

Comparative Analysis of AI Regulation in Education Across Western Balkan Countries: Challenges and Opportunities

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This chapter presents a comparative analysis of the regulation of AI in education across the countries of the Western Balkans (WB), examining existing legal frameworks, national strategies and practical implementations in preuniversity and higher education systems. Although AI has gained global importance, the pace of its integration into educational systems varies significantly among the countries of the world, including the countries of the Western Balkans. In Serbia, the government has adopted a proactive approach, launching a national artificial intelligence strategy (2020–2025) that includes the integration of AI content into primary and secondary education. The government also supports AI research through dedicated institutes and higher education programs focused on AI. Despite this, the actual presence of AI-specific legislation in education remains limited, with most references to AI appearing in policy documents rather than enforceable legal texts. In contrast, North Macedonia and Montenegro have taken initial steps towards introducing AI in their education sectors, with AI mentioned in broad digitisation strategies but without specific education regulations. In these countries, AI is often seen in the context of digital skills development rather than as a dedicated subject within educational programs. Meanwhile, Bosnia and Herzegovina faces challenges due to its decentralised education system, where AI and technology integration strategies differ between entities. Although there are references to the modernisation of education with technology, the content and legal framework specific to artificial intelligence are still in an early stage. This chapter contributes to the growing body of research on the regulation of artificial intelligence by providing a comparative analysis of the integration of AI into the educational frameworks of WB countries. It examines how Serbia, North Macedonia, Montenegro and Bosnia and Herzegovina respond to the global call for digitisation and AI education, exploring the extent to which national policies, legal frameworks, and strategic documents address AI in their education systems. The chapter highlights both similarities and differences in each country's approach to AI in education, analysing how each nation's legal environment either supports or hinders the integration of AI into curricula at primary, secondary, and tertiary levels. By presenting comparisons, this chapter contributes to ongoing discussions on how the Western Balkans region can leverage AI for education reform and broader social development, serving as a

roadmap for policymakers, educators, and researchers interested in managing AI in education.

Keywords: artificial intelligence regulation, education, Western Balkans

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Introduction

Artificial intelligence (AI) is transforming education worldwide, bringing new opportunities to personalize learning, improve student outcomes, and increase the efficiency of educational processes (Zawacki-Richter et al., 2019; Holmes et al., 2019). This technology allows educational institutions and teachers to adapt teaching material to the needs of each student through AI-based tools, thus increasing their involvement and motivation (Luckin et al., 2016). In addition, AI's role in data analysis and prediction helps schools and universities make informed decisions about educational strategies and resources (Roll & Wylie, 2016). Although the advantages of AI are recognized globally, the application of this technology varies between regions and depends on local educational policies and the readiness of institutions to adopt new technologies (Brynjolfsson & McAfee, 2017). Through the introduction of AI, education becomes more dynamic and adapts to rapidly evolving social and economic needs, providing students with key skills to succeed in the digital age (Schleicher, 2018).

In the Western Balkans, there is a growing interest in improving the education system through digitization and modern technology. Among technological innovations, artificial intelligence (AI) stands out as a special topic because it offers new ways to learn and teach, allowing educational institutions to adapt learning methods to the needs of each student. However, although many countries in the region recognize the importance of digitization, they still face challenges in implementing artificial intelligence in education systems.

In most countries of the Western Balkans, digitalization of education is already included in education development strategies. Thus, plans were developed to improve digital literacy, introduce new digital tools into classrooms and ensure access to the Internet and computers. The goal is to provide pupils and students with the necessary skills so that they can successfully navigate the modern digital world. But when it comes to specific strategies for artificial intelligence, most countries are just at the beginning of their journey.

Albania, for example, has made progress in digital transformation, and its plans include improving digital infrastructure and ensuring basic digital skills

for students. The national education strategy for the period from 2021 to 2026 is aimed at improving education at all levels. However, although the importance of digitization is emphasized, artificial intelligence is not directly mentioned in the strategic documents. In Albania, the foundation for digitization through basic digital skills is still being laid, but there is no specific legal framework for AI in education.

Bosnia and Herzegovina is also investing in digital skills and the general digitization of the education system. However, a specific framework for artificial intelligence has not yet been developed. Due to the complex political structure and the division of competences in education, each entity and canton has its own plans and priorities, which further complicates the introduction of a unified strategy for AI. The main goal is to equalize access to education and improve digital competences among pupils and students, but AI is still not in the focus of educational strategies.

Kosovo faces special challenges in education, where general literacy and the development of basic educational skills are a priority. Despite this, Kosovo has established a digital platform, Shkollat.org, in cooperation with UNICEF and Microsoft, which provides students with digital content and supports digital learning. Although artificial intelligence is not explicitly covered in the current laws, the Shkollat.org platform has the potential to be expanded in the future to include AI-supported functionalities.

In Montenegro, digital transformation is recognized as an important goal, and there are different strategies that aim to improve digital skills and align the education system with the needs of the labour market. The digital strategy of Montenegro for the period 2022 to 2026 recognizes AI as a tool for data management and decision-making, but its use in education has not yet been specifically elaborated.

North Macedonia, on the other hand, has begun efforts to develop a National Strategy for Artificial Intelligence, although this initiative has not yet been implemented into a concrete framework. The focus is on modernizing the education system and aligning it with European standards, but AI is still not included in education plans and laws. There are initiatives to modernize and adapt VET (vocational training) programs to the needs of the labor market, including technologies such as AI in certain segments, but this is still in its infancy.

Serbia stands out as the country with the most developed strategy for artificial intelligence in the Western Balkans. Strategy for the development of AI in Serbia for the period 2020–2025. includes plans to apply AI in education, with an emphasis on improving digital skills and adapting the curriculum to prepare students for future jobs. Serbia has already introduced content re-

lated to AI in primary and secondary schools, where students acquire basic knowledge about AI through subjects such as technology and informatics. Additionally, universities have master's and doctoral programs dedicated to artificial intelligence, and research centers and supercomputers support AI development and research. With this, Serbia is laying the foundations for harmonizing the education system with the needs of modern society and the labor market in which AI plays an increasingly important role.

State of AI Regulation on WB

Albania

Education in Albania is provided by both public and private institutions at all levels, from pre-university to higher education. The Ministry of Education and Sport oversees pre-university education and higher education. It is responsible for setting policies, ensuring the implementation of educational standards, and coordinating the educational calendar, including key exams such as the matura for secondary schools.

The Ministry of Finance plays a role in Vocational Education and Training (VET), sharing responsibilities with the Ministry of Education and Sport. While the Ministry of Finance manages broader aspects of VET, the Ministry of Education and Sport is involved in appointing teachers for general subjects in VET schools and ensuring the coordination of the academic calendar with other secondary schools.¹

Albania has recently achieved advancements in its educational system, particularly concerning digital transformation and the incorporation of Information and Communication Technology (ICT). National strategies, including the National Education Strategy 2021–2026 and the Digital Agenda of Albania, prioritize the enhancement of digital literacy, the improvement of ICT infrastructure, and the provision of essential skills for students in the contemporary digital landscape. The documents emphasize initiatives aimed at modernizing education via digital tools, enhancing technology access, and promoting digital competence among students and educators.²

The National Education Strategy 2021–2026 aims to enhance education quality at all levels, from primary to tertiary, and incorporates initiatives for improving teacher training and digital curricula. The strategy delineates objectives including the integration of ICT subjects into educational curricula and the enhancement of access to digital learning platforms. The Digital Agenda

¹ <https://eurydice.eacea.ec.europa.eu/national-education-systems/albania/overview>

² https://www.etf.europa.eu/sites/default/files/2024-01/Country%20Fiche_Albania_2023_EN_edited%20%281%29.pdf

of Albania aims to enhance digital literacy and fortify the country's digital infrastructure, with the objective of aligning educational institutions with European Union standards.

Nonetheless, the national framework reveals a distinct gap regarding the integration of AI in education. Key strategic and legal documents do not explicitly address the use of AI in education or establish a regulatory framework for the integration of AI technologies in schools, universities, or other educational institutions.

The emphasis on digitalization may indirectly facilitate the development of AI-related tools or initiatives in the future; however, there is presently no legal framework or explicit reference to AI-driven educational technologies, including adaptive learning systems, AI-driven analytics, or AI-enhanced teacher support tools. The National Strategy for Scientific Research, Technology, and Innovation 2023–2030 emphasizes the promotion of innovation and research but does not specifically mention AI in education, despite advocating for the wider application of technology in research and development.

In Albania's education system, the approach to artificial intelligence (AI) regulation differs between pre-university and university levels. At the pre-university level, the emphasis is on digital literacy and the integration of basic ICT skills, while concrete regulations on AI are still lacking. Documents such as the National Education Strategy 2021–2026 and the Digital Agenda of Albania 2021+ focus on improving digital infrastructure and access to digital resources, but without specific mention of AI tools for primary and secondary schools. On the other hand, at the university level, although there is no specific AI framework for educational tools, documents such as Law no. 80/2015 on higher education recognize the importance of innovation and research, thereby giving universities some autonomy in adapting to technological advances, potentially including AI.

- *Draft National Strategy for Scientific Research, Technology and Innovation 2023–2030.*³ This strategy outlines Albania's research and innovation priorities for 2023–2030, focusing on enhancing STEM education, research infrastructure, and digital skills development. Although the strategy promotes the use of technology and innovation across sectors, including education, AI is not specifically mentioned as part of the education framework. The document emphasises scientific research,

³ <https://arsimi.gov.al/wp-content/uploads/2023/03/Draft-Strategjia-Komb%C3%ABtare-p%C3%ABr-Shkenc%C3%ABn-Teknologjin%C3%AB-dhe-Inovacionin.pdf>

technology advancements, and innovation without direct reference to AI-driven tools or applications in the educational context. Issued by the Ministry of Education, Sports, and Youth (MASR); university level.

- *National Education Strategy 2021-2026*.⁴ This strategy outlines the objectives for enhancing the Albanian education system from 2021 to 2026, focusing on inclusivity, quality, and digital competence. While it stresses the importance of digital literacy and the integration of ICT in education, there is no explicit mention of AI in education. The document prioritises digital transformation broadly but does not specifically reference AI-driven tools or techniques for primary, secondary, or tertiary education. Issued by the Ministry of Education, Sports, and Youth (MASR); pre-university and university level.
- *Digital Agenda of Albania 2021+*.⁵ The Digital Agenda for Albania promotes the integration of advanced digital technologies across sectors, including education. However, AI in education is not directly mentioned. The focus is on improving digital literacy and expanding access to digital curricula, particularly in secondary and tertiary education. AI is implied as part of the digital transformation, but the document does not provide specific guidelines or initiatives involving AI in education. Issued by the Ministry of Infrastructure and Energy; pre-university and university level.
- *National Employment and Skills Strategy 2023–2030*.⁶ The document outlines key employment and skill development strategies for Albania from 2023–2030, focusing on strengthening education and professional training systems. AI is not explicitly mentioned in this strategy. However, the strategy emphasises digitalization and the need for a more flexible, modern education and training system, which may indirectly support AI integration in future skills development initiatives. Issued by the Ministry of Finance and Economy; university level.
- *Law No. 80/2015 on Higher Education and Scientific Research in Higher Education Institutions in the Republic of Albania*.⁷ This law governs the regulation and organisation of higher education and scientific research institutions in Albania. It outlines the rights and responsibilities of these institutions, including autonomy in academic and scientific activities.

⁴ <https://arsimi.gov.al/wp-content/uploads/2021/05/Draft-Strategjia-per-Arsimin-2021-2026.pdf>

⁵ https://konsultimpublik.gov.al/documents/RENJK_414_AgjendaDigjitale2021_Alb_22102021.docx

⁶ https://konsultimpublik.gov.al/documents/RENJK_561_1.-Dokumenti-Strategjik_final_2030_221122.docx

⁷ https://unitir.edu.al/images/dokumenta/Legjislacion/Ligj_80-2015_22.07.2015.pdf

AI is not specifically mentioned. The law focuses on promoting research, innovation, and modernising education, especially in the context of higher education. Issued by the Parliament of Albania; university level.

Bosnia and Herzegovina

Bosnia and Herzegovina (BiH) has a complex education system due to its political structure, consisting of two entities, Republika Srpska and the Federation of BiH, as well as the Brčko District. Each of these regions has its own responsibilities for education based on the constitutions of BiH, the entities, and the Brčko District Statute.

There are thirteen main institutions responsible for education across BiH:

- Ministry of civil affairs on the state level
- Ministry of Education and Culture in Republika Srpska.
- Ten cantonal ministries of education in the Federation of BiH, each responsible for their respective canton.
- The Department for Education of the Brčko District.

Republika Srpska operates with a centralized education system, with one ministry overseeing all educational matters. The Federation of BiH, on the other hand, has a decentralized system, where each of the ten cantons has its own ministry of education. The Federal Ministry of Education and Science only has a coordinative role in managing education across the cantons. The Brčko District has its own government structure, with the Department for Education being one of its departments. The Ministry of Civil Affairs of BiH (MoCA) coordinates educational activities across BiH and is responsible for defining basic principles and strategies at the international level.

Additionally, BiH has agencies to ensure the quality of education, including The Agency for Development of Higher Education and Quality Assurance, The Center for Information and Recognition of Qualifications in Higher Education., The Agency for Preschool, Primary and Secondary Education.

Coordination bodies such as the Conference of Ministers of Education in BiH and the Council for General Education have been formed to facilitate cooperation. The Rectors' Conference of Bosnia and Herzegovina represents universities and advises on higher education reforms.

In BiH, there are three official languages: Bosnian, Croatian, and Serbian, and each is taught in schools as a mother tongue, reflecting the country's diverse population.⁸

⁸ <https://eurydice.eacea.ec.europa.eu/national-education-systems/bosnia-and-herzegovina/overview>

Hence, following a complex structure, education laws and strategies are defined by authorities at the entity, canton, and district levels, as well as the country's constitutional governance structure. While there are four framework laws at the state level, covering preschool education, primary and secondary education, vocational education and training (VET), and higher education, their implementation varies across different administrative units. All administrative units are required to harmonise their local legislation with these state-level framework laws to maintain a minimum level of coordination and to align with international standards. However, in practice, policy integration and strategic alignment differ significantly between units. Education policy and strategic planning are not systematically aligned across the country. For example, there is no state-level strategy outlining national priorities for school education, leaving such decisions to administrative units, some of which lack the capacity to develop comprehensive strategies, implementation plans, and monitoring frameworks to support educational improvements.⁹

There is currently no state-level strategy for education that sets unified priorities for school education across the country. Instead, education policy and strategic planning are carried out at the level of administrative units, leading to disparities in educational quality and focus. Additionally, AI in education is not explicitly mentioned in any of the framework laws or strategic documents reviewed. The focus remains on improving digital competencies and integrating ICT into the education system, with AI being an underdeveloped area in educational policies.

At the pre-university level, the focus is on ensuring access to education, standardisation and digital literacy, while specific regulations on AI are almost non-existent. Documents such as the Framework Law on Primary and Secondary Education in BiH emphasise the rights of students and the uniformity of educational standards but do not include AI. On the other hand, at the university level, documents such as the Strategy for the Development of Higher Education in BiH 2016–2026 and the Strategy for the Development of Science and Technology in the Republic of Srpska 2023–2029 emphasise academic freedom, quality assurance of education and international standards, but AI is only marginally mentioned, mainly through digital skills and ICT infrastructure. This approach highlights the difference in priorities for primary and secondary education compared to higher education, where innovation and research are more prevalent.

⁹ <https://www.oecd-ilibrary.org/docserver/a669e5f3-en.pdf?expires=1729076070&id=id&accname=guest&checksum=DC55A7C6DFD15F6C480CBC2FD787E61F>

Following is the list summarising relevant documents.

- *Framework Law on Primary and Secondary Education in BiH*.¹⁰ This law regulates primary and secondary education, including preschool and adult education. It focuses on ensuring equal access to education, respecting the rights of students, and standardising education across entities. It promotes human rights, inclusion, and the use of the mother tongue. AI is not mentioned in the document. The law primarily addresses access to education, educational autonomy, and harmonisation of education standards across BiH. Issued by the Parliamentary Assembly of BiH; pre-university level.
- *Framework Law on Higher Education in Bosnia and Herzegovina*.¹¹ This law establishes the principles for higher education in BiH, including the organisation of universities, academic freedom, and institutional autonomy. The law emphasises the European Credit Transfer System (ECTS) and quality assurance in alignment with the Bologna Process. However, AI in education is not explicitly mentioned in the law. It primarily focuses on governance, academic integrity, and international recognition of degrees. Issued by the Parliamentary Assembly of BiH; university level.
- *Priorities for Higher Education Development in BiH 2016–2026*.¹² This strategic document outlines the development priorities for higher education in BiH, including areas such as good governance, resources, internationalisation, and labour market connections. AI is not explicitly mentioned in the document. The document focuses on aligning higher education with EU standards and enhancing quality assurance. Issued by the Ministry of Civil Affairs of BiH, EU/CoE Project; university level.
- *Development Strategy of the Federation of Bosnia and Herzegovina 2021–2027*.¹³ The strategy outlines priorities for economic development, digitalisation, and innovation in FBiH. It emphasises the development of digital skills and the implementation of artificial intelligence (AI) in various sectors. AI is mentioned as a key area for development, par-

¹⁰ <https://aposo.gov.ba/sadrzaj/uploads/Framework-Law.pdf>

¹¹ [https://hea.gov.ba/Content/Open/105?n=Okvirni_zakon_o_visokom_obrazovanju_u_Bosni_i_Hercegovini_\(%E2%80%99ESlu%C5%BEbeni_glasnik_Bosne_i_Hercegovine%E2%80%99C,_broj_5907_i_5909\).pdf](https://hea.gov.ba/Content/Open/105?n=Okvirni_zakon_o_visokom_obrazovanju_u_Bosni_i_Hercegovini_(%E2%80%99ESlu%C5%BEbeni_glasnik_Bosne_i_Hercegovine%E2%80%99C,_broj_5907_i_5909).pdf)

¹² https://www.mcp.gov.ba/attachments/en_Migrirani_dokumenti/Units/Education/Obrazovanje-strate%C5%A1ki/Prioriteti,e.pdf

¹³ https://parlamentfbih.gov.ba/v2/userfiles/file/Materijali%20u%20proceduri_2021/Strategija%20razvoja%20FBiH%202021-2027_bos.pdf

ticularly in enhancing digital literacy, promoting AI technologies, and encouraging innovation in education. Issued by the Government of the Federation of BiH; pre-university and university level.

- *Strategy for the Development of Science and Technology, Higher Education and Information society in the Republic of Srpska 2023–2029.*¹⁴ This strategy outlines the development of science, technology, higher education, and the information society in Republika Srpska. Key priorities include digitalisation, enhancing digital skills, and fostering innovation in line with EU goals. AI is not explicitly mentioned, although there is a focus on ICT development and promoting STEM education. Issued by the Ministry of Science and Technological Development, Higher Education, and Information Society of Republika Srpska; university level.

A list of entity, district and cantonal laws related to education can be found at the following link: <https://mcp.gov.ba/publication/read/pregled-zakona-nadleznih-ministarstava-iz-oblasti-obrazovanja>. However, laws do not address the issue of artificial intelligence in education.

Kosovo

The education system in Kosovo faces considerable challenges, particularly in literacy and teacher development. As of 2018, 79% of 15-year-olds struggled with reading comprehension, a much higher rate than the Western Balkans' average of 54% or the EU's 24%. Additionally, Kosovo's teachers were less likely to engage in professional development or adopt adaptive teaching methods. These challenges are critical for a country with the youngest population in Europe, with 30% of citizens under 18.¹⁵ To address these issues, Kosovo is focusing on digital learning, especially in the wake of school closures during the COVID-19 pandemic. The Ministry of Education, Science, Technology, and Innovation (MESTI) is building on digital initiatives launched during the pandemic. One key initiative is Shkollat.org, a digital learning platform created in collaboration with UNICEF and Microsoft. This platform provides educational content in multiple languages and is aligned with the curriculum for grades 1-12.

¹⁴ https://vladars.rs/sr-SP-Cyrl/Vlada/Ministarstva/mnk/Documents/%Do%A1%D1%82%D1%80%Do%Bo%D1%82%Do%B5%Do%B3%Do%B8%D1%98%Do%Bo_%Do%9C%Do%9D%Do%Ao%Do%92%Do%9E%Do%98%Do%94_%Do%9A%Do%9E%Do%9D%Do%90%Do%A7%Do%90%Do%9D_270923_%Do%9D%Do%94.pdf

¹⁵ <https://files.eric.ed.gov/fulltext/ED627657.pdf>

The Kosovo Education Strategy (2022–2026) places digital learning as a core objective, envisioning improvements in access to digital content, connectivity, and devices. However, digital learning faces challenges such as student disengagement and negative perceptions from both students and parents. Moving forward, the strategy aims to make digital learning more student-centred and engaging, supported by institutional mechanisms like a dedicated digitalisation unit.

The relevant legislation and initiatives concerning AI in education in Kosovo focus on digital learning and the integration of technology into the educational system. Kosovo Education Strategy (2022–2026) is the key strategic document that integrates digitalisation in education as one of its core objectives. AI and digital platforms like Shkollat.org play a central role in this transformation. The document outlines a strategic push for digital learning to ensure it is part of a broader educational reform effort, focusing on access to quality digital content, improving infrastructure, and fostering digital competencies among teachers and students.

Shkollat.org platform, launched in collaboration between Kosovo's Ministry of Education, Science, Technology, and Innovation (MESTI), UNICEF, and Microsoft, is the localised version of UNICEF's Learning Passport. It acts as a central repository for digital learning content and tools, including AI-supported educational content such as personalised learning through virtual classrooms and interactive assessments. Shkollat.org is mentioned as a key instrument for advancing digital education, with more than 12,000 video lessons covering Grades 1–9 and skill-based programs for Grades 10–12. The strategy emphasises the need for teachers to develop skills in using AI-powered digital tools to create a student-centred learning environment. Training programs are necessary to ensure that teachers are equipped to integrate digital platforms and AI into their teaching processes.

In Kosovo's education system, differences in approach between pre-university and university levels reflect different focuses and goals. At the pre-university level, legislation and strategies, such as the Law on Primary and Secondary Education and the Education Strategy 2022–2026, are primarily aimed at ensuring access to education, establishing standards, and developing digital competencies through platforms such as Shkollat.org. Although artificial intelligence is not explicitly mentioned, the emphasis on digitisation may open up opportunities for future integration of AI. On the other hand, at the university level, the Law on Higher Education emphasises accreditation, institutional autonomy and quality assurance, but AI is not mentioned as an integral part of the strategy. This shows that the university level is more ori-

ented towards institutional development and academic freedom, while the pre-university level is focused on building basic digital skills and modernising infrastructure.

- *Law on Primary and Secondary Education in Kosovo*.¹⁶ The law focuses on regulating the structure and provisions of public and private education at the primary and secondary levels. The law does not explicitly mention AI in education. Instead, it provides a general framework for compulsory education, school standards, and the rights to education for all children. While it does not address AI or digitalisation in detail, the law lays the groundwork for potential future developments in integrating technology and digital literacy into the education system. Issued by the Ministry of Education, Science, and Technology (MEST); pre-university level.
- *Law on Higher Education in Kosovo*.¹⁷ The law regulates higher education in Kosovo, covering aspects such as licensing, accreditation, institutional autonomy, and the rights and responsibilities of higher education institutions. The law does not mention AI in education. Issued by the Ministry of Education, Science, and Technology (MEST); university level.
- *Education Strategy 2022–2026*.¹⁸ The strategy focuses on transforming Kosovo's education system with an emphasis on digitalisation. It highlights the need for a centralised digital learning platform (Shkollat.org), digital competencies, and improved access to digital tools across primary and secondary education. AI is not specifically mentioned, but the strategy emphasises digital learning and modernising education infrastructure. Issued by the Ministry of Education, Science, Technology, and Innovation (MESTI); pre-university and university level.

Montenegro

The Ministry of Education, Science and Innovation centrally manages educational policy in Montenegro, overseeing the overall direction of education.

Montenegro's educational institutions encompass preschools, schools, educational centres, adult education providers, universities, and upper secondary non-tertiary schools. These may be classified as either public or private.

¹⁶ <https://gzk.rks-gov.net/actdocumentdetail.aspx?actid=2428>

¹⁷ <https://gzk.rks-gov.net/ActDetail.aspx?ActID=2761>

¹⁸ <https://masht.rks-gov.net/wp-content/uploads/2022/11/03-Strategja-e-Arsimit-2022-2026-Eng-Web.pdf>

Public education, extending to the university level, is secular, allowing religious activities solely within secondary religious institutions.

Montenegro considers education essential for societal development and has implemented substantial reforms in recent years to align its educational system with contemporary standards and EU legislation. The reforms have encompassed all educational levels, alongside the implementation of new laws and amendments to guarantee quality and alignment with international standards.¹⁹

Public financing for education is primarily handled at the central level, with some contributions from local self-governments, particularly for up-to-university education. Several strategies have been developed to improve specific areas of the education system, including early childhood education, vocational training, and teacher education. These documents emphasise aligning education with labour market demands, promoting practical skills, and fostering lifelong learning. However, the Digital Transformation Strategy of Montenegro (2022–2026) does acknowledge the potential of AI as a tool for data management and decision-making, though its role in education is not directly addressed.

In Montenegro, education regulation at the pre-university and university levels shows different priorities in the development of digital competencies and the integration of technology. At the pre-university level, documents such as the General Law on Education and Upbringing and the Strategy for Early and Preschool Education 2021–2025 emphasise access to education, equality and inclusiveness without specific references to artificial intelligence. The focus is on ensuring quality and equal opportunities in education, with an emphasis on the professional development of teachers and digital skills. On the other hand, the university level, which includes documents such as the Law on Higher Education, focuses more on institutional autonomy, accreditation, and quality assurance in accordance with the European Credit Transfer System (ECTS). Although AI is not directly mentioned in the educational context at the university level, digital transformation is recognised as an important factor, especially through the Digital Transformation Strategy 2022–2026, which supports the development of digital capacities and may pave the way for the future application of AI in education.

- *General Law on Education and Training.*²⁰ This law governs the overall organisation and functioning of the education system in Montene-

¹⁹ <https://eurydice.eacea.ec.europa.eu/national-education-systems/montenegro/overview>

²⁰ <https://www.katalogpropisa.me/wp-content/uploads/2020/12/056-Opsti-zakon-o-obrazovanju-i-vaspitanju-Odlomak.pdf>

gro, including preschool, primary, secondary, and adult education. It ensures equal access to education for all citizens and guarantees the autonomy of educational institutions. AI is not explicitly mentioned in the law. The focus is on educational equity, inclusivity, and quality assurance across all levels. Issued by the Government of Montenegro; pre-university and university level.

- *Law on Higher Education*.²¹ This law governs the structure and functioning of higher education in Montenegro, including academic autonomy, quality assurance, and accreditation. It outlines the roles of institutions, staff, and students, as well as criteria for academic positions. AI is not explicitly mentioned in the law. The focus is on academic governance, the European Credit Transfer System (ECTS), and lifelong learning. Issued by the Government of Montenegro; university level.
- *Strategy of Early and Preschool Education in Montenegro 2021-2025*.²² The strategy outlines the development of early childhood education in Montenegro, focusing on equal opportunities, quality improvements, and accessibility for all children. It emphasises inclusion, quality assurance, and expanding access to children from vulnerable groups. AI is not mentioned in the document. The focus is primarily on improving early education infrastructure and pedagogical quality. Issued by the Ministry of Education, Science and Innovation; pre-university level.
- *Strategy for the Development of Professional Education in Montenegro (2020–2024)*.²³ This strategy outlines the development of vocational education in Montenegro with a focus on aligning education with labour market demands. It emphasises skills development, inclusivity, lifelong learning, and employment. There is a significant focus on promoting practical training and dual education. AI is not mentioned in the document. The strategy prioritises digital skills and vocational training relevant to the economy. Issued by the Ministry of Education, Science and Innovation; pre-university level.
- *Teacher Education Strategy in Montenegro (2017–2024)*.²⁴ This strategy outlines the professional development of teachers in Montenegro, focusing on improving the quality of both initial and continuous te-

²¹ <https://www.gov.me/dokumenta/f42d2128-2514-423f-8338-b596f2a85b7a>

²² <https://www.gov.me/cyr/clanak/strategija-ranog-i-predskolskog-vaspitanja-i-obrazovanja-2021-2025-sa-akcionim-planom>

²³ <https://www.gov.me/dokumenta/3f8ece83-b549-4c84-8aeg-a8620ff67928>

²⁴ <https://www.gov.me/dokumenta/2f53913b-5300-4dbf-9b96-2efa1180085f>

acher education. It emphasises the need for teachers to adapt to new challenges, including technological advancements, and to develop pedagogical skills. AI is not explicitly mentioned. The strategy promotes flexible teaching models and continuous professional development for educators. Issued by the Ministry of Education, Science and Innovation; pre-university and university level.

- *Youth Strategy 2023–2027*.²⁵ The strategy outlines key goals for the development and empowerment of youth in Montenegro through the period of 2023–2027. It focuses on youth participation in public life, education, health, employment, and social inclusion. It aims to create mechanisms to support youth in their transition to adulthood and increase opportunities for their active participation in policy-making. AI is not explicitly mentioned. The strategy emphasises digital literacy and youth engagement in the digital space. Issued by the Ministry of Sports and Youth; pre-university and university level.
- *Digital Transformation Strategy of Montenegro (2022–2026)*.²⁶ This strategy outlines the advancement of digital services, skills, and infrastructure in Montenegro. It recognises the importance of AI as a tool for sorting data, creating data schemes, and identifying trends to support decision-making processes in various sectors. However, AI is not directly addressed in the context of education. The strategy emphasises the need for data availability and digital competencies across all levels of education. Issued by the Ministry of Public Administration, Digital Society and Media of Montenegro; university level.

A list of other education-related laws can be found here: <https://eurydice.eacea.ec.europa.eu/national-education-systems/montenegro/legislation-and-official-policy-documents>. However, AI is not addressed in these laws.

Republic of North Macedonia

The educational system in the Republic of North Macedonia aims to facilitate the nation's economic, social, technological, and cultural advancement. The Ministry of Education and Science is responsible for the ongoing advancement of education, moral education, and scientific research. The system operates on a decentralised model, wherein municipalities oversee primary

²⁵ <https://www.gov.me/dokumenta/c27c88df-e903-422d-b789-379490c307cf>

²⁶ <https://wapi.gov.me/download/59dcab9b-boe8-48b7-830b-6e4eab690521?version=1.0>

and secondary schools, with the exception of secondary schools in Skopje, which fall under the jurisdiction of the City of Skopje. The state allocates financial resources via block grants. In the initial phase of decentralisation, municipalities are allocated block grants exclusively for infrastructure projects. In contrast, municipalities in the subsequent phase receive funding for both infrastructure and the salaries of school employees. The Ministry of Education and Science is responsible for the management of schools catering to pupils with special needs.

The Bureau for Development of Education is responsible for preparing curricula for primary and secondary education, whereas the Centre for Vocational Education and Training focuses on developing curricula for vocational subjects. The State Educational Inspectorate oversees quality assurance within educational institutions.

Adult education is prioritised and governed by the Law on Adult Education and the Law for Vocational Education. The Centre for Adult Education advocates for adult education to address labour market demands and enhance personal development.²⁷

North Macedonia currently lacks AI-specific regulations. In 2021, the Macedonian Fund for Innovation and Technology Development (FITD) and the government initiated efforts to create a National AI Strategy, but the initiative remained unfollowed after the initial meeting and did not result in any strategy for the eventual legislative activity.

In North Macedonia, approaches to the regulation and strategies of education at the pre-university and university level have different emphases, reflecting specific needs and goals for each educational group. At the pre-university level, documents such as the Law on Basic Education and the Law on Secondary Education primarily focus on equal access, inclusiveness, and the structure and standards of the education system but do not include specific regulations for artificial intelligence (AI). The development concept of the Regional Center for Vocational Education and Training (VET) recognises the importance of AI in vocational education, which prepares students for technologically advanced jobs. In contrast, at the university level, the Law on Higher Education and the Law on Scientific-Research Activities emphasise academic autonomy, quality, and the encouragement of research, but specific guidelines for AI are lacking. The university levels are focused on quality assurance and the development of research potential, while the pre-university level in-

²⁷ <https://eurydice.eacea.ec.europa.eu/national-education-systems/republic-north-macedonia/overview>

cludes thorough preparation for the labour market through basic education and professional guidance.

- *Law on Primary Education.*²⁸ This law governs primary education in North Macedonia, ensuring equal access to education for all children and promoting the development of students' knowledge and skills. It highlights inclusivity and the right to free education for all children, including those with special needs. AI is not mentioned in this document. It primarily focuses on the educational system's structure and quality standards for primary education. Issued by the Government of North Macedonia; pre-university level.
- *Law on Secondary Education in North Macedonia.*²⁹ This law regulates the organisation, functioning, and management of secondary education in North Macedonia. It sets out provisions for vocational, artistic, and secondary education for students with special needs. The law mandates equal access to education and non-discrimination. The law does not explicitly mention AI in education. It mainly focuses on educational governance, curriculum standards, and ensuring inclusivity across secondary education. Issued by the Government of North Macedonia; pre-university level.
- *Law on Higher Education in North Macedonia.*³⁰ This law governs higher education institutions in North Macedonia, including universities and faculties. It defines the roles of institutions, academic autonomy, and quality assurance processes. AI is not explicitly mentioned in this document. The focus is primarily on establishing the framework for higher education institutions and ensuring academic freedom and quality. The law outlines the organisation of universities and faculties, requirements for accreditation, and governance structures, but it does not include specific provisions or regulations related to AI in education. Issued by the Government of North Macedonia; university level.
- *Law on Adult Education in North Macedonia.*³¹ This law governs the organisation and structure of adult education in North Macedonia, including formal, non-formal, and informal learning. It aims to equip adults

²⁸ https://mon.gov.mk/stored/document/Zakon%20za%20osnovnoto%20obrazovanie%20-%20nov_1.pdf

²⁹ <https://mon.gov.mk/stored/document/Zakon%20za%20srednoto%20obrazovanie.pdf>

³⁰ <https://mon.gov.mk/stored/document/zakon-za-visoko-obrazovanie-star-mk.pdf>

³¹ <https://mon.gov.mk/stored/document/Zakon%20za%20obrazovanie%20na%20ovozrasnite.pdf>

with the necessary skills and knowledge to meet labour market demands and support lifelong learning. AI is not explicitly mentioned in the document. The law focuses on ensuring education and upskilling for adults, particularly in technical and vocational areas. Issued by the Government of North Macedonia; university level.

- *Law on Scientific Research Activity*.³² This law regulates scientific research and innovation activities in the country, setting out principles for the funding, execution, and management of research. AI is not directly mentioned, although the law encourages the adoption of innovative technologies and fostering links between research institutions and the business sector. Issued by the Ministry of Education and Science, Republic of North Macedonia; university level.
- *Education Strategy 2018-2025*.³³ This strategic document outlines the vision, goals, and action plan for the development of education in North Macedonia from 2018 to 2025. The document does not mention AI explicitly but emphasises the modernisation of education, digital literacy, and the use of ICT. The focus is on improving education quality, infrastructure, and inclusivity across all levels (preschool, primary, secondary, vocational, and higher education). Issued by the Ministry of Education and Science, Republic of North Macedonia; pre-university and university level.
- *Development Concept for the Establishment of a Regional VET Centre in North Macedonia*. The document outlines the development of vocational education and training (VET) in North Macedonia, focusing on aligning education with the labour market demands. AI is mentioned as a tool integrated into VET programs, emphasising automation, virtual intelligence, and AI. The document highlights AI as a part of broader new technologies used in vocational training to prepare the workforce for future technological advancements. Issued by the Ministry of Education and Science of North Macedonia; pre-university level.

Serbia

The Ministry of Education in Serbia oversees the development and implementation of educational policies. Educational institutions, such as schools and preschools, possess considerable autonomy in the organization and delivery of programs. Higher education institutions possess significant autonomy.

³² <https://mon.gov.mk/stored/document/zakon-za-naucno-istrazuvacka-dejnost.pdf>

³³ <http://mrk.mk/wp-content/uploads/2018/10/Strategija-za-obrazovanje-MAK-WEB.pdf>

Educational institutions may be categorized as either public (state) or private. Public institutions receive funding primarily from the state budget, utilizing an input-based funding system. Private institutions do not obtain public funding. The Ministry of Education, in collaboration with Vojvodina authorities, regulates the establishment of educational institutions. The accreditation process is consistent across all educational levels, requiring higher education institutions to secure accreditation from the Commission for Accreditation and Quality Assurance prior to receiving a license from the Ministry.

The educational system consists of Early Childhood Education and Care, Basic Education (encompassing primary and lower secondary education), Secondary Education, and Higher Education. Basic education and preparatory preschool programs are obligatory and provided at no cost, whereas secondary education is offered free of charge but is not mandatory. Access to higher education is available to all citizens on equal terms.

Serbia is rapidly advancing in AI development and regulation. A new Law on Artificial Intelligence is being drafted, expected by spring 2025, alongside a national AI development strategy for 2024–2030. These efforts build on the existing AI Development Strategy (2020–2025), which aligns with European Commission policies, and aim to promote the safe, sustainable use of AI across sectors like education, the economy, and public services. Ethical AI guidelines were introduced in 2023 to address risks and safeguard individual freedoms. Serbia ranks 57th in the AI Readiness Index and plays a prominent role in the Global Partnership on AI (GPAI). The country has robust AI infrastructure, including a National AI Platform, a supercomputer, and an AI research institute supporting advancements in various fields. AI-focused events, such as the Data Science Conference, highlight Serbia's growing importance in the global AI ecosystem.³⁴

In 2019, the Serbian government adopted the AI Development Strategy for the period 2020–2025. Through a dedicated project, the UNDP actively supports the government's ambitious agenda in this field, which includes initiatives such as establishing an Institute for Artificial Intelligence and adopting Ethical Guidelines for responsible AI development. This underscores the need for continuous dialogue on the opportunities and risks posed by this rapidly evolving technology.

In order to advance and apply AI technology in public administration, academic research, and the broader Serbian industry, as well as to support start-

³⁴ <https://www.schoenherr.eu/content/ai-regulation-and-development-in-serbia#:~:text=Serbia's%20AI%20ecosystem&text=The%20National%20AI%20Platform%2C%20within,access%20to%20advanced%20computing%20resources.>

up companies in developing their products, the Government of Serbia has established the National AI Platform. This platform was developed in accordance with the goals and measures outlined in the AI Development Strategy of Serbia (2020–2025). The AI platform, a supercomputer, is located at the State Data Center in Kragujevac. It consists of four DGX-A100 nVIDIA servers with a total of 32 GPUs for handling deep learning (DL) and high-performance computing (HPC) simulations across multiple nodes. This system sets a new standard for computing density, offering 5 petaFLOPS of AI performance in a 6U unit.

The Government has also established the Council for Artificial Intelligence, which will be responsible for coordinating and aligning activities related to implementing the strategic framework for AI development. The Council will monitor the implementation of planned measures and activities, assess the current state, needs, and standards in AI development and application in Serbia and globally. It will play an advisory role, providing proposals, recommendations, standards, opinions, and expert explanations on all AI-related matters in Serbia. The Council will oversee the implementation of the AI Development Strategy (2020–2025), as well as any amendments and the development of a new strategy. It will also organize and monitor the drafting of laws and regulations related to AI development and application.

Also, the Research and Development Institute for Artificial Intelligence of Serbia plays a unique role in developing the AI ecosystem in the country. Its mission is to build an economically significant AI sector and help Serbia become a global leader in artificial intelligence. The AI Institute brings together scientists, researchers, and industry experts from around the world, focusing on AI research and its applications in areas such as the automotive industry, medical diagnostics, finance, business efficiency, and the discovery of new drugs and materials. With a vision of becoming a “factory” of leaders in AI, the institute supports intellectual property protection that benefits both researchers and industry partners. The goal is to patent and commercialize most of the discoveries made by the institute’s researchers. Formally established by the Government of Serbia in March 2021, the AI Institute currently operates offices in science and technology parks across Serbia, facilitating the growth of the country’s AI research and development capabilities.

When it comes to education, AI is present in education system:

- AI in primary schools - the AI Development Strategy of the Republic of Serbia (2020-2025) includes the introduction of AI-related content in the education system. In the 7th grade, students are required to take the subjects Technology and Engineering and Computer Science, which fo-

cus on the role, significance, and application of artificial intelligence (AI) in daily life, as well as its impact on humans. These subjects are taught twice a week. In the 8th grade, students continue to expand their knowledge of AI through the mandatory subject Technology and Engineering. They also engage in hands-on activities where they learn to construct and control simple school robots using AI, with classes held twice a week.

- AI in secondary schools - in high schools, students develop their skills for safely and responsibly using modern technologies, both in life and work. In the 3rd and 4th grades, under the elective subject Modern Technologies, students learn how to critically, safely, and responsibly use contemporary technologies, understand their functionality, and apply logical and algorithmic thinking to solve real-life problems. Additionally, the curriculum for students with special abilities in Computer Science and Informatics aims to equip them with key competencies for further education and participation in modern society, as well as career decision-making and problem-solving.
- AI in master's Programs - In 2021, master's programs specializing in artificial intelligence were introduced at several universities in Serbia, including the University of Novi Sad (Faculty of Technical Sciences and Faculty of Natural Sciences and Mathematics), University of Kragujevac, and University of Niš (Faculty of Natural Sciences and Mathematics and Faculty of Electronic Engineering).
- AI in doctoral programs - the Research and Development Institute for Artificial Intelligence, the first of its kind in Serbia and the region, focuses on AI research and its application in various fields. The institute invites young researchers to become part of a team shaping the future of AI in Serbia. Students with AI expertise (e.g., computer vision, speech and text generation) can join the institute and work on technical tasks, publish research, collaborate with international mentors, and participate in both national and international research projects. The institute supports the development of Serbia's AI industry through education and innovation.

In Serbia, approaches to the integration of artificial intelligence (AI) into the education system show different emphases between the pre-university and university levels, reflecting the specific needs and strategic goals of each educational group. At the pre-university level, documents such as the Law on Basic Education and Education and the Law on Secondary Education include compulsory subjects such as technology and information literacy, which lay

the groundwork for later application of AI, but specific AI guidelines are lacking. However, the Education Development Strategy in Serbia until 2030 recognizes AI as a key element in education and encourages the development of digital skills at all levels. At the university level, the Law on Higher Education emphasizes academic autonomy and quality assurance, while the Strategy for the Development of Artificial Intelligence in the Republic of Serbia (2020–2025) specifically promotes research and innovation in AI, including cooperation with the private sector and teacher training. Thus, the university level emphasizes the research and innovation potential of AI, while the pre-university level focuses on the development of basic digital skills and the basis for the application of AI in later education.

- *Law on Primary Education and Education.*³⁵ The law regulates primary education in Serbia, ensuring that every child has access to free primary education. It includes mandatory subjects such as technology and information literacy, which could lay the foundation for introducing AI-related topics in higher grades. No direct mention of AI is included in this law. Issued by the Government of Serbia; pre-university level.
- *Law on Secondary Education.*³⁶ The document does not explicitly mention AI. It focuses on general provisions regarding secondary education, including the development of vocational skills, curriculum standards, and the roles and responsibilities of educational institutions. AI is not a specific focus in the law, but technology and skills relevant to the modern job market are encouraged. Issued by the Government of Serbia; pre-university level.
- *Law on Higher Education.*³⁷ The law regulates the higher education system in Serbia, outlining academic freedoms, governance, financing, and accreditation procedures. It also establishes the autonomy of higher education institutions. AI is not explicitly mentioned in this law. The focus is on maintaining quality education and aligning with international standards. Issued by the Government of Serbia; university level.

³⁵ <http://www.parlament.gov.rs/upload/archive/files/lat/pdf/zakoni/2013/2229-13Lat.pdf>

³⁶ <https://prosveta.gov.rs/wp-content/uploads/2018/01/%Do%97%Do%Bo%Do%BA%Do%BE%Do%BD-%Do%BE-%D1%81%D1%80%Do%B5%Do%B4%D1%9A%Do%B5%Do%BC-%Do%BE%Do%B1%D1%80%Do%Bo%Do%B7%Do%BE%Do%B2%Do%Bo%D1%9A%D1%83-%Do%B8-%Do%B2%Do%Bo%D1%81%Do%BF%Do%B8%D1%82%Do%Bo%D1%9A%D1%83.pdf>

³⁷ <http://nsvo.gov.rs/%Do%B7%Do%Bo%Do%BA%Do%BE%Do%BD-%Do%BE-%Do%B2%Do%B8%D1%81%Do%BE%Do%BA%Do%BE%Do%BC-%Do%BE%Do%B1%D1%80%Do%Bo%Do%B7%Do%BE%Do%B2%Do%Bo%D1%9A%D1%83/?script=lat>

- *Strategy for the Development of Education in Serbia by 2030 (SROVRS 2030)*.³⁸ The strategy outlines the key development goals for the Serbian education system until 2030, emphasizing inclusivity, quality, and modernization across all levels of education. AI is explicitly mentioned, highlighting the importance of integrating AI in the education system, improving digital literacy, and preparing students for a future where AI plays a central role in various sectors. Issued by the Ministry of Education, Science and Technological Development of Serbia; pre-university and university level.
- *Strategy for the Development of Artificial Intelligence in the Republic of Serbia (2020–2025)*.³⁹ This strategy focuses on the development and implementation of AI across key sectors, including education. It sets out to enhance AI knowledge in primary, secondary, and tertiary education. The strategy emphasizes the importance of AI in education, including integrating AI into curricula at all levels. It promotes the development of digital skills, AI research, and AI-based innovation, ensuring ethical AI use. Key measures include the introduction of AI in teaching programs, teacher training, and cooperation between universities and the private sector. Issued by the Government of the Republic of Serbia; pre-university and university level.
- *Ethical Guidelines for the Development, Application, and Use of Reliable and Responsible AI*.⁴⁰ These guidelines focus on ensuring that AI systems in Serbia are ethical, reliable, and responsible. They outline principles for privacy, transparency, non-discrimination, and human dignity. They do not directly mention specific applications of AI in education, but they stress the need for ethical AI development across sectors, including education. Issued by the Government of Serbia; pre-university and university level.

Comparative Analysis of AI in Education Across the WB

The countries of the Western Balkans have different approaches and progress in digital transformation and the integration of artificial intelligence (AI) in education, and each case presents specific challenges and opportunities.

Albania focuses on digital literacy and information and communication technology (ICT) development without specific regulation for AI. There are currently no implemented AI programs in education, but the National Strategy for Education 2021–2026, emphasizes the need for digital skills. The chal-

³⁸ <https://prosveta.gov.rs/wp-content/uploads/2021/06/SROVRS-2030-1.pdf>

³⁹ <https://www.srbija.gov.rs/tekst/437277>

⁴⁰ <https://www.ai.gov.rs/tekst/sr/586/eticke-smernice.php>

lenges are in the lack of a legal framework for AI and limited resources for ICT. However, there is potential for future initiatives to introduce AI, with the expansion of ICT infrastructure in schools.

Bosnia and Herzegovina faces a complex management of the education system, without an explicit framework for AI, but with a focus on the development of digital competences. Although the current use of AI is not present, there is room for collaboration between entities to improve quality. The decentralized structure makes integration at the national level difficult, but improving the quality assurance system could bring significant progress.

Kosovo has a digital platform Shkollat.org, which has the potential to expand to AI functions in the future. The current focus is on the development of digital competencies, and the strategies point to the possibility of additional AI features in digital learning. The key challenges are the low literacy rate and limited professional training of teachers, but the young population and co-operation with organizations like UNICEF provide an opportunity for further development of AI in education.

Montenegro is focused on the development of digital skills and ICT, recognizing AI in the context of data management, but not in educational strategies. Plans for AI are included in the Digital Transformation Strategy 2022–2026, although economic challenges and insufficient commitment to AI are evident. However, Montenegro is in line with the EU's goals for digital competences, which could help further the application of AI initiatives in education.

North Macedonia focuses on modernizing the education system but still does not have a specific AI policy. AI is mentioned in the concept, but there are no concrete applications. It is possible that AI will be integrated into vocational education and training (VET) and other educational reforms. Although the AI strategy has been delayed and the infrastructure to implement it is limited, efforts to align with EU standards offer potential opportunities for progress.

Serbia has the most developed approach to AI in education in the Western Balkans, with a comprehensive strategy for AI 2020–2025 that includes AI in the curriculum and support for research. AI is already being applied at all educational levels. A new law on AI is expected by 2025, and a national strategy is under development. Challenges include continued support, as well as ethical and legal issues, but a strong research infrastructure and education reform initiatives give Serbia significant potential for further application of AI in education.

Conclusion

Analysis of the state of integration of artificial intelligence (AI) in education in the countries of the Western Balkans shows significant differences in approaches and levels of progress between countries. Serbia stands out as a leader in the region with advanced strategies for implementing AI at all educational levels, as well as strong support for research and development. Other

Table 1 Comparative Analysis of AI Regulation

Country	Digital transformation focus	Current AI use in education	Future plans for AI in education	Challenges	Opportunities
Albania	Digital literacy, ICT infrastructure, no specific AI regulations	None; emphasis on ICT and digital skills	Focus on digital skills in National Strategy 2021–2026	Lack of legal framework for AI, limited resources for ICT	ICT expansion in schools, potential for future AI initiatives
Bosnia and Herzegovina	Complex governance, no explicit AI framework, focus on digital skills	None; general focus on digital competencies	No national strategy; decentralized approach limits integration	Decentralized governance, varied policy implementation	Focus on quality assurance, room for collaboration across entities
Kosovo	Digital learning platform (Shkollat.org), AI potential in future	Shkollat.org platform may expand to AI	Potential expansion of digital learning with AI features	Low literacy rates, limited teacher professional development	Youth population, partnerships with organizations like UNICEF
Montenegro	Digital skills and ICT, AI recognized for data management but not in education	Not explicitly included in education strategies	Plans in Digital Transformation Strategy (2022–2026)	Insufficient focus on AI, economic constraints	Alignment with EU digital goals, existing ICT initiatives
North Macedonia	Modernization focus, no specific AI policies, VET program modernization	Mentioned in concept; no specific AI applications	Possible AI integration in VET and other educational reforms	Delayed AI strategy, limited infrastructure for implementation	Modernizing education to EU standards, potential VET advancements
Serbia	Comprehensive AI strategy 2020–2025, AI integration in curriculum, research support	AI introduced in primary, secondary, and higher education	New Law on AI expected by 2025, national strategy under development	Need for continuous support, ethical and legal challenges	Strong AI research and infrastructure, educational reform with AI integration

countries, such as North Macedonia and Montenegro, are committed to modernizing the education system through the development of digital skills but still do not have specific policies that would enable the wider application of AI in education. On the other hand, in Bosnia and Herzegovina, the complex government structure and decentralized education system make it difficult to create a unique strategy for AI, while Kosovo and Albania are in the early stages of developing digital infrastructure, with AI being a peripheral goal for now.

These differences point to the need for harmonizing strategic frameworks and additional efforts in building a common approach so that the countries of the Western Balkans can successfully use the benefits of AI in education. The adoption of good practices applied by Serbia could benefit other countries in the region, but at the same time it would be useful to consider the approaches implemented by the European Union. The European Union has developed a comprehensive framework for the responsible use of AI in education, emphasizing ethical principles, privacy protection, transparency and inclusiveness (Zawacki-Richter et al., 2019; Schleicher, 2018). Implementation of these principles could help the countries of the Western Balkans to integrate AI in a way that supports inclusive and quality education, while at the same time ensuring the protection of students' rights and the ethical use of technology.

Future steps for the region include increasing resources for infrastructure development, teacher training, and the formulation of clear policies and legal frameworks that would enable the integration of AI into the education system. Through cooperation and harmonization with European Union standards, the countries of the Western Balkans can use AI as a tool to transform educational systems and prepare students for work in a global digital environment. Additionally, regional cooperation and exchange of experiences between countries could speed up the process of introducing innovations, enabling faster adaptation to common European educational goals.

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Primerjalna analiza regulacije umetne inteligence v izobraževanju v državah Zahodnega Balkana: Izzivi in priložnosti

V tem poglavju je predstavljena primerjalna analiza ureditve umetne inteligence (UI) v izobraževanju v državah Zahodnega Balkana (ZB), ki obravnava obstoječe pravne okvire, nacionalne strategije in praktično izvajanje v douniverzitetnih in visokošolskih izobraževalnih sistemih. Čeprav je UI vse pomembnejša na globalni ravni, se hitrost njenega vključevanja v izobraževalne sisteme med državami sveta, vključno z državami Zahodnega Balkana, precej razlikuje. V Srbiji je vlada sprejela proaktiven pristop in začela izvajati nacionalno strategijo UI (2020–2025), ki vključuje vključevanje vsebin UI v osnovnošolsko in srednješolsko izobraževanje. Vlada podpira tudi raziskave UI preko posebnih inštitutov in visokošolskih programov, ki se osredotočajo na UI. Kljub temu je dejanska prisotnost zakonodaje o UI v izobraževanju še zmeraj omejena, saj se večina omemb UI pojavlja v dokumentih o usmeritvah in ne v veljavnih zakonodajnih besedilih. Nasprotno pa sta Severna Makedonija in Črna gora naredili prve korake za uvedbo UI v svojih izobraževalnih sektorjih, saj je UI omenjena v širših strategijah digitalizacije, vendar brez posebnih predpisov na področju izobraževanja. V teh državah se UI pogosto obravnava v okviru razvoja digitalnih spretnosti in ne kot poseben predmet znotraj izobraževalnih programov. Medtem se Bosna in Hercegovina sooča z izzivi zaradi decentraliziranega izobraževalnega sistema, v katerem se strategije vključevanja UI in tehnologije med posameznimi entitetami razlikujejo. Čeprav se omenja tehnološka modernizacija izobraževanja, so vsebine in pravni okvir, specifični za UI, še vedno v zgodnji fazi. To poglavje prispeva k naraščajočemu številu raziskav o ureditvi UI s primerjalno analizo vključevanja UI v izobraževalne okvire držav ZB. Preučuje, kako se Srbija, Severna Makedonija, Črna gora ter Bosna in Hercegovina odzivajo na globalni poziv k digitalizaciji in izobraževanju na področju UI, ter raziskuje, v kolikšni meri nacionalne politike, pravni okviri in strateški dokumenti obravnavajo UI v tamkajšnjih izobraževalnih sistemih. Poglavje izpostavlja tako podobnosti kot razlike v pristopu posameznih držav k UI v izobraževanju in analizira, kako pravno okolje vsake države podpira ali ovira vključevanje UI v učne načrte na primarni, sekundarni in terciarni ravni. S predstavitvijo medsebojnih primerjav poglavje prispeva k tekočim razpravam o tem, kako lahko regija Zahodnega Balkana izkoristi UI za reformo izobraževanja in širši družbeni razvoj, ter služi kot načrt za oblikovalce politik, izobraževalce in raziskovalce, ki jih zanima upravljanje UI v izobraževanju.

Ključne besede: regulacija umetne inteligence, izobraževanje, Zahodni Balkan