



# AI VET

Artificial Intelligence for VET providers

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## Compiled AI-VET pan-EU and country report

*Task 1 of Work Package 2*

*Assessing the readiness of VET ecosystem in adapting and adopting AI for  
education and teaching*



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## Introduction

The dawn of the Artificial Intelligence (AI) era heralds a transformative shift across virtually all sectors of society, with **profound implications for education and workforce development**. Vocational Education and Training (VET), a foundational element of Europe's strategy to foster employability, economic resilience, and social inclusion, **stands at the forefront of this transformation**. As AI technologies evolve rapidly, their potential to revolutionize the way vocational education is delivered, accessed, and aligned with labor market demands **presents both unprecedented opportunities and complex challenges**.

Vocational training systems have traditionally been designed to equip learners with practical skills and knowledge closely tied to specific industries and trades. **In an increasingly digital and automated economy, the nature of these skills is changing swiftly**. AI's capabilities—ranging from personalized learning algorithms to intelligent tutoring systems, virtual simulations, and data-driven labor market analysis—offer the promise of highly tailored, accessible, and relevant vocational education experiences. **These advances can empower learners by adapting educational content to individual learning styles and paces**, supporting those with diverse needs, and enhancing connections between training programs and real-world job requirements.

At the same time, integrating AI into VET demands a careful and nuanced approach. Across Europe, **significant variations exist in infrastructure, educator preparedness, regulatory frameworks, and cultural attitudes toward AI adoption**. This document presents a layered analysis of these dynamics by exploring the broader pan-European context and drilling down into the particular situations of Italy, Spain, and Poland—**countries that illustrate a spectrum of readiness, challenges, and strategic responses**.

The pan-European perspective highlights the ambitious potential of AI to enhance the personalization and inclusivity of vocational education. **Yet it also underscores persistent barriers such as data privacy concerns under GDPR, uneven access to digital resources, and the urgent need for comprehensive teacher training**. Financial constraints, especially in small and medium-sized institutions, add another layer of complexity to adopting advanced AI tools.

Italy's vocational education ecosystem **reflects the interplay of technological promise and systemic challenges**. While there is growing enthusiasm for the efficiency and innovation AI can bring, entrenched issues—such as underinvestment in educator salaries and infrastructure, limited access to modern digital devices—pose significant obstacles. Without addressing these fundamental concerns, **the potential benefits of AI risk being confined to isolated, student-driven use rather than becoming an integral part of the educational process**.

Spain, meanwhile, exemplifies a vibrant dialogue around the adoption of AI in VET, balancing promising opportunities with practical hurdles. **Challenges including limited teacher training, resistance to change, and gaps in technological infrastructure** contrast with dynamic advances in personalized learning, virtual simulations, and



strengthened collaboration between educational institutions and the business sector. **The Spanish experience underscores the importance of overcoming cultural and organizational barriers** to fully leverage AI's transformative power.

Poland's vocational education system is characterized by a gradual but determined integration of AI, supported by government initiatives and pilot projects. However, **persistent technical, financial, and cultural barriers remain significant**. In particular, gaps in teacher competencies, insufficient infrastructure, and ethical concerns about student data protection require targeted interventions. **Poland's case illustrates the critical need to build capacity and confidence among educators while expanding access to AI-powered tools** across urban and rural areas alike.

This document further examines the interplay between these challenges and opportunities, emphasizing the need for multi-stakeholder collaboration and inclusive policy frameworks. **Successful AI integration in VET requires investment not only in technology but also in human capital—through extensive teacher professional development—and in creating ethical guidelines that safeguard learner privacy and equity**. Moreover, aligning vocational curricula with the rapidly evolving demands of the labor market will be essential to ensure that AI-enhanced training translates into tangible employment outcomes.

As Europe collectively navigates the digital transformation of its vocational education systems, the responsible adoption of AI stands out as a strategic imperative. **This transition holds the promise of fostering more adaptive, accessible, and labor market-relevant training pathways that empower learners and strengthen the continent's economic competitiveness**. Yet, realizing this promise depends on addressing foundational challenges and embracing a vision of AI as a tool for equitable and sustainable education innovation.

Through an integrated analysis of the pan-European framework and the specific realities of Italy, Spain, and Poland, **this document serves as a resource for policymakers, educators, industry partners, and all stakeholders invested in shaping the future of vocational education**—one that harnesses the full potential of AI while upholding the values of inclusion, ethics, and quality learning.



# Assessment of the National policy landscape on AI reform

## AI Reform in EU: National landscapes, shared commitments, and strategic futures

AI has swiftly evolved from a futuristic concept into a pervasive and transformative force that is fundamentally reshaping the fabric of European societies. Its impact is felt not only in the ways people learn and work **but also in how governments govern, economies function, and social interactions unfold**. Across the European Union, AI stands as both a technological imperative and a profound test of political foresight—**demanding that policymakers go beyond mere innovation to embrace thoughtful regulation, inclusive education, and broad democratization of technological progress**.

The European Union has positioned itself as a global leader in the governance of AI, with the introduction of the landmark **AI Act in 2024 representing a comprehensive framework designed to uphold democratic values, protect fundamental rights, and prioritize the public good**. This regulatory vision reflects a deep commitment to ensuring that AI development and deployment align with the core principles of transparency, fairness, and accountability. However, while the EU provides this overarching blueprint, the real momentum and nuance of AI integration are unfolding on the ground at the national level.

Within member states, the journey towards AI adoption is richly diverse, shaped by each country's unique priorities, institutional strengths, and cultural contexts. **Some nations are channelling efforts into revamping digital skills education and modernizing vocational training to prepare their workforce for a rapidly changing labor market**. Others prioritize accelerating industrial transformation through AI-driven innovation, fostering competitive advantages in key sectors. Meanwhile, several countries have emerged as pioneers in ethical oversight and regulatory experimentation, **testing new approaches to governance that balance innovation with societal safeguards**.

This nuanced landscape reveals a pluralistic Europe—one where the convergence towards a shared AI future is not about uniformity but about **harmonizing different paths of development, experimentation, and leadership**. The national-level experiences offer invaluable lessons, illustrating how local realities can influence the practical realization of the EU's ambitious goals. Through these varied approaches, the continent is collectively shaping an AI ecosystem that aspires to be not only cutting-edge but also inclusive, responsible, and resilient.



The analysis that follows delves deeply into the experiences of key EU countries, exploring how they navigate the challenges and opportunities posed by AI integration. It highlights the **interplay between regulatory compliance and innovative policy-making**, revealing a dynamic process of adaptation and transformation. By weaving together these diverse national narratives, we gain a richer understanding of the evolving European AI landscape—one that embraces complexity and diversity while advancing towards a common horizon of technological and societal progress.

Across Northern and Western Europe, a fascinating pattern emerges: **smaller and mid-sized countries are leveraging their unique strengths to punch well above their weight in the ongoing transformation of artificial intelligence governance and education.**

These nations demonstrate that size need not be a barrier to leadership; instead, agility, strategic clarity, and a commitment to inclusivity and institutional readiness can drive meaningful, scalable AI reform.

Take Estonia, for example. Often hailed as a digital trailblazer, **Estonia's AI project stands as a beacon of how a small country can innovate at pace and scale.** Building on its longstanding legacy of digital governance, Estonia has woven AI literacy deeply into its educational fabric—embedding AI learning not only in high school curricula but also expanding it to vocational training programs. **This initiative exemplifies the power of focused, national-level ambition combined with public-private partnerships**, such as collaboration with pioneering companies like OpenAI. Estonia's approach reveals that **nimbleness and a clear vision can accelerate digital transformation**, turning potential into tangible outcomes that resonate nationally and inspire globally.

Meanwhile, **Finland charts a complementary but equally transformative course through its Elements of AI initiative.** This massive open online course has attracted over a million learners worldwide, transcending traditional technical audiences to reach citizens from all walks of life. By prioritizing digital citizenship over mere technical mastery, Finland offers a powerful narrative: **AI education is not just for specialists but a cornerstone of democratic engagement and empowerment.** The country's emphasis on accessible, inclusive AI literacy programs underscores the pedagogical potential of AI to foster informed, critical, and responsible participation in society. Finland's model is a testament to **how education can be the great equalizer in the AI age**, bridging divides and nurturing a shared understanding of technology's promises and pitfalls.

In Ireland, a different yet equally vital transformation is underway—one that targets the very architecture of governance itself. **The recent refresh of Ireland's National AI Strategy is marked by an ambitious effort to embed AI competence within the public sector's highest echelons.** By training hundreds of senior civil servants—and planning to extend this training across the entire public service—Ireland is building a governance system that is AI-ready not only in terms of technology but also institutionally prepared to



manage AI's complexities. This approach redefines public administration for the digital era, **where AI tools augment rather than replace human judgment, enhancing transparency, accountability, and decision-making.** Ireland's strategy serves as a model for digital maturity, illustrating how governments can evolve to meet the challenges and opportunities of AI with foresight and institutional resilience.

Finally, **Germany's DigitalPakt Schule initiative, while ostensibly focused on upgrading hardware in schools, is far more than a simple infrastructure project.** It reflects a strategic commitment to laying the groundwork for a broad and responsible AI integration across the education system. By pairing significant investments in technological infrastructure with extensive teacher training programs, **Germany is preparing its educational institutions for the complex demands of AI-enhanced learning environments.** This dual focus ensures that schools are not only equipped with the latest digital tools but also staffed by educators confident and competent in using these tools to support students effectively. Germany's approach highlights a crucial lesson: that responsible **AI adoption requires both material resources and human capacity building,** working hand in hand to transform education at scale.

Together, these four countries illustrate a rich tapestry of AI governance and educational innovation in Northern and Western Europe. They reveal how varied national approaches—rooted in digital heritage, educational philosophy, governance reform, and infrastructure investment—can converge toward a common goal: shaping an AI future that is democratic, inclusive, and sustainably transformative. In this way, **smaller states become powerful exemplars of how targeted, strategic efforts can generate outsized impact in the evolving European AI landscape.**

## European convergence and strategic divergence

Despite their diverse histories, institutional landscapes, and strategic priorities, **all national AI strategies share a remarkable convergence around a common set of foundational principles.** At the heart of this continental alignment lie commitments to ethical governance, comprehensive digital literacy, the modernization of critical infrastructure, and regulatory foresight that anticipates and manages AI's societal impacts. The **AI Act of 2024 provides the EU with a unified and robust legal framework, establishing the necessary guardrails for the responsible development and deployment of artificial intelligence.** Yet, the true measure of this legislation's effectiveness depends largely on how member states translate these broad directives into concrete actions—through national policies, targeted investments, educational reforms, and cultural change.



What is unfolding across Europe is not a move toward rigid uniformity or centralized control but rather an orchestrated diversity: **a vibrant mosaic of AI governance models**. Each reflects the unique cultural, political, and economic contexts of its country, yet all are harmonized by shared democratic values and a collective commitment to steer AI toward public good. **This pluralistic approach recognizes that the future of AI cannot be dictated by a one-size-fits-all formula**; it must be adaptive, context-sensitive, and rooted in the realities of diverse societies.

While the EU's regulatory framework plays a vital role in setting standards and ensuring baseline protections, **the real transformation in AI governance will arise from dynamic, bottom-up cultural shifts**. These shifts involve reimagining education, fostering digital fluency across generations, and embedding ethical considerations into the very fabric of public and private sector decision-making. **Cross-border collaboration will be essential**—sharing best practices, aligning standards where appropriate, and nurturing a European AI ecosystem that is competitive yet conscientious. The political will to govern emerging technologies with wisdom, transparency, and care is what will ultimately distinguish Europe's approach on the world stage.

The policy innovations underway across all Europe signal not just a governance willingness to regulate AI but to foster a critical and ethical-driven response. **Whether Europe emerges as a mere regulator or as a global exemplar of democratic technological governance will depend on the sustained commitment** of its institutions, civil society, and political leadership to uphold these shared principles in practice.

## Looking forward: Toward a human-centred digital future

At its core, the European approach to AI reform embodies a profound conviction: **technology must ultimately serve humanity—not the reverse**. In a global conversation too often dominated by the race for speed, scale, or disruptive impact, Europe is charting a different course—one marked by deliberation rather than haste, ethics rather than unchecked enthusiasm, and inclusion rather than deepening inequality.

The road ahead is undeniably complex and fraught with challenges. **The spectre of fragmentation still looms, as disparities in funding, infrastructure, and digital skills risk leaving some regions and populations behind**. Capacity limitations and digital divides threaten to slow progress and undermine social cohesion. Yet, **national strategies and initiatives across the continent demonstrate that Europe increasingly possesses not only the tools but also the vision** necessary to shape the future of AI on its own terms.



**The task now is to build upon this momentum**—intensifying public engagement to democratize AI literacy and participation; accelerating cross-national cooperation to harness shared expertise and resources; and steadfastly ensuring that the transformative power of AI is directed beyond mere efficiency gains or economic profit. Instead, **it must be oriented toward advancing justice, equity, and the flourishing of all individuals and communities.**

In doing so, Europe can fulfil its promise as a beacon of human-centred technological progress—one where innovation and humanity walk hand in hand toward a digital future that enriches society, safeguards rights, and nurtures the common good.

## Italy: Promising innovation amid structural constraints

Italy's journey into the realm of artificial intelligence is marked by a **striking tension between vibrant pockets of innovation and systemic structural challenges that slow broader progress.** Across the country, promising pilot projects serve as beacons of what AI could achieve within educational settings. For instance, **the deployment of AI teaching assistants in classrooms across four regions exemplifies Italy's experimental spirit.** These initiatives aim to harness AI's capacity to personalize learning experiences, provide real-time support to educators, and foster more inclusive pedagogical environments that can adapt to diverse student needs.

Yet, these pilots, while inspiring, also illuminate the scale of Italy's digital divide. With less than half of the population—approximately 45.8%—equipped with basic digital skills, and only around 5% of companies actively integrating AI technologies, **the nation finds itself at a critical crossroads.** The digital transformation is neither comprehensive nor uniformly distributed, exposing deep fissures between potential and reality. **The core challenge facing Italy is not a scarcity of innovative ideas or enthusiasm for AI's possibilities, but rather the difficulty of scaling these innovations within a fragmented educational system and complex institutional landscape.**

Italy's experience underscores a crucial lesson applicable far beyond its borders: **technological innovation cannot thrive in isolation.** Without the complementary development of equitable access, sustained infrastructure investments, and coherent institutional renewal, AI projects risk becoming isolated “boutique” experiments rather than agents of systemic change. The AI-assisted classroom pilot, for example, represents a vital first step but also highlights the need for **coordinated strategies that empower teachers** through comprehensive training, update curricula to reflect AI literacy and skills, and expand digital infrastructure to ensure all students can benefit equally.

Despite these hurdles, **Italy's potential in the AI domain remains compelling.** The nation's deep-rooted cultural heritage, world-renowned scientific research, and rich

design traditions position it uniquely **to champion a distinctly humanistic approach to AI**—one that embraces creativity, ethical responsibility, and social solidarity. If policy frameworks can bridge the gap between vision and implementation, Italy has the opportunity to shape a future where AI is not only a tool of efficiency but a catalyst for a more inclusive, creative, and ethically grounded society.

In this sense, Italy's path forward is not merely about catching up technologically; **it is about translating enduring values into the digital age, crafting an AI ecosystem that reflects the country's rich identity while embracing the demands of tomorrow's world.** The challenge is formidable, but so too is the promise—if the country can harness its strengths and address its weaknesses in a coordinated and strategic manner, Italy's AI future could become a model of innovation deeply intertwined with social progress.

## Poland: Infrastructure, literacy, and strategic catch-up

**Poland's AI transformation embodies the dynamic momentum of a country poised for a strategic leap into the digital future.** With its Artificial Intelligence Development Policy 2025–2030, Poland has adopted a balanced yet ambitious stance—one that carefully weighs the promise of AI with the practical realities of implementation. **This policy sets the tone for a national journey that is both forward-looking and deeply grounded in the challenges and opportunities unique to the country's social and economic fabric.**

Poland's AI strategy centres on **cultivating human capital and strengthening foundational infrastructure.** The AI4Youth program, developed in collaboration with Intel, exemplifies this focus by targeting the often overlooked yet critical segments of the educational system—secondary schools and vocational education. **This initiative aims to democratize AI competencies from the grassroots, ensuring that young people across Poland, including those in smaller towns and rural areas, gain practical skills and confidence in navigating AI technologies.** By doing so, Poland acknowledges that the future of AI depends as much on broad-based education as on policy frameworks.

Perhaps most striking about Poland's approach is the sheer scale of its digital education ambitions. The government's pledge to establish AI laboratories in secondary schools nationwide is an **extraordinary investment in educational infrastructure that seeks to transform classrooms into vibrant innovation hubs.** Complementing this physical upgrade is a commitment to train teachers in AI-related skills—an acknowledgement that **technology alone is insufficient without well-prepared educators** who can guide students through AI's complexities and potentials.

Beyond education, **Poland's legislative agenda reflects a keen awareness of the nuanced challenges AI poses in governance and public trust.** Particular attention is given to algorithmic transparency and the labelling of AI-generated content, especially in

public sector applications where decisions affect citizens' lives. This regulatory vigilance signals Poland's determination to foster AI systems that are not only innovative but also **accountable and understandable to the public.**

Poland's AI ambitions are not confined within its national borders. Deeply conscious of regional dynamics and geopolitical realities, Poland views digital sovereignty and economic competitiveness as integral to its AI strategy. As a key member of the Visegrad Group, Poland actively champions the creation of regional AI standards—**seeking a collaborative framework that harmonizes the EU's regulatory ambitions with local contexts and specificities.** This regional advocacy positions Poland not merely as a follower in the AI race but as a **shaper of the AI governance narrative for Central and Eastern Europe.**

In this sense, **Poland's AI transformation represents both a catch-up and a leapfrog moment.** While addressing fundamental gaps in infrastructure and education, **the country simultaneously shapes the broader dialogue on AI's role in society, balancing technological advancement with cultural and economic realities.** Through this dual focus, Poland is crafting a vision of AI governance that respects local needs while aligning with European values, thus playing a pivotal role in shaping a pluralistic and resilient digital future across the continent.

## Spain: Institutionalizing ethical AI in a changing digital order

Spain stands out today as **one of the most ambitious and structurally integrated pioneers of AI governance within the European Union.** Far from offering a mere set of aspirational goals, Spain's National Strategy for Artificial Intelligence, first launched in 2020 and bolstered with significant updates in 2024, **represents a comprehensive and pragmatic roadmap.** It moves decisively from high-level strategy to concrete, actionable reform, combining sustained financial investment with thoughtful institutional design and forward-looking legislation.

At the heart of Spain's approach lies a **multi-dimensional framework centred on six strategic axes.** These axes encompass the full spectrum of AI's development and deployment: from promoting cutting-edge scientific research and fostering robust economic integration, to cultivating domestic AI talent and embedding ethical considerations into every stage of AI use. Importantly, **Spain's commitment to ethical and inclusive AI governance transcends rhetoric**—it is reflected in a series of concrete mechanisms designed to embed fairness, transparency, and accountability into AI systems.

Among these mechanisms, the National AI Quality Seal serves as a benchmark for trustworthy AI products and services, **signalling compliance with rigorous standards.**



Meanwhile, the establishment of the Data Office demonstrates Spain's recognition of data governance as a foundational pillar of responsible AI. The most groundbreaking development, however, is the creation of the Spanish Artificial Intelligence Supervisory Agency which is not simply a regulatory watchdog; **it embodies a governance innovation that signals Spain's readiness to oversee AI with a holistic lens**—one that scrutinizes transparency, proactively prevents bias, safeguards fundamental rights, and reinforces democratic accountability.

Spain's political resolve to prioritize ethical AI is further underscored by its decision in March 2025 **to accelerate the passage of a dedicated ethical AI law**, using an urgent legislative procedure. This move reflects a keen awareness of AI's rapid evolution and its societal implications, as well as Spain's political maturity in addressing these issues head-on. By fast-tracking this legislation, Spain positions itself as a nation that embraces both technological progress and the imperative of robust governance.

Beyond regulation and oversight, **Spain's model is distinguished by the seamless integration of AI into public services and educational systems**. Rather than siloing AI as a technical specialty, Spain reimagines AI literacy as a transversal competence, embedding it across all levels of learning—from vocational training and university curricula to lifelong learning programs. Through initiatives like the National Digital Skills Plan, **the country is actively fostering AI fluency among its citizens, equipping them with the knowledge and skills necessary to thrive in an increasingly digital society**.

This inclusive educational strategy recognizes that building a digitally literate population is critical not only for economic competitiveness **but also for democratic participation in the age of AI**. By blending AI knowledge into everyday learning pathways, Spain nurtures a generation prepared to understand, critique, and innovate with emerging technologies.

Spain's AI governance model represents more than early adoption; it exemplifies democratic innovation. **It combines ambition with pragmatism, regulatory rigor with ethical vigilance, and technological advancement with social inclusion**. Spain is not only shaping the trajectory of AI within its borders but also offering a powerful example to other EU member states, demonstrating how democratic values and emerging technologies can advance hand in hand toward a shared, responsible AI future.



## AI reform in education and training

### Reimagining education in the age of AI: The EU comparative journey

As artificial intelligence continues to permeate every dimension of modern life, education finds itself at a pivotal crossroads. **AI is no longer an abstract concept confined to the realms of technology companies or academic research**; it has arrived at the very doorstep of classrooms across Europe, demanding that educators, policymakers, and learners fundamentally rethink what it means to teach, to learn, and to prepare for an uncertain future. **This moment of transformation challenges long-standing assumptions about pedagogy, curriculum design, and the role of educators themselves.**

Across the European Union, the collective vision is unequivocal: **to build a digitally sovereign Europe where citizens are not merely passive consumers of technology**, but active, informed, ethical, and empowered participants in shaping the digital society of tomorrow. Central to this vision is the education system—an intricate and sprawling ecosystem encompassing schools, vocational centres, universities, educators, students, and the myriad public institutions that support them. The integration of AI within this ecosystem is not simply a technological upgrade; **it represents a profound shift** that has the potential to redefine educational equity, access, and relevance.

Europe's response to this challenge has been both swift and strategic. Through ambitious frameworks such as the Digital Education Action Plan (2021–2027), the Coordinated Plan on Artificial Intelligence, and the Digital Decade 2030 targets, **the European Commission has established a robust and coherent policy architecture**. These initiatives do more than set goals—they embody a shared European ethos, emphasizing that digital transformation, and AI in particular, must uphold democratic principles, promote inclusion, and **catalyse innovation that benefits all layers of society**.

However, **the journey toward this shared vision is far from linear or uniform**. Across the continent, the pace, priorities, and pathways of AI integration into education vary considerably. **These differences reflect each member state's distinct historical legacies, political traditions, economic realities, and societal expectations**. This rich diversity is not a weakness but a strength—allowing for a pluralistic approach where innovation can be tailored to local needs while still converging on common values.

Take, for example, Italy, Spain, and Poland—countries that not only represent different geographic and cultural regions of Europe but also illustrate contrasting approaches to embedding AI in education. **Italy's landscape is marked by promising innovation** yet hampered by structural fragmentation and uneven digital capacity. **Spain offers a model**

**of integrated, ethically grounded governance**, combining ambitious legislation with systemic educational reform. **Poland's strategy emphasizes building human capital and infrastructure from the ground up**, reflecting both regional cooperation and a pragmatic vision for scalable transformation.

Together, these countries paint a nuanced picture of Europe's AI educational ecosystem—**one where tailored strategies respond to unique national challenges** but are united by the overarching goal of preparing citizens for a digitally complex and rapidly evolving world.

At stake is far more than the deployment of new tools or algorithms. The integration of AI in education offers unprecedented opportunities to personalize learning, enhance accessibility, and align curricula with the fast-changing demands of the labor market. **Yet it also raises profound questions about equity, data privacy, ethical use, and the risk of exacerbating existing social divides**. Addressing these challenges requires not only technological innovation but also institutional renewal, investment in educator capacity, and inclusive policymaking that listens to diverse voices.

In this context, Europe's commitment to human-centred AI—anchored in rights, ethics, and democratic oversight—**becomes a beacon for how technology can serve society rather than dominate it**. The education system, as the crucible of future generations' skills and values, will be a defining arena for realizing this vision.

As this report unfolds, it will delve into the specific strategies, challenges, and opportunities faced by key member states in their efforts to weave AI into the fabric of vocational education and training. By exploring the varied paths taken by Italy, Spain, and Poland, and situating these within the broader EU framework, we can better understand **how Europe's mosaic of AI governance and education reform is shaping a future that is as inclusive as it is innovative**.

The journey will be **complex and uneven**, requiring continuous adaptation and collaboration. Yet, with a shared commitment to democratic values and human flourishing, Europe is poised not just to navigate this crossroads, but to lead the way toward a digitally empowered and equitable future for all.

## Common thread: Teachers as the architects of digital transformation

Across Italy, Spain, and Poland, one undeniable truth emerges: **the success of AI integration in education rests not primarily on cutting-edge software or state-of-the-art hardware, but on people**—and above all, on teachers. They are the linchpins of this transformation, the architects shaping how technology translates into meaningful learning experiences.

AI challenges the very essence of the teaching profession. **It blurs long-standing boundaries between knowledge and information**, prompting a shift from rote memorization to critical thinking. It redefines assessment—not as a static measure but as a dynamic, ongoing dialogue between learner and educator. It unsettles traditional modes of instruction, **encouraging teachers to move from mere transmitters of facts to facilitators** of exploration, creativity, and collaboration.

Yet AI also offers unprecedented opportunities. **Adaptive learning systems can tailor content to individual student needs, predictive analytics can identify learners at risk of falling behind before it is too late, and automated feedback loops can relieve teachers of routine tasks**, freeing precious time to nurture human connection, empathy, and mentorship. These tools have the potential not to replace teachers, but to empower them—enhancing their professional practice while respecting their unique, irreplaceable role in the classroom.

To fully seize this opportunity, Europe must invest not only in the technologies themselves but in what might be called “AI pedagogy”—**the intentional cultivation of teacher competence, confidence, and agency in a digitally enriched educational environment**. This requires embedding AI literacy into initial teacher education, ensuring that new generations of educators enter the profession prepared to engage critically and creatively with AI tools. **It calls for comprehensive, sustained continuing professional development programs** that are closely aligned with national competency frameworks, offering not just technical know-how but ethical reflection and pedagogical innovation.

**Fostering vibrant communities of practice is essential.** Teachers need spaces—both physical and virtual—where they can share experiences, experiment with new approaches, troubleshoot challenges, and co-create solutions. Through such collaborative networks, **educators become agents of change** rather than passive recipients of top-down mandates, driving bottom-up innovation that is grounded in real classroom realities.

## Towards a EU education renaissance

The unfolding story of AI in education is still being written, with Italy, Spain, and Poland each contributing distinct and revealing chapters. These narratives reflect a spectrum of ambition, experimentation, success, and struggle—each shaped by unique histories, institutional capacities, and societal contexts. Yet when woven together, they illuminate a broader European narrative: one of not merely adapting to AI, **but actively reinventing what education can and should be.**

This is a moment pregnant with profound possibility. If guided by ethics, equity, and a clear sense of educational purpose, AI can be a powerful tool—not for depersonalization or



alienation—but for human flourishing. **It can empower teachers as thoughtful, creative professionals**; support learners as active, engaged participants; and prepare societies for futures that remain, as yet, only faintly imagined.

But the window for decisive action is narrow. **Success will depend on leadership that is visionary yet humble, ambitious yet grounded, collaborative rather than divisive.** The European Union’s role must extend beyond that of a funder or regulator. It must be a convener of diverse stakeholders, a broker of knowledge across borders, and a vigilant guardian of the shared values that underpin Europe’s democratic project.

Because at its best, AI is not about replacing human intelligence—it is about **amplifying it.** Nowhere is this amplification more vital than in the classrooms of Europe, where the seeds of tomorrow’s societies are planted, nurtured, and allowed to bloom.

## Italy: Caught between tradition and opportunity

**Italy’s education system is among Europe’s most historically rich and culturally vibrant,** yet it remains one of the continent’s most structurally complex and regionally disparate. The deeply decentralised nature of Italian education governance, combined with significant socio-economic disparities between the wealthier northern regions and the less developed south, **creates a uniquely challenging environment for the integration of AI into teaching and learning.** Rooted in longstanding traditions of pedagogy and humanism, Italy’s pathway toward AI adoption in education **is both full of promise and marked by significant tensions.**

On the policy front, Italy has taken important steps toward embracing digital transformation. The National Strategy for Artificial Intelligence (2022–2024) explicitly recognizes education and training as foundational pillars for the country’s AI ambitions. **It aims to align the skills supply with rapidly evolving labor market demands,** reflecting a strategic understanding that AI literacy will be crucial for future workforce competitiveness. Moreover, the Piano Nazionale Scuola Digitale (National Digital School Plan) has for years sought to modernize classrooms, **foster digital inclusion, and promote innovative pedagogies.** Complementing these efforts, the Next Generation EU Recovery and Resilience Facility (NRRP) has injected **unprecedented financial resources into Italy’s digital infrastructure,** catalysing new opportunities for AI-driven educational innovation.

Perhaps the most emblematic of these initiatives is “Scuola 4.0,” a visionary program **to transform classrooms into next-generation learning environments equipped with interactive technologies and AI-powered systems.** This effort transcends mere technological upgrade; it seeks to reconceptualize the very nature of the classroom—from a static space of knowledge transmission to a dynamic laboratory where digital

citizenship, creativity, and personalized learning converge. Such spaces are intended not only to enhance student engagement but also to **foster new pedagogical approaches that leverage AI's potential to tailor education to individual needs.**

However, despite these promising policy frameworks and investments, **Italy faces a critical bottleneck: the human dimension of education reform.** Teachers, who are central to any meaningful integration of AI, often feel ill-prepared to harness these new tools effectively. While the resilience and adaptability of Italian educators were on full display during the COVID-19 pandemic's emergency shift to remote learning, **the transition to AI-enhanced pedagogy demands more than ad hoc adaptation.** Initial teacher education programs have yet to embed AI literacy, and professional development opportunities remain sporadic and fragmented. There is a persistent gap between cultivating basic digital skills and equipping educators with a sophisticated understanding of AI ethics, algorithmic bias, and the pedagogical possibilities AI offers.

This gap reveals a deeper systemic issue: **the lack of a coherent, long-term vision that unites Italy's regional diversity, infrastructure upgrades, and human capacity building into a seamless strategy.** Italy's rich cultural heritage in education—centred on humanism, critical thinking, and creativity—could provide a fertile foundation for an AI-humanistic approach to learning. Yet, without deliberate policy coordination and investment in teacher empowerment, **there is a risk that AI initiatives remain scattered and fail to scale.**

Italy stands at a critical crossroads. It possesses the financial means through the NRRP, clear institutional mandates, and a rich tradition of educational philosophy. **The challenge now is to craft a cohesive roadmap that bridges the existing divides between north and south, infrastructure and pedagogy, policy and practice.** This roadmap must place teachers not as passive recipients of new technologies, but as active co-designers and innovators in the AI-powered classroom. By centring educators in this transition, Italy can unlock AI's transformative potential to foster equity, creativity, and inclusion in education.

In doing so, Italy's educational system can evolve into a beacon of democratic AI integration—**where technology is not a mere tool, but a partner in nurturing the intellectual and ethical growth of future generations.** The task ahead is daunting, but the stakes are high: the future of Italy's workforce, its societal cohesion, and its cultural legacy all depend on how effectively it navigates this critical phase of AI-enabled educational reform.



## Poland: Potential rising held back by fragmentation

Poland stands at a pivotal juncture, embodying a country rich with educational potential yet navigating the complexities of a fragmented digital transformation. Rooted in a proud tradition of academic excellence and supported by a vibrant, emerging tech ecosystem, **Poland's youth are among Europe's most digitally engaged.** This foundational strength offers a unique opportunity to harness AI as a driver of educational innovation and societal progress. Yet, despite clear ambition and promising initiatives, **Poland's progress remains uneven, reflecting a gap between strategic vision and operational reality.**

Over recent years, Poland has articulated a coherent policy intent to modernize its education system in response to rapid digital disruption. Landmark documents like the Integrated Skills Strategy 2030 and the Digital Transformation of Education Policy reflect this ambition, **emphasizing the importance of equipping learners with future-ready competencies and fostering a digitally fluent workforce.** However, while these frameworks offer a roadmap, they often remain aspirational in nature—lacking the necessary clarity on funding streams, cross-ministerial cooperation, and implementation pathways to transform vision into widespread, lasting impact.

Within this context, Poland's efforts in AI education have been largely driven by grassroots initiatives and civil society partnerships. The “Lekcja: AI” (Lesson: AI) programme is a notable example, **successfully engaging thousands of educators in foundational AI knowledge,** data literacy, and practical classroom applications. Backed by the Orange Foundation and coordinated with public education bodies, this initiative has helped seed awareness and competence across multiple regions. Yet, as impactful as such projects are, **their current status as pilots outside of a cohesive national framework limits their scalability and sustainability.**

In vocational education and training, **Poland is beginning to embrace immersive technologies** such as virtual reality (VR), augmented reality (AR), and AI-powered simulations to enhance learning experiences and align skills training with evolving industry demands. These projects, often supported by European Union cohesion funds and regional innovation grants, signal a growing recognition of the transformative potential of AI in practical, skills-based education. However, **their reach is sporadic and lacks the systematic coordination needed to ensure consistency and widespread adoption.**

Teacher professional development remains one of the thorniest challenges in Poland's AI education journey. The absence of a nationally recognized AI competencies framework means that **upskilling efforts depend heavily on voluntary, fragmented continuing professional development opportunities.** Without a unified, strategic approach to educator training, many teachers remain uncertain about how to integrate AI meaningfully into their pedagogy or how to navigate the ethical and social dimensions of emerging technologies.



In many ways, Poland's story is one of latent potential and energy waiting to be fully harnessed. The foundational elements exist—policy ambition, a robust institutional base, and a society increasingly aware of the importance of digital skills. **What Poland needs now is the connective tissue that can bind these ingredients into a resilient, future-oriented ecosystem.** This will require a long-term, adequately funded national strategy that aligns political priorities with grassroots innovation, ensures interdepartmental coordination, and **places educators at the centre of digital transformation** as proactive leaders rather than passive recipients.

Only by bridging this divide can Poland move beyond pilot projects and isolated initiatives to create a comprehensive AI education framework. Such a framework would not only equip its youth with essential competencies but also empower educators as champions of digital change—thereby ensuring that AI becomes a lever for **equitable, inclusive, and forward-looking education** across the entire country.

## Spain: National model of strategic convergence and readiness

Spain's approach is bold, structured, and remarkably cohesive. Over recent years, Spain has quietly emerged as a leader within Europe's evolving education-AI nexus, **drawing on a solid foundation of digital education policies** and a societal openness to innovation that fuels ambitious reforms. This positioning reflects a deliberate, strategic vision that not only embraces AI technology but also **integrates it thoughtfully across educational, economic, and social domains.**

At the heart of Spain's effort is the National AI Strategy, which unequivocally commits to embedding AI across the full educational lifecycle—from early childhood education through to lifelong learning. This vision is reinforced by the Digital Spain 2026 roadmap, **which effectively links AI policy with wider national priorities in education,** workforce development, and regional cohesion. This alignment illustrates a “whole-of-government” and “whole-of-society” approach, where **AI is not siloed** but integrated as a transformative lever for systemic change.

One of the most illustrative examples of this integration is the Código Escuela 4.0 programme. Far beyond a simple curricular update, Código Escuela 4.0 represents a pedagogical movement designed to introduce computational thinking, coding, and AI literacy from primary school onwards. This initiative marks a profound shift in mindset: **AI ceases to be an abstract, distant concept and instead becomes an accessible, interactive, and critical subject of engagement.** Children are encouraged to explore AI's possibilities and ethical dimensions playfully and thoughtfully, cultivating a generation that will approach technology with curiosity and responsibility.



In vocational education and training, Spain's ambition is equally striking. Through the Strategic Plan for Vocational Training (2022–2025), **the country is spearheading a transformation of its VET institutions** to align with the demands of the Fourth Industrial Revolution. Central to this effort is the deployment of ATECA classrooms—**state-of-the-art, technology-rich spaces** embedded within vocational schools. These classrooms serve not only as hubs for hands-on learning but as realistic simulators of AI-driven workplaces, spanning industries like smart manufacturing, logistics, and digital marketing. By immersing students in environments powered by AI tools, **Spain is fostering job-ready skills that respond directly to evolving labor market needs.**

However, technology and infrastructure are only part of the equation. What truly distinguishes Spain's approach is its robust investment in teachers as pivotal digital change agents. The National Institute for Educational Technologies and Teacher Training (INTEF) stands out as a model institution providing modular and scaffolded professional development **aligned with the European DigCompEdu framework**. INTEF's programmes go well beyond technical training; they immerse educators in the ethical, legal, and pedagogical implications of AI, encouraging them to become confident facilitators of AI-enhanced learning. This ensures that teachers are not passive adopters but **active collaborators and innovators in shaping AI's educational role.**

Spain's clear vision, institutional coordination, and significant public investment position it as perhaps **the most integrated and future-ready AI education system among the three countries under review**. Its strengths lie in marrying policy ambition with practical implementation and cultural receptivity to change. Yet, even as these advances gain momentum, challenges remain. **Spain must guard against the risk that AI-driven innovation becomes concentrated only in urban hubs or limited to pilot initiatives.** Ensuring universal access and fostering regional equity are essential to prevent digital divides from widening.

Maintaining sustained, inclusive dialogue with educators, students, parents, and civil society will be key to nurturing trust, addressing ethical concerns, and fostering a shared commitment to responsible AI integration. The real test for Spain's bold strategy will be its ability to scale innovation equitably and embed AI literacy not just as a technical skillset, **but as a cornerstone of democratic, ethical, and inclusive education.**

In this way, Spain's AI education journey exemplifies the potential for a national system **to harness technology as a force for social good**—cultivating digital citizens who are equipped not only to thrive in a changing economy but to shape the future of AI governance with wisdom and care.



# The response of the VET ecosystem to the AI technologies

## Vocational Education & Training in EU: A dynamic response

The EU vocational education and training (VET) landscape finds itself at a critical crossroads. **The challenge is urgent and multifaceted:** to embed AI skills, literacies, and mindsets across the entire education-to-employment continuum, ensuring that learners are not only prepared to use AI technologies but are also empowered to **shape and govern them responsibly in their future workplaces.**

This transformation transcends the mere transmission of technical competencies. It calls for a fundamental reimagining of pedagogical approaches—moving from traditional models of instruction toward flexible, learner-centred, and experiential frameworks that foster critical thinking, creativity, and adaptability. **Updating qualification frameworks becomes essential to reflect emerging AI-related skills while maintaining coherence with labour market demands and social inclusion goals.** Moreover, the transformation requires the cultivation of collaborative ecosystems that bring together educational institutions, industry partners, policymakers, and civil society actors in co-creating responsive and future-proof training pathways.

Equally crucial is the investment in educators themselves—VET teachers and trainers must be equipped not only with AI knowledge but with the **pedagogical tools and institutional support to integrate AI effectively and ethically into their practice.** Their role shifts from knowledge transmitters to facilitators of innovation and lifelong learning.

Across Europe, we see a rich spectrum of approaches reflecting the diversity of national policy priorities, historical legacies of vocational education, the structure of regional economies, and the varying levels of digital infrastructure maturity. **Some countries lead with bold strategic frameworks and substantial public investments, while others rely on agile pilot initiatives or strong private sector partnerships.** Despite these differences, a shared momentum is palpable—a collective recognition that the future of work and learning depends on successfully bridging AI and VET.

**Alongside this momentum, common challenges persist:** aligning curricula with fast-evolving AI technologies, addressing digital divides and regional inequalities, ensuring equitable access to upskilling opportunities, and fostering the institutional capacity needed for sustainable reform. Yet within these challenges lie vast opportunities—to reinvent vocational education as a driver of innovation, social mobility, and inclusive economic growth.



The journey toward AI-empowered VET **is complex and ongoing**. But the convergence of political will, technological potential, and educational commitment across Europe offers a hopeful and transformative pathway forward.

## Pan-EU vision and frameworks: Ambition meets fragmentation

At the European Union level, **a suite of forward-looking strategies has been articulated to guide and accelerate the digital transformation of education and training systems**, positioning AI at the heart of future labor market readiness. Frameworks such as the Digital Education Action Plan, the Pact for Skills, and the European Year of Skills 2023 embody a collective ambition: to equip European citizens with the competencies, mindsets, and ethical awareness necessary to thrive in an increasingly AI-powered economy.

These strategies are grounded in a human-centric vision of AI adoption, emphasizing that **technology should augment and enhance human work, not replace it**. This perspective seeks to ensure that the digital transition respects democratic values, fosters meaningful employment, and safeguards worker dignity. Furthermore, **the EU stresses the importance of cross-sectoral collaboration**—bringing together public bodies, educational institutions, industry stakeholders, and civil society to co-create learning pathways and anticipate future skills needs. This collaborative spirit recognizes that **AI's impact transcends traditional sector boundaries and calls for integrated, flexible approaches**.

Equity and inclusion are foundational pillars of the EU's vision. **The risk of digital divides deepening existing social inequalities is real and pressing**. Thus, policies aim to prevent exclusion by prioritizing access to quality digital infrastructure and targeted support for vulnerable groups. Similarly, sustainability considerations are increasingly woven into the narrative, linking AI upskilling efforts to broader green transitions. **The goal is to cultivate a workforce capable of contributing to environmentally responsible innovation and circular economy initiatives**.

Despite these ambitious policy blueprints and the availability of significant funding instruments—ranging from Erasmus+ mobility programmes and the European Social Fund Plus (ESF+) to the Digital Europe Programme—**the practical rollout of AI skills and education policies across member states remains uneven**. Several structural and contextual factors contribute to this complexity.

Foremost among these is the institutional landscape itself: education policy remains primarily within national and regional jurisdiction, **leading to diverse priorities, governance arrangements, and resource allocations**. This decentralization, while

reflecting democratic subsidiarity, can fragment efforts and slow down harmonized progress across the Union.

Another persistent challenge is the disparity in digital infrastructure across regions. **Rural areas and economically less developed territories often face greater obstacles** in deploying AI-enriched learning environments, from insufficient broadband connectivity to a lack of hardware and technical support. **These gaps risk leaving certain populations behind** at a moment when digital fluency is increasingly a baseline requirement for social and economic participation.

Perhaps most critically, the **shortage of AI-capable educators represents a bottleneck in scaling AI integration**. The profession demands a blend of technical literacy and pedagogical expertise—teachers who not only understand AI tools but can thoughtfully embed them into curricula, foster ethical reflection, and inspire digital citizenship. **Current professional development offerings are frequently fragmented and under-resourced**, creating a mismatch between policy ambitions and classroom realities.

Recognizing these barriers, the European Commission has actively promoted pilot projects, cross-national knowledge exchange platforms, and the development of innovative frameworks such as micro-credentials and digital badges. **These initiatives aim to support modular and flexible acquisition of AI-related skills**, allowing learners and educators to build competencies in bite-sized, stackable formats adaptable to diverse contexts and career trajectories.

Yet, the transition from promising pilots and isolated successes to comprehensive, systemic transformation remains a work in progress. **Bridging this gap requires sustained political commitment**, effective coordination between EU institutions and member states, and mechanisms that ensure inclusivity and equity remain front and centre.

In sum, while the EU's strategic vision provides a coherent and inspiring roadmap for AI-driven educational renewal, the journey toward realizing that vision on the ground calls for patient, persistent, and collaborative effort across multiple levels of governance and society.

## Common themes and divergences: lessons for a Pan-EU strategy

As Italy, Spain, Poland, and other European countries navigate the integration of artificial intelligence into their vocational education and training systems, several persistent themes emerge, reflecting both shared ambitions and common challenges. These themes illustrate the complexity of AI adoption and highlight pathways for more effective, inclusive, and sustainable transformation.



## *Curricular innovation and integration*

Across Europe, there is a clear consensus that AI cannot be confined to isolated courses or pilot projects. **AI knowledge, skills, and literacies must be woven into the fabric of vocational curricula across diverse sectors.** This means that AI is not only a standalone subject but also a cross-cutting competence embedded in traditional fields such as advanced manufacturing, logistics, healthcare, agriculture, and creative industries.

**Embedding AI throughout vocational education ensures that learners gain both sector-specific expertise and a broader understanding of AI's role and impact in their fields.** This holistic approach also facilitates interdisciplinary skills, critical thinking, and ethical awareness, which are crucial in the AI era.

## *The human infrastructure of AI*

While digital tools and AI platforms are essential, **the linchpin of successful AI integration is the educator.** Teachers and trainers must be prepared not only to use AI technologies but also to understand their pedagogical implications and ethical dimensions. **This requires systemic investment in professional development programs that go beyond generic digital literacy and address AI-specific skills, ethics, data literacy, and adaptive teaching methods.** Scalable and continuous training programs, tailored to different teaching contexts and career stages, are necessary to build teacher confidence and agency. Furthermore, fostering communities of practice and peer networks empowers educators to experiment, share best practices, and collaboratively innovate.

## *Bridging education and industry*

Strong partnerships between education providers and the private sector emerge as a vital factor in accelerating AI adoption in VET. **Industry engagement ensures that curricula remain relevant to evolving labour market demands,** that learners gain hands-on experience with real-world AI applications, and that resources and expertise flow between sectors. Such collaborations can support **entrepreneurial skills, create work-based learning opportunities, and foster innovation ecosystems.** These collaborations must be expanded and diversified to include small and medium-sized enterprises, startups, and research institutions to maximize impact and regional equity.



## *Micro-credentials and flexible learning pathways*

The pace of technological change necessitates flexible education models that enable learners to acquire AI-related competencies rapidly and modularly. **Micro-credentials, digital badges, and stackable qualifications offer a pathway for lifelong learning**, allowing both new entrants and incumbent workers to upskill in targeted areas without committing to lengthy formal programs. Early adoption of such frameworks through integrated system offers **valuable insights into how flexible certification can support labour market responsiveness and individual learning journeys**. At the EU level, harmonizing the recognition and portability of micro-credentials across borders will enhance mobility and access.

## *Infrastructure and addressing the digital divide*

Access to high-quality digital infrastructure is foundational to AI integration. AI-powered learning environments require reliable broadband, modern computing resources, and specialized equipment such as AI labs and VR/AR tools. However, **infrastructure disparities—especially between urban and rural areas or across economically diverse regions—pose a significant barrier**. Without strategic investments to bridge these gaps, digital divides risk deepening existing social and educational inequalities. **Targeted funding mechanisms and public-private partnerships must prioritize underserved communities** to ensure inclusive access to AI-enabled learning opportunities.

## *Ethical and human-centric AI education*

Europe's approach to AI is distinctively rooted in ethics and human-centred values. This ethos permeates VET curricula, where responsible innovation, transparency, data privacy, and societal impacts are integral components. Preparing learners to critically engage with AI technologies fosters not only technical proficiency but also digital citizenship, empowering individuals to shape AI development and deployment in ways that align with democratic principles and social justice. Embedding ethics into AI education helps counterbalance the rapid technological change with thoughtful reflection on consequences and risks.

## **Toward a coherent, inclusive, and impactful AI-VET ecosystem**

To realize AI's potential as a transformative force in education and the economy, **European VET systems must accelerate progress from fragmented, localized initiatives toward coordinated, system-wide reforms**. This transformation requires a multi-dimensional,

collaborative strategy encompassing policy, pedagogy, governance, infrastructure, and labour market alignment.

Europe stands at a pivotal moment. **The integration of AI into vocational education and training offers unprecedented opportunities to enhance learner outcomes, foster economic competitiveness, and promote social inclusion.** Italy, Spain, Poland, and other member states each bring unique strengths and face distinct challenges, but the shared goal is clear: to build AI-enabled VET ecosystems that are coherent, inclusive, and impactful.

Achieving this vision demands leadership that is visionary yet grounded; policy that is ambitious yet pragmatic; and collaboration that bridges sectors, regions, and governance levels. **The human dimension—especially the role of teachers as agents of transformation—must remain at the heart of this endeavour.** AI is not a substitute for human intelligence but an amplifier of it, particularly in education.

If Europe can harness its values of equity, ethics, and democratic governance to guide AI adoption in VET, it will not only prepare its citizens for the future of work **but also shape a future of work that serves society as a whole.** The road ahead is complex and challenging, but the opportunity to lead globally in human-centred AI education has never been greater.

### *Embedding ai skills as core vocational competencies*

AI literacy and skills must become foundational elements of vocational qualifications across all sectors, not optional extras. **National and regional qualification frameworks should integrate AI competencies explicitly, reflecting both technical knowledge and transversal skills** such as problem-solving, collaboration, and ethical reasoning. Curricular reforms need to be regularly updated to keep pace with technological advancements and labour market shifts, ensuring relevance and future-readiness.

### *Designing comprehensive teacher professional development pipelines*

Systematic, accessible, and ongoing professional development for teachers is essential. This includes initial teacher education programs that embed AI pedagogy and ethics, alongside continuous professional development that adapts to emerging technologies and educational practices. **Creating incentives and career pathways that recognize digital expertise will motivate educators to embrace AI-driven innovation.** Building strong support networks, mentorship programs, and online communities can facilitate peer learning and shared leadership.



## *Fostering multi-level governance and policy coherence*

Effective AI integration in VET demands coordination across multiple governance levels—from local and regional authorities to national governments and EU institutions. **Aligning policies on education, labour, innovation, and digital infrastructure creates synergies and avoids fragmentation.** Multi-stakeholder platforms involving government, education providers, industry, and civil society foster dialogue and co-creation of policies and programs. **The EU's role as convener, funder, and knowledge broker remains critical** in harmonizing efforts and scaling good practices.

## *Prioritizing equitable digital infrastructure investments*

Bridging the digital divide requires deliberate, targeted investments to upgrade infrastructure in underserved regions and institutions. **Funding should support not only hardware and connectivity but also the creation of AI-enabled learning environments, such as innovation labs and digital maker spaces.** Public-private partnerships can mobilize additional resources and expertise. Equitable infrastructure access is a prerequisite for inclusive AI education and ensuring that all learners benefit from technological advances.

## *Harnessing ai to enable personalized, adaptive learning*

AI's transformative power lies in its ability to tailor learning experiences to individual needs, strengths, and pacing. **VET systems should embrace AI-powered adaptive learning platforms, intelligent tutoring systems, and real-time analytics to enhance learner engagement and outcomes.** This shift from one-size-fits-all instruction toward personalized pathways supports diverse learner profiles and helps reduce dropouts and skills mismatches.

## *Strengthening labour market intelligence and responsiveness*

To keep pace with AI-driven economic transformation, VET systems must integrate robust labour market intelligence mechanisms. **Continuous data gathering, forecasting, and analysis help identify emerging skills needs and adjust training supply accordingly.** Collaborative efforts between educational institutions, employers, and policy makers enhance responsiveness, ensuring that learners acquire skills that match evolving job roles and industries.



## *Building cross-border recognition and mobility frameworks*

**AI skill acquisition should be portable across national borders to support workforce mobility and lifelong learning.** The EU can play a pivotal role in developing common standards, quality assurance mechanisms, and mutual recognition agreements for AI micro-credentials and qualifications. **Such frameworks facilitate transparency, trust, and interoperability,** enabling learners to navigate education and employment pathways across countries seamlessly.

## Italy: A slow but steady pathway to strategic integration

Italy's VET system is deeply shaped by regional heterogeneity and a longstanding tradition of sectoral specialization. **These characteristics create a unique blend of strengths and challenges as the country seeks to integrate artificial intelligence into vocational curricula and practice.**

At the national level, Italy's Piano Nazionale Scuola Digitale and the National Recovery and Resilience Plan place digital transformation front and centre, recognizing it as essential to future-proofing the workforce. Key priorities include:

- **Modernizing vocational curricula** to incorporate AI literacy and skills aligned with Industry 4.0 technologies, ensuring learners are prepared for evolving workplace demands.
- **Strengthening the role of Istituti Tecnici Superiori (ITS)** as centres of excellence in advanced technical training, tasked with driving innovation and fostering specialized competencies in emerging technologies.
- **Promoting territorial skill partnerships,** which serve as collaborative platforms linking education providers, local businesses, and research institutions. These partnerships are designed to co-create training pathways finely attuned to the economic and labor market realities of each region.

Several regions exemplify this collaborative and applied approach. For instance, Emilia-Romagna's partnerships with advanced manufacturing companies provide students with direct exposure to AI-driven processes in smart factories, robotics, and data analytics through teaching modules and internship placements. **Such initiatives ground AI learning in tangible, work-based experiences.**

However, the system's fragmented governance structure and uneven distribution of digital infrastructure across regions present significant barriers. **The quality and availability of AI-focused teacher training remain inconsistent, limiting educators' capacity to confidently integrate AI pedagogy into their practice.** Furthermore, private sector



involvement, while strong in industrial clusters, is less widespread, hindering scalable adoption of AI across diverse vocational sectors.

Despite these hurdles, Italy is making strides. **The deployment of digital labs and blended learning models is expanding**, offering more flexible and technology-enriched learning environments. Pilot programs testing AI-based assessment tools indicate a growing openness to innovation in evaluation methods. Notably, the recent evolution of ITS accreditation standards to explicitly include AI competencies reflects an institutional commitment to embedding AI skills at the heart of vocational education.

**The national VET landscape embodies both the promise and complexity of AI integration:** a rich foundation of regional expertise and industrial tradition, coupled with structural challenges that require coordinated policy, investment, and capacity building to fully unlock the transformative potential of AI in vocational learning.

## Poland: Early-stage innovation with high growth potential

Poland's VET ecosystem is **actively mobilizing to integrate artificial intelligence**, although it remains in the earlier stages of systemic adoption. The government's Action Plan for VET (2022–2025) explicitly addresses the digital and ecological transformation of education, setting priorities that include:

- **Curriculum renewal** to incorporate AI, data analytics, and essential digital skills.
- **Digitization of vocational examinations**, with pilots testing AI-based assessment tools aimed at improving the objectivity and relevance of student evaluations.
- **Promotion of micro-credentials** to enable modular, flexible upskilling focused on specific AI-related competencies.

Several pilot projects exemplify Poland's innovative approach. The **AI4Youth initiative**, a collaboration between Intel and the Ministry of Development and Technology, delivers AI fundamentals to technical schools nationwide. It includes teacher training and practical resources designed to boost digital literacy and AI awareness among future technicians and engineers.

Other noteworthy initiatives include:

- The **AI Workshop in Poniatowa**, providing hands-on AI labs where students develop practical competencies.
- **Wellms AI**, an AI-powered content generation platform that personalizes e-learning materials, enhancing both educator productivity and learner engagement.



- **EDUBOT**, a chatbot-supported blended learning methodology tailored to foster differentiated STEM education for students with fewer opportunities.

Despite these promising innovations, Poland confronts several challenges common across Europe:

- The absence of a comprehensive national AI-in-VET strategy limits systemic coherence and scale.
- Teacher training remains fragmented and underfunded, impeding consistent upskilling in AI pedagogy and tools.
- Infrastructure disparities, particularly in rural and underserved areas, hinder the widespread deployment of AI-enhanced learning environments.

Yet, Poland's flexible qualification frameworks alongside its embrace of micro-credentials, **signal a forward-looking, adaptable model**. This system positions Poland to respond rapidly to evolving labour market demands and to progressively embed AI competencies within its vocational training landscape.

## Spain: A model of structural reform and innovation

Spain has positioned itself as a frontrunner in systematically embedding artificial intelligence within vocational education and training (VET), **leveraging a combination of recent legislative reforms, strategic public-private partnerships, and innovative regional ecosystems**.

The 2022 VET Reform Law marks a significant milestone by introducing mandatory company internships for first-year students, thereby strengthening the vital link between education and real-world work environments. Additionally, the law establishes a dedicated vocational pathway focused on Artificial Intelligence and Data—an **unprecedented national credential that integrates AI, data science, and related disciplines into the formal VET framework**. This represents a holistic, future-oriented approach to skill development, encompassing:

- **Curricular innovation** through the integration of AI modules across a broad spectrum of technical and vocational programs, ensuring that learners acquire foundational and applied competencies relevant to emerging digital industries.
- **Public-private collaboration**, exemplified by partnerships such as Andalucía Emprende and Vintally. These initiatives harness AI technologies to enhance entrepreneurial skills assessment and improve employment matching, demonstrating how AI can be directly applied to workforce development and labor market alignment.



- **Regional innovation hubs**, like the AI Talent Hub at the Polytechnic University of Valencia, which serve as centers of excellence offering hands-on training in Industry 4.0 technologies, automation, and digital manufacturing. These hubs provide immersive environments where students gain practical experience with AI-powered tools and systems.

Best practice centers, including the Julián Zarco Institute, embed AI tools into student projects, cultivating ethical AI literacy and **fostering critical, responsible engagement with technology from the earliest stages of vocational education**. Digital learning platforms such as ODILO employ AI-driven personalization to tailor learning paths, thereby enhancing student motivation and optimizing educational outcomes.

Spain's commitment extends beyond learners to educators as well. The National Digital Skills Plan (2021–2025) incorporates AI training modules specifically designed to build teacher capacity. Concurrently, **pilot projects embedding AI in classrooms help educators develop familiarity and confidence with these technologies**, positioning teachers as active agents of digital transformation.

However, challenges remain. **Small and medium-sized enterprises, which form the backbone of Spain's economy, frequently face difficulties hosting interns or offering placements that involve advanced AI technologies**. Furthermore, disparities in digital infrastructure across rural and less urbanized regions threaten to limit equitable access to AI-enriched learning experiences. Scaling teacher professional development and ensuring regional equity continue to be critical priorities.

Spain's approach combines legislative foresight, institutional coordination, and collaborative innovation to build a resilient and inclusive VET system, **one that prepares learners for the AI-driven demands of the future economy** while centring ethical and democratic values in technology adoption.



## Challenges and opportunities in VET for responsible use of AI

### Pan-EU perspective: Harnessing AI's transformative potential

Across the European Union, the transformative potential of AI within VET systems is widely acknowledged as a **pivotal driver for reshaping education to better meet the demands of a rapidly evolving labor market**. AI's unique capacity to customize learning experiences introduces a paradigm shift from the traditional one-size-fits-all model toward a highly personalized, learner-centric approach. This shift holds particular significance in VET, **where education must be agile and finely attuned to the continuous digital disruption and technological advances** embodied by Industry 4.0.

**AI-powered platforms exemplify this emerging trend by offering integrated career guidance solutions** that link learners with educators, families, and labor market actors. By creating an interconnected support ecosystem, these tools facilitate more informed decision-making around education and career pathways. **Learners receive guidance tailored to their aptitudes, aspirations, and local employment opportunities**, fostering motivation, engagement, and ultimately helping to reduce dropout rates. Such platforms also provide educators and counsellors with data-driven insights to better support student progression and alignment with regional economic needs.

In parallel, **AI-driven data analytics are empowering VET institutions to continuously monitor real-time labor market dynamics**, enabling the identification of emerging skills, technological trends, and sectoral shifts. This granular labor intelligence allows for the timely updating and adaptation of curricula, ensuring that vocational programs remain relevant and graduates are equipped with skills in high demand. **This responsiveness is critical in sectors heavily impacted by automation, digitalization, and AI itself**, where skill requirements evolve swiftly and unpredictably.

However, realizing this promising vision is not without its challenges. Foremost among these is the **imperative to uphold data privacy and security**, especially within the European Union's stringent regulatory environment governed by the GDPR. **VET providers must carefully navigate complex legal and ethical frameworks** to responsibly utilize learner data while maintaining trust and safeguarding individual rights. This requires transparent data governance practices, robust consent mechanisms, and ongoing stakeholder communication.

**Equally pressing is the question of educator readiness**. Many teachers and trainers, steeped in conventional pedagogical models, face a steep learning curve in adopting and effectively integrating AI technologies into their teaching practices. **Without**



**comprehensive and targeted professional development programs, there is a risk of resistance, misuse, or underuse of AI tools**, which could undermine their transformative potential. Therefore, investment in upskilling educators—covering digital literacy, AI concepts, data ethics, and change management—is vital to empower them as **confident facilitators** of AI-enhanced learning environments.

Financial constraints further complicate AI adoption, **particularly for smaller vocational schools and small to medium-sized enterprises that play a critical role in practical training and apprenticeships**. The acquisition and maintenance of AI infrastructure, including hardware, software licenses, and technical support, can represent a significant financial burden. Additionally, public procurement procedures are often bureaucratic and slow-moving, limiting institutional agility and innovation. **Addressing these financial and procedural hurdles through dedicated funding streams, simplified procurement policies, and collaborative resource sharing** will be essential to ensure equitable access to AI-enabled education.

Taken together, the EU-wide landscape highlights the necessity of a well-coordinated, multi-stakeholder approach to embed AI in VET systems responsibly and inclusively. **This involves the alignment of policy frameworks, ethical guidelines, funding instruments, and capacity-building initiatives to foster an enabling environment** where AI's benefits can be harnessed while mitigating associated risks. Collaboration across policymakers, educators, industry partners, technology providers, and civil society must be deepened to **co-create scalable models that reflect diverse regional realities and learner needs**.

Ultimately, by addressing these interlinked challenges, the European Union can ensure that AI acts not merely as a technological add-on but as a **catalyst for profound educational innovation**. This will empower vocational learners with the skills, confidence, and critical awareness necessary to thrive in an AI-augmented labor market and contribute meaningfully to Europe's digital and economic future.

## Italy: Navigating structural challenges for AI-VET integration

Italy's journey toward embedding Artificial Intelligence within its vocational education and training sector is marked by a **complex interplay of optimism and systemic constraints, reflecting broader challenges within the national education ecosystem**. On one hand, there is a palpable enthusiasm among students and the general public for the potential benefits that AI-driven tools can bring—enhancing learning efficiency, personalizing educational content, and providing timely access to the latest knowledge and industry developments. This enthusiasm is a strong foundation upon which future innovations can be built. However, **the promise of AI must contend with persistent structural issues that threaten to limit its impact and accessibility**.

At the heart of these challenges lies the status and professional conditions of teachers. **Italy continues to grapple with a notable disparity in teacher remuneration compared to similarly qualified professionals**, which contributes to low morale and difficulties in recruitment and retention. This systemic undervaluation of educators is a critical barrier to the effective integration of AI in classrooms. **Without adequate compensation and recognition, teachers may lack the motivation, institutional support, and time necessary to engage deeply with AI tools as part of formal pedagogy.** Instead, AI risks being relegated to the margins—as an extracurricular curiosity or a resource for self-directed students—rather than a mainstream, pedagogically integrated element. Given the existing pressures on Italian teachers, including workload and societal expectations, neglecting this dimension would hinder sustainable progress.

In parallel, **technological infrastructure across Italy's educational landscape remains uneven and, in many cases, outdated.** Statistics indicating just over half a computer per student reveal significant limitations in access to essential digital devices. Moreover, many existing machines are aging and lack the processing power needed to run sophisticated AI applications smoothly. **This digital divide is starkly evident between urban and rural or economically disadvantaged regions**, exacerbating inequalities in educational opportunities. The risk is that while some students benefit from cutting-edge AI-enhanced learning environments, others fall further behind, entrenching disparities rather than bridging them.

Beyond hardware and human resources, the socio-emotional climate within schools demands attention in the context of AI adoption. While Italy reports comparatively lower rates of cyberbullying relative to other countries, incidents of general bullying remain high, **signalling a broader challenge in ensuring safe, supportive learning environments.** As digital tools and AI become more prevalent, it is essential that their implementation is coupled with comprehensive strategies to protect student wellbeing. This includes fostering digital citizenship, promoting empathy and respectful online behaviour, and providing clear channels for reporting and addressing harassment. **Such efforts require coordinated action involving educators, families, school administrators, and policymakers** to build trust and safety in digital learning spaces.

To truly unlock the transformative potential of AI within Italy's VET system, a multi-pronged, systemic approach is imperative. First, **substantial investments are needed to modernize and expand technological infrastructure**, ensuring equitable access to powerful, reliable devices and connectivity across all regions. Second, **elevating the professional status of teachers through competitive salaries, career development pathways, and recognition** is crucial to empowering educators as key agents of digital transformation. Third, comprehensive, **ongoing professional development programs must be scaled up to build AI literacy, pedagogical skills, and ethical awareness among teachers.** Fourth, the integration of AI should be accompanied by **robust policies**



**and practices safeguarding student wellbeing** and promoting inclusive, respectful digital cultures.

Only by addressing these foundational issues holistically can Italy move beyond isolated experiments and pockets of enthusiasm toward a sustainable, **equitable AI-enabled VET system**. This transformation holds the promise not just of improved educational outcomes, but of preparing a future workforce equipped with the skills and values to thrive in a digital economy—one that is both innovative and socially cohesive.

## Poland: Addressing capacity gaps to leverage AI

Poland's vocational education landscape stands at a pivotal crossroads, characterized by a growing recognition of Artificial Intelligence's transformative potential, yet **tempered by significant capacity and infrastructure challenges that must be overcome to fully realize this promise**. The awareness among policymakers, educators, and industry stakeholders of AI's ability to reshape learning and skills development is increasing, yet translating this awareness into widespread, effective adoption remains a complex task.

**One of the foremost challenges lies in teacher preparedness**. Many vocational educators in Poland currently lack formal training in AI competencies, which creates a critical skills gap in both technical knowledge and pedagogical application. Addressing this requires **comprehensive professional development programs that go beyond basic digital literacy to include deep engagement with AI tools**, ethical considerations, and innovative teaching methodologies. Such training must empower teachers not only to use AI technologies but to embed them thoughtfully into their curricula, creating learning experiences that enhance student engagement, mastery, and critical thinking.

**Infrastructure disparities pose another pressing issue**. While urban centres often benefit from relatively reliable internet connectivity and access to modern computing resources, many vocational schools in rural and less economically developed areas face persistent limitations. **Insufficient broadband access, outdated hardware, and a lack of technical support exacerbate the digital divide**, risking the exclusion of large segments of the student population from AI-enhanced educational opportunities. This gap undermines the EU's broader goals of equitable access to quality education and skills development, making targeted investment in infrastructure modernization imperative.

Ethical considerations surrounding AI use are actively debated within Poland's education sector. **Concerns around data privacy, the transparency of AI algorithms, and the role of automated systems in academic evaluation** highlight the need for robust governance frameworks. Clear policies that ensure responsible AI deployment, protect sensitive student data, and provide avenues for accountability will be essential to building trust among educators, learners, and parents. Transparency in how AI-driven decisions are

made—particularly in grading, assessment, and progression monitoring—must be prioritized **to avoid bias, discrimination, or unintended negative consequences.**

Despite these challenges, **Poland’s vocational education system possesses strong foundations that position it well to capitalize on AI’s opportunities.** AI-powered personalized learning pathways have the potential to revolutionize education by adapting content, pacing, and support to each student’s unique needs, thereby improving retention rates and skill acquisition. These adaptive systems can offer timely interventions to learners at risk of falling behind and help maximize individual potential.

Moreover, AI-enabled remote learning platforms can bridge geographic barriers, delivering high-quality vocational education to students in smaller cities and rural areas who might otherwise lack access to specialized training. **This democratization of learning opportunities aligns with Poland’s commitment to inclusive education and regional development.**

Automation of routine administrative and evaluative tasks—such as grading, attendance tracking, and progress reporting—offers additional benefits by freeing teachers from time-consuming paperwork. **This enables educators to dedicate more energy to creative instructional design, mentorship, and individualized student support,** thereby enhancing teaching quality and professional satisfaction.

Integrating cutting-edge AI technologies like robotics, machine learning, and data analytics into vocational curricula can also increase the sector’s attractiveness, drawing in younger generations fascinated by technological innovation and future-oriented career paths. **Such modernization aligns with labour market needs,** particularly in high-tech manufacturing, logistics, and IT sectors that are experiencing rapid growth.

To unlock the full potential of AI in Polish VET, **concerted efforts must focus on securing sustained investment in technological infrastructure,** ensuring equitable access across all regions. Equally important is the establishment of comprehensive, **ongoing teacher training initiatives** that address both skill development and change management, fostering educator confidence and capability in AI integration.

**Strengthening collaboration with industry partners** will be crucial to maintaining curriculum relevance, facilitating work-based learning opportunities, and ensuring that students acquire the competencies demanded by evolving labour markets. **Industry engagement can also provide insights into emerging AI applications,** helping education providers anticipate and adapt to future skill needs.

Finally, addressing cultural resistance and ethical concerns through **transparent policymaking, stakeholder dialogue, and public awareness campaigns** will foster a responsible and inclusive approach to AI adoption. By promoting shared values of trust, equity, and human-centred innovation, Poland can build a VET ecosystem that harnesses



AI not merely as a technological tool but as a catalyst for social and economic empowerment.

## Spain: Balancing innovation and inclusion for AI in VET

Spain's VET ecosystem vividly illustrates the delicate balancing act between harnessing the transformative potential of Artificial Intelligence and navigating the entrenched barriers that may slow or limit its widespread adoption. While there is clear enthusiasm for leveraging AI-driven innovation to enhance learning and skills development, **systemic challenges rooted in human, infrastructural, and cultural factors present significant obstacles that require coordinated, sustained attention.**

A primary challenge lies in the **uneven level of AI competency among educators across the country.** Many teachers lack access to structured, continuous professional development programs specifically tailored to AI tools and pedagogies, resulting in feelings of unpreparedness and uncertainty. **This gap can foster resistance or apprehension toward adopting AI,** with some educators concerned about being displaced or marginalized by technology.

Investment disparities further complicate Spain's AI ambitions. While certain urban centres and well-funded institutions boast advanced technological infrastructures—such as high-speed internet, modern computing equipment, and AI-enabled platforms—many schools in rural or economically disadvantaged areas lag behind. **Inadequate connectivity, obsolete devices, and limited technical support perpetuate a digital divide** that restricts equitable learner access to AI-powered personalized and inclusive educational experiences. This infrastructural inequality not only undermines the potential of AI to enhance VET but risks exacerbating **existing social and economic disparities.**

Beyond the technical and financial hurdles, cultural factors significantly influence AI uptake within Spain's VET system. **Resistance to change, a hallmark of traditional pedagogical mindsets, remains prevalent.** Many educators and stakeholders harbour concerns about the implications of AI on the teacher-student relationship, fearing that increased automation may depersonalize education or diminish the educator's role as a mentor and guide. **Ethical and regulatory uncertainties further complicate the picture.** Questions around data privacy, algorithmic transparency, bias mitigation, and accountability in AI-driven decision-making loom large, with educators, parents, and policymakers seeking clear, trustworthy frameworks to guide responsible AI use.

Despite these challenges, **Spain's VET sector offers compelling examples of how AI's integration can be transformative.** Adaptive learning systems dynamically tailor educational content to individual learner needs, facilitating more effective mastery of skills. Virtual tutors and AI-enhanced simulations provide immersive, hands-on learning

opportunities essential to vocational training, enabling students to practice and refine competencies in realistic, low-risk environments. Moreover, AI-powered labor market analytics deliver real-time insights into emerging skill demands, **helping to align curricula with evolving employer requirements** and ensuring graduate employability in a fast-changing economy.

AI's capacity to automate routine administrative tasks also offers significant relief to educators overwhelmed by paperwork and bureaucratic demands and **frees up valuable time for teachers to focus on pedagogy, mentorship, and personalized student interaction**—activities central to high-quality vocational education.

Strategic collaboration between educational institutions and industry partners is increasingly recognized as a cornerstone for successful AI integration. These partnerships enable the **co-creation of curricula and training programs that reflect real-world technological trends and workplace challenges**, fostering innovation and relevance. Initiatives that bring together VET providers, technology firms, and employers encourage the sharing of resources, expertise, and best practices, further accelerating AI adoption.

To fully realize AI's benefits, Spain must prioritize several key areas. First, **comprehensive and sustained teacher professional development** is critical, embedding AI competencies, pedagogical strategies, and ethical considerations into continuous learning pathways. Second, **equitable investment in technological infrastructure is necessary** to close the digital divide and ensure all learners can access AI-enhanced education. Third, **developing clear, robust regulatory and ethical frameworks** will build stakeholder trust, safeguard rights, and encourage responsible innovation. Finally, **fostering cultural shifts through active stakeholder engagement**, transparent communication, and effective change management will be essential to overcoming resistance and nurturing a mindset that embraces AI as a complementary tool rather than a threat.



## Conclusions

*The integration of Artificial Intelligence into Vocational Education and Training across Europe represents both a remarkable opportunity and a multifaceted challenge. This comprehensive analysis has underscored the transformative potential AI holds to **reshape how vocational learning is delivered, personalized, and aligned with the evolving demands of the labor market.** Across the pan-European landscape and within the distinctive contexts of Italy, Spain, and Poland, AI emerges as a catalyst for innovation—enabling more tailored learning experiences, improving accessibility, and fostering closer links between education and employment.*

*However, **the pathway to realizing AI's full benefits in VET is far from straightforward.** Significant barriers remain, spanning technical, financial, cultural, and ethical dimensions. The pan-European level reveals persistent concerns around data privacy and security, compliance with regulations such as GDPR, and the pressing need for extensive teacher training. Without addressing these foundational issues, **the risk of uneven AI adoption threatens to deepen existing inequalities in educational access and quality.***

*At the country level, **Italy's experience highlights how systemic challenges**—such as insufficient teacher remuneration, outdated infrastructure, and social issues like bullying—**can limit the integration of AI tools**, confining their use predominantly to autonomous student activities rather than embedding them within comprehensive educational practices. **Spain's situation illustrates both the promise and complexity of embedding AI**, with opportunities in personalized learning and industry collaboration balanced by infrastructural gaps and cultural resistance. Meanwhile, **Poland's journey showcases the critical importance of investing in educator competencies and ethical frameworks** while ensuring equitable access across diverse regions.*

***Across all these contexts, a clear and urgent need emerges for a holistic, multi-dimensional strategy.** Investment in robust digital infrastructure must go hand-in-hand with comprehensive professional development programs that empower educators to confidently and effectively use AI technologies. **Equally essential is the development of transparent ethical guidelines that protect student data privacy and foster trust among all stakeholders.** This foundation will enable AI not only to enhance learning outcomes but also to do so in ways that are inclusive and socially responsible.*

*Moreover, **continuous alignment between vocational curricula and labor market trends, enabled by AI's data-driven insights, will be crucial** to ensuring that learners acquire skills that are relevant, up-to-date, and valued by employers. Strengthening partnerships between educational institutions and the business sector can accelerate this alignment, making VET programs more dynamic and responsive to economic needs.*



***The findings presented in this document make it clear that AI's promise in vocational education cannot be realized through technology alone. It requires a concerted effort by policymakers, educators, industry partners, and communities to create supportive environments where AI-enhanced learning can thrive equitably. Such environments will enable VET to not only keep pace with technological advances but to proactively shape the future of work and learning in a way that benefits all learners, regardless of background or geography.***

***In conclusion, the responsible and strategic adoption of AI offers an unprecedented chance to modernize and democratize vocational learning across Europe. By addressing the intertwined challenges of infrastructure, training, ethics, and policy coherence, Europe can unlock AI's full potential to create personalized, accessible, and labor-market-relevant educational pathways. This will be instrumental in preparing the workforce of tomorrow—equipped not only with technical skills but also with the agility, creativity, and critical thinking necessary for a rapidly changing world.***

***As Europe moves forward, the lessons learned from diverse national experiences provide valuable insights into best practices and pitfalls to avoid. Embracing these insights will be key to fostering a future-focused VET ecosystem—one that harnesses AI responsibly, innovates continuously, and prioritizes equitable opportunities for all learners.***



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