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GenAI and its implications for teacher education in Montenegro: integrative report

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1. Introduction – National Frameworks for the Integration of AI in Teacher Education

In recent years, artificial intelligence (AI) has increasingly entered public discourse in Montenegro through political announcements, media coverage, academic conferences, and civil society initiatives. However, a significant gap remains between the rising public interest and actual (official) implementation of AI in education. There is an intuitive sense that both students and teachers are increasingly using AI, though not in an official, regulated, or ethically guided manner. This report integrates data from current digital transformation documents in Montenegro and insights from three focus groups with university educators, aiming to present the current situation and offer guidelines for meaningful integration of AI in teacher education.

Although AI is recognized as a topic of the future, its systematic introduction into the education sector is underdeveloped. In Montenegro, this challenge is further complicated by regulatory shortcomings, institutional inconsistency, and cultural resistance or ambivalent attitudes toward digital change. According to reports such as *AI 2024* (https://practiceguides.chambers.com/practice-guides/artificial-intelligence-2024/montenegro/trends-and-developments) and strategic documents from the Ministry of Public Administration, the current legal framework does not address specific aspects of AI use in education. Most initiatives, such as the *Digital Strategy* 2022–2026, focus on public administration and infrastructure, but not on educational institutions (https://www.gov.me/clanak/predlog-zakona-o-informacionoj-bezbjednosti).

Topics like digitalization, cybersecurity, and AI are becoming more present in Montenegrin society, but the broader use of AI in education remains marginal and unregulated. The *Digital Transformation Strategy 2022–2026* and related laws mainly emphasize public administration, with AI only mentioned peripherally. Even in the draft *Higher Education Strategy 2023–2026*, where academic integrity and the need to modernize teaching are addressed, AI is approached cautiously and without specific operational solutions (https://education-profiles.org/europe-and-northern-america/montenegro/~technology#2.1).

Despite the absence of concrete regulations, AI is implicitly acknowledged as a tool/technology likely to play an important role in education in the near future. However, institutional unpreparedness, significant gaps in digital literacy among both teachers and students, and the lack of infrastructure and technical support — as documented in several studies, especially during the COVID-19 pandemic — contribute to inconsistencies and a lack of transparency in AI adoption across schools and universities.

The lack of a national AI strategy or plan, misalignment of laws (e.g., those on data protection and copyright), and scarce technical support further limit development in this field. As a result, the academic community increasingly relies on self-initiated activities and informal training, often in collaboration with international partners through various projects. The University of Montenegro

is currently involved in several ERASMUS+ projects that address the role of AI in university teaching and research.

A positive development is the emergence of actors like the Montenegrin AI Association (https://ictcortex.me/en/montenegrin-ai-association-maia-from-data-science-to-practical-applications/), which brings together researchers and educators. Start-up companies such as Uhura Solutions and Spectro Solutions (https://uhurasolutions.com/, https://spectro-solutions.com/#hero), and UNDP-supported initiatives, suggest the country has the capacity for technological growth. However, education policy must catch up with this trend. The University of Montenegro also hosts a cybersecurity hub, established through cooperation within the Ulysseus university alliance. According to the *Global Index AI* (https://global-index.ai), Montenegro ranks low on the European scale in terms of developing responsible and sustainable AI policies. While initiatives from UNDP and MAIA aim to enhance AI use in the public sector and research (https://www.undp.org/montenegro/news/artificial-intelligence-more-efficient-and-transparent-public-administration), the education system is still characterized by a fragmented approach, dependent on individuals or ad hoc projects.

A major challenge remains the disparity in digital literacy among teachers. While some actively explore and apply AI in their work, others are skeptical or uncertain, as shown in the focus group discussions. There are no clear guidelines, institutional solutions, or systemic training programs to enable a balanced and responsible integration of AI in teaching. This report, based on available documentation and insights from three university focus groups, aims to map the current situation and offer realistic recommendations grounded in educational practice, rather than solely regulatory or technological perspectives.

2. Encountering AI and attitudes towards it

Conducted in 2024 with university teachers from a wide range of disciplines, a series of focus groups revealed a broad spectrum of experiences, perceptions, and emotional responses to the growing presence of artificial intelligence (AI) in academic life. These conversations provided a rich insight into how educators are navigating the early stages of engagement with AI technologies, especially generative AI tools such as ChatGPT, which have rapidly become part of the educational landscape. In all three groups, participants were asked to reflect on their initial encounters with AI. For many, these first interactions came through curiosity or necessity—testing tools that had become widely discussed in both academic and public discourse. Most of these experiences were centered around text-based AI platforms like ChatGPT, which allowed users to experiment with content generation, question-answering, and other language-related tasks. These early engagements provoked a diverse range of emotions, from curiosity and excitement to anxiety, skepticism, and professional uncertainty.

Participants from technical and natural sciences—who often have greater exposure to digital tools in their research and teaching—demonstrated a higher level of understanding and willingness to experiment. These educators reported using AI to automate repetitive tasks, generate instructional content, assist with coding, or even reorganize course materials. They saw in AI a practical, efficiency-enhancing potential that aligned with existing workflows. On the other hand, educators

from the humanities and social sciences emphasized different concerns. While intrigued by the potential of AI, they were also more likely to stress the importance of ethical considerations, cultural context, and the philosophical implications of using machines in processes traditionally rooted in human judgment and creativity. Those with less digital experience or exposure to AI tended to approach these tools with more caution, voicing skepticism and highlighting challenges such as linguistic and cultural biases, the erosion of academic authenticity, and fears about the dehumanization of education.

One participant described her first encounter with AI as "unsettling, because the model responded like a student who knows the basics but doesn't understand context." This striking observation reflects a broader unease with how AI can mimic human responses without genuine comprehension, raising concerns about how to assess student learning in a landscape where form can be convincingly simulated but substance may be absent. Several participants echoed similar concerns, referring to AI as "a tool that creates an illusion of knowledge." This perception places educators in a difficult position, where they must go beyond evaluating the surface quality of student work to probing for deeper understanding. The core pedagogical challenge, as many saw it, lies in navigating this tension between appearance and reality—between easily accessible, well-formed content and the actual learning, reflection, and synthesis that higher education seeks to cultivate.

Some of the most thought-provoking contributions framed AI not just as a technological shift but as a phenomenon with deeper epistemological and ontological consequences. One comment, in particular, stood out: AI was described as something that "shifts the ontological boundaries of education," challenging traditional notions of authorship, intellectual identity, and the very meaning of educational practice. As AI systems become capable of generating increasingly coherent and context-aware outputs, questions arise about what it means to create, to think critically, and to engage in academic discourse. Across the discussions, there was broad agreement that AI should not be understood merely as a tool to be used, but as a complex and transformative force that demands new forms of pedagogy, critical literacy, and institutional reflection. Participants emphasized that AI's influence extends beyond operational convenience—it touches the core values of education and the relationships that define it.

The overall tone of the focus groups could be described as critically optimistic. Educators recognized that AI holds significant potential to improve teaching, foster creativity, support personalized learning, and reduce the burden of administrative work. However, this optimism was tempered by strong calls for caution, critical awareness, and ethical responsibility. Participants frequently expressed ambivalence: while AI could serve as a partner in innovation, it also posed risks to academic integrity, student engagement, and the authenticity of the teacher-student relationship.

Particularly among educators in fields such as philosophy and pedagogy, there were concerns about the loss of human-centeredness in education. When machines generate student work, what is lost is not just control over assessment, but the process of intellectual development itself—the

ongoing disscusion, reflection, and personal growth that define meaningful learning experiences. The danger, as some noted, lies not in the genAI itself but in the potential for it to be used uncritically, without pedagogical purpose. As the discussions evolved, a clear consensus emerged: AI must be approached neither as an existential threat nor as a miraculous solution, but as a new pedagogical challenge. It invites—and in many ways requires—educators to rethink how knowledge is created, shared, and evaluated. This involves not just technical adaptation, but a broader cultural and institutional shift.

Most participants expressed a strong willingness to experiment with AI tools, learn more about their capabilities and limitations, and adapt their teaching practices accordingly. However, they emphasized that such a transformation cannot be carried by individual initiative alone. There is a pressing need for institutional support, including professional development, pedagogical frameworks, ethical guidelines, and spaces for collaborative learning. Ultimately, the integration of AI in (higher) education will depend not only on technological advancement but on the collective capacity of educators to respond thoughtfully, critically, and creatively. As one participant concluded, “We are not just integrating a new tool — we are navigating a shift in what knowledge means, and how it is created, shared, and valued.”

3. AI, Learning, and Students

All three groups agreed that students are already widely using AI, though mostly in ways that do not foster deep learning. This widespread use is no longer speculative or marginal — it has become an integral part of students' approach to academic tasks. Whether consciously or by default, many students now rely on AI-generated content as a shortcut to meet formal requirements, rather than as a support tool for building understanding or insight.

Students typically use tools like ChatGPT for writing papers, translating, and structuring presentations, but rarely critically evaluate the content. The convenience and speed of these tools seem to outweigh the need for careful reading, synthesis, or engagement with the subject matter. Teachers reported issues with generic language, lack of analysis, and poor critical thinking. Repetitive phrasing, oversimplified arguments, and formulaic expressions were commonly marked as signs that students had not internalized what they submitted. One participant noted: “Sometimes a paper appears perfectly structured, but then you realize the student can’t explain a single sentence.” This gap between output and understanding was seen as a growing pedagogical concern.

A striking example came from a participant teaching early childhood education, describing a paper where a student proposed that 5–6-year-old children could volunteer in hospitals or military institutions — clearly AI-generated content copied without reflection and critical thinking. This anecdote underscores the potentially absurd results when AI is used uncritically, with no regard for age-appropriate knowledge, ethics, or context. It also exemplifies how AI, when misused, can distort educational reality and produce outputs that are not just inaccurate but without sense. Teachers also observed that AI-generated work often lacks stylistic variation, examples, or personal reflection. The writing tends to be flat, impersonal, and repetitive — missing the

intellectual signature that indicates the student's voice, experience, or perspective. These texts may include inaccurate facts, fake sources, and language patterns that don't match students' vocabulary, further disconnecting factual knowledge from understanding. This mismatch not only signals a lack of authorship but also disrupts the trust between teacher and student, complicating assessment and feedback processes.

Of particular concern is the rise of the so-called "pedagogy of servicing," (where there is no need for deeper learning – everything is serviced and given "on the plat") where AI is used to fulfill formal requirements, rather than develop thinking and competencies. In this model, education is reduced to ticking boxes, submitting assignments, and passing exams — often without true engagement. AI simply becomes the latest tool to expedite this transactional relationship. The main challenge, participants said, is the passivity of students — they're losing the habit of questioning, exploring, and testing ideas. Critical thinking, once a foundational goal of higher education, is at risk of being replaced by strategic compliance: doing just enough to satisfy requirements, often with minimal effort or reflection.

Some teachers are adapting by modifying tasks: requiring oral explanations, reflective essays, context-based assignments, and projects that combine sources with personal analysis. These alternative approaches aim to reintroduce the human element into learning and to make space for complexity, nuance, and depth. By asking students to explain their choices, reflect on their process, or connect abstract content to real-world contexts, educators are attempting to ensure that AI serves learning rather than replaces it. This is an effort to use AI as a tool to strengthen knowledge.

One participant from pedagogy pointed to a broader cultural problem: "AI is just a symptom. The real issue is that students don't know why they're learning — they just want to finish something. Pedagogy must change." This insight connects technological practices with broader educational values. It highlights a growing disconnect between learning as a process of meaning-making and education as a system of measurable outputs. Without a clear sense of purpose, even the most advanced tools will be misused. The challenge, therefore, is not only to manage AI in classrooms but to reimagine education itself — to restore motivation, relevance, and a sense of ownership in the learning process.

4. AI, Teaching, and Teachers

The role of the teacher is rapidly evolving. The scope of this transformation reflect not only the rise of new technologies but also broader shifts in how knowledge is produced, accessed, and shared. The focus groups revealed that many teachers now use AI to help design tasks, prepare presentations, write summaries, and even evaluate student work. For many, AI has become a silent partner in the background — a tool that streamlines workload, increases efficiency, and opens new creative possibilities.

AI is seen as an "extension of the teacher," especially in administrative or repetitive tasks. It is most appreciated where it relieves cognitive overload, allowing educators to concentrate on higher-

order aspects of teaching, such as mentoring, dialogue, and curricular innovation. Some described AI as a "digital assistant" that saves time but doesn't replace professional judgment. Importantly, teachers emphasized that AI can assist but not replace the human elements of intuition, experience, and context awareness that remain central to effective pedagogy.

Participants gave specific examples of AI use: supporting didactic material design, identifying patterns in student errors, and enabling personalized instruction. These applications were seen as particularly helpful in large classes or in courses where formative feedback is crucial. For example, AI tools were used to detect language mistakes, allowing teachers to address them systematically in class. Others reported using AI to create varied versions of the same task for students with different skill levels — a practice that supports inclusivity and differentiation.

However, concerns were also raised that education policy could undermine teacher autonomy if genAI is introduced systemically without professional dialogue or contextual adaptation. Participants warned that top-down implementation, driven by efficiency metrics rather than pedagogical reflection, could marginalize the teacher's voice and judgment. A few noted previous examples where educational technology was rolled out without training or consultation, resulting in poor outcomes and resistance from faculty. Teachers see their role shifting — more as mentors and guides in a complex information landscape than mere transmitters of knowledge. This redefinition calls for rethinking the teacher's identity in the digital age: not as a gatekeeper of content, but as a navigator of meaning, critical thought, and moral judgement.

AI's potential is particularly evident in interdisciplinary teaching, problem-based learning, and content personalization. These pedagogical approaches align well with AI's capacity to generate adaptive materials, simulate scenarios, or support inquiry-based instruction. A technical faculty member described using AI to generate multiple versions of assignments, saving time — but always reviewing them. AI can produce drafts, but the teacher remains the final authority on appropriateness, accuracy, and alignment with learning goals.

Participants from language and literature were more concerned about AI-generated stylistic uniformity and the risk of students losing their voice. In fields where nuance, tone, and authorial identity are essential, the use of genAI raised important pedagogical questions: How can students develop a personal voice if they rely on generic text generators? How do we teach style, originality, and expression in an age of automated fluency? These concerns reveal the tension between efficiency and authenticity in genAI-supported education.

Educators in pedagogy and education sciences had deep discussions about genAI as a "digital Vygotsky," suggesting it could support students' development in guided learning contexts. This metaphor reflects a vision of AI as a scaffold — a cognitive partner situated within the Zone of Proximal Development (ZPD), helping learners to progress with appropriate support. One said: "AI can be an ally — or a seducer. A seducer if the student doesn't understand what they're doing. An ally if guided properly by the teacher." This view emphasizes that genAI's educational value depends on the quality of its integration — not its sophistication or novelty. They emphasized that AI should not replace pedagogical judgment.

Professional development was highlighted as a critical need — not just technical training, but also pedagogical, ethical, and cultural. The introduction of AI into classrooms cannot be reduced to learning tools; it must be accompanied by a broader reflection on educational values, goals, and risks. One participant said: “We need space to reflect, not just someone to show us which button to press.” Teachers called for collaborative spaces where they could share experiences, raise concerns, and co-create practices that respect both technological innovation and human-centered education.

There's a clear digital literacy gap among teachers, which underscores the need for systematic education and support. Without institutional backing, digital inequality among teachers could lead to uneven educational quality. In this context, professional development is not a luxury but a necessity — essential for ensuring that all teachers, regardless of background or discipline, can engage with genAI in meaningful and responsible ways.

AI can support personalized, problem-oriented, and collaborative teaching — but only if teachers know how to pedagogically adapt it. Otherwise, technology may only worsen existing inequalities and passivity. This insight resonated across disciplines: AI has transformative potential, but its value depends on human design, intention, and care. The focus should not just be on how to use AI, but why. The pedagogical purpose must be clear: not to replace, but to enhance the human dimension of education. Ultimately, the message from all focus groups was aligned: genAI, if used wisely and reflectively, can amplify good teaching. But if adopted blindly or uncritically, it risks mechanizing learning. The future of education will not be shaped by machines alone, but by the people who choose how to work with them.

5. How to Meaningfully Integrate AI into Teacher Education?

Based on the findings presented, we propose the following guidelines for integrating AI into teacher education in Montenegro:

- Develop a national genAI legislation education, including ethics, goals, and usage methods, aligned with EU regulations. This framework should provide a foundation for coherent policymaking, ensuring that genAI tools are implemented in ways that respect fundamental rights, promote inclusion, and support pedagogical innovation. It must reflect both national specificities and global best practices.
- Introduce professional development programs for teachers, with accredited training that combines technical literacy with pedagogical reflection. These programs should go beyond software instruction and cultivate educators’ critical understanding of how genAI affects teaching, learning, assessment, and the broader culture of education. Tailored training modules can help teachers navigate the complexities of using genAI while preserving the humanistic values of education.
- Integrate genAI into education policies and curricula, especially in teacher education programs. Initial teacher training should include modules on the ethical, didactic, and psychological implications of genAI, preparing future educators to engage with digital

tools responsibly. Curricular integration should promote genAI not just as a tool, but as a topic of reflection, debate, and inquiry across disciplines.

- Support research and pilot projects on the application of genAI in teaching. Universities and schools should be encouraged to experiment with genAI in controlled, well-designed environments. Such projects can provide valuable insights into what works, what doesn't, and what requires further regulation. A national repository of case studies and good practices would help scale successful initiatives.
- Provide institutional infrastructure and ethical protocols. Without reliable internet access, secure digital environments, and clear ethical guidelines, the implementation of AI risks deepening existing inequalities. Infrastructure should include not only hardware and software, but also support systems for digital inclusion.
- Establish partnerships with experts, civil society, and the start-up community. Collaboration between universities, innovators, NGOs, and policy bodies can foster a dynamic genAI ecosystem that supports local development while maintaining transparency and accountability. These partnerships can help bridge the gap between educational needs and technological solutions.
- Implement clear academic integrity guidelines in the AI era and enhance ethical competencies among students and teachers. The proliferation of generative AI tools has redefined the boundaries of authorship and originality. Updated integrity policies must reflect these shifts while promoting a culture of honesty, reflection, and responsibility. Ethics education must be a cornerstone of AI integration.
- Promote broader digital culture among educators and the education community. Digital transformation is not only about tools, but also about mindsets. A supportive digital culture includes open dialogue, peer mentoring, collaborative innovation, and a willingness to adapt. Teachers should feel empowered, not overwhelmed, by new technologies.

Montenegro stands at the crossroads of digital development and educational reform. While institutional foundations remain weak, there is a clear recognition of the need to integrate AI into education. Teachers' voices show a willingness to learn, change, and apply technology responsibly. This readiness, however, must be matched by systemic vision and support. With institutional support, a clear strategy, and investment in expertise, AI can become a tool for empowerment, not destabilization, of education. Rather than introducing AI as a top-down technological fix, it should be embedded in a thoughtful process of educational renewal — one that values critical thinking, teacher autonomy, and equity. The goal is not for the education system to outsmart technology, but to turn it into a resource for critical, ethically grounded, and meaningful learning. In this process, the teacher remains the key agent of change — not merely a user of AI, but a shaper of its purpose, limits, and role in the learning process. By investing in teacher capacity, institutional resilience, and ethical infrastructure, Montenegro has the opportunity to shape a future where AI supports — rather than disrupts — the human core of education.