial and real relationships and environments. AI-mediated environments can reduce the potential for human interaction, which impacts

[12] Gregory Kestin, Kelly Miller, Anna Klales, Timothy Milbourne, and Gregorio Ponti (2025). AI Tutoring Outperforms Active Learning.
[13] OECD (2026). OECD Digital Education Outlook 2026: Exploring Effective Uses of Generative AI in Education.
[14] Ibid.
[15] UNESCO (2022).Recommendation on the Ethics of Artificial Intelligence.

[16] Agentic AI tools are autonomous software systems that use artificial intelligence to perceive its environment, make decisions, and execute multi-step tasks to achieve specific goals with minimal human supervision. GenAI simply creates new content based on available information and predictions regarding it, only when prompted by users. Agentic AI can act on objectives and make decisions without constant human involvement.
[17] Seth Jacobowitz (2026). The hidden functions of sycophancy in AI systems: steering, consistency, and cognitive dependency. AI & Society, 41, pp. 6573-6588.

the development of competences such as sociability, empathy, emotional regulation, ending up with more difficulties for societal participation[18]. AI literacy can build on this by introducing sorting algorithms in real life in a school yard[19], or building an analogue "matchbox computer" (AKA. hexapawn) to understand the power of feedback that fuels AI's key feature - machine "learning"[20].

Python

Case Study - European Council for Steiner Waldorf Education - the HERMMES Curriculum

LLLPlatform's member, ECSWE, developed a curriculum for media education based on the DigComp competence areas, adapted to children aged 0-18, and funded through the Erasmus+ programme. Though there is a multitude of curricula available, what distinguishes this one and provides applicability for this Working Paper's purposes is the **curriculum providing age-appropriated approaches** which develop digital competences without digital tools usage, and scaffold the competence developed based on learners' specific age.

The voice of stakeholders in decision-making on AIEd

In addition, ITSs' adapting to learners' needs and the general research around AIEd starts from the assumption that the EU already has excellent needs-identification systems. However, very often learners' rights in terms of having their voice heard are not respected. LLLPlatform members active in the early childhood education and care and school education highlight the **insufficient knowledge that people in society have of children's rights**. AIEd is implemented at this level of learning without comprehensive consultations with young learners or their parents, under the assumption that they do not have the capacity to take such decisions. However, the **empowerment of young learners** to be involved in decision-making on which AIEd is used and how is not only a question of rights, but also **lays at the foundation of developing critical thinking[21].**

[18] European Commission (2026). Friend or foe?: Evidence from the use of generative artificial intelligence in learning and teaching.
[19] HERMMES (2026). Bubble sort in the school yard – sorting algorithms one step at a time. The HERMMES practice example collection.
[20] HERMMES (2026). Hexapawn – Playing chess against a matchbox computer to grasp the feedback principle underlying machine "learning" - AI unplugged 3. The HERMMES practice example collection.

[21] Esther M.A. Geurts, Rianne P. Reijs, Helene H.M. Leenders, Maria W.J. Jansen, and Christian J.P.A. Hoebe (2023). Co-creation and decision-making with students about teaching and learning: a systematic literature review. Journal of Educational Change, 25, pp. 103-125.

Python

Case Study - Eurochild and Learning for Wellbeing Foundation - We Are Here: A Child Participation Toolbox

LLLPlatform's members, Eurochild and L4WB-F, developed in 2020 a comprehensive Toolbox to aid institutions in practices that increase **child participation in decision-making**. This is not intended only for AI-related decision-making, but rather is a framework used in all contexts of education and training, and beyond. For this Paper's purposes, this toolbox can provide the needed support to organise **methodologies under which learners can be consulted on AIEd choices**, having also developed their critical thinking competences.

The perceived infallibility of AI and the case of model collapse

Furthermore, as these ITSs are now enriched by LLMs, the fear of **model collapse**[22] raises, having been documented extensively with AI feeding on AI-generated content which perpetuates dubious or fake information[23]. This flooding of the internet with 'AI-slop'[24] increases the pool of flawed information which the LLMs operate with, increasing potential for AI hallucinations[25], including in AIEd, like a vicious cycle. Wrong information will be presented with long-lasting effects on susceptible, young learners in process of developing discernment capacities[26]. Though AIEd tools have been improving their training capacity and design features could limit the pool of information they work with, a series of experiments showed that the scale at which data sets can be poisoned is exceptionally difficult to handle once LLMs are automated. Tracking back the original data sets in LLMs is tremendously difficult given the pace at which new data proliferates[27]. Even a small contamination can have a rippling effect, while significant efforts are needed for data hygiene and human oversight[28]. Recent tests on Chat-GPT showcased how it could be used for mathematics learning, but only with robust

[22] Model collapse stands for a degenerative process affecting generations of learned generative models, in which the data they generate end up polluting the training set of the next generation. Being trained on polluted data, they then mis-perceive reality.

[23] Ilia Shumailov, Zakhar Shumaylov, Yiren Zhao, Nicolas Papernot, Ross Anderson, and Yarin Gal (2024). AI models collapse when trained on recursively generated data. Nature, 631, pp. 755-759.

[24] AI Slop as the vast repository of digital content: text, images, code, and data, generated by AI that is derivative, unrefined, and often lacks factual or logical coherence; as defined by Samar Ansari (2025). AI Slop and Data Pollution in the Age of Generative AI: Strategic Risks, Economic Consequences, and Governance Pathways for Business, Management, and the Creative Industries.

[25] AI hallucination is a phenomenon where, in a LLM, often a generative AI chatbot or computer vision tool, perceives patterns or objects that are nonexistent or imperceptible to human observers, creating outputs that are nonsensical or altogether inaccurate.

[26] Ben Williamson, Alex Molnar, and Faith Boninger (2024). Time for a Pause: Without Effective Public Oversight, AI in Schools Will Do More Harm Than Good. National Education Policy Center.

[27] Ilia Shumailov, Zakhar Shumaylov, Yiren Zhao, Nicolas Papernot, Ross Anderson, and Yarin Gal (2024). AI models collapse when trained on recursively generated data. Nature, 631, pp. 755-759.

[28] Samar Ansari (2025). AI Slop and Data Pollution in the Age of Generative AI: Strategic Risks, Economic Consequences, and Governance Pathways for Business, Management, and the Creative Industries.

hallucination mitigation techniques[29]. **This highlights that there is a need for great care regarding how ITSs incorporate AI or which AIEd tools are used in education and training, considering that it can incur costs and human-power beyond the sector's capacities, while any oversight can lead to damning consequences** for learners' long-term development**.** At the minimum, the use of **ITSs must be accompanied by media and AI literacy education**, both for students and educators. It has to be highlighted that educators must have teaching-AI competences, since they both technical AI literacy but also competences on pedagogical design, assessment, ethical reasoning, data awareness, critical evaluation of AI outputs and responsible professional decision-making[30].

The wicked problem of baked-in bias and homogenisation for AI

AIEd and GenAI bring a risk for the **homogenisation of cultural content and viewpoints**, since predictive technology is bound to promote mainstream perspectives, and it will feed more of the increasing AI-created content, which is not covered by copyright restrictions. As UNESCO identified, this danger is bound to erode the cultural fabric of our societies[31], the learning about our cultures, and the development of competences linked to creativity and originality. Next to teaching learners about GenAI in technical terms, **the solution should not be to learn better how to prompt and adapt to the tools. The objective is to ensure that the tools are adapted to the learners' needs.** Otherwise, we risk that our learners spend a disproportionate amount of time fact-checking AI-generated materials and distrusting any source of information due to information-overload instead of focusing on learning and producing[32].

AIEd tools continue to **discriminate against different cultural perspectives and different types of learners**. LLLPlatform members explained how AIEd tools help with real-time translation and adaptive language learning, allowing migrant or migrant-background learners to have their needs identified and adapted to. However, these benefits come with risks regarding data collection that might violate the privacy of learners from a migrant-background, as well as with the fact that the AIEd tools predominantly used in Europe lean towards a Western-based culture, conflating the diversity present in European learning environments[33]. This is happening even as educators have long been asking for training on sensitive management of multicultural classrooms[34].

The risks of excessive screen time and its relationship to supervised learning

[29] European Commission (2026). Friend or foe?: Evidence from the use of generative artificial intelligence in learning and teaching.
[30] Ricardo Alberto Reza Flores, Rosa Maria Vicari, Cristiano Galafassi, and Mireia Usart (2026). Taxonomy for Human Life and Artificial Intelligence (TaVHIA): A Transdisciplinary Architecture That Reframes the Human–AI Relationship in Education. 18th International Conference on Computer Supported Education.
[31] UNESCO (2026). Re|Shaping Policies for Creativity: we share, we act, we build.
[32] Ben Williamson, Alex Molnar, and Faith Boninger (2024). Time for a Pause: Without Effective Public Oversight, AI in Schools Will Do More Harm Than Good. National Education Policy Center.
[33] Gareth Barkin (2025). Epistemological Persistence in Multilingual AI: The Illusion of Locality in Large Language Models. International Review of Modern Sociology, 51(1-2), pp. 73-100.
[34] European Commission (2023). Promoting diversity and inclusion in schools in Europe.

Education and training institutions cannot ensure supervision on learners' usage of digital tools outside instruction hours. However, learners are confronted with an overexposure to digital tools from too early on in their life. In a 2026 **Eurobarometer**, 25% of adolescents aged 13-18 reported spending over six hours on a screen each day. On average, adolescents spend over four hours daily on screens, exceeding what is quantified as excessive screen time. The damage to brain development is documented[35], and was shown to be impactful for adults as well. The excessive screen time is impacting brain parts linked to memory formation, problem-solving, focusing, while diminishing gray matter and affecting sleeping cycles. All this opens up the brain to significantly quicker aging, reduction of capacity, and increased risk for dementia[36]. The majority of the time spent on screens cannot be attributed to the time in education and training institutions, but as the numbers of learners addicted to screens grows, it is necessary for education and training institutions to intensify their contribution to efforts in combating such trends. The education and training institutions already provide a multitude of analogue solutions as is recommended in the EC and OECD AI Literacy Framework, and as showcased in the HERMMES case study above. Though some aspects of excessive screen time are negative irrespective of the content consumed, there needs to be underlined that short, bite-sized content which overload the dopamine system and do not engage memory and executive functioning are much more problematic. All these ramifications require an analysis of how AIEd is used, ensuring that though digital activities are performed, these are balanced in the education and training institutions with analogue approaches, and work towards providing content that develops learners' competences to self-regulate screen usage. LLLPlatform is looking forward to **ICILS 2028** which will expand its focus on digital wellbeing, including digital self-regulation, emotional resilience and digital connectedness. **Therefore, the inclusion of AIEd tools must come with a wider reflection on the curriculum, that ensures an alternation between screen use and other types of learning activities, embracing analogue techniques for preparing competences needed for the usage of AI, having the age of the learner in mind, promoting resources such as the EC and OECD AI Literacy Framework and the HERMMES curriculum.**

Growing equity gaps in different learning environments

Though the previous sections touched upon equity, when looking at VET and higher education, learners already passed through a few levels of education and training and **equity gaps exponentially rise**[37]. The LLLPlatform members operating in these sectors expressed significant **academic gaps between learners that successfully leveraged AI and had access to it compared to the others.** This highlights once more the importance of supervised training, and

[35] Sudheer Kumar Muppalla, Sravya Vuppalapati, Apeksha Reddy Pulliahgaru, and Himabindu Sreenivasulu (2023). Effects of Excessive Screen Time on Child Development: An Updated Review and Strategies for Management. Cureus, 15(6). ; Jörg M. Fegert and Maria Melchior (2026). Child safety online - Protecting and Empowering Minors in a Digital World. European Commission - Report by the Co-Chairs of the Special Panel on Child Safety Online.

[36] Laurie A. Manwell, Merelle Tadros, Tiana M. Ciccarelli, and Roelof Eikelboom (2022). Digital dementia in the internet generation: excessive screen time during brain development will increase the risk of Alzheimer's disease and related dementias in adulthood. Journal of Integrative Neuroscience, 21(1).

[37] Sahan Bulathwela, Maria Perez-Ortiz, Catherine Holloway, Mutlu Cukurova, and John Shawe-Taylor (2024). Sustainability, 16(2); Mokgata Alleen Matjie, Andani Nethavhani, Mary Matlakala (2026). AI and the digital divide in education. Frontiers in Computer Science, 8.

progressive training with associated curricular changes across educational levels to ensure that foundational competences are robustly developed. As raised by UNESCO, educational inequalities can be exacerbated by educators lacking teaching-AI competences[38]. Educational policies should address emerging AI divides, including disparities in teachers' AI competence, institutional capacity, critical evaluation skills, and opportunities to engage meaningfully with AI-supported learning.

The equity gaps are felt not only within sectors but also between VET and higher education, as AI usage had a greater uptake in higher education, which furthers misconceptions that VET is a 'second choice'. VET stakeholders mentioned that work-based learning, apprenticeships, vocational laboratories, sector-specific training, or cooperation with employers complicate AIEd adoption. A true commitment to boost AI uptake in VET requires tailoring resources for both in-school and in-company activities. **The EU agenda on improving VET attractiveness cannot be achieved until AIEd benefits are experienced by each format of learning, and the competences necessary to engage ethically and effectively with AI are developed by all learners and educators.** The conversation becomes more complex when looking at different topics of study across VET and higher education. Stakeholders in the artistic fields grapple with the debate over whether AI can aid people's creativity or it simply replaces it, but also with **graduates' rights as their work is mined and used to perfect AI systems[39] that could potentially replace them on the labour market.**

Python

Case study - EfVET - RenAIssance

LLLPlatform member, EfVET, started in 2025 to address specific AI skills gaps in higher education and VET within the Cultural and Creative Industries (CCI) through the **RenAIssance** project, which will last until 2029. RenAIssance identifies **key AI competency gaps and delivers specialized training programs across multiple European countries.** It designs AI-enhanced learning resources aligned with European Qualifications Framework (EQF) levels 3-8, ensuring industry relevance and employability. Training programs include generative AI, digital craftsmanship, and eco-conscious design methodologies. The project will define and validate AI-driven occupational profiles and competences, and ensure formal accreditation for all AI training.

Beyond tertiary education, Eurofound identified inequity among workers using AI. 30.9% of the highly educated individuals in the EU use AI for professional purposes while only 4% of the low-educated workers use it[40]. The LLLPlatform adult education stakeholders expanded the perspective on the equity gap beyond professional AI usage, expressing significant concerns around the **addictive and infantilising design of AI tools, and specifically AIEd, as well as the risks these tools pose for community-led learning.** AIEd and AI tools marketed towards earlier levels of learning contain stronger safeguards, whereas **adults are**

[38] UNESCO (2024). AI competency framework for teachers.
[39] UNESCO (2026). Re|Shaping Policies for Creativity: we share, we act, we build.
[40] Eurofound (2026). Who uses Generative AI? Patterns and inequalities across the EU.

mostly considered from a user perspective, rather than a learner perspective, with tools

being geared towards retaining adult users as much as possible on platforms, while recommending AI usage for any task. This erodes capacities to engage actively in the community, and learn together with others, at a slower pace. In addition, if there are reservations still on how it should be used in schools, it is already presented as inevitable on the labour market. **Such inevitability, brought forward by the companies that have most to gain from AI usage, forces adults to engage with the tools with limited investment and attention dedicated to their learning journey.** Investment in adult learning across EU Member States remained at 0.5% of their GDP, with company-based learning investment raising it to around 1%[41]. With a higher population of adult learners compared to young learners, these numbers are untenable. This AI inevitability is rejected by the non-formal and informal learning sector that focuses on developing democratic and citizenship competences. Fostering such competences gives people choices and allows them to reject AI tools should they wish to, but this does not sit well with the current inevitability trend.

Adults are a heterogeneous group that experiences AI differently. Those with low basic competences encounter AI less often as a learning tool than through recruitment, work allocation, benefit administration, health information or other essential services. However, AI-supported services should retain an accessible human and non-digital route. Adults should not have to use AI, disclose unnecessary data or understand a complex automated system to obtain a service or learning opportunity. This is aligned with **broader campaigns** for ensuring people's right to access essential services offline.

Python

Case Study - EBSN - iRead4Skills

LLLPlatform member, EBSN, was involved in the **iRead4Skills** Horizon Europe project. It developed **open-access tools** in Portuguese, French and Spanish for adults with low literacy and for practitioners and organisations supporting them. Its Assess Complexity and Writing Assistant tools classify written texts by level of difficulty and identify features of vocabulary, syntax, meaning and textual structure that may impede comprehension. A mobile application offers a **simplified way to assess texts, while a Microsoft Word add-in** helps authors create more accessible material. A classified title database assists trainers and learners in finding suitable reading resources.

The title database also classifies literary and other culturally valuable works by textual complexity, helping adult learners and practitioners identify reading suited to the learner's current level and build confidence to progress towards more demanding literature; where adaptation is needed, the project's writing tools can assist practitioners in making texts more accessible.

The tools can help practitioners **select and adapt authentic texts to learners' current reading proficiency, organise progressively more demanding reading activities and make sources of difficulty more visible.** They support, rather than replace, professional judgement and dialogue with learners.

[41] European Commission (2020). Workforce skills and innovation diffusion - Trends and Policy Implications.

b. Educators' Usage of AIEd

Some of the most reported uses of AIEd tools by educators are assistance with lesson plans attuned to curricular objectives in their country, filling in administrative documentation, and creating educational materials and resources[42]. **Considering the long-documented pressures on the educator profession, it is natural that they sought automatising increasing responsibilities and management of classrooms and workloads[43].** OECD provides solutions on how educators and AI can collaborate, starting from the more dystopian 'replacement' approach, to collaborative solutions which operate transactionally, situationally, or operationally and which can be combined with augmentation[44].

An overwhelmed profession with little capacity for AI integration

It is highly unlikely that educators would systematically turn to collaboration or augmentation with AI when pressure mounts and they need quick solutions[45]. Education and training systems miss comprehensive strategies to adapt educators' training to include AIEd in their approach, they miss accompanied training on related competences such as media and information literacy, they miss strategies on the procurement and usage of AIEd in education and training institutions, and there are insufficient guidelines on augmenting using AIEd[46]. Even if these resources are created, the expectation falls on educators to implement this adaptation. ICILS 2023 points to a gap between rapid AI adoption and system-level support, considering that in most participating countries, **fewer than one third of principals reported receiving guidance from education authorities on GenAI use**[47]. By 2022, only seven UNESCO countries had developed AI frameworks for teachers[48].

Currently, fewer and fewer people aim to join the teaching profession[49], and the additional burden of digitalising on their own adds up on the reported high level of burnout for new entrants in the profession due to lack of support systems[50]. Access to continuous professional development is difficult, though many educators report the need for it[51]. Unless the profession gets similar salary recognition to other tertiary educated jobs, the support personnel is increased, the administrative workload is better balanced with pedagogical/andragogical workload, decision-making includes educators, and learners are involved to cooperate with

[42] OECD (2026). OECD Digital Education Outlook 2026: Exploring Effective Uses of Generative AI in Education.
[43] European Commission (2023). Education and training monitor 2023 ; Ben Williamson, Alex Molnar, and Faith Boninger (2024). Time for a Pause: Without Effective Public Oversight, AI in Schools Will Do More Harm Than Good. National Education Policy Center.
[44] OECD (2026). OECD Digital Education Outlook 2026: Exploring Effective Uses of Generative AI in Education.
[45] Ben Williamson, Alex Molnar, and Faith Boninger (2024). Time for a Pause: Without Effective Public Oversight, AI in Schools Will Do More Harm Than Good. National Education Policy Center.
[46] Dlearn (2025). Artificial Intelligence for Equity and Inclusion in European Education: Challenges and Opportunities.
[47] IEA (2024). ICILS 2023 International Results and Report Findings.
[48] UNESCO (2024). AI competency framework for teachers.
[49] European Commission (2026). The teaching profession in the EU - A comparative analysis building upon the TALIS 2024 results..
[50] OECD (2025). Results from TALIS 2024 - The State of Teaching.
[51] European Commission (2026). Friend or foe?: Evidence from the use of generative artificial intelligence in learning and teaching.

educators[52], among many other needed changes, the uptake of quality and impactful AIEd without burning out the profession is impossible. Especially if we factor in also the hidden labour that educators would have to contend with when checking if AI tools 'hallucinated' content or not[53]. What is witnessed across the EU is a series of cumulative conditions that are not met which place the educators in a position where it is difficult to progress in any new direction, and especially on AI. Furthermore, the current adoption points towards educators being servants to technology, dedicating vast time resources to double-check the work of the AI and having their professional expertise ignored by becoming AI quality assurance checkers[54].

Looking beyond teachers: Educator engagement with AI

The above reflections referred to regulated teaching professions, but other professionals in the sector experience similar conditions, such as in-company trainers, apprenticeship mentors, professionals supporting learners in the workplace, youth workers, adult educators. They need access to training, and to a supportive professional system that allows safe and smooth AI integration in their work.

Educators in the non-formal and informal learning sector are frequently excluded from AI conversations, even as much of the learning that people do in life occurs outside formal learning. With insufficient research and data collection on this sector, the potential that it could have in developing AI competences is squandered, and it is not always considered in policymaking. They provide **community-based services which reach out to those most disadvantaged in conditions that the learners trust more**, especially if they had negative experiences in more institutionalised settings, such as formal education and training. This outreach must be further leveraged if all people are to have equitable access to develop AI competences, and do so under safe conditions rather than by running the risk to uncritically engage with tools in their households, in the absence of easily accessible and effective guidance. **The Big Tech often promotes its tools for profitmaking, without providing sufficient guidance for personal usage, leaving the 40% of Europeans without basic digital skills[55], for example, at risk of uncritical engagement with tools.**

Specifically looking at **adult basic skills practitioners, they combine teaching with outreach, guidance, confidence-building, assessment and referral**. Libraries, community organisations, migrant associations, employment and health services, trade unions, employers, volunteers and former learners may provide the first trusted contact. AI can support multilingual messages, plain-language materials and warm referral, but passive digital outreach will not overcome the adult-learning participation gap. Providers need approved tools, clear data rules, support when incidents occur, protected professional learning time and a named person who remains accountable for consequential decisions. Volunteers and peers can build trust, but should complement rather than replace qualified staff.

[52] LLLPlatform (2024). 21st century challenges for the educator profession: a call for system change: The changing role and challenges faced by education and training professionals.
[53] European Commission (2026). Friend or foe?: Evidence from the use of generative artificial intelligence in learning and teaching.
[54] Ben Williamson, Alex Molnar, and Faith Boninger (2024). Time for a Pause: Without Effective Public Oversight, AI in Schools Will Do More Harm Than Good. National Education Policy Center.

[55] Eurostat (2026). Skills for the digital age.

Python

Case study - European Association for the Education of Adults and All Digital - Emerging Technologies for Holistic Literacy in Adult Education (ETHLAE) project

LLLPlatform members, EAEA and All Digital, implemented the Erasmus+ project Emerging Technologies for Holistic Literacy in Adult Education (**ETHLAE**). It leveraged technology to target adult learners in vulnerable conditions, building on the potential of non-formal and informal learning in the adult education sector. **The project looks also beyond AI, at virtual reality, augmented reality, the Internet of Things, but most importantly it adapts learning about such tools to the Key Competences for Lifelong Learning approach**, and specifically to **LifeComp**, the EU Competence framework for personal, social, and learning to learn competences. This showcases how the learner, not the tool, is at the centre of the process. Educators are supported with resources and materials for their target groups which is currently an underdeveloped field. As other sectors of learning have research and materials developed for them, the adult education sector needs more support for projects such as ETHLAE to map fully and scale up the best practices. The **MOOC** developed through the project contains educator training materials.

AI's strong impact on assessment in education and training

The OECD showcased how different GenAI models improved capacity to grade coursework. The caveat is that the GenAI models' performance in assessment depends on the domain of study and format of testing. Moreover, there are great challenges with open-ended assessment which involve creative-reasoning[56]. Certain formats of essay writing have been smoothly graded by GenAI, but this implies the existence of a fixed essay format. Though **GenAI can simplify grading in numerous instances of standardised testing, which contribute to longitudinal studies and data collection**[57], this ignores the increasing evidence against summative assessments. In 2021, LLLPlatform published its Position Paper on Assessment and Wellbeing in which **formative assessments have been promoted as more effective for learning. AIEd opens the opportunity to replan assessments, and focus on more creative assessments which support learners' development, rather than measure acquired competences**.

OECD identified the **paradox of 'false mastery'**, where learners could provide outputs quickly and with high quality while using AI, but were unable to replicate this in assessments without AI, showing that their learning gains were not progressing even as their direct learning outputs indicated otherwise[58]. Linked to OECD's findings, ICILS 2023 identified **more than three quarters**

[56] OECD (2026). OECD Digital Education Outlook 2026: Exploring Effective Uses of Generative AI in Education.
[57] Ibid.
[58] Ibid.

of participating school principals considering it likely that students could become reliant on GenAI rather than learning independently, while around two thirds anticipated difficulties in developing deep subject understanding[59]. The growing use of AI in education and training, especially among children aged 9-16[60], unearths a more structural problem with the assessment types used. Education and training systems overwhelmingly evaluate outputs rather than the learning process, where most of the creativity, critical thinking, and intellectual effort is used. LLLPlatform and its members demanded alternative assessment measures and provided solutions, as in the aforementioned Position Paper for many years. If we continue with summative assessment formats, there is a worry that we might be verging on more scenarios where AI-created outputs would be evaluated by AI tools, **switching from a direct dialogue between educator and learner to an indirect dialogue that is fully enabled through AI.** Data from the **Higher Education Policy Institute** shows that 94% of UK undergraduate students rely on GenAI, up from 53% in a matter of a few years. As Professor Luckin (University College London) underlines: "there comes a moment where the [AI] agent's autonomy runs out and the student must appear". This is what she explains as the 'accountability moment', providing learners the opportunity to show their understanding of the output produced with AI-support. The format of this can be an exam, an oral defence, a demonstration[61]. In the VET sector, in particular, LLLPlatform members insist on practical demonstrations, simulations, oral explanations, and workplace-based assignments testing occupational competences required for AI usage.

The paradox of false mastery can be insidious for the evaluation of adults' needs for further training. AI may help organise responses, identify patterns of error, generate further practice and make small gains in fluency, strategy and independence visible to the learner. However, AI should not be the sole basis for placement, withdrawal of support, certification or recognition of prior learning. A qualified practitioner must distinguish second-language performance from underlying competence, review the evidence with the learner and provide a route to correction or appeal. Progress should include transfer to an authentic task and the ability to perform with less support.

While the OECD identifies some potential in AIEd for assessment, Williamson et al. (2024) insist that this is the case due to a narrow understanding of the learning process. They detail the highly constrained pedagogic model of AIEd, which allow a limited range of predetermined responses, and do not consider the complex learning process that learners must undergo. Educators' subjective experience, subject matter expertise, classroom interactions, and contextual knowledge of a given learner, class, or social setting are discarded for the tools' 'objectiveness'. EdTech providers push such tools with a predatory marketing approach aiming to free the time of burdened teachers. The bias in examination is clear, not only towards decreased grading for learners that do not conform to the AIEd tool's approach, but even accusing non-native speakers of cheating[62].

[59] IEA (2026). School Principals As Change Agents in an Era of AI-Driven Transformation. IEA Compass: Briefs in Education.
[60] European Commission (2026). Friend or foe?: Evidence from the use of generative artificial intelligence in learning and teaching.
[61] Rose Luckin (2026). THE SKINNY on AI for Education. Issue 26, March 2026.
[62] Ben Williamson, Alex Molnar, and Faith Boninger (2024). Time for a Pause: Without Effective Public Oversight, AI in Schools Will Do More Harm Than Good. National Education Policy Center.

c. Institutions' Usage of AIEd

It is arguable that AIEd usage should not start from learners and educators, but from the institutional level, as the first point of contact should be institutions that engage in responsible procurement, ensure an appropriate guidance and governance framework on AI, and leverage AI's big data analytics potential. The higher education sector experimented the most at institutional level with AI. Applications integrating LLMs could even be used to compare study programmes from different learning pathways or between institutions and facilitate easier learning mobility, credit transfer, recognition of prior learning, equivalence of qualifications, etc[63]. Moreover, AI tools have been used to compare historic data on courses/programmes and learners' behaviours, realising when the length of workload in a course was problematic, when credit allocation was disproportionate with workload, or understanding which degrees collaborated with each other, to allow higher education institutions' management create smoother pathways for collaboration. Suggestions on course selection can become more tailored, according to learners' previous behaviours as well as the developments of the course offer and labour market demands[64]. AI's data analytics power seems to be yielding more systemic impact for such tools compared to many of the learner-educator uses. **However, technosolutionism should be avoided, as mass planning of education and training pathways or adaptation based on data patterns or AI modelling might not always be the ideal solution, while full predictive capacity of learning and labour market needs requires human review of the AI outcome.**

[63] OECD (2026). OECD Digital Education Outlook 2026: Exploring Effective Uses of Generative AI in Education.
[64] Ibid.

While the higher education sector has the capacity to engage in such AI usage, providers in school, VET, and adult education sectors are smaller in size, lacking dedicated technical, legal, or procurement personnel. Therefore, without supporting institutional readiness through shared support services, practical guidance, and funding, there can be no expectation of AI adoption.

Python

Case Study - European Vocational Training Association - The RecognAIze Project

LLLPlatform member, EVTA, has been exploring increased AI capacity at institutional level in VET. This capacity, as the section above covered, is not yet fully enabled. The **RecognAIze project** intends to improve AI usage in VET for the purpose of including learners with Specific Learning Difficulties. This is bound to **improve the sector's attractiveness, as well as its inclusivity**. At this stage of the project, only the **Digital Maturity Assessment for VET Providers** is finalised. However, this tool points towards what each sector in education and training needs to do, as the expansion towards AIEd might be ill-placed if institutions are underdeveloped in overall digitalisation.

d. AIEd Impact on Learners' and Educators' Metacognition

OECD showcased how learners operating with AI tools performed better than others, but they did not show deeper knowledge acquisition, and would focus less on reflection and self-monitoring, losing capacities to self-regulate. However, once assessed without using AI tools, those learners underperformed the cohort that did not have access to AI tools[65]. Similarly, a study from MIT on misinformation showed that people benefitted from a better capacity of identifying misleading/fake information with GenAI tools over a period of four weeks, but once the tool was taken away unassisted performance declined by over 15%, showing how **even short-term uses of GenAI erode misinformation detection abilities**[66], demonstrating the need to accompany AIEd with media and information literacy education. A study on essay writing which split learners into three groups, one using Brain-Only (no tools), one using Search Engines, and one using LLMs, revealed that over the course of four months LLM users consistently underperformed at neural, linguistic, and behavioral levels, being incapable to accurately quote their own work. The cognitive activity was significantly downscaled, as electroencephalography (EEG) was used to measure cognitive load during essay writing[67]. An erosion of self-efficacy is experienced, as those trusting LLMs tend to exhibit lower critical thinking, which lowers self-confidence[68]. Gerlich showed that the significant negative impacts on critical thinking of AI tools usage was more daunting for younger learners, showing how higher education students managed to engage more critically with AI tools[69]. The recommendation was, as expected, the necessity to focus on active learning pedagogies and modalities of deeply engaging content rather than simply retrieving information through reading and AI tools usage[70].
This situation is referred to by stakeholders as **cognitive outsourcing or offloading[71].** Improving competences or, in general, excelling at anything requires practice and repeated failure on which lessons are learnt. **Learning must be appreciated more for its process, than destination**. Yet the **2025 PISA Results** pointed to a much more daunting picture. Basic skills decline for learners aged 15 has been steep across the entire world, but especially when zooming in on the EU. 25.9% of EU young learners underachieve when it comes to basic science skills, 31.3% on basic reading skills, and 33.9% on basic mathematics skills[72]. The impact of AI on this steep decline has been underlined. Though AI cannot explain fully the downward trend, part of the larger gap between the **2022** and **2025** results can be attributed to uncritical usage of AI. Wide-spread use of AI to bypass

[65] OECD (2026). OECD Digital Education Outlook 2026: Exploring Effective Uses of Generative AI in Education.
[66] Anku Rani, Valdemar Darry, Paul Pu Liang, Andrew Lippman, and Pattie Maes (2026). Dialogues with AI Reduce Beliefs in Misinformation but Build No Lasting Discernment Skills. In Proceedings of the 2026 CHI Conference on Human Factors in Computing Systems (CHI '26). Association for Computing Machinery.
[67] Hank Lee, Advait Sarkar, Lev Tankelevitch, Ian Drosos, Sean Rintel, Richard Banks, and Nicholas Wilson (2025). The Impact of Generative AI on Critical Thinking: Self-Reported Reductions in Cognitive Effort and Confidence Effects From a Survey of Knowledge Workers. In CHI Conference on Human Factors in Computing Systems (CHI '25).
[68] Ibid.
[69] Michael Gerlich (2025). AI Tools in Society: Impacts on Cognitive Offloading and the Future of Critical Thinking. Societies, 15(1).
[70] Ibid.
[71] Jason Lodge and Leslie Loble (2026). Artificial intelligence, cognitive offloading and implications for education.
[72] European Commission (2026). EU PISA 2025: First results.

intellectual effort has been documented, with learners entirely using AI to complete whole assignments without any critical engagement with the work performed. OECD identified in its PISA results analysis that 31.2% report frequent use of AI to summarise texts they needed to read. It was specifically captured that those learners almost never using AI to summarise texts performed better on basic science skills compared to those learners that frequently used AI to summarise texts[73].

LLLPlatform stakeholders confirmed the findings, identifying that learners no longer only search for information using digital tools, but rather they skip any production activity, passing AI's work as their own. ICILS 2023 also showed, on average across participating countries, **86% of students were in schools where principals considered GenAI likely to encourage students to submit work that was not their own.** Similarly, 90% were in schools where principals expected GenAI to make it difficult for teachers to judge the authenticity of students' work[74]. Data seems to confirm that students rely more on GenAI rather than learn from it, with tests ran on Khan Academy's AI tutor that found only 1% of interactions reaching the level of deep cognitive engagement that predicts learning[75]. Such reflections were considered by the OECD and Ronald Beghetto[76] when exploring the competition between fast and slow AI. **Fast AI** would be a usage where a learner or educator requests the AI to fully perform a task on their behalf. **Slow AI** would mean efforts for providing additional context to the AI, treating it as a sounding board, and developing parallel alternatives to what information it shares. The AI tool would no longer be the unique source of information, and, most importantly, it will remain a source only, not a leading part of the learning process[77]. **Famously, when Wikis, such as Wikipedia, became widespread, they were welcomed in the learning process but they never were treated as trustworthy sources given how anyone could edit their content. The same standard is not yet fully applied to GenAI tools in education and training.** Only 31% of Europeans checked the source of online information in 2025[78], showing an erosion into due diligence checks which could be related to the information overload which requires comprehensive checking. This Eurostat statistic accounted for all information encountered online, but this further increases risks when using GenAI to obtain information considering how entangled data sources are in such tools, and the high level of AI literacy needed to uncover GenAI's sources. Moreover, ICILS repeatedly highlighted a gap between perceived and demonstrated digital competence, most recently in 2023, as **84% of Grade 8 students reported being at least moderately confident in judging the trustworthiness of online information, while only 4%–32% successfully completed specific information-evaluation tasks**[79]. Therefore, GenAI usage must be accompanied by a stronger media and information literacy education, including easily accessible methods on fact-checking.

In its **2020** and **2023** Position Papers, LLLPlatform promoted experiential learning, outdoor learning, project-based learning, and similar engagement-intense learning methodologies. These were highlighted as drivers for the development of transversal competences which foster metacognition. In its

[73] OECD (2026). PISA 2025 Results (Volume I).
[74] IEA (2024). ICILS 2023 International Results and Report Findings.; IEA (2026). AI in ICILS Flyer.
[75] European Commission (2026). Friend or foe?: Evidence from the use of generative artificial intelligence in learning and teaching.
[76] OECD (2026). OECD Digital Education Outlook 2026: Exploring Effective Uses of Generative AI in Education.
[77] OECD (2026). OECD Digital Education Outlook 2026: Exploring Effective Uses of Generative AI in Education.
[78] European Commission (2026). Young people - digital world. Eurostat.
[79] IEA (2026). Digital Natives—Reality or Myth?.

2021 Position Paper on Assessment and Wellbeing, LLLPlatform underlined the importance of relational engagement in feedback provision, with educator-led feedback loops considered with peer-to-peer feedback encouraged, but also with a focus on ipsative assessment, considering the progress of each learner based on their previous learning path. Though all these approaches can be enhanced by AIEd, **it is crucial to understand that the end goal is to allow learners to develop their competences, not simply increase efficiency in output production.**

This becomes similar to what is known as mandatory manual flight training. Pilots must do this though automation has become the norm in aircrafts. However, due to potential malfunction and general skill degradation, it is important for aircraft pilots to train themselves analogue. **This should be the requirement also for developing critical thinking and metacognition in education and training at all levels.**

Python

Case Study - Lie Detectors - Journalist-led classroom visits and teacher training workshops

LLLPlatform member, Lie Detectors, aims to foster critical thinking in schools through journalist-led **classroom visits and teacher training** on media and information literacy (MIL). Based on an award-recognised training concept developed with educators, Lie Detectors has trained **over 500 journalists to conduct workshops for children 10-15 years and share accessible tools on how to detect disinformation and how to understand the digital information environment.** Rather than telling students what to think, the journalists teach children how to think critically and evaluate sources, including AI. The classroom visits are free of charge, delivered in multiple languages, and are currently accessible in Austria, Belgium, Croatia, Germany, Luxembourg, Poland, and Switzerland. Its programmes are scalable and provide the kind of support tools that underfunded education and training institutions require. Recognising the importance of educators as multipliers, Lie Detectors conducts journalist-led teacher training and disseminates educational follow-up resources. The workshops and materials allow teachers to integrate MIL transversally, irrespective of the subject they teach. **The training has already reached 2000 teachers, which then connected to over 135000 learners in 7000 classrooms.**

e. Investment in AIEd: hidden costs and the cost of rapid technological developments

A commonly identified challenge in relation to AIEd was the **speed at which technology keeps developing.** This speed is unfathomable for the underfunded education and training sector, which does not have the resources to keep up with analysing new technology, acquiring it, training on its usage, and implementing it effectively. Competing with EdTech in keeping up with such development is unreasonable, at a time when the educator profession deals with shortages, being undervalued, and experiencing numerous professional challenges[80]. This can lead to excessive acquisition of AIEd tools and platforms which are then underutilised or misused. The famous example of a company that spent $500 million on Claude AI tokens in a month[81] illustrates the unchecked use of AI that is not always beneficial, but almost always costly. If enterprises experience such issues, education and training institutions might be even less prepared to include AI in their work.

Hidden costs caused by improper planning

Currently, there are incomplete calculations on the costs of underutilised AIEd, but the data still sheds light on this worrying situation. Such is the case of data available from secondary education in the US, where schools are not using 65% of the licences they acquire, losing 5.6 billion dollars annually[82]. These numbers do not exist in the EU, and procurement is more centrally regulated compared to the US, while uptake of digital tools is not as broad, but it does require an assessment of this situation to understand the hidden costs. Licences do not account only for AIEd, as they could apply to any digital resources, but we see the incorporation of AI in almost all tools these days, with a price increase for every AI augmentation. **This shows the high costs of not properly training education and training professionals and leadership before engaging in spending sprees encouraged by the EdTech sector.**

EdTech providers have been long making predictions on the EU EdTech market size, but this is only bound to create a self-fulfilling prophecy where spending will be done without discernment, leading to wasteful investment when education and training is struggling for resources. **The aim must be to direct different streams of investment in learners and educators, ensuring that education and training institutions invest in them, and not in the EdTech sector.** The evaluation of EdTech products and their continued services must depend on criteria linked to competence achievement, as the responsibility of achievement is placed solely on educators or governments but never on EdTech providers which promote their 'miraculous' solutions. This situation is exacerbated by a lack of standards and indicators to monitor the learning impact of EdTech tools[83]. The current resources from the European Commission on assessing all types of

[80] LLLPlatform (2024). 21st century challenges for the educator profession: a call for system change: The changing role and challenges faced by education and training professionals.

[81] https://www.axios.com/2026/05/28/ai-spending-roi-enterprise-costs

[82] Sierra Noakes (2026). Beyond the Screen Time Debate: Reclaiming EdTech ROI Through Intentional Procurement. Digital Promise.

[83] Natalia Kucirkova (2024). Why we need global minimum quality standards in EdTech. World Economic Forum.

digital education content, not only AI, is a much needed resource providing a complex selection of criteria ranging from pedagogical fit and curriculum alignment, to engaging learning experience, to design, accessibility and inclusion, to reliability, to impact and assessment, to legal compliance, to technical interoperability, and to financial viability[84]. **Though much appreciated considering the lack of regulatory oversight for EdTech companies, this still puts pressure on educators and learners, treating them as consumers that must make responsible choices, rather than increasing responsibilities on EdTech providers considering that education and training is a public good.** Moreover, AI systems adopted in education and training should consider both the educational benefits they may offer and the potential risks they may pose to learning, educator agency, equity, inclusion and learners' cognitive development.

Python

Case Study - European Parents Association (EPA) - GenAI4ED

LLLPlatform's member, EPA, has been implementing a Horizon Europe-funded project, **GenAI4ED**, with the aim of **bridging GenAI with human competences in secondary education.** The relevant element for this section of our Paper is the **Societal Readiness Level assessment framework**. Such tools need to be implemented before forcing education and training institutions and stakeholders into wasteful AIEd acquisitions that are unfit for purpose.

[84] European Commission (2025). Making informed choices on digital education content: EU guidelines for teachers and educators.

The costs of ineffective digital training

Besides non-addressed lack of capacity to understand which technology to trust and procure, the speed at which technology advances creates pressure on educators to adapt teaching methodologies and contribute to curricular changes. Less than 40% of educators in the EU were feeling comfortable to use digital technology in the classroom[85]. Close to or more than 90% of principals identified a need for professional development to enable teachers to support students in using GenAI responsibly and effectively. ICILS evidence points to the need not only for teacher professional development, but also for system-level guidance and leadership support that enables schools to make informed and coherent decisions about AI[86]. The expectation is not that teachers or principals need to retrain on each tool, but rather that the training that they receive supports them in becoming lifelong learners that can adapt to other tools. The training offer should allow them to use baseline functioning of any digital technology. The National Recovery and Resilience Plans allocated 28.3 billion EUR to digital education[87]. Besides the much needed investment in infrastructure, funding was also dedicated to multiple platforms for educator training. Reports from stakeholders within LLLPlatform have shown the difficulties in interoperability, in additional workload burdens, and in lower quality of training, which amounted to poorly implemented resources. **Member States must meaningfully invest in educators and give them paid-training leave to develop**

[85] European Commission (2026). Digital Education Action Plan: policy background.
[86] IEA (2026). School Principals As Change Agents in an Era of AI-Driven Transformation. IEA Compass: Briefs in Education.
[87] European Commission (2024). Recovery and Resilience Scoreboard - Thematic Analysis Digital skills and education.

these competences, while ensuring a whole-of-government approach so that all responsible ministries collaborate on providing training opportunities for educators. Otherwise, every new tool or new technology will bring massive needs for retraining which will be inefficient and costly.

Infrastructural costs and the EU's digital sovereignty

Though investment in the education and training sector in terms of professionals, in resources for the learners, in available infrastructure (digital and otherwise), and in the services provided to learners should be prioritised over AIEd, there are certain infrastructural investments which prevent the EU from implementing AIEd that is secure and promotes healthy and sustainable competence development. These are related to EU cloud-based solutions, to the investment in EU EdTech companies, and even access to high speed internet[88]. First and foremost, data is missing on high speed infrastructure in VET, adult education, non-formal and informal learning, or early childhood education and care. Even for schools, where most data is available, the **2023 European Court of Auditors** report shows that only around 10-15% of the EU schools had access to high speed internet connection. Infrastructural needs must be addressed first.

Furthermore, the biggest EdTech providers on which most platforms in education and training across the EU are operating hail from the U.S. Education and training stakeholders have long warned against hidden costs - considering subscription-based models, changing pricing once lifelong lock-in is achieved, maintenance costs - caused by U.S. EdTech monopoly[89]. The lifelong lock-in to certain platforms exemplifies how learners are not developing competences through their learning but rather technical skills to become lifelong users of a particular platform. The challenge of vendor lock-in is referred to in the European Commission **Communication on European Tech Sovereignty**. It took a geopolitical conflict with the U.S.' current administration, the Trump administration, for the EU to reflect on tech sovereignty and consider designing EU solutions that do not replicate U.S. models. **As long as safeguards are not placed on EdTech providers, the for-profit model will never be compatible with the public mission of education and training and will lead to misspending that causes further cuts to education and training due to inefficiency, leading to the professionals reverting to more AIEd and similar EdTech solutions to compensate the dwindling resources, reinforcing a vicious cycle.** Quality education and training costs, and the current investment is insufficient. There is a need for more than 4.7% of GDP (current EU average public expenditure on education and training)[90] and more than 0.1% of GDP (current EU average public expenditure in adult education)[91] to match the ambitions placed on education and training according to the **Union of Skills Communication**. But the return on investment is significant, as the current decline on basic skills, the shrinking of economy due to skills mismatches, and the inability to engage constructively with AI have all been reaped after a long period of underinvestment since 2008, with small spikes of investment that were

[88] Business School (2025). The Missing Infrastructure Behind Europe's Edtech Ambitions. FE News.

[89] SOLIDAR Foundation (2021). The Commodification of Education and the Prevalence of For-Profit Education Stakeholders. ; LLLP (2022). Investment in Education & Training: A public good for all.

[90] European Commission (2025). Public spending on education was 4.6% of the EU's GDP. Eurostat.

[91] European Commission (2020). Workforce skills and innovation diffusion - Trends and Policy Implications.

intended to (but never managed to) offset the impact of the COVID-19 pandemic[92].

f. Environmental Impact of AIEd

AI tools lead to an enormous consumption of electricity and water, and by 2030 could account for the basic needs of 1.3 billion people annually (or around 15% of the planet)[93]. Such shocking numbers require learning how to minimise AI's impact. The environmental impact, at a time when Europe is confronted with its largest heatwaves that closed education and training institutions while also taking the lives of 14.000 people, including children[94], cannot be neglected. Education and training must critically contend with environmental damage and must reflect whether chaotic usage of AI does not do that AI will have an impact on reducing environmental damage if we consider how it can aid with more effective planning of resources, with better agricultural outcomes, and other similar technological innovations in certain sectors. But the current overreliance on GenAI and some AIEd tools for menial and recreational tasks points towards increased environmental strain without sufficient focus on offsetting this impact. While the EC and OECD AI Literacy Framework includes references to environmental impact and assessment of when best to use AI, this is again a piecemeal approach. The objective is to mainstream learning for sustainability across all learning environments, and build tools with sustainability in mind, rather than have to teach the individual impact of each tool[95].

Python

Case Study - SOLIDAR+ - ECHO-Network and ECODE

LLLPlatform member, SOLIDAR+, implemented an Erasmus+ project, **ECHO-Network**, which identified ethical alternatives to digital tools and developed learners capacity to act safely online and ensure that their digital choices are respected. A resource of the project has been a **Digital Survival Kit**. Many questions raised there are relevant for all aspects of AIEd, considering if the tool used is actually necessary, what impact it has on our learning journey, on our data privacy, and so on. However, specifically for this section of our Paper, questions are also raised on what is the **environmental impact of a digital tool**, and what is our responsibility in mitigating that by being more selective on tool usage. **Such toolkits and assessment frameworks are needed, with much more attention paid to assessing if AIEd can be meaningfully absorbed before making expensive acquisitions.**

To build up on ECHO-Network, SOLIDAR+ started ECODE (Ethical, Common and Open Digital in Education), an Erasmus+ project (2025-2027) promoting digital citizenship through non-formal education. ECODE will equip youth workers with the skills and tools to deliver digital education, advocate for ethical digital technology, and strengthen Europe's network of actors committed to this cause. Over two years, the project will produce a European training programme addressing the legal context, ecology, inclusion, and AI, alongside a replication guide for other organisations and an advocacy roadmap for youth workers across Europe.

[92] LLLP (2022). Investment in Education & Training: A public good for all.

[93] United Nations University Institute for Water, Environment and Health (2026). Rising Emissions, Depleting Water and Vanishing Land—UN Scientists: AI Is Threatening Natural Resources for Billions.

[94] Zia Weise (2026). Brutal June heat wave killed as many as 14,000 Europeans. Politico.

[95] LLLP (2020). Lifelong Learning for Sustainable Societies.

g. Ethical considerations in relation to AIEd

Discussions around AIEd have frequently touched upon ethical considerations and the ethics of AIEd. The own European Commission **Guidelines on the ethical use of artificial intelligence and data in teaching and learning** clearly show that awareness of implications exist and intention to address is acted upon. Yet, much of this effort has focused on a level of operationalisation and concrete action instead of starting from a principled conversation informed by the two millenia of moral philosophy, or by the ethics of education itself. In an ever changing world, questions around the aims of education, the choice of pedagogy, teacher and student agency are subjects in constant need of re-evaluation before deciding how AIEd is supposed to serve such ambitious objectives[96].

Most policymaking discussions around AIEd work with **implicit assumptions around the normative philosophical frameworks considered when developing new initiatives.** However, virtue ethics[97], deontology[98] or consequentialism[99] would all reach different implications of how AIEd should be designed, and how policies on it are to be developed and enforced. Many of the assumptions also work within the European model landscape, yet within Islamic ethics, the principle of impartiality, even in decisions regarding oneself, could be well-placed within AIEd debates. Similarly, more recent strands of moral philosophy, such as ethics of care, would emphasise relational ties over impartial, universal principles and this would also reach a completely different outcome in policymaking[100].

With such a diversity of AI tools and AIEd, their development hinged on a variety of processes all over the world. **Some of the initial GenAI models, for example, were tested with workers in the Global South, being exposed to uncensored and abhorrent outputs.** These are considered the 'ghost workers' that have made the AI what it is today[101]. These ethical considerations are not often considered in this sector, though the chain of production is quite essential in other policy sectors, such as trade policy. Reflection on how AI tools are proposed and ethical criteria imposed on this when selecting which AI tools one should work with ought to be considered in EU policymaking.

As the AIEd tools have been expanding, more implications have been revealed, with questions raised on the representativeness of learner datasets on which AIEd had been trained, on the IP of educational resources which educators create with AI, on the misalignment between developers focus on mathematical optimisation in their pedagogies rather than fully embedding well-established learning theories such as constructivism or project-based learning. Clashes between educators' and learners' rights on the one side, and data mining from the Big Tech on the other side have been also experienced first-hand[102]. At the time of writing, in October 2026, in the Digital Omnibus

[96] Wayne Holmes (2026). Artificial Intelligence in Classrooms: Ethical Dimensions. European Parliament.
[97] Aristotle. (4th Century BCE). The Nicomachean Ethics.
[98] Immanuel Kant (1785). Groundwork of the Metaphysic of Morals.
[99] John Stuart Mill (1863). Utilitarianism.

[100] Wayne Holmes (2026). Artificial Intelligence in Classrooms: Ethical Dimensions. European Parliament.
[101] Ibid.
[102] Wayne Holmes (2026). Artificial Intelligence in Classrooms: Ethical Dimensions. European Parliament.

negotiations the Irish Council Presidency prepared for the introduction of Article 88bis to the GDPR. In practice, this means that EdTech companies, including Big tech, will be able to exploit personal data of students and educators for the development of AI systems driven by their commercial interests[103]. Algorithmic surveillance had been more considered within the labour market rather than specifically for learners, yet the way in which ITSs were discussed in this paper shows that such processes enter education and training as well, creating a climate of distrust and anxiety that is completely at odds with the mission of education and training.

Across the paper, ethics has been a central component yet not tackled head-on until at this point. This section cannot capture all facets of ethical discussions that arose with AIEd, yet the aim is to insist that, currently, ethical conversations are approached on a case-by-case basis rather than facilitating an EU-wide discussion on where do we currently stand on the ethics of education, and, implicitly, what role does AIEd play for such considerations. Any future AI strategy/guideline/plan at European, national, regional, or even organisational level must start from clarifying its ethical framework, select the ethical principles based on which it is built, and only then look at operationalisation of AIEd in education and training.

[103] ETUCE (2026). Students are not for Data Mining: ETUCE urges EU member states to reject Irish Presidency proposal that allows Big Tech to exploit students' and educators' data to train AI.

4 Are AI Competences Something Altogether New?

AI-related competences are presented as entirely new or still insufficiently developed in education and training. At the same time, this has led to calls for existing competence frameworks to be updated in response to these developments. In this context, the European Commission and the OECD developed the **AI Literacy Framework**, while the revised DigComp 3.0 recognises AI-related knowledge, skills and attitudes as an integral part of digital competence. DigComp 3.0 includes more than 300 AI-related learning outcomes, demonstrating that AI competences are not treated as a separate field, but rather embedded across the broader digital competence framework. While this represents a rich and valuable resource, it also increases the level of complexity and may require substantial implementation efforts, which could, in some contexts, outweigh expected benefits.

Education and training institutions and educators miss guidance on which AIEd to use, on how to integrate AI in teaching techniques, on where AI connects with other points in the curricula to ensure smooth integration, and they are missing time to implement all this. A new competence framework on AI implies additional work into identifying how to include it and adapt it with existing competence frameworks. **It also implies the presentation of AI literacy as an altogether new competence. The in-classroom examples for AI literacy provided in the framework are not tailored for the different education subjects. This only adds to the workload of adapting the framework into day-to-day usage.** AI literacy is not the same as computer literacy, or media literacy, yet it draws on them all. Though revolutionary, AI is a digital tool, and its presence in the world depends on the perception of all members of society. Therefore, it is not different to any other digital tool, though we might agree on differences in terms of impact, intended use, unintended consequences, etc. In the absence of AI literacy resources in the past years, we have seen learners still leveraging AI successfully without experiencing an overreliance on AI and declining critical thinking competences which have been widely presented in this paper. It becomes increasingly obvious that having **Key Competences for Lifelong Learning** is what ensures a future-proof approach for learning. The years spent on developing adaptations to AI competence frameworks, and implementing them are inconsistent with rapid uptake on new technologies or with future emergence of any other new technology.

When considering the knowledge on the nature of AI, on the intended usages depending on the different type of AI, on its environmental impact, or on the intended impact based on human choice in its design[104] it has no difference from the knowledge required for other tools created previously, their limitations, their unintended consequences. When looking at the most mentioned skills linked to AI literacy, critical thinking, collaboration, creativity, problem solving, computational thinking or self and social awareness stand out[105]. These have all been encompassed under the personal, social and learning to learn competence or cultural

[104] OECD and European Union (2026). Empowering learners for the age of AI: An AI literacy framework for primary and secondary education.
[105] Ibid.

awareness and expression competence which were present in the **Council Recommendation on Key Competences for Lifelong Learning**. When it comes to the attitudes: empathy, curiosity, courage, adaptability, innovation are all frequently called for[106] and they are all part of existing EU competence frameworks. **Since AI competences can be obtained with existing tools, the question is why was their implementation not intensified rather than creating new resources?**

Python

Case study - European Association of Regional and Local Authorities for Lifelong Learning (EARLALL) - STEMMING Project

LLLPlatform's members, EARLALL, has been implementing the **Agentic AI and Quantum-Secure STEM Talent for Smart Solar Europe (STEMMING) project**, which will target 8000 people to be trained (learners, educators, non-academic staff), relying on AI-assisted and human-reviewed mentoring, while creating microcredentials, STEM learning approaches and platforms to support the Solar sector in Europe. **What distinguishes this initiative from other AI-powered projects is the smooth integration of tools among human-centric approaches, as well as their commitment to link together DigComp, EntreComp, and GreenComp.** The project clearly identifies that AI competences are at the intersections of Key Competences for Lifelong Learning, and to implement an education and training approach that is impactful for an up and coming sector requires a combination of competences and a holistic preparation of learners, educators, but also institutions. Rather than creating a new AI-specific competence framework, STEMMING operationalises existing European competence frameworks by translating and combining them into applied learning pathways, microcredentials and challenge-based approaches for the green and digital transition.

The LLLPlatform members frequently reported that what educators need are easy to implement competence frameworks. Such frameworks need clear learning outcomes and examples for AI inclusion in learning activities. Member States and EU institutions must focus on **supporting educators to adapt to new ways of developing the long-standing competences identified under the Key Competences for Lifelong Learning.** Educators need to understand how to connect the Key Competences for Lifelong Learning with AI, while identifying how any kind of new type of competence needed connects with the Key Competences. The smoothest way to implement AI literacy is to contextualise it within already existing approaches that educators use and provide tailored guidance for its inclusion in the already existing day-to-day teaching and learning activities.

Existing competence frameworks can be translated into functional outcomes for AI-related tasks: recognising when AI is involved; stating a meaningful purpose; interpreting and verifying an output; protecting personal data; communicating responsibly; deciding when to stop; obtaining qualified human help; and completing a

[106] OECD and European Union (2026). Empowering learners for the age of AI: An AI literacy framework for primary and secondary education.

comparable task without the tool. These outcomes connect directly to literacy, numeracy, digital and media literacy, language, critical thinking and learning to learn. They should be practised through authentic tasks such as understanding a bill, checking a calculation, preparing for an interview or questioning an automated service decision.

LLLPlatform members identified two types of AI competences that were not included in the **Key Competences for Lifelong Learning Communication**, yet they have been slightly alluded to while the Communication was implemented. These are interdisciplinary academic intelligence and meta-competences. Interdisciplinary academic intelligence is in high demand as the interconnections between global challenges have intensified and require a cross-curricular approach, and as AI tools combine resources from diverse disciplines. However, teaching and learning in a cross-curricular approach requires significant adaptation for educators that need guidance and support. The upcoming **European Commission STEAM Education Competence Framework** is highly appreciated specifically for connecting competences across subjects.
Meta-competences such as meta-cognition, meta-subjective intelligence or meta-contextual intelligence have been underlined for safe use of AI and beyond. **Therefore, LLLPlatform suggested developing needed additions to the existing EU competence frameworks to include these competences and provide guidance for educators on how to incorporate them in their work.**

Within the existing competences listed in the Key Competences for Lifelong Learning Communication, LLLPlatform members insisted that some deserve intensified attention due to relevance for AI literacy. They flagged socio-emotional competences and learning to learn competences, with the associated competences of self-regulation and self-efficacy. Usage of new technologies is often connected with self-regulation and self-efficacy, given that learners require confidence to engage with new tools, but they need to know how to guide their learning journey and what choices to make when using online tools. Learners need to trust themselves, they need to feel confident for success, and they need to strive to direct their learning in the future. Developing learning to learn competences and the socio-emotional competences become inevitable[107] considering that learners need to be open to updating their competences given how quickly technology changes, while it is impossible to outsource socio-emotional competences to AI. **Yet, the main focus is now placed on AI-specific competences which resemble more an effort to understand how to use a new, specific tool rather than a systemic approach to learners' needs - which the Key Competences for Lifelong Learning Communication provides.** It must be specified that even in the context of these competences, educators would need an intensified amount of support and resources to foster and assess their development.

[107] European Commission (2026). Friend or foe?: Evidence from the use of generative artificial intelligence in learning and teaching.

5 The Policy Changes Needed in Education and Training

This Paper covered a wide range of aspects linked to AIEd, from design, to learner usage, to educator training, to investment trends, to impact on competence development, among others. A series of potential measures have been raised by civil society in education and training, by learners, educators, and practitioners alike, to ensure a systemic approach which would not put undue pressure on any of the stakeholders involved in the process. For each recommendation below which is targeted towards a specific actor, this will be specified. The recommendations that do not foresee such a reference are intended for two or more actors to implement together.

a. Placing responsibilities on the AIEd producers – safety by design

• Maintain the AI Act designation of **education and training as a high-risk sector** and do not weaken the conditions under the AI Act, and **ban any data extraction** from learners and educators for commercial interests, ensuring that the Omnibus VII will not affect education and training as a sector.

• The **European Commission** should develop an **EU Label for AIEd** products to certify their accordance with pedagogical and andragogical standards, as well as with health, safety, privacy and ethical standards.

• The **European Commission** should develop **Application Programming Interfaces (APIs)** for education and training resources and applications to facilitate interoperability among EU Member States.

• **EU Member States** should jointly develop **standardised solutions**, including AIEd applications, which they vouch for and they own.

• **EU Member States** should intensify the implementation of the AI Act to ensure that **no addictive algorithmic design** is implemented into any AI tool which could have a counterpart tool implemented as AIEd. This must include actions against infinite scrolling, autoplay, variable reward systems, streak-based engagement, push notifications, personalised recommender systems, frictionless re-engagement loops. The list is not exhaustive and requires development with all relevant stakeholders in education and training.

• **EU Member States** should develop and implement a set of **mandatory requirements on all providers of AIEd tools** that are allowed to be used in education and training institutions to ensure that the quality of information used and outputs are

maintained[108], combatting risks of **model collapse**.

• Provide a system for **automatic triggering of legal procedures** towards EdTech providers when AIEd tools have implications which violate the rights of learners, educators, and institutions that have been caused by their design.

• The **AIEd producers must provide clear disclaimers** that any AIEd tool is a machine, while eliminating any misleading features that replicate humanity - such as language usage which provides AI tools with human-like attributes.

• The **AIEd producers must embed limitations on AIEd usage** which are regulated by over-use that has health, learning, and/or environmental negative implications.

• The **AIEd producers must ensure that each AIEd tool links information to the source(s)** it is drawing from to facilitate fact-checking.

• The **AIEd producers must organise ethical, voluntary, and specific training actions on AI which ensure that the learner datasets used capture the full diversity of the learner body in the EU**, while also ensuring that the content on which the AIEd operates on is attuned to intellectual and cultural artefacts that are not solely specific to the EU.

[108] This includes Retrieval-Augmented Generation (RAG) procedures that need to be updated constantly. Retrieval-Augmented Generation (RAG) is a machine learning technique that improves Large Language Model (LLM) responses by fetching relevant data from external knowledge sources before generating an answer.

b. Pedagogical and Andragogical Standards – develop with learners and educators

• The **European Commission** should establish permanent **European co-design mechanisms** linking researchers, practising teachers and teacher educators, including those working in initial and continuing teacher education. Relevant professional associations and networks should be involved in developing, piloting and regularly revising pedagogical and andragogical standards for AIEd. This should feed the adaptation of the EU Label for AIEd mentioned in the previous section of the recommendations.

• The **EU Member States** must develop an **impact assessment tool** for all EdTech-produced AIEd solutions, ensuring that they comply with efficacy, effectiveness, ethics, equity, and environment criteria. Deny access to education and training to any AIEd tool that does not comply.

• Include **adults** with low literacy, numeracy, digital or language proficiency in design, testing and monitoring, and recognise or compensate learners and practitioners who contribute their time and expertise.

• Provide **detailed guidelines for educators and institutions' leaders** on usage of AI and adaptation of AI to their needs. All applications should always remain human-led and subject to appropriate safeguards. The guidelines must always balance risks with concrete opportunities, considering the impact of AI-supported simulations, health and safety training, accessible learning for people with disabilities, language support, recognition of

prior learning, personalised learning pathways, among others.

• **Education and training institutions should reject the usage of any tool that disregards the professional expertise** of education and training professionals.

• **Education and training institutions** should ensure that each **AIEd tool used is checked** by education and training professionals and assessed as providing an added value to learning, before committing to its usage.

• Require information about AI use, data and choices to be available in plain language, audio and relevant languages, with a person able to explain it. Formal disclosure alone does not establish informed participation.

• The **EU institutions and Member States should prevent any anthropomorphisation features** from AIEd, and especially for those tools used with younger learners, while education and training institutions must ensure that each AIEd use is paired with human support and contextualisation with human relations.

• **Ensure that each policy discussion around AIEd establishes clearly and publicly the ethical principles** based on which it operates, and review the essential questions linked to the ethics of education whenever new policy decisions on AIEd need to be taken.

c. Key Competences for Lifelong Learning – the solution to a long-lasting structure in education and training that prepares for the future

• The **European Commission** must intensify the implementation of the **Council Recommendation on Key Competences for Lifelong Learning**, providing ample guidance to Member States on how to promote competence-centred education and training.

• Increase priority on the **socio-emotional elements of the Council Recommendation on Key Competences for Lifelong Learning**, as well as for meta-cognitive competences such as learning to learn, critical thinking, meta-subject and meta-contextual competences, problem solving.

• The **European Commission** should provide more **interconnections between the Competence Frameworks created by the European Commission** for the Council Recommendation on Key Competences for Lifelong Learning - draw inspiration from ETF's Scaffold approach, and identify which competences from all competence frameworks contribute to AI Literacy.

• The **European Commission** should make all EU **competence frameworks accessible in all languages of the EU**, and provide them each with implementation tools such as granular learning outcomes, exemplified class usages, adaptations for educator

competences, self-assessment tools, among others.

• The **European Commission should develop the EU STEAM Competence Framework**, ensuring that it provides strong references on how to change the model of education and training towards an inter-disciplinary one.

• The **EU Member States must ensure that prior to AIEd use, education of students and educators on AI literacy**, including computer literacy, digital media literacy and other related competences is provided.

d. The Costs of Underinvestment in Education and Training – investment solutions for maximum leverage of AIEd

• The **European Commission** should leverage the **European Digital Infrastructure Consortium - EDIC** - to create European cloud and AI solutions, based on interoperability principles, to power EU-made AIEd tools.

• **The EU Member States** must retain **ownership of the AIEd tools used in education and training**, protecting it as a public good, and investing only in open source tools.

• **The EU Member States** must invest in ensuring **paid training leave** for all educators to update their competences on safe, ethical and effective AI usage. It is crucial to ensure that training is focused on transversal competences related to AI, to allow educators to adapt to any kind of incoming tools. The training must be future-proofed to avoid costs of running continuous training loops with every single new tool that emerges in the digital realm.

• The **EU Member States** should invest in **support personnel** for each education and training institution to ensure that they have dedicated staff for the procurement and maintenance of any digital solutions, including AIEd.

•The **EU Member States** should engage in **annual evaluations to assess the usage of AIEd** in education and training institutions, and incorporate clauses to ensure easy cancellations of all unused tools.

• The **European Commission and EU Member States must pool resources and boost investment** to ensure that by 2030 each education and training institution has access to **high speed internet connection.**

• The **European Commission and EU Member States** must invest in **research about AI**, including the latest developments, assessing which tools can be cleared for usage in education and training, providing a clear and easy to use menu of such tools to all professionals, and providing a great basis of longitudinal data to assess the impact of AI. This should be connected through cross-border research, professional-learning networks for teacher educators, enabling them to draw on comparative evidence, shared evaluation methods and practices tested in other education and training systems.

• The **EU Member States** must fund the conditions of **adult participation** as well as

technology, including devices and connectivity, guidance, accessible learning materials, transport and care support where relevant, and paid learning time for workers. Digital flexibility should not transfer the cost of learning to the adult.

• The **European Commission and the EU Member States** must organise joint effort to **map the current costs on AI** incurred by all education and training institutions and identify any financial waste before pushing for further investment in AIEd tools, and especially the commercially available tools that bear hidden costs.

e. Usage Standards

• The **EU Member States** must **diversify the curricula** at national level to ensure increased access to experiential, outdoors and project-based learning, counterbalancing the time spent on screens - this must be assessed in complementarity with the time the learners already spend on screens outside learning activities. The end objective should be to develop learners' self-regulation competences.

• **Education and training institutions should feature an equivalent of 'manual flight hours'** in education and training, tasking learners with performing similar activities that they have previously performed using AI tools but this time without AI.

• The **EU Member States** must **review how assessment is done in education and training,** focusing more on the learning process and the developed competences, rather than on evaluating outputs. Prioritise formative assessment and application of learning in real-life situations, while also ensuring that AI-functionalities can only be used as a support tool given the format of the assessment, and cannot fully be used to perform the assessment.

• **Education and training institutions** should ensure that each assessment result is verified by an additional **meta-test** where the learners would explain the logic of their answers without usage of AI.

• The EU Member States should prevent early age usages of AI in education and training, developing AI-relevant competences by means of analogue approaches, followed by progressive introduction of AI as critical thinking capacities are developed.

• The **EU Member States** ought to intensify **research into the way in which AI literacy can be developed in non-formal and informal learning environments**, and develop National Lifelong Learning Strategies where AI Literacy is considered across all formats, levels, and environments of education and training.

• The **European Commission and the EU Member States** should jointly develop **guidelines for inter-disciplinary education and training**, and promote the competences developed by such less mainstream approaches in education and training.

• The **European Commission and the EU Member States** must, including through the Erasmus+ programme, ensure **collaboration** among all education and training stakeholders in the implementation of AI according to the needs of each level/format/environment of learning.

• **Education and training institutions** must provide an accessible human route and the possibility to correct information or challenge an outcome wherever AI materially influences assessment, guidance, recruitment or access to a service.

• Evaluate reach, independent skills gain, transfer, learner agency, practitioner workload, accessibility, errors, complaints and total cost. Results should be disaggregated by relevant learner characteristics and should include null and negative findings.

• The **EU Member States** must support the **educator profession** to address the compounding challenges which prevent any kind of meaningful engagement with AI. This includes improving pay, working conditions, status of the profession, increasing the staff profiles supporting education and training professionals.

f. Governance

• The **EU Member States and education and training institutions** must ensure learner and educator **consultations** for any decision regarding AIEd in an education and training institutions, followed-up by direct involvement of learners and educators into the adaptation of any AIEd tool to their needs and into the implementation and monitoring process.

•The **European Commission and the EU Member States** must include **social partners** in governance arrangements related to VET. Learners and educators must remain central, but VET implementation also requires structured involvement of employers, chambers, trade unions, sectoral organisations and other social partners.

• **All stakeholders, at all levels, must strengthen the mechanisms for children participation and children consultation in education and training institutions** both as a right for the young learners, but also as a methodology to develop the competences needed for them to make informed choices on AIEd in the future.

6 Conclusions

The LLLPlatform Working Paper on AI in Education and Training will be updated at different moments, acknowledging the long-lasting impact of the inclusion of more digital tools in education and training. This initial reflection will, in the future, be complemented by more sector specific papers, to account for peculiarities of AIEd which could not be addressed in a transversal paper. The above recommendations are intended for both the EU and the national level, but also towards education and training providers.

The LLLPlatform aims to re-focus the core of discussions on AI in education and training. **The education and training sector will not accept to be bypassed while decisions are considered a matter of economic or technological consideration. AI usage in learning is, first and foremost, a matter which concerns learners, educators, and education and training institutions.** It is their responsibility and right to discuss what competences are needed for the future and how these will be developed accounting for the new tools. Partnerships and international cooperation with a broad-range of stakeholders are necessary and have always been considered in education and training, but such stakeholders cannot take meaningful decisions in contradiction with education and training stakeholders.

As has been made clear across the paper, the threats of certain digital habits, of social media, and also of AI have been raised multiple times by the education and training community. These have not been heard and have led to the current state of affairs which is undesirable and puts the EU on course to re-think its digital strategy. As a result, it is time to get it right the first time on AI and avoid systemic, generational, and irreversible damage.

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