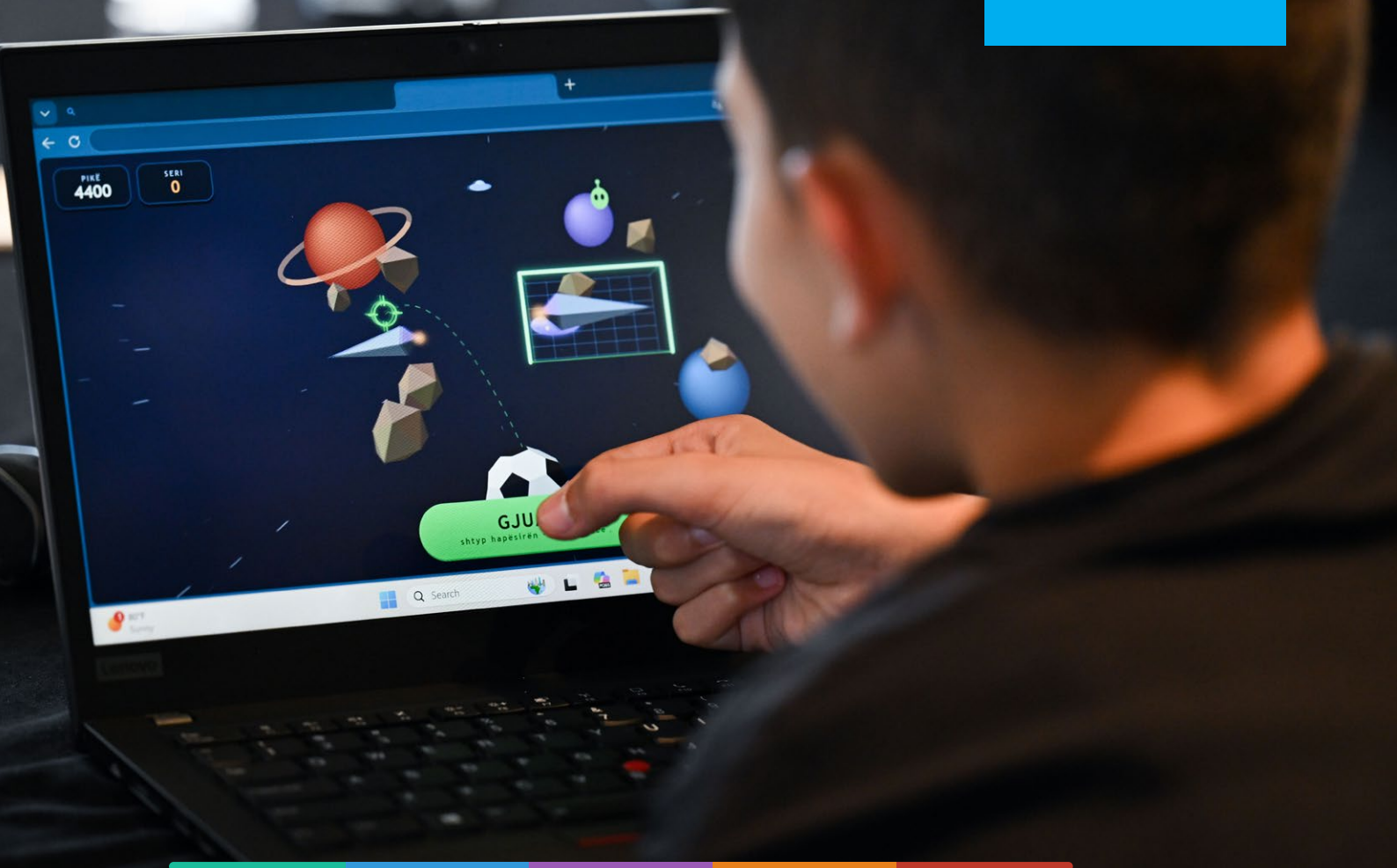




From Digital Access to Digital Competence

A Comprehensive Analysis of Digital
Competence Development in Kosovo's
Pre-University System



Roadmap for **Digital Education Reform**

From Digital Access to Digital Competence

A Comprehensive Analysis
of Digital Competence Development
in Kosovo's¹ Pre-University System

Roadmap for Digital Education Reform



August 2026

¹ All references to Kosovo should be understood in the context of UN Security Council Resolution 1244 (1999)

Acknowledgment

Prepared by:

Dr. Mohsen Saadatmand - *a digital learning specialist
and researcher at the University of Helsinki*

Prof. Assistant Krenare Pireva Nuçi *at the Faculty of Education
at University of Prishtina*

Dr. Mohsen Saadatmand is a digital learning specialist and researcher at the University of Helsinki with over 15 years of experience in international education development, digital innovation and policy analysis. He has worked with UNICEF and UNESCO on digital learning programmes and education policy analysis across global and underserved contexts."

Prof. Assistant Krenare Pireva Nuçi at the Faculty of Education at University of Prishtina. She holds a PhD in Computer Science from University of Sheffield and was a Fulbright Scholar at University of Illinois Chicago. Her research focuses on the application of Artificial Intelligence in education, particularly recommender systems, Natural Language Processing (NLP), and Machine Learning. She coordinated several projects funded at both the national and EU levels.

DISCLAIMER

The opinions expressed in the report are those of the authors and do not necessarily reflect the views or opinions of UNICEF.

Table of Contents

Abbreviations	5
Executive Summary	7
Key findings and recommendations	8
1. Introduction	
Background and rationale	16
Methodology	18
Data sources	18
Data Analysis	19
2. Kosovo Context	
The Kosovo Education System	22
Digital competence in the Kosovo pre-university curriculum	27
3. Findings of the Analysis	
Pillar 1 Governance, coordination and implementation	30
Pillar 2 Infrastructures, learning environments and resources	35
Pillar 3 Student digital competence and curriculum integration	40
Pillar 4 Teacher digital competence and professional development	52
Pillar 5 Emerging Technologies and AI	61
4. A Theory of Change	
Proposed ToC for digital competence development in Kosovo's pre-university education	66
Foundational pillars and their contribution to change	69
Pillar 1 (P1)	69
Pillar 2 (P2)	71
Pillar 3 (P3)	74
Pillar 4 (P4)	77
Pillar 5 (P5)	79
Limitations of the analysis	89
Annexes	
References	105

List of Tables

Table 1.	The structure of education system in Kosovo (MESTI, 2022)	23
Table 2.	Curricular areas and school subjects by curriculum stages (MESTI, 2016)	25
Table 3.	Intended learning outcomes of key competences related to digital competences	41
Table 4.	Intended learning outcomes of digital competence transversally across areas in six stages of Education	42
Table 5.	Digital competence-related elective subjects	44
Table 6.	International Assessment Instruments	47
Table 7.	Mapping Life Skills and Technology and ICT subjects against DigComp	49
Table 8.	Alignment of DigComp Categories and Subcategories Across Grades 1–12	50
Table 9.	Progression of Teacher Training Alignment with DigCompEdu Areas (2018–2024)	54
Table 10.	Current Alignment vs Suggested Trainings based on DigCompEdu Areas	56
Table 11.	List of International Assessment Instruments for Benchmarking Digital Competence	58

List of Figures

Figure 1.	Methodological procedure	18
Figure 2.	Kosovo's Core Curriculum Structure	26
Figure 3.	Digital competence integration across seven curriculum areas for Stage 5-6	46
Figure 4.	Kosovo students' performance in ICILS 2023	48
Figure 5.	Number of accredited ICT-related programs by year	53
Figure 6.	ICILS 2023 Teacher ICT Use	59
Figure 7.	ToC pathway and components	67

Abbreviations

AI	Artificial Intelligence
AILit	AI Literacy
AI CFS	AI Competence Framework for Students
AI CFT	AI Competence Framework for Teachers
CARNET	Croatian Academic and Research Network
AR	Augmented Reality
CPD	Continuous Professional Development
CIL	Computer and Information Literacy
COVID	Corona Virus Disease
DCF	Digital Competence Framework
DigComp	Digital Competence Framework for Citizens (EU)
DigComp	Digital Competence Framework for Educators (EU)
EC	European Commission
EdTech	Educational Technology
EMIS	Education Management Information System
EU	European Union
FGD	Focus Group Discussion
GDPR	The General Data Protection Regulation
GenAI	Generative Artificial Intelligence
HTML	Information and Communication Technology
ICT	Hyper Text Markup Language
ICILS	International Computer and Information Literacy Study
ISCED	International Standard Classification of Education
IRDLL	Index of Readiness for Digital Lifelong Learning
ILO	Intended Learning Outcomes
IT	Information Technology
KODE	Kosovo Digital Economy Project
KREN	Kosovo Research and Education Network
KCF	Kosovo Curriculum Framework
KII	Key Informant Interviews
KPI	Key Performance Indicator

KCF	Kosovo Curriculum Framework
MESTI	Ministry of Education, Science, Technology and Innovation
MED	Municipal Education Directorate
MOOC	Massive Open Online Courses
NLP	Natural Language Processing
NGO	Non-Governmental Organization
LMS	Learning Management System
STEM	Science, Technology, Engineering and Math
ToC	Theory of Change
TPACK	Technological Pedagogical Content Knowledge
PISA	Program for International Student Assessment
PD	Professional Development
OECD	Organization for Economic Co-operation and Development
OER	Open Educational Resources
OEP	Open Educational Practices
RG	Reference Group
SSO	Single Sign ON
TKAEDITE	Transforming the Kosovo and Albanian Education System by Introducing Digital Technology in Teacher Education
UNICEF	United Nations Children's Fund
UNICEF EDC	UNICEF Educators' Digital Competence Framework
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCO DLGF	UNESCO Digital Literacy Global Framework
VET	Vocational Education and Training
VR	Virtual Reality
XR	Extended Reality

Executive Summary

The integration of digital competences into Kosovo's pre-university education system is a strategic imperative for preparing future-ready students and workers capable of thriving in a digital society and economy. Globally, digital literacy has become a foundational skill, and for Kosovo this is a pressing issue as nearly two-thirds of its workforce needs digital upskilling representing the highest proportion in the Western Balkans (World Bank, 2024).

Similarly, student performance in international assessments such as PISA¹ (Program for International Student Assessment) and ICILS² (International Computer and Information Literacy Study) reveals significant gaps in foundational learning and digital readiness.

The objective of this report is to present the current status of digital skills and competences in Kosovo's pre-university education by providing a detailed account of student and teacher digital competences, key barriers and enablers, and the contextual factors affecting digital skills development.

In particular, it provides a detailed account of Kosovo's education system in relation to student digital competence, teacher digital readiness, policy governance, infrastructure; reviews the competency-based curriculum and maps it against EU and international frameworks to identify gaps and areas for alignment; analyzes current tools for assessing digital competence among students and teachers; collects key stakeholders' perspectives and practical insights on digital skills integration into Kosovo's education system; and finally proposes a Theory of Change (ToC) with an actionable roadmap with clear implementation actions to foster digital competence enhancement for students and teachers.

The methodology employed a mixed approach of desk research and document analysis with qualitative and ground-level evidence to combine policy-level and practice-level insights for triangulation of findings. The desk review conducted a thorough analysis of key documents, including national education policies, curricula, and teacher training catalogs, alongside international frameworks to map the policy background, as well as the existing analyses and reports to establish a foundational understanding of the situation and to identify initial gaps.

The stakeholder consultation included Key Informant Interviews (KIIs) with policy-makers and representatives from Ministry of Education, Science, Technology and Innovation (MESTI), Municipal Education Directorates (MED), school leadership, and universities and Focus Group Discussions (FGDs) with teachers. School visits and

1 OECD's Program for International Student Assessment measures 15-year-olds' ability to use their reading, mathematics and science knowledge and skills. <https://www.oecd.org/en/about/programmes/pisa.html>

2 International Computer and Information Literacy Study is a large-scale assessment of International Association for the Evaluation of Educational Achievement that measures students' abilities to use computers for accessing, creating, and communicating information. <https://www.iea.nl/studies/iea/icils>

classroom observations were carried out along informal discussions with teachers and principals regarding the use of digital tools, infrastructure, and professional development in selected schools.

This report contributes to Objective 5 of the Education Strategy 2022–2026, which emphasizes the development of digital competence among all education stakeholders, particularly students and teachers. It provides an in-depth analysis of how digital skills are integrated into the pre-university curriculum and their role in advancing the vision of cultivating digitally literate and empowered learners, referred to in the Education Strategy as “digital natives”.

The primary audience for this report includes education stakeholders in Kosovo, particularly governmental bodies, MESTI and its sub-organizational units, the Ministry of Finance, Labor and Transfers, municipal education departments, educators, universities, and, more broadly, international partners, donors and organizations engaged in education development in Kosovo.

Key findings and recommendations

Kosovo has made the digitalization of education a strategic priority through the Education Strategy 2022–2026 with an Action Plan (MESTI, 2022b) to ensure implementation and a dedicated budget to digitalize education system. It aims to establish a centralized digital education platform, develop high-quality digital learning materials, provide internet connectivity and devices, and cultivate digital competence among all education stakeholders.

MESTI has started endeavors to localize the European Digital Competence Framework for Citizens (DigComp), European Digital Competence Framework for Teachers (DigCompEdu), and European Digital Competence Framework for Educational Organizations (DigCompOrg). Although these frameworks provide clear roadmaps, the challenge lies in converting the strategies into consistent and tangible implementation as the action plan lacks coordination and robust accountability mechanisms. Furthermore, digitalization in education system is not systematic and many initiatives remain scattered and project-driven with limited systemic coordination across actors³.

While these objectives and fragmented efforts signal promises, Kosovo's education faces persistent challenges in coordinating policy governance and implementation actions. The lack of institutional capacity, cross-sectoral and multi-stakeholder coordination, inconsistent and insufficient curriculum integration of digital com-

3 Examples of projects included:
- Learning Passport (shkollat.org) by UNICEF: <https://shkollat.learningpassport.org/>
- Digital Economy (KODE) Project for Kosovo by World Bank through Kosovo Research and Education Network (KREN): <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/249951531020771941/kosovo-kosovo-digital-economy-kode-project>
- EU co-funded TKAeDITE.eu (Transforming the Kosovo and Albanian Education System by Introducing Digital Technology in Teacher Education): <https://tkaedite.eu/>
- EdTech bachelor program in Faculty of Education in University of Prishtina/Priština.

petences, infrastructure deficiency, funding shortfalls, and the absence of Kosovo framework for emerging technologies such as Artificial Intelligence (AI) and Generative AI are the main barriers for an effective system-wide digital transformation. Equally important, limited in-service teacher preparedness in digital competencies is another factor impeding the integration of digital skills in classroom settings.

The findings from the analysis are presented in five pillars explaining challenges and gaps that contribute to the situation of digital competence development in Kosovo's pre-university education. For each pillar, a set of recommendations are suggested which are further detailed with targeted activities and actions in the proposed theory of change, presented in Section 4 of the report. The ToC is supplemented with a roadmap outlining required activities and actions, actors and stakeholders with their roles and responsibilities, timeframes, priority level, milestones and indicators (Appendix D).



Pillar 1: Governance, coordination and implementation

Without relevant and appropriate policy and governance mechanisms for digital education, implementation at the school level is not effective. The analysis shows that in Kosovo's pre-university education context, there is a persistent disconnect between ambitions for digitalization and its actual implementation. While digital transformation is prioritized in Kosovo strategies such as the Education Strategy 2022–2026, weak cross-sectoral and multi-stakeholder coordination, and organizational bottlenecks hinder effectiveness in policy implementation.

The absence of a central coordinating body, fragmented institutional responsibilities, and limited inter-ministerial collaboration have led to inconsistent implementation of digital initiatives. Additionally, a decentralized education governance model further complicates coordination with municipalities operating independently and lacking the financial and technical capacity to sustain digital transformation. This lack of coordinated and cross-sectoral efforts across central, municipal, and school levels, unclear roles and responsibilities and overlapping mandates and weak leadership result in inconsistency and delay in translating strategic ambitions into classroom-level practice.

The gap between policy and implementation is further reinforced by lack of monitoring and institutional accountability and ineffective financing mechanisms that pose major bottlenecks in budget disbursement and funding distribution. While budget has been allocated for education digitalization, funds are often not disbursed, underutilized or redirected, which is the result of uncoordinated funding mechanisms with development partners and implementation bottlenecks aggravating inefficiencies.

Recommendations:

1. Strengthen strategic leadership, institutional capacity and cross-sectoral coordination at central and municipal levels to reinforce policy implementation and reduce fragmentation.
2. Establish clear multi-stakeholder coordination and mechanisms to engage all actors from government, schools, teachers, parents, civil society, private and EdTech sector.
3. Streamline budget allocation for the digitalization of education with equitable disbursement and distribution to ensure timely and efficient funding at central and municipal levels.
4. Establish monitoring, evaluation, and central accountability systems to ensure policy implementation and promote informed decision-making in the digitalization of education.



Pillar 2: Infrastructures, learning environments, and resources

As important as policy governance, multi-stakeholder engagement and cross-sectoral coordination are, the availability of and equitable access to infrastructure is equally essential for enabling digital competence development for both students and teachers.

This includes internet connectivity, accessibility, equipment, digital platforms, and relevant content and materials. The analysis shows that significant digital infrastructure gaps and inequities persist with insufficient access to digital tools and school equipment, particularly in rural and underserved schools. Schools face poor connectivity, outdated equipment, and shortage of essential digital tools. The digital learning ecosystem is fragmented with no unified and interoperable platforms.

This is combined with a lack of centrally coordinated learning management system (LMS), ad-hoc and fragmented use of LMSs by municipalities, insufficient curriculum-aligned digital content, and inadequate pedagogical guidelines for classroom integration. Additionally, cybersecurity and digital safety protocols and technical guidelines are underdeveloped, limiting the secure use of digital technologies and resources in the classroom. Students have unfiltered access to content on the internet in the classroom and digital learning materials are not provided through an established central or municipal procedure but rather through school or teacher initiative.

Recommendations:

1. Modernize and provide sustained delivery of digital infrastructure and guarantee equitable access to reliable connectivity and equipment for schools, particularly rural and underserved regions with required funding and support mechanisms.

2. Streamline digital learning platforms, develop and institutionalize a centralized, coordinated learning management system to ensure interoperability, accessibility, and secure use.
3. Develop and scale up curriculum-aligned digital content and shared repositories and promote the integration of OERs and OEP to expand access to digital learning resources.
4. Safeguard online safety at schools and digital learning environments by institutionalizing cybersecurity protocols and digital safety standards.
5. Invest in human and technical resource development through targeted programs and active stakeholder engagement including partnerships, and foster collaboration with private EdTech, and IT sector, and SMEs.



Pillar 3: Curriculum integration and student digital competences

The Pre-University Curriculum Framework (2016) recognizes digital competence as a transversal skill embedded across all seven curriculum areas, with a stronger focus within “Life and Work.” However, the current curriculum does not adequately support the systematic development of digital competences across subjects and lacks clear articulation of specific skills and intended learning outcomes by grade level. The analysis of the curriculum reveals inconsistency in how digital skills are articulated and applied across subject areas. For instance, mathematics shows stronger integration while other subjects such as languages, arts, and natural sciences reflect partial or superficial references without supporting pedagogical or assessment guidance.

Despite the aim of MESTI to localize EU frameworks, mapping the curriculum against DigComp Framework highlights partial alignment with stronger coverage in areas such as browsing, managing data, programming, and significant gaps in advanced digital skills, problem-solving, entrepreneurial thinking, and digital citizenship. ICT-related textbooks are widely considered outdated, often covering basic computer operations without providing a clear progression toward more advanced, applied, or critical digital skills such as coding, cybersecurity and data and AI literacy. While the analysis shows a high exposure to technology in everyday life by students this does not translate into meaningful educational use as a result of curriculum implementation.

Students, though familiar with digital devices, often lack critical and creative thinking skills necessary for meaningful educational applications of digital tools as they are not systematically integrated into subjects and grades. Many students lack even foundational digital literacy despite spending substantial time online (ICILS 2023). Results of international assessments such as ICILS (2023) and PISA (2022) score Kosovo's performance well below international averages in digital literacy indicating persistent weaknesses in both foundational and applied digital skills. The

lack of adequate resources and technological tools in schools hampers students' skill development as does the minimal collaboration between schools and the private sector, which offers students limited opportunities to develop and advanced digital skills. These findings underscore the need for a comprehensive curriculum reform of integration of digital competences aligned with EU and global standards and the development of a Kosovo assessment framework for digital competences.

Recommendations

1. Reform the curriculum to propose digital competence as a new competence and integrate transversal digital competence beyond basic digital skills across subject areas and aligning with EU and global frameworks (DigComp, UNESCO DLGF).
2. Develop and implement a pre-university Digital Education Action Plan with clear goals, priorities, timelines, and measures to guide implementation of the reformed curriculum.
3. Define progressive digital competence outcomes, from foundational to advanced skills, using EU and global standards by embedding emerging technologies such as AI.
4. Establish and implement Kosovo assessment framework and tools to evaluate students' progression from foundational to advanced skills, aligned with EU and global frameworks for each curriculum stage.
5. Promote student-led initiatives and practical applications of digital skills with a focus on inclusion and equity (e.g., girls in tech, marginalized students).



Pillar 4: Teacher digital competences and professional development

A major barrier in advancing digitalization in education in Kosovo is the insufficient preparedness of teachers to integrate technology meaningfully and pedagogically into their teaching practice. Many teachers lack the necessary digital competences and pedagogical training to utilize advanced digital tools in classroom settings. Advanced digital competence and AI pedagogy are also largely absent from teachers' professional development programs.

This challenge is further intensified by shortages of, and fragmented professional development in digital pedagogy or technological pedagogical knowledge, which are not linked to certification or career progression, thus diminishing their long-term impact and effectiveness on classroom integration. Pre-service programs are only beginning to integrate the EU DigCompEdu framework, for example, The University of Prishtina/Priština's integration of DigCompEdu framework into its teacher education programs and a new ICT-focused bachelor's degree aiming to prepare a new role, the EdTECH expert, that will lead the digitization transformation process

in schools. In-service teacher training and professional development programs vary widely in quality and lack systematic monitoring and systematic approval, while offering limited incentives for teachers to engage in non-accredited digital competence development programs.

These programs are not systematically provided by MESTI and municipalities nor do teachers pursue them on their own initiatives. Furthermore, the education system lacks assessment tools and monitoring mechanisms for digital competences. The absence of standardized tools and structured frameworks for evaluating teacher digital competences makes it difficult to measure progress and identify capacity gaps. This gap in teacher preparedness significantly hinders the advancement of students' digital skills and competences as they are not adequately and systematically exposed to experiences with digital tools and technologies in the classroom setting.

Recommendations

1. Develop and institutionalize Kosovo Digital Competence Framework for Teachers as an official mandatory document for professional development aligned with DigCompEdu, UNICEF's EDCF, and UNESCO's ICT-CFT.
2. Strengthen digital competence through modular and needs-based continuous professional development (CPD) programs in technological pedagogical content knowledge (TPACK) and incentivize them by certification and career promotion.
3. Promote and cascade peer-to-peer and community-based learning for teachers in advanced digital skills and digital pedagogy including AI literacy and subject-specific use of digital tools through MESTI, municipalities and donor-supported programs and certified trainers in technology integration and a digital platform for sharing professional practices.
4. Develop and implement Teacher Digital Competence Assessment Instrument to systematically evaluate and monitor teacher digital competences linked to professional development, licensing, and career advancement.



Pillar 5: Emerging technologies and AI

As emerging technologies such as AI, GenAI and immersive technologies are increasingly impacting learning and teaching in different subject areas, their applications are critical for digital skills development in Kosovo's pre-university education. This area is still new within Kosovo's education system with limited adaptability and system-level applicability challenges. While AI is acknowledged within the broader Digital Agenda for Kosovo 2030, it is not explicitly integrated into education policies, curricula, and teacher professional development frameworks. Advanced digital skills and AI literacy are not embedded in the curriculum syllabi with learning

outcomes. Although teachers have begun experimenting with AI tools for lesson planning and administrative support as reflected in TALIS⁴ (2024) findings, and students use AI tools for their own purposes, this use is largely unstructured and often lacks critical implementation in schools and for educational purposes.

Kosovo's Education Strategy 2022-2026 predates the emergence of generative AI tools such as ChatGPT, and the system currently lacks formal AI literacy frameworks, ethical and responsible use regulations, and quality assurance standards. Gaps in Kosovo's education system regarding the integration of emerging technologies and AI are significant as Kosovo currently lacks a coherent strategy or regulatory framework at central level to guide their use in teaching and learning.

Recommendations

1. Develop an AI framework in education aligned with international frameworks such as DigComp 3.0⁵, UNESCO AI CFS⁶, UNECSO AI CFT⁷, AILit⁸.
2. Integrate AI literacy and advanced technological skills into the curriculum to prepare students with the mindset and skills to understand, use and critically evaluate these technologies.
3. Strengthen teacher capability in emerging technologies and AI through targeted CPD, pedagogical training, and pilot initiatives such as peer-to-peer mentorship.
4. Provide policy and institutional support for school-wide AI adoption in teaching and learning, ensuring equitable access and ethical and responsible use.

The findings and recommendations underscore the urgency of commitment from government and coordinated cross-sectoral actions to drive digital transformation in Kosovo's education system. For Kosovo to fully harness the potential of digital education, it must adopt a systemic and holistic approach, moving beyond a narrow focus on providing devices and connectivity. This means a systematic curriculum reform, investing in infrastructure to ensure all schools have stable access to high-speed internet and modern devices, prioritizing large-scale teacher training in digital pedagogies, the design of Kosovo assessment instruments for digital competences, and the creation of supportive school environments where digital learning is seamlessly embedded into everyday practice. The transition to a digitally inclusive education system is neither immediate nor linear but with sustained commitment, Kosovo can bridge the gap between policy and practice by ensuring that digital transformation is not just an aspiration but a reality for all learners.

4 OECD Teaching and Learning International Survey - is the world's largest international survey about teachers and school leaders. <https://www.oecd.org/en/about/programmes/talis.html>
 5 <https://publications.jrc.ec.europa.eu/repository/handle/JRC144121>
 6 <https://www.unesco.org/en/articles/ai-competency-framework-students>
 7 <https://www.unesco.org/en/articles/ai-competency-framework-teachers>
 8 <https://ailiteracyframework.org/>

1 Introduction

A decorative graphic consisting of a horizontal line with five colored dots (cyan, blue, purple, orange, red) positioned below the word 'Introduction'.

Background and rationale

In recent years, Kosovo has made significant strides to align its education system with global digital transformation trends through strategic policies and frameworks. Notably, the Education Strategy 2022–2026, grounded in the Government of Kosovo's Program 2021–2025, positions digitalization as one of its five core strategic objectives, emphasizing the use of digital technology to improve the quality and accessibility of education.

The Strategy presents clear objectives, activities, indicators, and costs, aiming to enhance digital infrastructure, develop digital competences among teachers and students, and ensure equitable access to modern educational resources. The current core curriculum (2016) identifies digital competence as a “transversal element” integrated across all subjects and seven curricular areas, with a special focus on the “Life and Work Area.” Its aim is to empower students with the knowledge and skills needed to navigate a digitized world, where digital literacy is as foundational as reading, writing, and numeracy.

Digital competences are essential for learning, teaching, and active citizenship in today's technology-driven world. In Kosovo, digital learning remains relatively new (UNICEF, 2024), and integrating digital competence into pre-university education is crucial to equip students for employment, higher education, and participation in the digital economy. Digitalization of education is not only a pathway to Kosovo's digital economy but also a driver for improving overall education quality in Kosovo (RED, 2023).

The integration of digital competence in Kosovo's pre-university education remains at an “emerging” level of digital readiness (World Bank, 2024). The World Bank's Digital Readiness Assessment identifies five critical areas of Kosovo's digital readiness: **(i) weak coordination in digital policy implementation, (ii) poor school connectivity and outdated technological resources, (iii) limited teacher training in digitalization in education methodologies, (iv) schools struggling to integrate technology into curricula, and (v) lack of private-sector engagement in educational technology.** The findings expose a fundamental paradox: while digitalization in education is a Kosovo priority, schools lack the necessary tools and training to actualize this vision.

For Kosovo, aligning education policies and practices with EU and international standards is pivotal to ensuring progress and competitiveness. Frameworks such as DigComp, DigCompEdu, and DigCompOrg, alongside those developed by UNESCO, UNICEF, and the OECD, offer structured and evidence-based approaches and guidance for digital competence development. Of particular relevance to this analysis is DigComp, initially developed by European Commission's Joint Research Centre in 2013, updated in 2016, 2017, and DigComp2.2 (2022), which integrated emerging dimensions such as AI literacy and digital well-being. DigComp3.0

was published at the end of 2025⁹. Widely adopted by other countries, these frameworks offer comprehensive guidance for Kosovo strategies which enables strengthening of its capacity to equip students and teachers with the competences needed to navigate and critically engage with digital and AI technologies. By leveraging these frameworks, Kosovo can measure progress, enhance alignment with European and global standards, and advance its path toward building a digitally competent society.

To address these gaps, this assessment sets out to analyze the current state of digital competence integration in Kosovo's pre-university education by examining the surrounding conditions and contextual factors. This required a comprehensive review of policies, strategies, and practices, combined with a systematic mapping of the curriculum against European and international frameworks. Such mapping provides a benchmark to assess the extent to which digital competence is embedded in the curriculum while also highlighting shortcomings, gaps, and areas for improvement.

The subsequent sections outline the methodology, followed by the presentation of the main findings, a Theory of Change with recommendations and action points, and a roadmap for strengthening digital competence integration in Kosovo's pre-university education.

⁹ https://joint-research-centre.ec.europa.eu/projects-and-activities/education-and-training/digital-transformation-education/digital-competence-framework-citizens-digcomp/digcomp-framework_en

Methodology

This analysis used a mixed-method approach combining desk research and document analysis with qualitative methods to capture both policy-level and practice-level insights. As shown in Figure 1, the analysis began with a desk review to establish a foundational understanding of existing policies, curricular documents and strategic frameworks, and relevant analyses on digital skills integration. This was supplemented by structuring a series of consultations with key stakeholders to gather practical insights, contextual experiences, and first-hand information. The mapping of stakeholders identified institutions and organizations mandated, engaged, or otherwise relevant to advancing digitalization in Kosovo's pre-university education system. Stakeholders included local authorities, educational institutions, policymakers, teachers, students, and school leaders.

Figure 1. Methodological procedure



Data sources

Desk review and document analysis

Desk review provided a foundational understanding of the situation and helped to identify initial gaps. It included Kosovo education policies and strategies, curricula, teacher training catalogs, open access databases (e.g., PISA, ICILS, TALIS) alongside international frameworks to map the policy background, as well as the existing analyses and reports (see the list of documents in Annex B).

Key Informant Interviews (KII)

Semi-structured interviews were conducted with representatives from organizations and sectors engaged in education policymaking, implementation, and digitalization efforts (see Appendix C). A total of 17 KIIs were conducted, each lasting approximately one hour. Participants were selected based on their expertise and relevance to the analysis, including individuals from a range of professional backgrounds and roles within relevant institutions.

Focus Group Discussions (FGD)

Three focus group discussions were conducted with teachers from different regions, each lasting approximately two and a half hours using a semi-structured discussion guide to gather insights on practical experiences, challenges, and opportunities related to digital skills integration in the classroom. Two FGDs included 10 teachers each, while the third involved 6 participants. Teachers were purposively selected based on predefined criteria to ensure inclusivity and representativeness (See Annex D).

Observations and school visits

Three sample schools from two regions of Kosovo were visited to observe teaching practices, the availability and use of digital tools, and the overall school environment. These visits included direct classroom observations to gain a deeper understanding of how digital skills and technologies are integrated into teaching and learning practices. Observations focused on the practical use of digital tools in real-time classroom settings, including how teachers employ technology to support pedagogy, how students interact with digital platforms, and how digital resources are embedded within subject-specific lessons. In addition to classroom observations (6 classrooms), semi-structured consultations were held with three school principals and six teaching staff. These discussions examined the relevance and effectiveness of teacher professional development programs in digital education, the current state and maintenance of ICT infrastructure.

Data Analysis

The analytical framework employed both deductive (themes identified through desk review and document analysis) and inductive (emerging from KIIs, FGDs and observation) approach. Deductive themes were developed from policy review and document analysis. This desk research identified recurring macro-level themes, including infrastructure and resource limitations, coordination gaps, fragmented implementation, challenges in assessment and monitoring, and localization needs. These findings also informed the design of interview topics, protocols, and stakeholder consultation tools (KIIs and FGDs). Inductive themes, on the other hand, were derived from the qualitative narratives of stakeholder consultations and observations. These captured practical insights and contextual interpretations, reflecting ground-level realities and lived experiences across the education system. Additionally, the study applied natural language processing (NLP) techniques to examine three key sets of documents as explained in Annex E. Results from the ICILS 2023 were analyzed using Python, based on publicly available datasets on the website¹⁰.

10 <https://www.iea.nl/studies/iea/icils/2023>

The analysis of KIIs, FGDs, and school observations provided richer insights into classroom practices, curriculum gaps, teacher development needs, governance issues, implementation bottlenecks, and systemic barriers. Transcripts were produced and thematically summarized, with cross-validation conducted by the research team to enhance interpretive reliability. Observations of schools and classrooms, along with on-site discussions with principals and teachers, served as additional triangulation points. This multi-source approach allowed validation across levels of analysis. For example, policy texts were confirmed or, in some cases, contested by insights from municipal education directors and classroom teachers, who revealed implementation challenges often absent from official documentation. Findings and interpretations were further reviewed through discussions and validation by the Reference Group to ensure contextual accuracy (See Annex F). This rigorous thematic and triangulated approach enabled a nuanced, multi-dimensional understanding of digital competence integration in Kosovo's pre-university education.

Kosovo Context



The Kosovo Education System

The education system in Kosovo has undergone significant transformation in recent years, with reforms aiming to improve quality, inclusiveness, and alignment with European standards. At the heart of these reforms is the introduction of the competency-based curriculum in 2016, shifting the focus from memorization to the development of skills such as critical thinking, problem-solving, and digital literacy. In higher education, digital transformation has emerged as another key priority, with policies and projects designed to strengthen both teacher and student digital competences. Governance of the education system follows a hybrid model that combines central and local responsibilities.

MESTI leads overall policy development and curriculum design, while municipalities play a major role in managing schools, including budgeting and staff recruitment. Several key institutions are central to the functioning of the education sector. MESTI drives policy and strategy, while the respective agencies (see MESTI, 2022) ensure quality and standards in higher education. The Municipal Education Directorates (MED) oversee local school administration. Non-governmental actors also play an important role in teacher professional development and innovation in teaching practices.

The structure of the education system in Kosovo aligns with the International Standard Classification of Education (ISCED) and is organized across multiple levels as shown in Table 1. The term KSNA (in Albanian language: *Klasifikimin e Standardit Ndërkombëtar të Arsimit*), is similar to the OECD Classification of Levels of Education which is based on the ISCED developed by UNESCO. The only difference is that the pre-primary class is considered an integral part of ISCED Level 0 and 1 in education. All formal levels of pre-university education are divided into formal sub-levels, referred to as the Main Curriculum Stages, each with specific objectives and functions.

As shown in Table 1, the curriculum framework is structured into six main stages, which represent periods characterized by common features in terms of both children's development and curriculum requirements. Each stage covers one, two, or three grades. For every stage, the core curriculum is designed by designing the standard learning progression requirements, the organization of learning experiences, as well as the approaches and assessment criteria. Pre-university education is preceded by early childhood education (birth to age 5) and the pre-primary class (ages 5–6), which lays the groundwork for formal schooling. Primary education (ages 6–10) focuses on foundational acquisition, while lower secondary education (ages 11–14) advances student competencies through reinforcement and orientation stages. Upper secondary education (ages 15–17) includes both general and vocational streams and concludes with the state “Matura” exam. Beyond Grade XII, post-secondary non-university, higher education, and postgraduate studies

fall outside the pre-university scope. Adult and lifelong learning is also supported through formal and non-formal pathways.

Table 1. The structure of education system in Kosovo (MESTI, 2022)

Age	Education Level	KSNA Level	Curriculum Stage	Core Curriculum
Born-5 Years	Pre-school Education	-	Pre-primary Curriculum Stage: Early Childhood Education	Core Curriculum for Early Childhood Education
5-6 Years	Pre-primary Class	KSNA 0	Pre-primary Curriculum Stage: Early Childhood Education	Core Curriculum for Pre-primary Grade and Primary Education
6/7-8	Primary Education	KSNA 1	Stage 1: Basic Acquisition – pre-primary Class, Grades I and II	Core Curriculum for Pre-primary Grade and Primary Education
9–10	Primary Education	KSNA 1	Stage 2: Reinforcement and Development, Grades III–V	Core Curriculum for Pre-primary Grade and Primary Education
11–12	Lower Secondary Education	KSNA 2	Stage 3: Advanced Orientation – Grades VI, VII	Core Curriculum for Lower Secondary Education
13–14	Lower Secondary Education	KSNA 2	Stage 4: Reinforcement and Orientation – Grades VIII, IX	Core Curriculum for Lower Secondary Education
15–16	Upper Secondary Education – Vocational Schools	KSNA 3	Stage 5: Foundational and General Development – Grades X, XI	Core Curriculum for Upper Secondary – Vocational Schools
17	Upper Secondary Education: General, Vocational Schools	KSNA 3	Stage 6: Consolidation and Specialization – Grade X–XII; Grade XII	Core Curriculum for Upper Secondary – General Education (Gymnasium);
State Matura				
18+	Post-secondary non-university education	KSNA 4	-	-
	Higher education	KSNA 5		
23/24+	Postgraduate education	KSNA 6	-	-
23/24+	Adult education / Lifelong learning on a broad scale (formal and non-formal)	-	-	-

Kosovo's curriculum is competency-based, introduced officially in 2016 as a continuation and upgrade of the 2011 curriculum within the broader framework of education reform.

The aim was to move away from rote learning and subject-heavy approaches toward a framework that emphasizes transferable skills such as problem-solving, critical thinking, digital literacy, communication, and civic engagement. Learning is organized around key competencies rather than only subject knowledge, aligning the system more closely with European trends. The responsibility for curriculum development and revision rests primarily with MESTI. Within the Ministry, specialized departments and expert groups, often in consultation with municipal education authorities, and local and international partners, guide the process of curriculum design and updates. In terms of recent and upcoming reforms, the most significant milestone has been the roll-out of the competency-based curriculum across pre-university levels.

In general, the Curriculum Framework (CF) regulates the pre-university education system in Kosovo. It consists of a set of documents and measures defined for its implementation ([MESTI, 2016](#)). These documents are divided into two main parts: (i) The conceptual part, which is the CF itself; and (ii) The implementation part – comprised of accompanying documents that enable the implementation of the CF at the specific stages (see Table 1) of the education system by clearly defining the expectations from students, teachers, and schools. This includes core curricula for all formal levels of pre-university education: (i) Core Curriculum for Early Childhood Education (birth to 5 years); (ii) Core Curriculum for the Pre-primary Class and Primary Education; (iii) Core Curriculum for Lower Secondary Education; (iv) Core Curriculum for Upper Secondary Education – General (Gymnasiums); and (v) Core Curriculum for Upper Secondary Education – Vocational Schools ([MESTI, 2016a](#); [MESTI, 2016b](#); [MESTI, 2016c](#)).

When analyzing digital skills in Kosovo's education system, it is essential to understand the broader structure of the Kosovo curriculum, as outlined in this section ([MESTI, 2016](#).) Kosovo's curriculum is organized around six key competences, which have specific Learning Outcome Competencies (LOCs).

These competences are intended to be developed progressively and sustainably throughout a student's schooling:

- Communication and expression competence
- Thinking competence
- Learning competence
- Competence for life, work, and the environment
- Personal competence
- Civic competence

The six competences are foreseen to be achieved through seven main Curriculum Areas, such as:

- Languages and communication,
- Arts,
- Mathematics,
- Natural sciences,
- Society and environment,
- Physical education, sports, and health,
- Life and work.

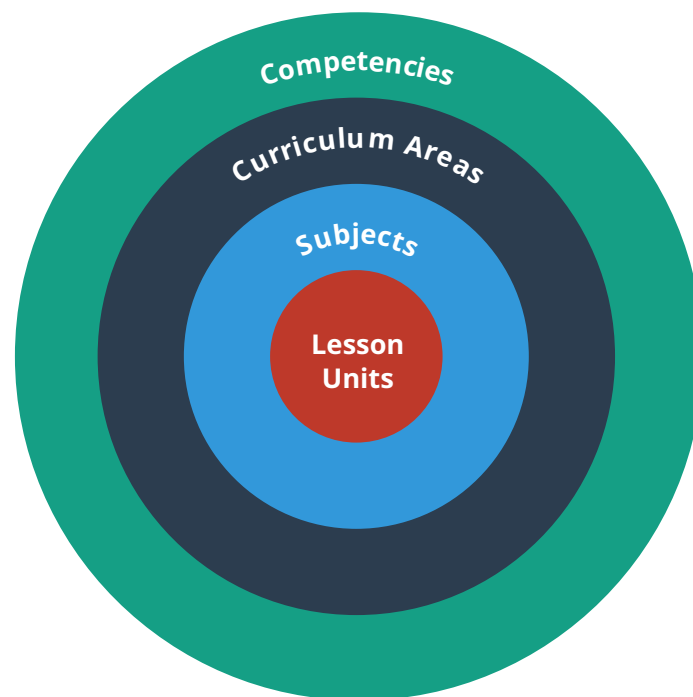
These areas provide a structural foundation for teaching and learning across all levels of education. Within each area, subjects are grouped (see Table 2) under shared learning objectives, referred to as Learning Outcome Areas (LOAs). Collectively, the Curriculum Areas are designed to function in an integrated manner, ensuring that students not only acquire subject-specific knowledge but also develop a coherent and transferable set of skills aligned with the overall competency framework.

Table 2. Curricular areas and school subjects by curriculum stages (MESTI, 2016)

Curriculum Area	Early Childhood (0-5)	Stage 1 (Prep-II)	Stage 2 (III-V)	Stage 3 (VI-VII)	Stage 4 (VIII-IX)	Stage 5 (X-XI) General Ed	Stage 6 (XII) General Ed
Languages & Communication	Language activities	Mother tongue, English	Mother tongue, English, Second Lang	Mother tongue, English, Second Lang	Mother tongue, English, Second Lang	+ Other languages	+ Other languages
Arts	Artistic expression and communication skills	Visual Arts, Music	Visual Arts, Music	Visual Arts, Music	Visual Arts, Music	Visual Arts, Music	Visual Arts, Music
Mathematics	Reasoning and Numerical skills	Math	Math	Math	Math	Math	Math
Natural Sciences	Inquiry, discover environment	People and Nature	People and Nature	Bio, Phys., Chem.	Bio, Phys., Chem.	+ Geo, Astronomy	+ Geo, Astronomy
Society & Environment	Self & social awareness; development of social skills	Society and Environment	Society and Environment	Civic Ed., History, Geo	Civic Ed., History, Geo	Hist., Civic Ed., Sociology, Psychology, Phil.	Hist., Civic Ed., Sociology, Psychology, Phil.
Physical Ed. & Health	Hygiene, motor skills	PE, Health	PE, Health	PE, Health	PE, Health	PE, Health	PE, Health
Life and Work	Curiosity, procedure	Life Skills	Life Skills	Tech with ICT	Tech with ICT	ICT	ICT

To summarize, the framework begins with competences, which serve as the foundation guiding the entire education system. These competences are progressively developed across different stages, ensuring coherence and continuity in student learning. Each curricular area encompasses subjects grouped by shared educational goals depending on the stages (see Table 2). Within these subjects, targeted modules are designed to develop specific learning outcomes, including digital skills. This structure allows for a flexible and competency-based approach to teaching, ensuring that digital competence is integrated meaningfully across learning contexts while staying aligned with Kosovo educational goals. The distinction between digital competence and digital skills will be further clarified in subsection 2.2.

Figure 2. Kosovo's Core Curriculum Structure



For the comprehensive development of competencies, there must be an inter-connection between the curriculum areas, subjects, and modules (see Figure 2). For example, a lesson unit is part of a single Subject (Example: Set of lesson units are part of Mathematics Subject), a subject is part of a Curricular Area, which then based on the level of the stage contributes to obtain one or more of six competences listed above. So, to make sure that the competence is obtained successfully, when designing assessments, the teachers ensure that learning outcomes are clearly defined at each level, starting from the module, then extending to the subject, areas, and ultimately aligning with the overarching competence. This cascading approach guarantees consistency and coherence in learning evaluation, and it contributes directly to the development of competencies.

Digital competence in the Kosovo pre-university curriculum

The curriculum framework objectives are articulated through a defined set of competencies as explained in the previous section. Here, it is therefore essential to clarify the terminology used throughout, the distinctions between *skills*, *competencies*, and *competences*. Although these terms are often used interchangeably in policy and strategy documents, they carry distinct and nuanced meanings that influence both strategic planning and implementation. This conceptual ambiguity has also been highlighted in recent publication by Kosovo Pedagogical Institute (2024)¹¹ noting that Kosovo and political documents often use overlapping terms such digital skills, ICT skills, and 21st-century skills to describe individuals' capacity to engage with technology. Different organizations, including UNESCO, UNICEF, the EU, the EC have used related but not identical terms to define the capacity to work with and apply technology for various purposes. For example, UNICEF (2019) by referencing the European Council (2018) adopts the definition of digital competence as *"the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society"*. In Kosovo, building on this understanding, the EU co-funded project TKaEDiTE.eu (2025) highlights digital competence as encompassing the skills, knowledge, and attitudes essential for success in education, the labor market, and civic life in a rapidly evolving technological world. This framing aligns with the Digital Education Vision for the European Schools (DEVES, 2019) and Digital Competence Framework (DCF) for European Schools (2020) which underscore that every learner must develop digital competence to participate confidently, critically, responsibly, and creatively in a digital society.

In this context, digital competence extends beyond the mere operational use of technology. It encompasses the comprehensive ability to engage meaningfully, critically, and responsibly with digital environments. Digital skills, by contrast, refer to specific, task-oriented capabilities such as operating devices, using applications, creating digital content, and communicating online. These skills represent the foundational building blocks of digital competence. Digital competencies, on the other hand, are typically role- or context-specific, denoting how individuals apply digital skills and knowledge within professional or educational domains. While skills denote technical and task-specific abilities, and competencies describe role- or profession-specific applications of these abilities, competence captures the broader, integrated, and contextualized capacity to combine knowledge, skills, attitudes, and values to act effectively in real-life situations. For the purposes of

11 Instituti Pedagogjike i Kosovës: <https://ipkmasht.rks-gov.net/wp-content/uploads/2023/11/Kompetenca-digji-tale-e-mesimdhnesve-dhe-perfshirja-n%EF%BF%BD-tekstet-shkollore.pdf>

this analysis, the term digital competence will be used as the conceptual reference, given its comprehensive scope and pedagogical significance in supporting the integration of digital education.

In Kosovo's curriculum, the digital competence is treated both as a transversal element across all learning areas and as a subject in its own in the Curriculum Area Life and Work. With respect to stand-alone approach, from grade 1-5, it is part of the subject "Life Skills", continuing in grades 6–9 with a subject "Technology and ICT", which also has elements of counseling and career guidance, followed by pure ICT as a stand-alone subject in grades 10–12, with additional electives such as Coding, Internet Usage and Safety, Media Education, and Programming.

In practice, however, integration is uneven: while the subjects within the curriculum areas in mathematics, natural sciences, languages, and Life and Work often reference digital skills, the extent of embedding depends heavily on teachers' initiative, training, and school infrastructure. The curriculum framework outlines general learning outcomes and lesson plans, but lacks detailed toolkits, best practices, or indicators to guide implementation. Students typically progress from basic digital literacy in primary school to more advanced problem-solving, programming, and multimedia production in upper secondary, though areas such as cybersecurity, data literacy, and critical media use remain only partially covered. Assessment with respect to digital competence is not standardized at central level, and monitoring is left largely to schools and teachers. Without a clear coordination mechanism or systematic teacher training, implementation varies significantly across schools and regions.

While the Strategy of Education (MESTI, 2022) recognizes digital competence as a priority, barriers such as curriculum overload, uneven infrastructure, and limited professional development hinder consistent application, as will be discussed throughout Pillar 3.

Findings of the Analysis



This section presents the findings of the analysis. They are organized into five main pillars with each pillar representing a thematic area with sub-thematic areas. The pillars together present a comprehensive and holistic approach to addressing digital competence integration in pre-university education.

PILLAR 1

Governance, coordination and implementation



This pillar assesses policy design and governance of integrating digital competences into the education system. It covers Kosovo education strategies, alignment with international standards, the main stakeholders and how its efforts and systems are coordinated for policy implementation, as well as financial and human resources.

Policy design and adaptation for digital education

Kosovo's strategic vision to leverage digital transformation is articulated across overarching strategies and policy frameworks including the National Development Strategy 2030, the Digital Agenda of Kosovo 2030, the e-Government Strategy 2023-2027, and the National Cyber Security Strategy 2023-2027. In the education sector, notably the Education Strategy 2022–2026 introduces a dedicated digital education pillar, outlining a system-wide transformation agenda that prioritizes five key areas in six pillars for digital learning, encompassing platforms, content, teacher training, and infrastructure.

The Kosovo Education Strategic Plan (2017-2021) emphasizes the effective use of technology in teaching and learning: “we must therefore start implementing competency-based curricula, equip schools with Information Technology and teaching aids, improve the quality of textbooks, and above all, improve the quality of teaching at all levels of the education system”. The Curriculum for Pre-University Education identifies digital skills as transversal integration across all subjects; however, it lacks detailed grade-specific learning outcomes which makes it difficult for teachers to systematically integrate digital competence.

Kosovo is also actively working to align its digitalization in education policies and curriculum with European and global frameworks such as DigComp, DigCompEdu, and DigCompOrg. The Education Strategy 2022-2026 refers to DigComp as a benchmark for curriculum alignment and incorporates measures to enhance teacher digital competence using DigCompEdu, which specifies digital competences for teachers. Kosovo also seeks active participation in EU and regional initiatives to both contribute and benefit from shared practices to inform policymaking. While

such international and regional practices provide valuable lessons for advancing Kosovo's digitalization in education agenda, the practical alignment remains minimal due to a lack of policy governance, structured action plans, monitoring systems, and institutional mechanisms to embed these frameworks in a systematic and sustainable manner.

On a policy level, cybersecurity and digital safety are well integrated into strategies such as the e-Government Strategy 2023-2027 and the National Cyber Security Strategy 2023-2027, which establish clear standards for security, privacy, and institutional resilience for government organizations and systems. These strategies address digital safety and competence gaps through focused efforts, including promoting scientific research and innovation in education, developing STEM education incorporating cybersecurity components for students (especially young girls), and creating basic cybersecurity curricula for high school and university levels to overcome the existing skills and gender gaps. However, despite these high-level commitments and mandated objectives which establish general requirements for all sectors, the establishment and reinforcement of policies, legislation, unified technical standards and specifications, guidelines and protocols for the education sector itself remain underdeveloped or lacking baseline data. Particularly, this is combined with rapid rise of AI tools such as ChatGPT, which have further outpaced existing educational policies and the implementation of these emerging technologies that create security dilemma and safe use. These gaps represent a systemic lack of frameworks and safeguards leaving students and teachers vulnerable to online threats. These issues are further discussed in Pillar 2.

Institutional roles and coordination mechanisms for policy implementation

There is a significant gap between policy and practice, highlighted by the lack of effective implementation and a critical disconnect between strategic planning and implementation. Ministries, municipalities, and international actors often work in isolation, with limited synergy or alignment. Within MESTI, there is a notable lack of institutional mechanisms and coordination to effectively plan, implement, and maintain digitalization efforts. This is compounded by the absence of a lead coordinating agency and vague prioritization mechanisms. Although policies and budgets exist, implementation remains superficial due to weak follow-up, bureaucratic barriers, and the absence of clear implementation structures. A central challenge is the lack of a unified implementation strategy for integrating digital skills, leading to fragmented and inconsistent efforts across different levels.

Kosovo's overall digital readiness is classified as "emerging" (1.7 on a 4-point scale, World Bank 2024), with leadership and governance rated at 1.9 reflecting the presence of strategic frameworks but insufficient implementation capacity and institutional structures.

Kosovo's education system operates under a highly decentralized governance model, similar to Norway, giving significant authority to local administrations (mu-

nicipalities/MEDs). While intended to empower local decision-making, decentralization complicates coordination and inter-sectoral cooperation. Municipal authorities often operate independently with weak vertical communication and limited support from the central level. This situation became even more apparent during the interviews with various stakeholders. Few mechanisms exist at the municipal or school level to align digital initiatives with central level priorities, exchange practices, or coordinate resources. As a result, MESTI, MEDs, and school-level efforts are poorly integrated. Collaboration across central, local, and international actors frequently occurs in silos as well, described by stakeholders as “very fragmented,” and is further hampered by political changes, institutional silos, and weak channels of communication flow. This reflects fragmented governance and weak leadership characterized by unclear roles and responsibilities among MESTI, MEDs, schools, and academic institutions.

MESTI has not institutionalized a digitalization in education steering committee or coordination body to bring together key actors including other ministries (Economy, Finance), MEDs, academia, civil society, and the private sector to drive the digitalization transformation process. While municipalities hold legal authority over schools, many lack the financial and professional capacity to manage the implementation of digitalization transformation in an effective manner. This disconnect between policy commitments and implementation practices highlights the need for clearer guidance and enabling legal and institutional conditions to mobilize coordinated efforts for digital education.

Monitoring of curriculum implementation, particularly for digital skills and competence, is identified as one of the weakest points of digital transformation in Kosovo. The Education Strategy 2022-2026 outlines concrete steps but falls short on a robust accountability for frameworks and timelines. The absence of rigorous measurement and monitoring systems makes it difficult to track progress and inform policy decisions. The perspectives of students, teachers, and parents are not systematically incorporated into digitalization in education policy or program design. While some youths actively develop digital skills outside school, they feel underrepresented in decision-making. Parents are often excluded from discussions around school digitalization and curriculum changes despite their key role in supporting home-based digital learning. There is a lack of structured communication platforms, such as institutional email systems or dedicated portals, to facilitate coordination between schools, teachers, and parents. Teachers, as frontline implementers, are rarely consulted in the planning or evaluation of digital policies. Although teacher unions and education-focused NGOs provide feedback, their engagement remains informal and ad hoc.

The private sector and development partners play a vital role in advancing digitalization in education through infrastructure, content development, training, and research. However, their efforts remain fragmented due to the absence of formal donor coordination. This leads to duplication, short-term interventions, and weak sustainability. Moreover, Kosovo lacks a strategy or framework for public-private

partnerships in digital education. Without such a framework, MESTI and municipalities are unable to effectively engage with private sector actors, align shared objectives, or establish safeguards related to data protection, ethical use of technology, platform interoperability, and transparent procurement.

Resourcing, budgeting and funding mechanisms

While the Education Strategy 2022-2026 has a substantial allocated budget of approximately €52 million for digitalization, there is a persistent and significant challenge in the actual disbursement of these funds. One important bottleneck is the distribution of the allocated budget. For instance, €6 million annually earmarked for digital technology in schools have not been disbursed since 2023 and were even diverted to textbook subsidies in 2023. Likewise, a €300,000 annual budget for teacher training consistently remains undisbursed due to procurement issues. The non-disbursement of domestic funds also led to the likely withdrawal of an additional €12 million pledge from the EU, which was contingent on Kosovo's initial financial commitment. This consistent failure to execute the allocated budget undermines the entire digitalization strategy, despite explicit recognition of the need for investment in pre-university education. The non-disbursement is attributed to a "lack of leadership and capacity" within MESTI.

Investment in digitalization and its distribution are characterized by a mix of central and decentralized efforts, often leading to inconsistencies and an overall funding gap. Despite being a decentralized system, the state remains the main funder and education is funded through government and municipal revenues (RED, 2023). Municipalities, while legally possessing some autonomy, receive an annual education grant from the central government largely allocated to teacher salaries and basic services, leaving very limited funds for capital investments like digital technology. This forces some municipalities, such as Prishtina/Priština, to allocate their own significant budgets (e.g., €1 million) for digitalization, leading to disparities in digital readiness across regions.

Projects for school digitalization and IT equipment are often funded through municipal budgets, drawing from both government allocations and local revenues. KREN's school connectivity project (around €3-3.5 million) was funded from the remaining budget of the Kosovo Digital Economy Project, but its future expansion also depends on new governmental decisions, highlighting a reliance on project-based funding rather than sustainable investment. This entity in the future could fit under the newly created Digitalization Department in MESTI. A recent strategic shift indicates future investments prioritizing hardware, specifically smartboards for every classroom, with a budget of €4-6 million over three years. Donor support from international organizations like UNICEF, GIZ, and USAID has provided digital equipment to some schools, but this needs to be shifted to a central level with broader implementation or training initiatives.

Institutional capacity for financial management in Kosovo's education sector is

weak across MESTI, MEDs, and schools due to limited financial data, poor inter-institutional coordination, and severe human resource shortages. Bureaucratic hurdles are reported as a major impediment preventing the timely distribution of funds for both digital technology and training. Even when a budget line is included in the procurement plan, the actual procurement procedures are frequently not initiated according to the planned timeline. This lack of follow-up on prepared technology procurement (e.g., identifying needs and collecting data from schools) results in essential equipment remaining undelivered. Schools have very limited access to digital technology directly due to the non-disbursement of the allocated budget (€6 million). The decision to shift allocated digital technology funds to textbook subsidies (for instance in 2023) further exemplifies the inefficiency and unreliability of current procurement and financial management which impedes the efficient procurement and integration of digital learning materials. There is a need for MESTI to explore more sustainable financial alternatives for textbooks and to foster competitive policies to ensure high-quality digital learning resources. The education sector lacks targeted investment, innovation support, and structured partnership structures hindering timely acquisition of digital tools and training services.

The human resources and support system for digitalization in education is another constraining factor in digitalization in education in Kosovo. There is a considerable shortage of technical and digital maintenance staff in schools, often resulting in a single ICT teacher being responsible for maintaining all equipment. A notable lack of pedagogical training and subject-specific practical training for in-service teachers exists, often due to limited municipal budgets for professional development planning. There is also a critical lack of highly skilled individuals in the education sector, particularly teachers who can teach coding from early grades, with many teachers acquiring digital skills independently, and those who can cover the elective ICT-related courses. Low salaries discourage highly skilled digital professionals from entering or remaining in the teaching profession, and teachers often lack financial incentives for engaging in digital learning and professional development.

MESTI struggles to attract and retain qualified IT experts due to low salaries, contributing to a weakened curriculum and an overall shortage of specialized staff for digitalization. While 30 IT coordinators have been engaged to support schools, their integration has proven challenging, and proposed digital coordinator roles at municipal and school levels frequently remain unfilled despite available funding. A comprehensive training needs analysis across all levels of the education system is urgently needed.

PILLAR 2

Infrastructures, learning environments and resources



This pillar assesses the enabling conditions and infrastructures necessary for digitalization in education in Kosovo's pre-university system, covering access to devices and connectivity, safe and inclusive digital environments, platforms and content, classroom integration, and the sustainability of resources.

Digital infrastructure, access, and support

Kosovo has achieved high internet coverage, reaching more than 90% nationwide. Over the past two years, the Kosovo Research and Education Network (KREN) has connected 243 primary and secondary schools to the internet, including schools in 220 previously unserved rural villages. KREN's services currently provide secure internet access, Wi-Fi, and Microsoft licenses through a hybrid cloud data center. While this is a good initiative by KREN under the Ministry of Economy and KODE, this represents only about 20–25% of all schools and roughly 30% of the student population in Kosovo. Still, connectivity is underutilized with many teachers relying on personal laptops and mobile data. While most schools have basic equipment like computer labs, access is often restricted, with teachers frequently using personal laptops and mobile data for digital lessons. On average, only one computer is available for every 35 students, and two-thirds of schools lack IT labs (PISA 2018). This puts the system significantly behind the EU's average ratio of 1 computer for every 3 students. The Kosovo Education Strategy 2022–2026 aims for universal school connectivity and improved equipment, but procurement delays and budget reallocations hinder implementation. In many schools, digital equipment remains idle due to lack of guidance or implementation planning and many resources and equipment are observed to be uninstalled and unused.

The digital divide is stark, particularly between urban and rural areas and public and private schools, and many classrooms still lack essential tools such as projectors and smartboards, this is reflected in MESTI (2022) as well. As mentioned before, budget disbursement to equip schools with digital technology remains a major barrier. Inclusion and equity are also hampered by a critical gap in providing digital solutions for students with disabilities, as resource centers lack dedicated assistive digital equipment and tailored accessibility features. There are no specific guidelines for the adoption of digital devices for marginalized student groups. The lack of centralized hardware and software support leads to frequent disruptions and limited guidance hindering sustainability. KREN, despite its potential as an ICT Competence and Support Centre, faces an undefined legal and operational status

post-KODE project, limiting its funding, flexibility, and discouraging full migration to its platforms.

An essential enabling factor is mobilizing stakeholders in digitalization and education to foster a culture of collaboration, partnership, and co-creation of teaching and learning solutions. Promising actors like BONEVET, JCoders, Shkolla Digjitale, ICK in Prishtina/Priština, and the Innovation and Training Park in Bernica and in Prizren, along with various youth digital hubs, foster interest in coding, robotics, AI, and entrepreneurship. Some universities have also established innovation labs or collaborated with tech incubators. However, these initiatives often exist in isolation from the formal education system and are not systematically leveraged to support Kosovo education goals. Teachers and schools lack mechanisms to trial and provide feedback on new digital tools or co-develop locally relevant EdTech solutions. There is significant untapped potential to harness Kosovo's vibrant youth and tech community for co-creating scalable, context-relevant digital learning innovations, which would require stronger collaboration between EdTech innovators, policymakers, teacher training institutions, and digital infrastructure providers, supported by innovation funds, and regulatory support.

According to the World Bank, Kosovo's EdTech sector faces significant challenges to growth due to a lack of funding from both public and private sources hindering the formation of a culture of collaboration between schools, teachers and startups to innovate and adopt modern EdTech tools and solutions for teaching and learning (World Bank, 2024). Additionally, the absence of supportive legal and institutional frameworks for EdTech startups and the ICT sector further hinders the development and widespread adoption of new educational technologies in schools.

Digital learning platforms and content

Digital learning platforms in Kosovo are limited, fragmented, and lack coordinated implementation. Many existing platforms are introduced as ad hoc or small-scale initiatives by local and/or international organizations and remain underutilized due to weak rollout, poor communication, limited training, and a lack of sustained teacher support. Notable examples include eShkollori, an initiative launched during the pandemic, and Shkollat.org, a localized version of UNICEF's Learning Passport launched in 2021, which provides access to Microsoft Teams, Office 365, MESTI-approved video lessons, and tools for virtual classrooms. The SchoolMe, which is provided as a 'pay-for-student-service' platform is used in some municipalities based on their available budget, but service is discontinued once funds are exhausted. KREN also developed a Moodle-based LMS, supported by GIZ and CARNET, designed for scalability and synchronized with Microsoft cloud, theoretically capable of serving all universities and schools but still lacking a formal coordination plan in central level for its full implementation. So, despite their potential, these platforms are not widely or systematically adopted. The absence of a clear policy and coordination at central level has led many municipalities to adopt privately managed plat-

forms, creating system disintegration and raising concerns about data governance, ownership, contributing to system fragmentation and potential inefficiencies. Low adoption rates for platforms like Moodle are attributed to limited school autonomy, financial constraints, lack of expertise, and insufficient teacher motivation and specific training. This constant cycle of adopting and abandoning tools disrupts teaching and leads to frustration and burnout among teachers which in turn hinders the integration of technology.

Progress toward a centralized system, a goal of the Kosovo Education Strategy 2022-2026, remains unrealized. A technical commission has been established to draft Terms of Reference for a unified platform, but existing digital platforms are not integrated. And again here, the primary impediment is the persistent lack of policies and coordination between MESTI, municipalities, and stakeholders. This policy vacuum encourages fragmented private digital solutions which may lack long-term viability, secure data ownership, or interoperability. A central pre-university student management system is notably absent. Furthermore, there is an absence of discussion or plans for system-wide implementation of Single Sign-On (SSO), crucial for streamlined user authentication and security.

Along with streamlined digital learning platforms and LMSs, the provision of quality and curriculum-aligned digital learning materials is equally important. Teachers report scarce resources, mostly in specific areas, causing them to rely on external platforms or create their own content. Students report that they actively adapt to digital information sources, shifting from Google to ChatGPT for school and personal use. The scarcity of multi-dimensional and interactive digital teaching materials beyond traditional textbooks hinders a shift to dynamic learning. Online content is often not fully aligned with the Kosovo curriculum, difficult to incorporate, or raises safety concerns. Multi-modal digital content is largely absent from MESTI-approved repositories. Although the EU-supported TKAEDiTE.eu project (of which MESTI is a partner) established an EdTech Recording Studio (edtech.uni-pr.edu), a clear strategy for its use and material development is needed.

Open digital initiatives like tkaedite.eu, Trajnimi.com and DokuLab exist, but the systematic integration of Open Educational Resources (OERs), Open Educational Practices (OEPs), and Massive Open Online Courses (MOOCs) into the formal education system remains limited and underutilized. While there is growing global consensus on the importance of open learning ecosystems (e.g. UNESCO OER recommendations), for Kosovo, embedding OERs, OEPs, and MOOCs into education strategies and teaching practices could enhance the availability and adaptability of digital learning content, promote pedagogical innovation, and foster collaborative knowledge-sharing among teachers and institutions.

Digital safety and cybersecurity across the education system

Cybersecurity and digital safety remain critically underdeveloped and there is a critical absence of formal, school-wide protocols or guidelines concerning on-line safety, digital ethics, or responsible technology use. Despite the DigComp framework emphasizing protection of devices, personal data, and digital well-being, there is a lack of relevant policies, legislations and standards to guide school practices. Observations indicate that in quite many schools, students have access to unfiltered online content. Digital safety responsibilities primarily fall to individual teachers, who must navigate cyber-related issues with limited guidelines and personal judgment. While some teachers informally incorporate safety themes and some schools have internal regulations (like restricted access), students often bypass these indicating a threat to school digital safety and cybersecurity. Concerns like cyberbullying and misinformation are prevalent, yet schools lack standardized protocols for intervention, leading to inconsistent or unresolved incidents. Many teachers feel unprepared to manage topics like cyberbullying, digital ethics, and misinformation, especially regarding their psychological and behavioral dimensions. Students advocate for a functional role within schools to address cyberbullying and for official guidelines from MESTI/MED. While KREN provides secure connectivity and network management to connected institutions, most schools procure unfiltered commercial internet packages exposing students to inappropriate content and cybersecurity risks. Basic protections such as internet filtering, secure browsing and device management protocols are largely absent at the school level.

Classroom integration and instructional design

The effective integration of digital tools into classroom practice remains an emerging challenge, with significant underutilization of existing infrastructure. Despite having infrastructure, schools were unprepared to implement the PISA test digitally, highlighting a disconnect between availability and practical application. Providing digital resources alone does not guarantee improved performance; these resources must be relevant, and educational staff must have the capacity to use them effectively. As mentioned before, many digital tools remain idle or underutilized due to inadequate technical support and lack of coordination.

The development of digital learning in Kosovo was largely shaped by emergency solutions adopted during the COVID-19 pandemic, such as Zoom and Google Meet, which facilitated remote instruction and collaboration. The Kosovo Education Strategy (2022-2026) aims to promote digital and blended learning, but systematic integration of online, hybrid, and blended learning models is not well established and has not significantly advanced post-COVID-19. One of the main barriers is the persistent lack of curriculum-aligned digital content and methodologies, coupled with inadequate access to structured and hands-on training for teachers on blended learning methods and broader digital pedagogies. This limits their ability to effectively integrate these models into everyday teaching practices, keeping online/

blended learning at the periphery of mainstream school practices.

There is a disconnect between available digital resources and actual school-level needs, often rooted in limited autonomy, budgetary constraints, and insufficient student access to devices and internet at home. While teachers show openness to using technology in lessons, students report developing their digital skills primarily through extracurricular programs rather than within the formal school system. The scarcity of multi-dimensional and interactive digital teaching materials beyond traditional textbooks hinders the shift toward more dynamic and engaging learning environments. Teachers express a strong need for flexible, hands-on training opportunities to explore digital pedagogies at their own pace. Without addressing these gaps in infrastructure, training, and content, online and blended learning risk remaining marginal rather than mainstreamed within Kosovo's pre-university education system. The uneven distribution of resources also directly results in unequal teaching conditions and limited learning opportunities for certain student populations.

PILLAR 3

Student digital competence and curriculum integration



This pillar focuses on how student digital competences are defined and integrated within the curriculum, how learning outcomes are specified and benchmarked against EU and global frameworks, how progression of digital competence development is planned across educational stages, and what assessment tools or instruments are in place to assess student progress.

Specification of digital competencies in the curriculum and integration in cross-curricular areas

The Pre-University Curriculum Framework (2016) recognizes digital competence transversally integrated in all six competences, further in all seven-curriculum areas, with a domination in the seventh curriculum area, Life and work. Digital skills are often confined to isolated subjects like Life and Work (Grade 1-5) and ICT (Grade 6-9), without a unified operational framework. Since the curriculum was designed prior to the DigComp Framework, only after 2017, there were ongoing efforts to align subject curricula with EU standards and introduce or strengthen advanced digital skills, such as coding, web design, and cybersecurity – to name a few. In particular, they are rarely addressed in a systematic way across grade levels. Furthermore, the introduction of advanced digital skills like computational thinking, mobile and web programming, and AI into the Kosovo curriculum is currently not feasible due to existing deficiencies in teacher training, lack of necessary resources including appropriate textbooks, and minimal cooperation with the private sector.

The integration of digital competence across curriculum areas and stages reflects both tentative progression and areas of overlap. Before analyzing digital competence within specific curriculum areas, Table 3 presents the intended learning outcomes (ILOs) related to digital competence for each curricular competence, as outlined in the main curriculum framework (MESTI, 2016).

Table 3. Intended learning outcomes of key competences related to digital competences

Competence	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Communication and expression competence	N/A	ILO 7 ILO 8	ILO 3 ILO 7	ILO 1 ILO 5	ILO 4 ILO 5 ILO 9	ILO 4 ILO 6 ILO 9
Thinking Competence	N/A	ILO 5	N/A	N/A	ILO 2 ILO 7 ILO 9	ILO 4
Learning Competence	N/A	ILO 9	ILO 1 ILO 6	ILO 1 ILO 2 ILO 3	ILO 6 ILO 9	ILO 1
Competence for life, work, and the environment	N/A	N/A	ILO 5	ILO 4 ILO 7	N/A	ILO 6 ILO 7
Personal Competence	N/A	N/A	N/A	N/A	N/A	N/A
Civic Competence	N/A	N/A	N/A	N/A	N/A	ILO 10

The analysis of digital competence in relation to the intended learning outcomes (Table 3) across all six competences indicates that each stage includes a defined set of ILOs. The numbering of these ILOs follows the original format used in the curriculum framework (MESTI, 2016). In Stage 1 and 2 of the curriculum framework (MESTI, 2016) the digital competence is introduced through basic tasks such as expressing simple sentences with ICT support, giving short presentations using technology, creating imaginative digital products, and applying knowledge to solve problems through ICT. In Stage 3 and 4, the digital competence develops further with students identifying and analyzing information from diverse media, using software for communication and problem-solving, producing digital materials for school needs, and accurately presenting or classifying data using ICT. They also engage in projects and propose fair evaluation criteria for academic and civic activities supported by technology. At the upper secondary level, Stage 5 to 6, students demonstrate proper use of ICT in communication, academic writing, and presentations, critically compare digital sources, present experimental and research results using technology, design and maintain websites, and apply professional software for analysis and technical tasks. By the final stage, they also show responsible digital citizenship by evaluating the accuracy of online information and promoting its ethical use. In addition to analyzing the digital competence-related Intended Learning Outcomes for each of the six competencies outlined in the Kosovo curriculum framework, the analysis also extends to examining the digital competence-related ILOs across the seven curriculum areas (see Table 3).

Table 4. Intended learning outcomes of digital competence transversally across areas in six stages of Education

Curricular Areas	Indented Learning Outcomes in various stages
Language and Communication	Stage 1: Uses ICT to convey information from audiovisual media (TV, computer) and to write simple words, sentences, and symbols. Stage 2: Applies ICT (computer, printer) to write and evaluate texts, characters, and ideas. Stage 3: Creates graphic texts, tables, sketches, animations, and other visuals using digital tools. Stage 4: Produces literary and non-literary works with software, recording tools, or video/animation programs. Stage 5: Uses ICT to read, write, design, and present extended topics. Stage 6: Employs advanced software to produce complex creations such as videos, animations, documentaries, and multimedia projects.
Arts	Stage 1 to 5: Not explicitly emphasized. Stage 6: Develops artistic works (music, visual arts, drama, dance) using technology, including contemporary mediums such as video art, installations, and performance.
Mathematics	Stage 1 -2: Uses ICT for math Stage 3: Use technology for research, calculations and measurements in order to solve various mathematical problems. Stage 4: ICT for research, calculations, and measurements in problem solving. Stage 5: Uses Excel spreadsheets and validates mathematical reasoning with ICT, identifying benefits and limits of digital tools. Stage 6: Uses computer for modeling programs to solve complex mathematical problems and simulations.
Natural Sciences	Stage 1 to 2: Not explicitly emphasized Stage 3: Uses ICT to gather data from multiple sources, both inside and outside the classroom. Stage 4: Employs computer applications for research and problem solving across scientific fields. Stage 5 to 6: Not explicitly emphasized
Society and Environment	Stage 1: Uses ICT and media to access simple, age-appropriate information about society and the environment. Stage 2: Effectively applies ICT and multimedia to study cultural, historical, and natural events. Stage 3: Effectively uses digital resources to explore social and environmental phenomena. Stage 4: Categorizes and analyzes media sources for social, historical, and environmental issues. Stage 5: Uses ICT and digital sources to make cause-effect analyses of local and international events. Stage 6: Applies ICT tools to engage in social activities, sustainable development, and environmental awareness, including presenting creative projects for climate and environmental protection

Physical Education, Sports, and Health	Stage 1-6: ICT not directly emphasized.
Life and Work	Stage 1: Uses ICT for daily tasks, communication, and basic projects; learns safe ICT practices. Stage 2: Uses ICT for daily tasks and learning, reflects ideas with a computer, and creates simple projects to build practical skills Stage 3: Applies ICT across subjects for digitization in learning and explores sources for vocational orientation. Stage 4: Uses ICT in research, project work, and learning unit implementation; explores career options through digital tools. Stage 5: Uses ICT for learning and research, demonstrates proficiency in applications and web services, applies multimedia for tasks and projects, and promotes technology's role in protecting the environment. Stage 6: Uses ICT and programming for projects and research, applies software for professional tasks, develops personal and career skills, and creates projects addressing global challenges such as climate change.

While there is a clear intent to gradually advance skills from basic exposure in the early stages to more complex applications by the end of schooling, several digital competences appear repeatedly across stages with minimal variation, indicating a repetition and overlapping over stages within the seven curriculum areas as shown in Table 4. For example, the statement “using ICT to advance learning and the quality of everyday life” recurs from the earliest stage through to graduation. This repetition emphasizes the importance of ICT but risks redundancy rather than deepening the expected outcomes. Further, the analysis of digital competence progression reveals several significant gaps in providing a successful and progressive learning experience (see Table 4). At the early stages, there is a heavy focus on basic ICT skills such as communication and simple productivity tasks, with limited emphasis on critical thinking, problem-solving, and research using technology.

This results in a missed opportunity to build a deeper understanding of digital tools across subjects early on. For example, the absence of ICT integration in Physical Education and limited use of technology in Natural Sciences in the initial stages may hinder students from developing crucial skills that could later be essential for problem-solving and data analysis in more advanced stages. Moreover, advanced digital skills like object-oriented programming, modeling, and multimedia creation are introduced only in the later stages of education (Stages 5-6). By delaying these essential skills, students are left with insufficient time to fully master them before graduation.

Furthermore, there is a lack of interdisciplinary use of digital tools, limiting students' ability to apply technology across subjects creatively and innovatively. Finally, while some subjects introduce media literacy, critical analysis of digital content is not emphasized enough in the early years, leaving students vulnerable to misin-

formation and unable to critically engage with digital resources. To address these gaps, a more consistent and integrated approach to digital competence across all stages is needed, ensuring that students develop both digital skills and the ability to apply them in real-world, interdisciplinary contexts. One approach to address this problem was the proposal of elective subjects. These elective courses offer students the opportunity to choose learning areas that align with their interests, talents, and developmental needs, while also ensuring exposure to essential digital competence.

Table 5. Digital competence-related elective subjects

Education Stage	Total No. of Elective Subjects	No. of Electives Related to Digital Competence	Share
Grades I–V	11	2	18%
Grades VI–IX	20	3	15%
Grades X–XII	10	3	30%

Table 5 indicates that the number of elective subjects related to digital competence ranges between 18% and 30% of total offerings across grades I–XII. In primary education (Grades I–V), electives introduce “Coding” from Grade 1 onward, providing early opportunities to develop problem-solving and computational thinking skills. From Grade III, students may also take “Education in the Use of the Internet”, which continues through Grade V, addressing safe and purposeful engagement with online environments. In lower secondary education (Grades VI–IX), the range of digital oriented electives broadens, while “Internet Usage and Safety” is systematically included each year, reinforcing responsible digital behavior.

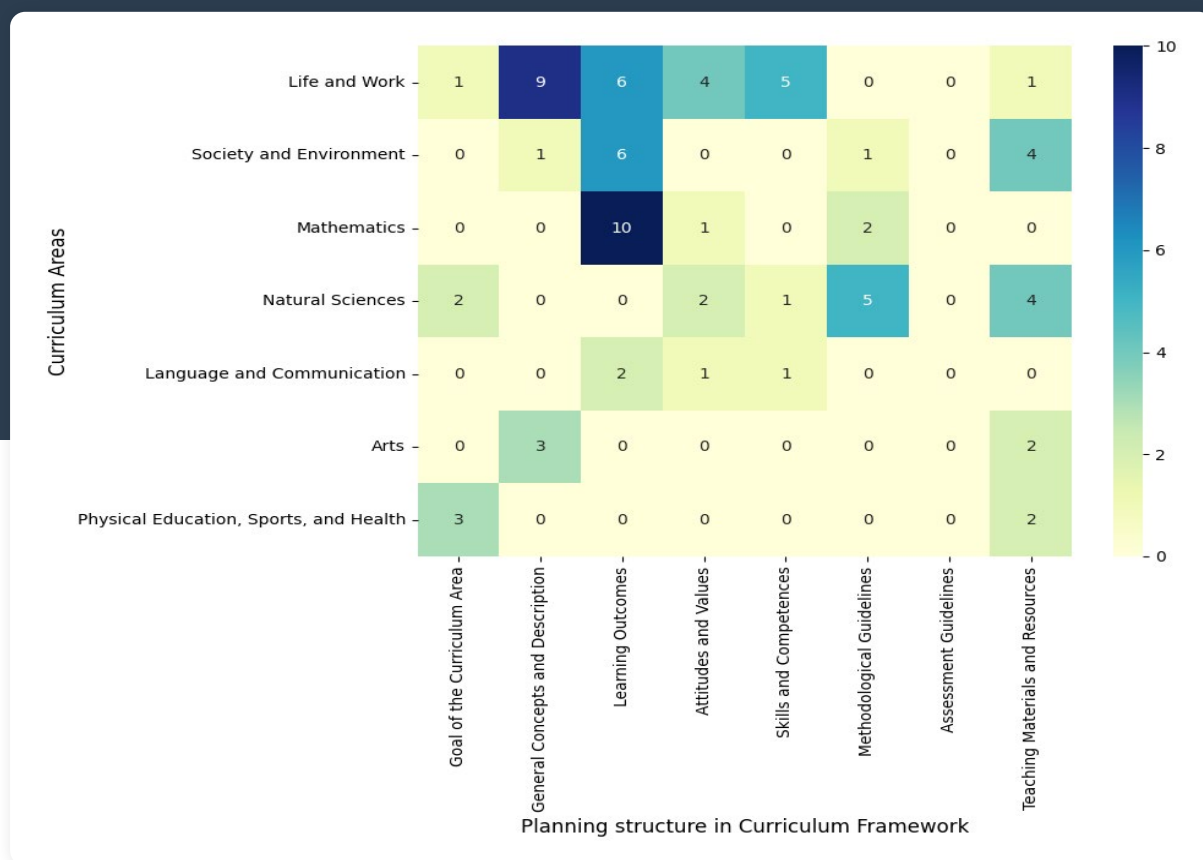
From Grades VIII and IX, “Media Education” is introduced, fostering critical engagement with media content and digital communication. At the upper secondary level (Grades X–XII), electives place greater emphasis on advanced and applied digital competence. “Media Education” and “Internet Usage and Safety” remain available in all three years, while “Programming” is introduced in Grades XI and XII, allowing students to deepen technical and vocationally relevant digital skills. This progression demonstrates a structured effort to integrate digital competence through elective subjects, starting from basic coding and safe internet use in the early grades, to advanced programming and critical media literacy in secondary education. These electives are designed to ensure that students gain essential digital literacy for academic and professional success. Currently, there is insufficient clarity regarding student enrollment rates in these courses as well as the preparedness of teachers to effectively deliver them. Findings from key informant interviews further reveal that these courses are often deliberately avoided, primarily due to limited human resource capacities and inadequate institutional support mechanisms.

Returning to digital competence through the lens of the Life and Work curriculum area and analyzing the textbooks of the Life Skills subject (Grade 1-5), we see that the integration of digital competence practically starts with only one topic in grade 1 but fortunately it is expanded into one section in grade 5. Also, for the subjects mentioned for grade 6-9, as mentioned in the previous section, it is a criticism from the teachers participated in FG and Youth Reference Group. They argue that the curriculum is outdated and does not effectively support the development of digital competence in practice. Despite the text book's title, "Technology and ICT," which suggests a broad focus on topics such as Industrial Technology, Environmental Science, Mechanical Engineering, Physics, Career Education, and Agricultural and Construction Techniques, the actual number of teaching hours dedicated to digital competence is insufficient.

The curriculum attempts to cover a wide array of subjects under the umbrella of technology and ICT, but this "pizza style" approach, trying to teach everything under one name, has led to frustration from both students and teachers. They feel that the subject fails to deliver on the promise of its title, offering little in terms of in-depth digital skills development. This criticism is further validated by the results of international assessments in which our students participated. For instance, the ICILS 2023 findings ranked Kosovo's 8th-grade students among the lowest-performing countries out of the 34 nations assessed, highlighting significant challenges in developing students' digital competence.

Furthermore, when talking about practice, the transversal integration from the other side is uneven as well: while Mathematics, Natural sciences, Languages, and Life and Work curriculum areas often reference digital skills, the extent of embedding depends heavily on teachers' initiative, training, and school infrastructure. The framework outlines general learning outcomes and lesson plans, but lacks detailed toolkits, best practices, or indicators to guide implementation.

When analyzing in the curriculum documents for how often digital-related terms (like "technology" or "ICT" or "digital skills" or "digital competence") are mentioned across curriculum areas, the results highlight a notable inconsistency. While certain curriculum areas explicitly articulate the rationale for embedding digital competence and reflect this emphasis within general aim, general concepts and intended learning outcomes (see Mathematics), others demonstrate only partial or superficial inclusion (Languages, Natural Science, Arts, Physical Education). In several cases, although digital-related terms are mentioned within intended learning outcomes, there is a conspicuous absence of accompanying methodological guidelines, assessment frameworks, or alignment with domains such as attitudes and values, skills, and competences. From the analysis, illustrated in Figure 4, it appears that the curriculum area Mathematics places greater emphasis on digital skills than Life and Work, despite the latter having a dedicated subject aimed at developing digital competence, which is a clear paradox.

Figure 3. Digital competence integration across seven curriculum areas for Stage 5-6

This fragmented approach exposes a systemic gap in the current curriculum document and underscores the lack of a coherent framework for embedding digital competence consistently across all curriculum areas.

Assessment of student digital competences

Kosovo currently lacks a formal and standardized framework for the assessment of student digital competence across education stages. While some schools and teachers conduct informal or teacher-designed assessments, these are inconsistent and vary widely in terms of depth, content, and evaluation criteria. In the absence of Kosovo recognized assessment tools, there is no coherent way to measure student progress in digital competence or identify learning gaps over the curriculum stages.

On the international level, several instruments are used for assessing students' digital competence. The ICILS assesses the ability to use computers to investigate, create and communicate. In 2023, ICILS defined CL in two strands: (i) understanding computer use, and (ii) gathering and managing digital information. Further, as a third optional component is added the Computational Thinking which assesses problem decomposition, algorithmic thinking, and pattern recognition. International benchmarking initiatives, such as Kosovo's participation in ICILS highlight

significant shortcomings in students applied digital skills despite widespread access to technology. These findings underscore the urgent need for a structured Kosovo assessment framework, along with a comprehensive reform of the current curriculum. Additionally, an action plan must be developed to ensure that the goals outlined in policy documents are effectively implemented in the classroom. Further, the OECD plays a major role in assessing digital competence for students. While it does not have a direct equivalent to ICILS, it incorporates digital skills through task-based assessments. Notably, in its most recent cycle 2025, PISA introduced AI literacy as a new dimension, reflecting the evolving landscape of digital competence.

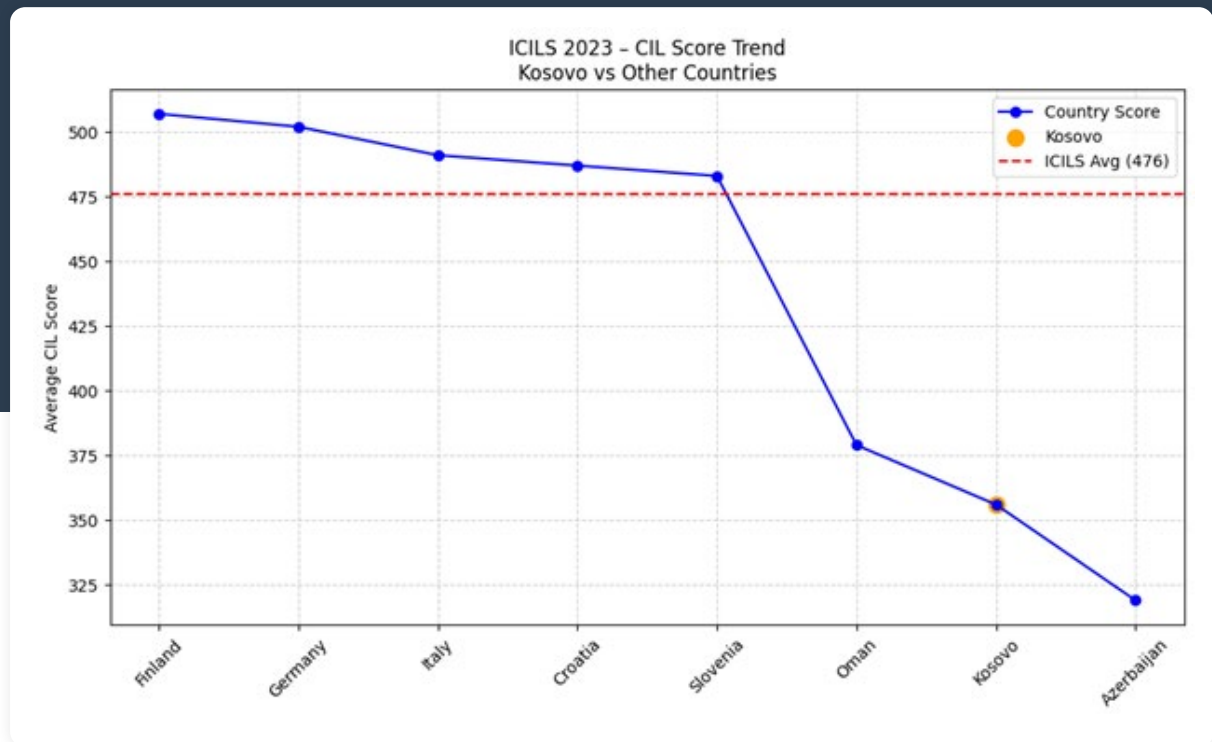
Table 6. International Assessment Instruments

Tools	Target	Type	Used for
ICILS	Student	Test	International Benchmarking
PISA	Student	Task	System-level policy monitoring

Table 6 lists international assessment instruments and their types. Both assessments provide valuable insights that raise a flag for analyzing how well-prepared students are to navigate an increasingly digital world. They also play a crucial role in informing education strategies and policy reforms by highlighting how effectively (or in our case how poorly) the policy documents are being implemented in the classroom. Additionally, Kosovo's participation in international assessments and measures reveals critical shortcomings. According to PISA 2022 results, Kosovo faces significant challenges in education, lagging behind OECD countries in both foundational and digital skills (World Bank, 2024). Only 28% of the population demonstrates basic digital skills, far from the EU target of 80% (Eurostat, 2019). These results confirm minimal progress compared to 2015, with Kosovo's students continuing to perform well below international averages in mathematics, reading, and science, pointing to structural weaknesses in the quality of teaching and learning.

Another measure is the International Computer and Information Literacy Study (ICILS 2023) showing Kosovo's eighth-grade students scored an average of 356 (± 4.1) in Computer and Information Literacy (CIL), placing Kosovo at the bottom among 34 participating systems and far below the ICILS average of 476 (see Figure 5). Out of the 3,345 students who participated, the vast majority remained at Level 0 or Level 1 proficiency, struggling with essential tasks such as searching and retrieving online information, evaluating digital sources, and using tools for communication and collaboration. In comparative terms, Kosovo ranked second to last among EU education systems, despite having relatively widespread Internet access.

Figure 4. Kosovo students' performance in ICILS 2023



Yet, despite the efforts and access to infrastructure, the ICILS results reveal a critical disconnect between what is written in curricula, the practical exposure to technology and mastery of digital skills in school contexts. This gap highlights the need for a more systematic approach to digital education, one that moves beyond access and focuses on structured, curriculum-embedded instruction. The results suggest that Kosovo's education policy must prioritize teacher training in digital pedagogies, the development of explicit ICT-integrated lesson plans, and the creation of supportive environments where digital learning becomes routine and meaningful. Kosovo's participation in ICILS 2023 has not only provided a reflection of its current standing, but also a clear signal that investment in digital access alone is insufficient. The next step is turning infrastructure and potential into competence, ensuring every student is equipped not just with devices, but with the skills to navigate, contribute to, and thrive in a digitally connected world in an ethical manner.

Mapping of curriculum digital competences against EU and global frameworks

While official documents reference European models, there is a notable absence of structured action plans or effective curricular integration. MESTI, MDA, and schools overseeing curriculum implementation and teacher training have not been fully engaged in translating and contextualizing these EU digital competence frameworks into practice. Given that the curriculum was designed in 2016, before the launch of the DigComp Framework, directly mapping the curriculum against it could lead to

misleading results. To avoid this, we went a step further by mapping the textbooks of subjects within the “Life and Work” curriculum area. This approach ensures a more accurate assessment of how digital competences are being addressed, considering the curriculum’s design timeline and its current alignment with evolving digital competence standards. Table 7 presents the mapping of textbooks of subjects in “Life and Work” curriculum area.

Table 7. Mapping Life Skills and Technology and ICT subjects against DigComp

Grade	Area 1: Information & Data Literacy	Area 2: Communication & Collaboration	Area 3: Digital Content Creation	Area 4: Safety	Area 5: Problem Solving
1	1.1 Browsing, searching – Using personal computer	–	–	–	–
2	1.1 Browsing, searching – Media types (PC, TV, Phone)	2.1 Interacting through digital technologies – Games in media	–	–	–
3	–	–	–	4.2 Protecting health and well-being – Hazards from mobile/Internet waves	–
4	1.1 Browsing, searching – Searching for information online	2.2 Sharing through digital technologies – Radio, TV, social media	3.1 Developing digital content – Drawing in Paint; Programming basics	4.3 Protecting personal data and digital identity – Internet safety; Protecting data	–
5	–	–	3.2 Integrating & re-elaborating – ICT projects; Origami with PC; Coding (Micro:bit, Coding Club)	4.2 Protecting health & well-being – Internet risks and protection	5.2 Identifying needs and responses – Coding/problem solving
6	1.1 Browsing, searching – Searching/saving notes	2.3 Engaging in citizenship – Using ICT in lab	3.1 Developing digital content – 3D drawings; Movie Maker; Apps	4.1 Protecting devices – OS protection; Lab rules	5.3 Creatively using digital technologies – Creating ICT projects
7	1.1 Browsing, searching – Online search; Blogs	2.1 Interacting – Email; 2.2 Sharing – Collaboration	3.1 Developing – Word processing; Tables; Drawing	4.3 Protecting personal data – Online behavior; data protection	5.4 Identifying digital competence gaps – ICT enthusiast projects
8	–	–	3.1 Developing – Excel; Robotics; Photo editing; Simulators	–	5.2 Identifying needs – Micro:bit projects
9	–	2.1 Interacting – Online presentations	3.1 Developing – CAD, Scratch, Arduino, Android Studio	4.3 Protecting data & identity – Safe social media use	5.3 Creatively using tech – Problem solving w/ microcontrollers

10	–	–	3.1 Developing – Excel advanced; PowerPoint; Multimedia creation	–	5.2 Identifying needs – Data analysis & charts
11	1.2 Evaluating data – Online search strategies	2.2 Sharing – E-forms; Surveys	3.1 Developing – MS Access databases	4.1 Protecting devices – Malware protection; Digital signatures	–
12	1.3 Managing data – Databases (SQL); Info systems	–	3.1 Developing – Python, AI, Software dev	4.4 Protecting environment – Internet security; IoT safety	5.3 Creatively using tech – Algorithms, programming problem solving

Some of these materials introduce elements of programming with tools such as Scratch, basic web development using HTML, and introductory concepts of network security (e.g., ICT in gymnasium, grade XII). Key emerging areas such as artificial intelligence (AI), XR, AR, cybersecurity ethics, and mobile app development are absent. Consequently, while basic digital literacy is fostered throughout compulsory education, the pathway toward advanced digital competence is fragmented or shifted to elective subjects, lacking both continuity and a cross-disciplinary approach.

However, we proceeded with a deeper analysis aligned with the DigComp subcategories across Grades 1–12 highlighting a clear pattern of strengths, inconsistencies, and gaps within the ICT curriculum. To determine the status of each subcategory, we calculated the number of grades in which the subcategory was addressed and classified the results as “Strong” when covered in four or more grades, “Moderate” when appearing in two to three grades, “Weak” when addressed only once, and “Absent” when not covered at all (see Table 8).

Table 8. Alignment of DigComp Categories and Subcategories Across Grades 1–12

Area	Subcategory	Grades Covered	Status
Area 1: Information & Data Literacy	1.1 Browsing, searching & filtering	1, 2, 4, 6, 7, 11, 12	Strong
	1.2 Evaluating information	4, 7, 11	Moderate
	1.3 Managing information/data	6, 8, 11, 12	Strong
Area 2: Communication & Collaboration	2.1 Interacting through digital technologies	2, 4, 6, 7, 9	Strong
	2.2 Sharing through digital technologies	4, 7, 11	Moderate
	2.3 Engaging in digital citizenship	6, 11	Moderate
	2.4 Collaborating through digital technologies	1, 7	Moderate
	2.5 Netiquette	–	Absent
	2.6 Managing digital identity	7, 9	Moderate

Area 3: Digital Content Creation	3.1 Developing digital content	4, 5, 6, 7, 8, 9, 10, 11, 12	Strong
	3.2 Integrating/re-elaborating content	5, 6, 8, 10	Strong
	3.3 Copyright and licenses	–	Absent
	3.4 Programming	4, 5, 8, 9, 12	Strong
Area 4: Safety	4.1 Protecting devices	4, 6, 11, 12	Strong
	4.2 Protecting personal data & privacy	3, 4, 5, 6	Strong
	4.3 Protecting health & well-being	3, 7, 9, 11, 12	Strong
	4.4 Protecting the environment	12	Weak
Area 5: Problem Solving	5.1 Solving technical problems	5	Weak
	5.2 Identifying needs & tech responses	2, 5, 8, 10, 12	Strong
	5.3 Creatively using digital technologies	6, 9, 12	Moderate
	5.4 Identifying digital competence gaps	7	Weak

The results in Table 8 show that part of the DigComp Categories and Subcategories Across Grades 1–12 have strong coverage, including browsing and searching (1.1), managing data (1.3), interacting through digital technologies (2.1), developing and re-elaborating digital content (3.1, 3.2), programming (3.4), and multiple aspects of safety such as protecting devices, data, and well-being (4.1, 4.2, 4.3). These are systematically reinforced across the curriculum, demonstrating that students repeatedly engage with these digital skills.

Several areas are only moderately integrated, such as evaluating information (1.2), sharing and engaging in digital collaboration (2.2, 2.3, 2.4), managing digital identity (2.6), and creatively using digital technologies (5.3). These appear in certain grades but lack the continuity needed to build progressive mastery. Some subcategories display weak coverage, including protecting the environment (4.4), solving technical problems (5.1), and identifying digital competence gaps (5.4). These are introduced in the curriculum but remain confined to a single grade, limiting their impact on long-term digital competence development.

Finally, a few subcategories are completely absent, namely netiquette (2.5) and copyright and licenses (3.3). These omissions represent significant gaps, as both responsible online behavior and intellectual property awareness are essential for digital citizenship. Overall, this analysis demonstrates strong foundations in information handling, content creation, and digital safety, but requires reinforcement in collaboration, early problem solving, and the inclusion of missing areas to ensure balanced coverage of the full DigComp framework.

PILLAR 4

Teacher digital competence and professional development



This pillar presents teachers' digital competence standards and frameworks, professional development and pedagogical training (pre-service & in-service), the capacity and preparedness of teachers to integrate digital tools and approaches and the application of digital methods in lesson planning and delivery, as well as systems and instruments for assessing teacher competences.

Teacher digital competences standards and frameworks

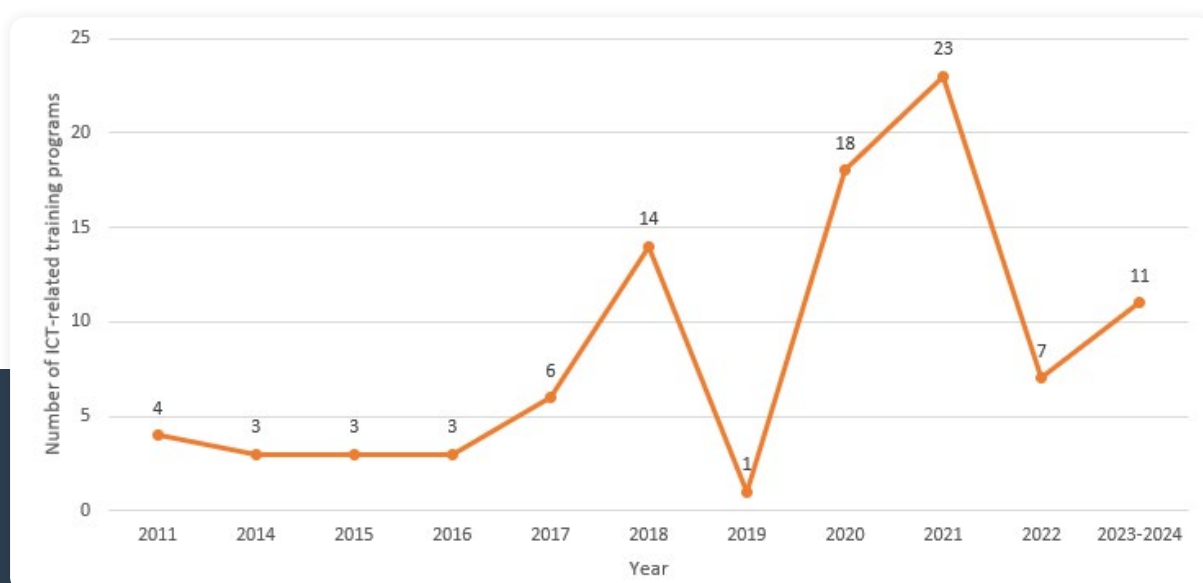
While many teachers in Kosovo are willing to implement digital learning and widely use digital platforms, their actual digital competence and preparedness for pedagogical integration remain a challenge (TKaEDiTE 2025). The main challenge includes teachers' technical ability, which resulted in a B1/B2 level (Integrator) based on SELFIE instrument research (conducted by Institute of Pedagogy, 2023b; TKaEDiTE 2025), but also their capacity to integrate digital skills effectively into their pedagogy. There is a widespread confusion between basic digital literacy and the ability to use technology effectively in teaching. Although the Kosovo Education Strategy 2022-2026 includes clear measures for increasing teachers' digital competence and references frameworks like DigCompEdu, the practical integration and development of these competences are still at an early and uneven stage. Formal training such as the ones licensed by MESTI has covered basic tools like the use of PC, PowerPoint and Excel (MESTI Catalogs 2019-2024). Project-driven initiatives, in this case the tkaedite.eu project, provided training to more than 100 elementary school teachers training related to EdTech, STEAM, Robotics and IoT with some exposure to AI Literacy and coding (TKAEDITE.eu) with the help of partners from Sweden, Norway and Finland. Critically, some teachers lack even basic digital literacy skills, and their extensive online engagement does not always translate into meaningful educational use. Disparities exist with teachers in urban areas generally more inclined to seek online materials, and older teachers showing less confidence in incorporating digital technology. Although, some teachers feel secure in using technology regardless of age, highlighting the importance of individual motivation (Nuci et al, 2025).

Teachers' professional development programs and pedagogical training

Teacher professional development in Kosovo, while a critical area for strengthening digitalization in education transformation, remains shattered by lack of coher-

ence and structure and inconsistent implementation. MESTI opens annual calls for teacher training programs including digital skills development and has drafted a new administrative instruction on school-based training (see No. 119/2020 on School-Based Professional Development for Teachers). Figure 6 illustrates the number of accredited or approved professional development programs for teachers with respect to ICT either as a standalone program specific to ICT or integrated within different domains, from 2011 to 2024 (MESTI Catalogs). It reveals a steady increase in program offerings over the years, with notable spikes, particularly between 2019 and 2021, where the number of programs rose significantly from 1 in 2019 to 23 in 2021. This trend may reflect heightened attention to digital and pedagogical training during the COVID-19 pandemic period. A decline is observed in 2022, with only 7 programs recorded, suggesting a potential shift in 2024. For 2023 no data is available on the MESTI website, indicating a lack of reporting. According to KII, the reporting of programs implemented in 2023 was postponed to February 2024. Consequently, the programs from 2023 and 2024 were published together later that year, with 11 of the 2024 programs originally submitted at the end of 2023. The resurgence in 2024, with 11 programs listed, indicates a renewed effort in expanding teacher professional development initiatives. This timeline not only helps track progression but also identifies years of significant policy shifts or disruptions in program delivery.

Figure 5. Number of accredited ICT-related programs by year



The comparative analysis between the accredited teacher training programs and the DigCompEdu framework from 2018 to 2024 reveals a partial yet meaningful alignment with several digital competence areas.

The mapping of Kosovo's licensed training as part of teacher professional development programs against the DigCompEdu framework shows meaningful progress over the past decade in strengthening educators' digital competence. Training has evolved from early foundational courses focused primarily on basic ICT skills to more recent programs that address blended learning, online learning, distance learning, digital collaboration, and the use of interactive tools, reflecting a shift toward more comprehensive digital pedagogy (see Table 9).

Table 9. Progression of Teacher Training Alignment with DigCompEdu Areas (2018–2024)

DigCompEdu area	2018–2024
Area 1: Professional Engagement	2018–2019: Very limited; mostly tool use with occasional communication with parents (SchoolUpdate). 2020–2021: Some progress through online collaboration trainings (Google tools, online collaboration). 2022–2023: Trainings emphasize school-level collaboration and community building in online teaching, but reflective practice and CPD remain underdeveloped. 2024: Trainings on professional networks (Moodle communities, online teaching collaboration).
Area 2: Digital Resources	2018–2019: Basic Microsoft Office, Access, Excel trainings, mainly technical, not pedagogical. 2020: Content creation courses (WBT Plus). 2021: Google Suite adoption. 2022–2023: Widespread embedding of multimedia and cloud tools; OER and resource-sharing increasingly emphasized. 2024: Google Suite integration, Moodle, and multimedia content.
Area 3: Teaching & Learning	2018–2019: Limited pedagogical integration; GeoGebra and basic ICT integration provided some support. 2020: Online collaboration and SchoolUpdate helped incorporate blended strategies. 2021: Adaption with blended and distance learning. 2022–2023: Teachers increasingly use interactive platforms (Mentimeter, Kahoot, Poll Everywhere) and project-based approaches for engagement. 2024: Online pedagogies mature with Moodle and structured e-didactics.
Area 4: Assessment	2018–2019: Only some quiz/test elements. 2020: WBT Plus and Google Forms introduced structured online assessment. 2021: Online teaching and Google Classroom. 2022–2023: Experimentation with digital feedback tools, quizzes, rubrics, and peer-assessment in distance learning. 2024: Moodle assessment modules and feedback strategies.

Area 5: Empowering Learners	2018: Career guidance (Busulla.com) and subject engagement via GeoGebra. 2019–2020: Gamification (Kahoot) fosters participation. 2021: Inclusion via online teaching and differentiated engagement. 2022–2023: Focus on learner autonomy, blended learning, and accessibility. first steps toward systematic inclusion. 2024: Major improvement with SEN-focused modules (PIA, Braille, Assistive Tech).
Area 6: Facilitating Learners' Digital Competence	2018–2019: Some exposure through ICT clubs, communication modules, and internet safety. 2020: Focus on safe use and digital communication, and resource creation. 2021: Google Suite, project work, and distance learning. 2022–2023: Systematic integration of media literacy, collaborative platforms, and digital creation into classrooms. 2024: Moodle, assistive technologies, and structured student digital projects.

To assess the alignment of training modules with DigCompEdu, further analysis was provided. Firstly, each of the 22 DigCompEdu competences was rated per year from 2018 to 2024 on a four-point scale (0 = None, 1 = Low, 2 = Medium, 3 = High). Next, averages were calculated for each of the six DigCompEdu areas. Areas scoring 2.5 or above were considered Strong, those between 1.5 and 2.4 as Moderate, and those at 1.4 or below as Weak. As shown in Table 10, the strongest alignment is found in Area 2: Digital Resources and Area 3: Teaching and Learning, with numerous programs focused on creating and managing digital content, integrating tools like Google Suite, Moodle, and Microsoft Office into instructional practice, and supporting interactive, blended, and distance learning. Area 5: Empowering Learners is also addressed, particularly through initiatives that encourage learner engagement, blended approaches, and more recently, the inclusion of SEN-focused modules such as Braille and assistive technologies. Elements of Area 6: Facilitating Learners' Digital Competence are present as well, with training on online safety, digital communication, and media literacy promoting responsible and effective technology use. By contrast, Area 4: Assessment remains less developed, focusing mainly on quizzes and basic feedback, while Area 1: Professional Engagement shows the weakest alignment, limited to collaboration tools with little emphasis on reflective practice or structured professional development.

To close these gaps and achieve full alignment with DigCompEdu, Table 10 lists recommended training modules that could be provided in the future, some of which were piloted through the EU-co funded project tkaedite.eu (TKaEDiTE, 2025). Thus, regular updates to training catalogs and stronger coordination with strategic frameworks can ensure that teacher development remains relevant, equitable, and transformative in the digital age.

Table 10. Current Alignment vs Suggested Trainings based on DigCompEdu Areas

DigCompEdu Areas	Current Alignment	Recommendation of New Trainings, few of them piloted in tkaedite.eu
Area 1: Professional Engagement	Weak - Limited to collaboration tools (SchoolUpdate, Google Suite, Moodle). Reflective practice & CPD underdeveloped.	'Workshops on reflective digital practice (e-portfolios, digital teaching journals)', 'Structured CPD programs using DigCompEdu Check-In self-assessment', 'Peer mentoring and digital professional learning communities'
Area 2: Digital Resources	Strong - High alignment through WBT Plus, Google Suite, Moodle, multimedia content.	'Open Educational Resources (OER) licensing & reuse practices', 'Advanced resource curation & repository building', 'Integrating AI-assisted content creation responsibly'
Area 3: Teaching & Learning	Strong - Blended learning, online teaching, Moodle, interactive tools.	'Innovative digital pedagogy (flipped classroom, gamification)', 'Adaptive learning systems integration', 'Project-based learning with digital tools'
Area 4: Assessment	Moderate - Online quizzes (Forms, Moodle), basic feedback. Missing analytics.	'Digital learning analytics & dashboards', 'AI-supported formative assessment', 'Designing rubrics and feedback loops in LMS platforms'
Area 5: Empowering Learners	Moderate - Strong (by 2024 SEN-focused trainings, inclusion improving).	'Universal Design for Learning (UDL) with digital tools', 'Differentiated instruction using adaptive platforms', 'Inclusive design for accessibility (WCAG, assistive tech)'
Area 6: Learners Digital Competence	Strong - Media literacy, online safety, digital collaboration, assistive technologies.	'Critical media & information literacy modules', 'Digital citizenship & online ethics programs', 'Problem-solving with coding, AI, and emerging technologies'

Integration of digital methods, tools and resources in lesson planning and teaching

Based on MESTI catalogs 2019-2024, the teachers in Kosovo use a range of digital tools in their instruction, including projectors, educational websites, digital libraries, and applications such as PowerPoint, e-school, SchoolMe, Canva, and Prezi. Simulators are also used in technology classes to enhance interactivity. However, the integration of digital competence into subject teaching largely depends on individual teacher initiative rather than a structured curricular framework. The use of digital methods often shifts in response to training trends, lacking consistency, and long-term strategic direction. Infrastructure limitations continue to constrain classroom-level implementation. Teachers frequently face inconsistent internet access and a shortage of functional projectors, often relying on personal laptops and mobile data to deliver lessons. While LMS infrastructure through KREN is available for schools, its use remains limited due to the lack of teacher training and curricu-

lum-aligned digital content. Even so, the mere provision of digital equipment and devices does not lead to meaningful digital learning or the development of digital competence unless it is intentionally integrated into pedagogical practice. Despite the increasing presence of AI tools, the absence of clear institutional regulations raises the risk of their misuse, particularly concerning plagiarism and the authenticity of students' work.

To promote the integration of digital tools and methods, several initiatives have been undertaken, including KREN's provision of internet connectivity to schools and support from international organizations such as WorldBank, GIZ and UNICEF through various donor-funded projects. However, in the absence of corresponding investment in content development, pedagogical training, and technical maintenance, these efforts risk remaining unutilized. Further intensifying the issue is the lack of dedicated IT and digital maintenance staff in most schools which undermines the long-term functionality of digital infrastructure and places an additional burden on teachers already facing implementation challenges.

Assessment and evaluation of teacher digital competence

Kosovo currently faces significant challenges regarding the assessment of teachers in the pre-university education system. While MESTI has a strategic objective to cultivate digital competence for all stakeholders, the practical implementation of assessment mechanisms is largely underdeveloped and there is no system-wide mechanism or structured instruments at the central level to evaluate teachers' digital competence or their integration of technology in classes.

On the international level, similar for students, several instruments are used for teachers for assessing Digital Competence. International Computer and Information Literacy (ICILS) designed a questionnaire for teachers measuring the (i) ICT Self-Efficacy, (ii) Pedagogical ICT Use, (iii) Professional Development, and (iv) Beliefs and Attitudes toward ICT in Education. Similarly, the OECD leads efforts in evaluating teacher digital competence through its Teaching and Learning International Survey (TALIS, 2024). TALIS collects data via structured questionnaires focusing on ICT use in teaching, Professional Development, Teacher self-efficacy, and Barriers, and this time it added a new dimension, the use of AI in teachers' work. Additionally, instruments like SELFIE are used for self-reflection and school development. Developed by the European Commission, SELFIE enables teachers and schools to evaluate how digital technologies are integrated into teaching and learning practices (see Table 11).

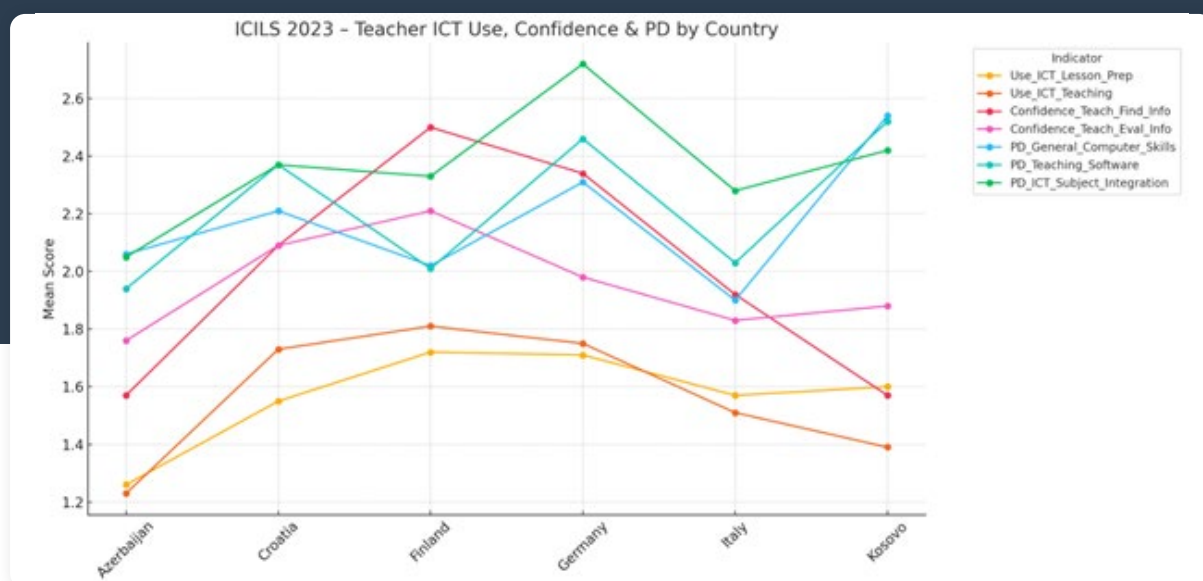
Table 11. List of International Assessment Instruments for Benchmarking Digital Competence

Tools	Target	Type	Used for
ICILS	Teachers	Survey	International Benchmarking
TALIS	Teachers	Survey	System-level policy monitoring
SELFIE	Teachers	Self-assessment	School Development in Finland, Reflection

Both survey-based and self-assessment tools serve as practical mechanisms to reflect on digital teaching practices. They also inform Kosovo education policies and school-level strategies. For instance, countries like Finland (OPEKA), Croatia (CARNET e-Schools), and Slovenia (ZRSS – pilot phase) have adopted national instruments, often aligned with the EU SELFIE Framework, to better understand and support teacher development in the digital era. A recent study by TKAEDITE (Nuci et al., 2025), utilizing the SELFIE instrument, revealed varying levels of digital competence among teachers: strong performance in the “Digital Resources” domain but weak proficiency in “Teaching and Learning”. In this instrument participated 1600 preuniversity teachers. This highlights a critical gap between knowing digital skills and understanding how to apply them pedagogically. Although the SELFIE platform has been piloted in Kosovo, its effectiveness has been constrained by a lack of formal policy support and structured follow-up mechanisms.

When it comes to ICILS, Kosovo participated for the first time in 2023, whereas in TALIS the teachers participated for the first time in 2024. In ICILS, 1197 teachers participated presenting a distinct profile characterized by high participation in ICT-related professional development (PD) but low self-reported confidence and limited use of digital technologies in teaching. Despite ranking among the highest for teacher engagement in PD activities, particularly in areas such as general computer skills, the use of educational software, and the integration of ICT into subject teaching, Kosovo teachers report substantially lower confidence in their ability to teach students how to find and evaluate information online. Furthermore, their actual use of ICT for lesson preparation and delivery remains modest compared to their international peers. This disparity suggests that while the quantity of training is substantial, its quality or applicability may be limited.

Teachers may not be receiving sufficiently hands-on, context-specific, or pedagogically grounded training to translate professional development into classroom practice. It also points to broader systemic issues, such as limited infrastructure, lack of digital teaching resources, or insufficient institutional support that may be hindering teachers’ ability to implement what they learn in PD sessions. Teachers who participated (sample: 3281) in TALIS 2024 (OECD, 2025a) were highly motivated, confident and adaptable professionals, but had low mentoring opportunities. When asked about the use of AI, 45% of teachers claimed they lacked the knowledge and skills to teach using AI well below the OECD average of 75% while 69% cited inadequate school infrastructure as a barrier, much higher than the OECD average of 37%.

Figure 6. ICILS 2023 Teacher ICT Use

As shown in Figure 7, teachers in Finland and Germany consistently stand out, reporting frequent use of ICT both in preparing lessons and during classroom instruction. They also express strong confidence in guiding students to find and critically evaluate information online. These results suggest that both countries benefit from robust infrastructure, supportive systems, and well-established pedagogical approaches that embed digital competence in everyday teaching. In contrast, Kosovo demonstrates a different pattern. While teachers in Kosovo report high levels of participation in ICT-related professional development, their actual use of digital tools in the classroom and their confidence in teaching digital skills remain considerably lower. This disconnect points to a likely gap between training and practice, where the professional development offered may not be sufficiently practical, targeted, or sustained to build real competence in classroom application. Croatia falls somewhere in the middle. Their teachers report moderate use of ICT and a balanced level of confidence, along with steady participation in PD activities. This pattern may reflect a more gradual rollout of digital policies or variability in how effectively ICT integration is implemented across schools.

When it comes to the evaluation of teachers, municipality-level entities currently lack the capacity or structured instruments to evaluate teachers' digital competencies or their integration of technology. The standard evaluation forms provided by MESTI for teacher evaluation are reported to lack components related to digital competences. Some recommendations call for the development of such instruments to standardize digital skills evaluation for teachers.

While a systemic evaluation for digital skills appears to be lacking at the Kosovo-wide level, according to KII information there are some sporadic school-led initiatives for evaluating digital competence where all teachers, not just ICT teachers, are evaluated on their digital skills as part of their annual performance review. Eval-

uations are conducted through observations, peer reviews, student questionnaires, and portfolio evaluations, using standardized tools reportedly provided by MESTI ([UA 15/2023](#)). This underlines a pressing need for more targeted, practice-oriented PD programs and follow-up support mechanisms to ensure that teachers not only attend training but gain the confidence and competence to integrate digital tools effectively in their everyday teaching. Whereas for the evaluation part, it is important to understand the need for reforming the standard for evaluation of teachers and integrating the digital component as an important criterion to be evaluated.

Pillar 5

Emerging Technologies and AI



This pillar provides an overview of the impact of emerging technologies on education, with particular emphasis on artificial intelligence (AI) in Kosovo's pre-university education system. Although this area is still new within Kosovo's education system with limited adaptability and system-level applicability challenges, the section introduces a couple of global AI frameworks and their implications and applicability for Kosovo and a short analysis of the current state of AI literacy, policy development, ethical governance, and pedagogical integration in the classroom.

Policy frameworks, AI literacy and competence development

AI is acknowledged within the broader Digital Agenda for Kosovo 2030, but it is not explicitly integrated into education policy or strategy. The Education Strategy 2022–2026 predates the mainstream emergence of GenAI tools like ChatGPT and other Large Language Models. There is currently no formal regulation, anti-plagiarism system, or AI competence framework in education. Advanced digital skills and AI literacy are not embedded in the curriculum syllabi with learning outcomes. Although MESTI plans to develop a digital competence framework based on EU models, Kosovo would benefit from adopting frameworks like DigComp 2.2, DigComp 3.0 which explicitly includes AI and data skills, and from contextualizing the OECD (2025b) and UNESCO AI frameworks (2024). These can inform age-appropriate, level-based integration of AI literacy and competency for both students and teachers.

Pedagogical integration of emerging tech and AI in teaching and learning

Interactive digital learning materials such as virtual labs, animations, and educational games are reported to be practiced scarcely in Kosovo's schools. Students are widely using AI tools like ChatGPT for both academic and personal purposes, sometimes "in a wrong way" for homework without understanding the content which results in uniform submissions compromising learning. Teachers also use AI tools like ChatGPT for idea generation, to streamline lesson planning, and to reduce administrative workload, yet the use of these technologies is largely unstructured and fragmented. Copyright and plagiarism concerns are typically raised when identical student work is submitted rather than being systematically addressed as part of school policy.

Ethics, governance and regulation

Kosovo lacks a policy or regulatory frameworks for the ethical governance of AI in education. Global references such as the EU AI Act, the European Commission's AI guidelines, and the UNESCO AI Competency Framework offer clear directions for responsible AI use. Kosovo has not yet adopted cybersecurity protocols, anti-plagiarism systems, or AI quality assurance standards in education system or in schools. Ethical considerations, especially regarding AI use, are pressing. This gap is particularly problematic given the increasing use of AI in schools without sufficient oversight. The absence of EdTech standards and data protection guidelines like the General Data Protection Regulation (GDPR) undermines public trust and risks market fragmentation.

Global frameworks and implications for Kosovo

Technologies such as AI, extended reality (XR), gamification, and simulation are increasingly being adopted in education and training. In particular, they show great promise for science education and skills development. Among these, generative AI (GenAI) has emerged as the most disruptive and influential significantly impacting teaching, learning, and educational practices. The growing influence of AI in daily life, work, and education requires a proactive and structured approach to AI literacy and competence development (OECD, 2025).

AI offers potential benefits, including adaptive content creation, personalized tutoring, real-time assessment and feedback, and improved administrative efficiency. However, it also brings risks: plagiarism, reduced agency and diminishing critical thinking (TeachAI)^[11]. To harness its benefits while mitigating risks AI must be approached through a human-centered approach to promote ethical awareness, critical thinking, and inclusion supported by policies, infrastructure, and professional development.

AI literacy is increasingly regarded as a fundamental 21st-century competency and the ability to critically engage with and ethically use AI will shape future readiness in education. As highlighted by UNESCO AI Framework (2024), education must not serve merely as a testing ground for AI adoption but must empower learners to co-create sustainable futures through thoughtful and value-driven interactions with technology.

Few countries have fully integrated AI into their national curricula and harnessed its full potential. Among the pioneers which have made notable efforts in policy implementation are Finland¹² for having embedded AI education across its national system through multi-sectoral collaboration among universities and industry partners; Singapore's National AI Strategy 2.0¹³ integrates AI education across all levels, emphasizing ethics and real-world applications; Estonia through its AI Leap

¹² <https://www.oph.fi/en/artificial-intelligence-education-legislation-and-recommendations>

¹³ <https://www.smartnation.gov.sg/initiatives/national-ai-strategy/>

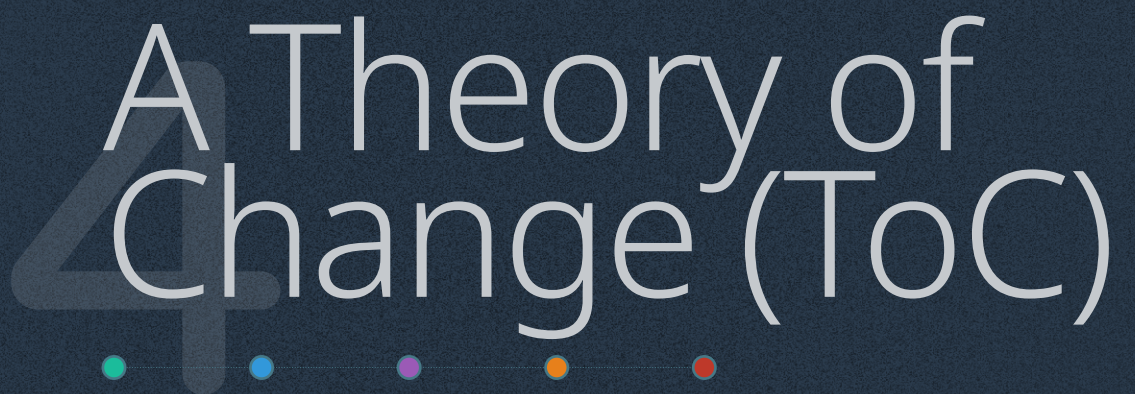
Program provides students and teachers with access to AI-based educational tools and teach them the most effective ways to use them.

Kosovo can draw on such frameworks and models to inform its AI policy and curriculum reform. Here, a few international frameworks including those from UNESCO, OECD, and the European Commission, are introduced to provide insights and inputs for contextualizing them in Kosovo. The goal is to support Kosovo strategies that empower both students and teachers to become competent, ethical, and confident users of AI.

- **DigComp 3.0 (2025)** covers five thematic areas:
 - Artificial Intelligence (including Generative AI) competence
 - Cybersecurity competence
 - Digital rights, choice and responsibilities
 - Wellbeing in digital environments
 - Competence to tackle misinformation and disinformation
- **UNESCO AI Competency Framework for Students (2024)** defines twelve competencies across four domains:
 - Human-centered mindset
 - Ethics of AI
 - AI techniques and applications
 - AI system design
- **OECD AILit Framework (2025)** proposes four modes of student interaction with AI:
 - Engaging with AI
 - Creating with AI
 - Managing AI
 - Designing AI

These frameworks emphasize not only technical proficiency but also cognitive, emotional, and ethical readiness. Students must build critical thinking, ethical reasoning, creativity, and digital resilience. Teachers must be equipped with the competencies to guide the following skills: instructional integration, human-centered design, and continuous professional development.

A Theory of Change (ToC)



Proposed ToC for digital competence development in Kosovo's pre-university education

In the context of education and digital transformation, ToC is a valuable tool to help policymakers, educational institutions, and stakeholders to develop and implement strategic actions and targeted interventions to improve intended learning outcomes, enhance skills development, mobilize actors, and align the efforts and resources toward an impactful goal. Drawing on the ToC methodologies by USAID (Salib, 2022) and UNICEF (Rogers, 2014), a ToC is proposed to support the integration of digital competence in Kosovo's pre-university education system. This ToC is based on the situation analysis and identification of the core problem, the underlying causes and consequences, and the resources and opportunities available to address it. It outlines pathways from actions, to outputs, to outcomes and impacts, and a vision of digitally competent students and teachers in Kosovo's pre-university education.

Problem (Context)

Kosovo's pre-university education system faces significant challenges in effectively integrating digital competences for students and teachers despite strategic recognition of digital transformation and its importance for a digital society. The current state of digital readiness is emerging and it is characterized by a substantial gap between policy aspirations and practical implementation. As presented in full account in the previous sections, the comprehensive analysis of the status of digital competence integration into pre-university education identified key barriers and several interrelated challenges and gaps contribute to this situation as follows:

- **Policy-implementation gap:** There is a significant disconnect between ambitions for digitalization and its actual implementation due to organizational bottlenecks, inconsistent governance, weak cross-sectoral and multi-stakeholder coordination and fragmented efforts in policy delivery.
- **Outdated curriculum and weak competence integration:** The current curriculum does not adequately support the systematic development of digital competence across subjects and lacks clear articulation of specific skills and intended learning outcomes by grade level. Emerging technologies such as AI and advanced digital skills are not integrated into curriculum, and it lacks frameworks and guidelines for use by teachers and students.
- **Limited teacher digital capacity and pedagogical preparedness:** Many teachers lack adequate digital competence and practical training in digital pedagogy resulting in inconsistent integration of technology into teaching practices. A key underlying factor is the insufficient provision of structured pedagogical training and continuous professional development programs focused on digital competencies.

- **Digital infrastructural gaps and inequities:** Schools face poor connectivity, outdated technological resources, and shortages of essential digital tools. These issues are compounded by inequities between urban and rural areas. Cybersecurity and digital safety protocols remain underdeveloped, further limiting safe and effective use of digital technologies.
- **Fragmented digital learning ecosystem and resources:** Kosovo lacks coordinated digital learning platforms, adequately produced digital learning content for schools and teachers, and pedagogical guidelines for classroom integration. Challenges also include limited adaptation and structuring of open educational resources, weak data governance, and interoperability gaps.
- **Inadequate assessment tools and monitoring systems for digital competences:** There is a lack of standardized and structured assessment tools or mechanisms to assess student and teacher digital competence. Monitoring systems and frameworks to evaluate the effectiveness of digitalization in education initiatives and teacher capacity are underdeveloped.

Impact

Vision: An inclusive and equitable pre-university education ecosystem that provides conditions to foster students' and teachers' digital competence and prepares digital citizens for active participation in a digital society and economy.

Long-term outcome: All pre-university students and teachers in Kosovo are fully engaged in a high-quality technology-enhanced education system where digital competences are an integral part of the curriculum and teaching–learning practices, aligned with EU and global standards.

Structure of the Theory of Change

The proposed theory of change, as illustrated in Figure 7, outlines the pathway from inputs and activities through outcomes to the achievement of the long-term impact.

Figure 7. ToC pathway and components



The ToC is built on five foundational pillars as the focus areas where inputs and activities will lead to short-term and mid-term outcomes, ultimately contributing to the envisioned goal:



The ToC is presented in a visual format in Figure 8, followed by a detailed description of all components for each pillar. It illustrates a pathway by linking related activities and outcomes to the intended impact. For each pillar, based on the gaps identified in the analysis, the corresponding inputs and activities are outlined as derived from the recommendations of the analysis. The outputs are presented and will be incorporated into the roadmap with defined milestones and KPIs. These outputs serve as the building blocks leading to short-term and long-term outcomes. In the roadmap, key stakeholders and actors along with their roles and responsibilities are presented.

Logic model for the ToC

This logic model assumes that if the inputs and activities defined for each pillar are implemented in line with the assumptions, they will generate outputs as the immediate results. These outputs will in turn lead to short-term outcomes (within 1–3 years), medium- to long-term outcomes (within 3–5 years), and ultimately contribute to the desired impacts (5+ years) as illustrated in Figure 8. Alongside the ToC diagram, the underlying assumptions are also presented and explained in more detail at the end of this section.

Foundational pillars and their contribution to change

Pillar 1 (P1)

Recommendations:

1. Strengthen strategic leadership, institutional capacity, and cross-sectoral coordination at central and municipal levels to reinforce policy implementation and reduce fragmentation.
2. Establish clear multi-stakeholder coordination and mechanisms to engage all actors from government, schools, teachers, parents, civil society, private and EdTech sector.
3. Streamline budget allocation for the digitalization of education with equitable disbursement and distribution to ensure timely and efficient funding at central and municipal levels.
4. Establish monitoring, evaluation, and accountability systems to ensure policy implementation and promote informed decision-making in the digitalization of education.



Inputs and Activities

- A1.** Establish a dedicated Digital Education Unit within MESTI's Digitalization Department with a cross-departmental mandate for policy design, coordination, implementation, and capacity development with stakeholders and partners.
- A2.** Establish and institutionalize a high-level cross-sectoral steering committee or Task Force bringing together MESTI, Ministry of Finance, municipal education authorities (MEDs), and other relevant actors to oversee policy implementation, budget alignment, and accountability regarding digital education.
- A3.** Establish an ICT Competence & Support Centre jointly led and co-financed by MESTI and other ministries to provide system-level technical and pedagogical support and appoint digital focal points for localized implementation.
- A4.** Conduct a comprehensive training needs analysis across MESTI, municipal education directorates, and schools to identify specific staffing gaps and digital skills requirements for ICT and EdTech personnel.

- A5.** Launch a Digital Innovation Fund for Education to incentivize public-private partnerships and support the co-creation of digital learning solutions and content with startups, NGOs, academic institutions, and international partners.
- A6.** Introduce and implement a framework for financing mechanisms to prioritize digital education investments and equitable resource allocation.
- A7.** Conduct a thorough review of procurement processes to identify and eliminate bureaucratic bottlenecks to unblock and disburse the allocated budget for digital technology in schools.
- A8.** Develop a centralized monitoring system to track digital policy implementation and digital education initiatives in combination with the Education Management Information System (EMIS) to support data-driven decision-making with monitoring and evaluation indicators and KPIs.
- A9.** Develop initiatives such as consultation processes, advisory boards and surveys to involve students, teachers, and parents in digital education initiatives.

Outputs

- OP1.** A dedicated Digital Education Unit and a multi-ministry steering committee are officially established and regularly convene.
- OP2.** Cross-sectoral digital education coordination bodies and technical working groups at central and municipal levels are established and functional.
- OP3.** Inter-ministerial and inter-agency coordination mechanisms are established and operations are ongoing.
- OP4.** A dedicated task force and ICT Competence and Support Centre are formally established with structure and budget.
- OP5.** EdTech coordinator and technical support roles are formalized and staffed at the municipal and school levels and focal points for digital education support are appointed in a significant number of municipalities.
- OP6.** A significant portion of undisbursed allocated budgets for digitalization and training is released and utilized, resulting in targeted procurement of high-need classroom tools for rural and underserved schools.
- OP7.** A Kosovo monitoring and evaluation system is developed, and data collection begins; mechanisms and systems are in place to regularly gather feedback for the development of digital education initiatives.



Short-Term Outcomes

- STO1.** Enhanced institutional capacity and leadership within MESTI and MEDs to drive and manage digital transformation initiatives effectively.
- STO2.** Increased transparency and accountability in the planning, implementation, and budgeting of digital education initiatives.
- STO3.** Improved inter-ministerial coordination and communication on digital education goals.
- STO4.** Reduced fragmentation and duplication of efforts among various stakeholders involved in digital education.
- STO5.** Improved budget allocation and distribution mechanisms for digital education.



Long-Term Outcomes

- LTO1.** Enhanced capacity for digital education governance with data-driven policy decision-making to ensure long-term sustainability of digital transformation in education.
- LTO2.** Unified and accountable governance and coordination mechanism for digital education efforts for consistent policy implementation and effective budget allocation across Kosovo's pre-university system.
- LTO3.** Sustained and adaptable digital education ecosystem with clear roles, responsibilities, and effective collaboration among all stakeholders with a unified Kosovo-wide approach to digital competence development.

Pillar 2 (P2)

Recommendations:

1. Modernize and provide sustained delivery of digital infrastructure and guarantee equitable access to reliable connectivity and equipment for schools, particularly rural and underserved regions with the required funding and support mechanisms.
2. Streamline digital learning platforms, and develop and institutionalize a centralized, coordinated learning management system to ensure interoperability, accessibility, and secure use.
3. Develop and scale up curriculum-aligned digital content and shared repositories and promote the integration of OERs and OEP to expand access to digital learning resources.

4. Safeguard online safety at schools and in digital learning environments by institutionalizing cybersecurity protocols and digital safety standards.
5. Invest in human and technical resource development through targeted programs and active stakeholder engagement including partnerships and foster collaboration with private EdTech, and IT sector, and SMEs.



Inputs and Activities

- A1.** Conduct a mapping of existing infrastructure and technology use to identify gaps in digital education implementation and school digital maturity (connectivity, equipment, and usage patterns) and use monitoring data to provide targeted support to underperforming schools and regions.
- A2.** Develop and implement a minimum standards package for school-level digital infrastructure and equip them with safe internet access, classroom devices, and tools with baseline cybersecurity measures such as firewalls, secure Wi-Fi and filtered content systems in all public schools.
- A3.** Develop a digital equity policy with targeted funding mechanisms to ensure provision of accessible digital tools and content to support students with disabilities.
- A4.** Mandate consolidation of existing LMSs at central level under a maintained architecture (e.g., KREN) as a central entity responsible for providing comprehensive technical support, maintenance, and scaling to ensure ownership and interoperability.
- A5.** Establish a Single Sign-On (SSO) authentication system across all platforms to streamline access, improve user experience and ensure secure integration of services.
- A6.** Promote the systematic and effective use of Kosovo digital learning platforms like Shkollat.org through targeted advocacy, intensive training, and explicit integration into classroom practice.
- A7.** Develop guidelines and standards for the adoption and use of OERs, OEPs, and MOOCs, and establish open-access digital repositories to host curated resources accessible to teachers and students across all education levels.
- A8.** Establish a content quality assurance and review board under MESTI to oversee the co-creation, evaluation, and approval of curriculum-aligned content developed in collaboration with teachers, students, and educational institutions.
- A9.** Develop a centralized and interoperable digital repository of curated high-quality learning materials for students and teachers, supported by a quality assurance system to ensure regular review, updates, and alignment with educational standards.

- A10.** Engage EdTech companies, civil society, and academia in co-creating and evaluating digital learning solutions in cooperation with schools as test-beds.
- A11.** Develop and enforce cybersecurity policies and protocols, and school guidelines on digital safety, including cyberbullying, misinformation, incident reporting mechanisms, and procedures for addressing online risks.



Outputs

- OP1.** Schools have reliable internet connectivity, essential classroom devices (computers, tablets, and other digital tools) and implement baseline cybersecurity and digital safety protocols to support effective digital learning.
- OP2.** A consolidated, centrally coordinated digital learning platform (e.g., Shkollat.org, KREN LMS) is operational with streamlined technical support, maintenance, and secure access mechanisms including Single Sign-On (SSO).
- OP3.** Kosovo guidelines, standards, and a content quality assurance framework are in place and curriculum-aligned digital learning content is available through accredited repositories, including OERs, OEPs, MOOCs, and digital textbooks.
- OP4.** Partnerships with EdTech companies, civil society, and academia are established for co-creating locally relevant digital learning solutions that are piloted and scaled based on feedback from teachers, students, and educational institutions.



Short-Term Outcomes

- STO1.** Increased access to and effective utilization of digital infrastructure, devices, and learning platforms, particularly in rural and underserved areas.
- STO2.** Improved digital learning environments and safer online access for students with enhanced digital safety and cybersecurity practices and awareness among students, teachers, and school administrators.
- STO3.** Availability and use of curriculum-aligned digital learning content, including interactive and inclusive materials and equitable access to digital learning resources for all students with targeted support for learners with disabilities and students in remote areas.

- STO4.** Fully functional, centralized, and interoperable digital learning ecosystems (platforms, content repositories) with consistent adoption and pedagogical integration in classroom.
- STO5.** Co-created, locally relevant digital learning solutions are piloted and scaled based on feedback from teachers, students, and educational institutions. More locally relevant digital learning solutions are co-created and piloted.



Long-Term Outcomes

- LTO1.** A robust and inclusive digital learning ecosystem that supports flexible, engaging, and student-centered learning, reducing the digital divide and ensuring inclusivity.
- LTO2.** Universal, equitable, and sustainable access to modern digital infrastructure, safe learning environments, and relevant digital resources across all pre-university schools.
- LTO3.** Kosovo's education system can efficiently adopt, utilize, and scale innovative digital tools, content, and services, fostering continuous improvement in teaching and learning.

Pillar 3 (P3)

Recommendations:

1. Reform the curriculum to propose digital competence as a new competence and integrate transversal digital competence beyond basic digital skills across subject areas, aligned with EU and global frameworks (Dig-Comp, UNESCO DLGF).
2. Develop and implement a pre-university Digital Education Action Plan with clear goals, priorities, timelines, and KPIs to guide implementation of the reformed curriculum.
3. Define progressive digital competence outcomes, from foundational to advanced skills, using EU and global standards by embedding emerging technologies such as AI.
4. Establish and implement a Kosovo assessment framework and tools to evaluate students' progression from foundational to advanced skills, aligned with EU and global frameworks for each curriculum stage.
5. Promote student-led initiatives and practical applications of digital skills with a focus on inclusion and equity (e.g., girls in tech, marginalized students).



Inputs and Activities

- A1.** Revise curricula to include digital competence as the seventh key competence, embed measurable digital skills and attitudes across all subjects and grade levels, and mandate cross-curricular integration of skills such as programming, AI, robotics, digital arts, critical and computational thinking, and responsible online behavior.
- A2.** Develop and localize a Kosovo digital competence framework aligned with EU and global frameworks (DigComp, UNESCO, OECD, EC) defining progression and measures from foundational to advanced applied/critical skills.
- A3.** Revise outdated laws and administrative barriers to enable digital and blended content adoption, including digital textbooks and open educational resources, and updating ICT books.
- A4.** Integrate career-relevant digital skills into the “Life and Work” curriculum, aligning content with evolving labor market demands and embedding practical digital skills relevant to various professional pathways (VET education).
- A5.** Develop and pilot Kosovo digital competence assessment tools for key stages (grades 5, 9, 12) and align them with EU/global benchmarks to provide structured feedback and track student progression.
- A6.** Create and expand opportunities and student-led initiatives such as competitions, tech clubs, hackathons, civic engagement, and STEAM programs to encourage students to apply digital skills to real-world problems, especially girls and marginalized students.
- A7.** Design and scale up bit-sized learning and micro-credentials in digital skills embedding different subjects utilizing available European and global resources and initiatives.



Outputs

- OP1.** Kosovo digital competence framework developed, revised curriculum competence syllabi integrating digital competence across subjects and grades incorporating digital competence learning outcomes are published.
- OP2.** Pilot curriculum modules and subject-specific teaching guides that integrate advanced digital skills (e.g., coding, programming, AI concepts) are developed and tested in selected schools.

- OP3.** Revised legislation and policies to reduce legal and administrative barriers to the adoption of digital textbooks and digital learning resources.
- OP4.** Piloted digital competence assessment tools deployed at key grades with initial data collection and feedback mechanisms.



Short-Term Outcomes

- STO1.** Digital competences are systematically and consistently integrated across most subjects and grade levels, with clear learning outcomes and progression pathways.
- STO2.** Students demonstrate improved foundational digital skills developing critical thinking, creative digital content creation skills, and responsible online behavior.
- STO3.** Increased integration of foundational and advanced digital skills into subject-specific curricula in pilot schools.
- STO4.** Improved alignment of Kosovo's curriculum with European and global digital competence frameworks with practical guidelines of their local implementation and scaleup.
- STO5.** Kosovo digital competence assessment tools for students are developed and initially deployed to gather baseline data and test their effectiveness.



Long-Term Outcomes

- LTO1.** A competency-based EU-aligned curriculum that fully integrates transversal digital skills and advanced digital competence (including critical thinking, computational thinking, digital content creation, emerging technologies) across grades.
- LTO2.** Systematic integration of digital competences across the pre-university curriculum, ensuring progressive development from foundational to advanced skills.
- LTO3.** A generation of digitally literate students capable of critical thinking, problem-solving, and responsible use of digital tools for their purposes and applied digital competencies.
- LTO4.** Assessment tools for digital skills fully aligned with international standards supporting lifelong digital competence development.

Pillar 4 (P4)

Recommendations:

1. Develop and institutionalize a Kosovo Digital Competence Framework for Teachers as an official mandatory document for professional development aligned with DigCompEdu and UNICEF EDCF, UNESCO ICT CFT endorsed by MESTI.
2. Strengthen digital competence through modular and needs-based continuous professional development (CPD) programs in technological pedagogical content knowledge (TPACK) and incentivize them by certification and career promotion.
3. Promote and cascade peer-to-peer and community-based learning for teachers in advanced digital skills and digital pedagogy, including AI literacy and subject-specific use of digital tools through MESTI, municipalities and donor-supported programs and certified trainers in technology integration and a digital platform for sharing professional practices.
4. Develop and implement a Kosovo Teacher Digital Competence Assessment Instrument to systematically evaluate and monitor teacher digital competences linked to professional development, licensing, and career advancement.



Inputs and Activities

- A1. Develop and adopt a Kosovo Digital Competence Framework for teachers, endorsed by MESTI, localizing DigCompEdu areas (from foundational to advanced) and incorporating teacher competence frameworks from UNESCO and UNICEF.
- A2. Establish structured and accredited CPD programs and training in ICT, TPACK and digital pedagogy with incentive mechanisms (certifications, promotion, credits) linking them to career progression.
- A3. Design and roll out CPD programs focused on advanced digital topics such as AI, cybersecurity, robotics, and subject-specific digital tool integration in teaching.
- A4. Promote peer-to-peer learning and teaching by establishing communities of practice through school-based mentorship initiatives, sharing lesson plans, digital resources, and teaching practices leveraging NGO's, donors and MESTI capacity.
- A5. Establish "train-the-trainer" models by upskilling IT specialists and reskilling ICT teachers with latest technological skills to act as master trainers at municipalities and schools.

- A6.** Design and implement a Kosovo teacher digital competence assessment system with a dashboard to monitor teacher training exposure, digital tool usage, and teacher digital competence.
- A7.** Adapt blended learning/teaching methods and integrate OERs and MOOCs, and establish training and guidelines for teachers to integrate OERs and MOOCs into teaching.
- A8.** Conduct a comprehensive analysis of teacher capacity and needs, and a periodic assessment to guide targeted digital upskilling and promote research-driven efforts to support evidence-based improvements in teaching and learning.

Outputs

- OP1.** Kosovo Digital Pedagogy Competence Framework developed and ready for adaptation in pre- and in-service teacher education.
- OP2.** Modular, accredited and targeted CPD programs for ICT, TPACK, and digital pedagogy developed and piloted across subjects and education levels.
- OP3.** Master trainers and peer teaching communities are promoted to cascade digital learning training and mentoring.
- OP4.** Kosovo assessment system for teachers piloted and integrated into performance review with a monitoring and evaluation dashboard established to track teacher digital competencies and pedagogical training.
- OP5.** Blended learning/teaching methods and integration of OERs and OEPs are piloted and promoted across schools and utilized by teachers.

Short-Term Outcomes

- STO1.** Increased digital competence among pre-university teachers, encompassing technical skills and pedagogical application.
- STO2.** Improved teacher confidence and readiness to integrate into classroom pedagogy supported by technical and pedagogical guidance.
- STO3.** Scaled central and local CDPs program for digital pedagogy and teachers' career incentives for CPD institutionalized.
- STO4.** Institutionalized assessment tools and monitoring systems in teacher digital competence development.
- STO5.** Master trainers and peer learning communities actively support teachers in integrating digital tools.



Long-Term Outcomes

- LTO1.** Digitally competent teachers capable of applying advanced pedagogical strategies and technologies across subjects and grade levels.
- LTO2.** A sustained culture of continuous professional development and peer learning among teachers in the education system.
- LTO3.** Institutionalized and incentivized monitoring systems ensure long-term teacher engagement and accountability in digital pedagogy.
- LTO4.** Improved student digital competences and learning outcomes driven by teachers' effective integration of technology.

Pillar 5 (P5)

Recommendations:

1. Develop an AI framework in education aligned with international frameworks such as Digomp 3.0, UNESCO AI CFS, UNECSO AI CFT, AILit.
2. Integrate AI literacy and advanced technological skills into curriculum to prepare students with the mindset and competences to understand, use and critically evaluate these technologies.
3. Strengthen teacher capability in emerging technologies and AI through targeted CPD, pedagogical training, and pilot initiatives such as peer-to-peer mentorship.
4. Provide policy and institutional support for school-wide AI adoption in teaching and learning, ensuring equitable access and ethical and responsible use.



Inputs and Activities

- A1.** Develop a Kosovo strategy framework for AI and emerging technologies in education, embedding ethical principles, pedagogical goals, quality standards, and implementation pathways.
- A2.** Embed advanced digital skills and emerging technologies into curriculum and adapt AI literacy frameworks (DigComp 2.2, DigComp 3.0, UNESCO AI CFS, AILit) with defined learning outcomes.
- A3.** Integrate AI competencies into teacher education and CPD targeted on AI pedagogy and AI use for teaching and assessment and link them to certification aligned with DigCompEdu, and UNESCO AI CFT.

- A4.** Develop and enact regulations, operational protocols, and quality assurance standards for AI in education, addressing academic integrity, and ethical and responsible use.
- A5.** Allocate dedicated funding and pilot subsidies to provide AI-enabled devices and encourage the adoption of low-cost, open-source AI tools in schools, with a focus on secondary and upper secondary education.



Outputs

- OP1.** Kosovo strategy framework for AI emerging technologies in education is developed.
- OP2.** Curriculum for AI and advanced digital skills across grade levels is developed based on international and EU frameworks.
- OP3.** Kosovo guidelines and quality assurance standards for ethical and pedagogical AI use are published.
- OP4.** CPD and training programs for teachers on emerging technologies and AI pedagogical integration are implemented.
- OP5.** Dedicated funding and pilot programs for AI-enabled education are launched and uptake of AI and GenAI by schools, teachers, and student increased.



Short-Term Outcomes

- STO1.** Increased awareness and foundational understanding of AI and emerging technologies among policymakers, school principals, teachers, and students.
- STO2.** AI literacy modules integrated into curricula and teacher training programs with measurable student engagement in AI-related projects.
- STO3.** Teachers demonstrate increased confidence and capacity to explore, pilot, and evaluate AI tools in teaching and classrooms.
- STO4.** Regulatory frameworks and ethical guidelines for AI in education are established.



Long-Term Outcomes

- LTO1.** Proactive integration of emerging technologies and AI literacy into education policy, curricula, and pedagogical practices, guided by ethics, inclusivity and innovation.
- LTO2.** Teachers and students are equipped to critically and responsibly engage with AI, fostering innovation, problem-solving, and lifelong learning.
- LTO3.** A resilient pre-university education system that continuously adapts with technological change, utilizing them in teaching and learning while safeguarding equity, digital wellbeing, and human-centered learning.

Key Assumptions:

For this ToC to be successful, several assumptions and conditions must hold true:

- **Sustained political will and commitment** from the government of Kosovo, particularly MESTI, to prioritize digital transformation in pre-university education regardless of political changes.
- **Shared understanding of the digital skills gap** among all stakeholders, including the government, policymakers, education providers, and the private sector.
- **Institutional and human capacity building** at all levels (MESTI, MEDs, school leadership, IT staff) to plan, implement, and monitor digitalization in education effectively.
- **Effective multi-level coordination** between ministries, MEDs, schools, civil society, the private sector, and international partners to prevent duplication and ensure alignment with government priorities.
- **Adequate and consistent funding** for infrastructure, content, teacher training, and technical support, with budgets fully disbursed.
- **Teacher readiness and motivation** to adopt digital pedagogies, participate in professional development, and integrate technology in classroom practice.
- **Student engagement beyond school**, with equitable access to devices and digital tools at home to bridge the home-school digital divide.
- **High-quality and relevant resources** (digital content, tools, and training) that are pedagogically sound, culturally contextualized, and aligned with curricula and international frameworks.
- **Reliable infrastructure and technical support**, ensuring consistent internet connectivity, devices, and maintenance, especially in rural and underserved schools.

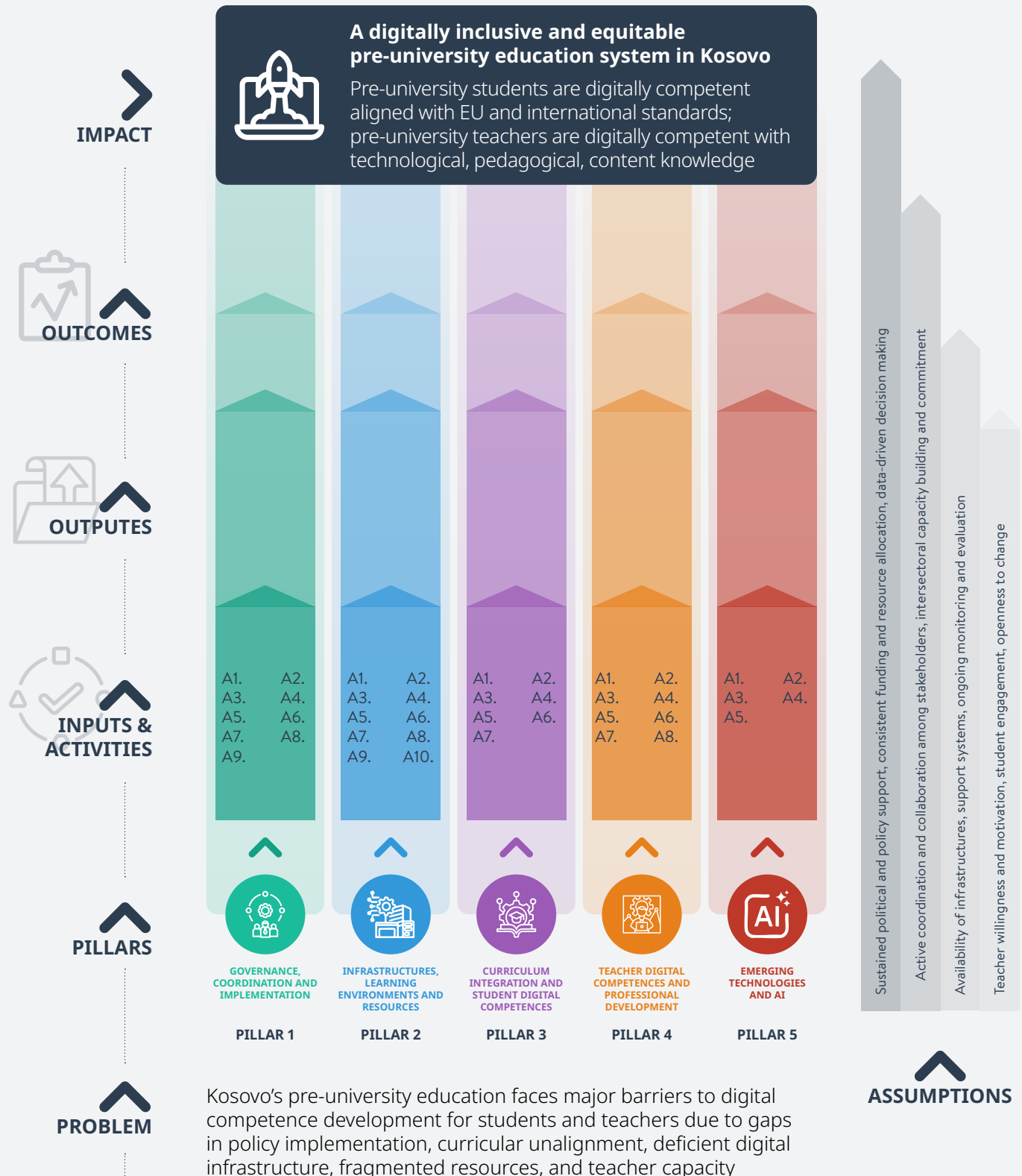
- **Data-driven decision-making**, with systematic collection and use of accurate, disaggregated data to guide planning, policy, and resource allocation.
- **Effective contextualization of international frameworks** (EU, UNICEF, UNESCO, OECD) adapted to Kosovo's education system with clear learning outcomes and assessment instruments.
- **Overcoming resistance to change**, including bureaucratic barriers, outdated legal frameworks, and traditional teaching mindsets through reform and capacity-building.
- **Active stakeholder collaboration**, with meaningful engagement of teachers, students, parents, civil society, and private sector actors in the design and implementation of digital education.

Key Stakeholders (actors directly or indirectly involved in the implementation of ToC):

- **Government bodies:**
 - Government of Kosovo
 - Ministry of Education, Science, Technology and Innovation (MESTI)
 - Municipal Education Directorates (MEDs)
 - Ministry of Economy, Ministry of Finance
 - Ministry of Internal Affairs (for cross-sectoral collaboration)
- **Educational institutions and stakeholders:**
 - School leadership and administration (principals)
 - Teachers (ICT teachers, subject teachers)
 - Students across all pre-university levels
 - Parents and caregivers
 - Universities, academic institutions and Institutes (e.g., University of Prishtina/Priština, Faculty of Education, Kosovo Pedagogical Institute)
- **Civil society & non-governmental organizations (NGOs)**
- **Private sector including** EdTech companies and IT service providers
- **International partners:**
 - European Union (EC, ETF, EACEA)
 - GIZ
 - ITU
 - USAID
 - OECD
 - UNICEF
 - UNESCO
 - World Bank

Figure 8.

Digital Competence Integration in Kosovo's Pre-University Education



*For each Pillar - the **Problem** and **Impact** are the same

PILLAR 1

GOVERNANCE, COORDINATION AND IMPLEMENTATION



INPUTS & ACTIVITIES



OUTPUTS



OUTCOMES SHORT-TERM



OUTCOMES LONG-TERM

A1.
A3.
A5.
A7.
A9.

A2.
A4.
A6.
A8.

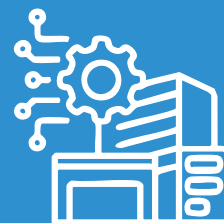
- Digital Education Unit established and operational with steering committee and cross-sectoral coordination bodies.
- ICT Competence & Support Center and task force established and EdTech coordinator roles assigned.
- Budgets for digitalization in education and teacher training disbursed and effectively used.
- National monitoring and evaluation system with feedback mechanisms are functional.

Improved cross-sectoral coordination mechanisms and engagement in digital education, more accountability in budgeting and implementation with transparent roles and responsibilities

Coherent governance with well-defined policies, coordinated implementation, sustained funding, and data-driven decision making for digitalization in education

PILLAR 2

INFRASTRUCTURES, LEARNING ENVIRONMENTS AND RESOURCES



INPUTS & ACTIVITIES



OUTPUTS



OUTCOMES SHORT-TERM



OUTCOMES LONG-TERM

A1.
A3.
A5.
A7.
A9.

A2.
A4.
A6.
A8.
A10.

- Schools equipped with internet, essential devices, and baseline cybersecurity and digital safety measures.
- Nationally consolidated digital learning platform operational with streamlined support and secure access.
- Curriculum-aligned digital content and repositories established with quality assurance.
- Partnerships with EdTech, civil society, and academia established digital learning solutions piloted.

Provided reliable digital infrastructure at schools, safe and inclusive digital learning environments with curriculum-aligned content through national and coordinated learning platforms

Inclusive and equitable access to digital infrastructure, safe digital learning environments and quality digital learning resources

PILLAR 3

CURRICULUM INTEGRATION AND STUDENT DIGITAL COMPETENCES



INPUTS & ACTIVITIES



OUTPUTS



OUTCOMES SHORT-TERM



OUTCOMES LONG-TERM

A1.
A3.
A5.
A7.

A2.
A4.
A6.

- Curricula revised and aligned with EU-frameworks for digital competences and learning outcomes.
- Curriculum modules and subject-specific teaching guides for advanced digital skills are tested in selected regions, schools.
- Legislation and policies enabling adoption of digital textbooks and learning resources are revised.
- Digital competence assessment tools deployed with initial data collection and feedback.

Embedded digital competences systematically across curricula aligned with EU/global frameworks with improved advanced digital skills and competences for students supported by assessment tools

EU/global-aligned competency-based curricula with transversal digital competences across pre-university education levels with improved learning outcomes

PILLAR 4

TEACHER DIGITAL COMPETENCES AND PROFESSIONAL DEVELOPMENT



INPUTS & ACTIVITIES



OUTPUTS



OUTCOMES SHORT-TERM



OUTCOMES LONG-TERM

A1.
A3.
A5.
A7.

A2.
A4.
A6.
A8.

- Teacher Digital Competence Framework developed and integrated into pre- and in-service teacher education.
- Modular, approved CPD for digital pedagogy programs piloted and scaled across subjects and education levels.
- Master trainers and peer learning communities promoted to support cascading of digital pedagogy training.
- Teacher digital competence assessment tools piloted and integrated into performance reviews.

Enhanced teacher digital pedagogical competences through structured professional development programs, peer-learning communities, supported by real-time monitoring systems

Digitally competent teachers with strong TPACK supported by a culture of CPD for effective adaptation of new technologies in teaching

PILLAR 5 EMERGING TECHNOLOGIES AND AI



INPUTS & ACTIVITIES



OUTPUTS



OUTCOMES SHORT-TERM



OUTCOMES LONG-TERM

A1.
A3.
A5.

A2.
A4.

- National strategy framework for AI emerging technologies in education is developed.
- Curriculum for AI and advanced digital skills across grade levels is developed based on International and EU frameworks.
- National guidelines and quality assurance standards for ethical and pedagogical AI use published.
- Training programs for teachers on emerging technologies and AI are implemented.

Integrated AI and advanced technology competences into curricula and teacher training, piloted and supported by regulatory frameworks

Reformed curricula with AI literacy and emerging technologies competences with empowered students and teachers ready for critically and responsibly

Limitations of the analysis

There are a few limitations identified for this study that should be acknowledged:

- **Limited student perspectives and inputs in field consultation:** Although the analysis aimed to create a roadmap for enhancing students' digital skills as well, but direct student engagement in field research was minimal due to ethical and logistical constraints. The study was not designed to involve students from all education levels in data collection or interviews, as this would have required a separate scope with comprehensive ethical approvals beyond the study's capacity. However, to incorporate student perspectives to a limited extent, a Youth Reference Group consisting of four students (aged 18 and above) participated in a focus group discussion. This student engagement does not fully represent socio-economic backgrounds, regions, or grade levels nor the necessary data and inputs limiting depth interpretation and conclusions. In addition, the results of students who participated in international assessments were analyzed and reflected upon in relation to their digital competence levels, providing further insights into how well they meet global standards and highlighting areas for improvement.
- **Exclusion of private schools:** This analysis is focused on public schools in Kosovo. While one non for-profit school was visited for teacher consultation and classroom observation, the analysis does not comprehensively include private schools, which often have stronger digital infrastructure and more advanced use of digital technologies. As a result, high-performing digitalization in education practices in private institutions may be underrepresented, potentially creating a bias toward less-resourced public settings.
- **Demographic representation of teachers and students:** The selection of teachers and students was purposive, based on availability and practical arrangements. Although efforts were made to ensure diversity across socio-economic backgrounds, geographic locations (urban and rural), and educational levels, the sample may not fully reflect the broader demographic distribution. Nevertheless, this limitation does not significantly compromise the validity of key findings and conclusions.
- **Lack of central - level digital competence assessments:** Kosovo currently lacks standardized assessments for evaluating student digital competence across grade levels or key stages. Similarly, there is no Kosovo-level evaluation of teachers' digital pedagogical competencies. This lack of baseline and system-wide data limits the ability to objectively measure digital skill acquisition, teaching readiness, or progress across the system.

- **Limited data on elective course uptake and teaching quality:** The study could not assess the extent to which students enroll in elective courses related to digital skills, the quality of teaching in these courses, or the degree to which the DigComp is integrated into instruction. This restricts insight into curriculum implementation and student uptake of advanced digital learning opportunities.
- **Lack of data on teacher ICT-related professional training:** The analysis does not include comprehensive data on how many teachers have undergone ICT-related professional development programs.

5 Annexes



Annex A. Roadmap for digital education reform and digital competence development in Kosovo's pre-university education

Implementation priority level: Urgent (within 1 year); Short-term (1–2 years); Mid to long-term (3–5 years)

Pillar	Action/Activity	Priority	Indicative Timeframe	Actors/ Responsibilities	Milestones	Indicators/KPIs
P1. Governance, coordination and implementation	A1.	Urgent	2026	- MESTI: lead coordination and establishment, define goals, structure, roles, - Ministry of Finance: budget and resource allocation	- Digital Education Unit (DEU) within MESTI established, organizational structure approved, - A multi-ministerial steering committee is formed.	- DEU is functional with roles and functions, annual budget assigned - Committee members are assigned and meetings are being held.
	A2.			- MESTI: lead the establishment of the steering committee - Municipalities: introduce their roles and representatives - Ministry of Finance and other organizations: have their representatives		
	A3.	Short-term	2026-2027	- Ministry. of Finance: financial support and develop budget framework for the Center - MESTI: mandate the formation of the Center and oversee the organization, oversee the staff& training analysis - MEDs: provided consultation and their coordination roles, conduct needs analysis for ICT personnel needs - KREN: to support the establishment and act as an enabler	- Organizational structure approved by the government and MESTI - Budget line assigned and inter-agency coordination mechanisms defined - ICT Center established, institutionalized and staffed with technical, pedagogical and support teams - Staff and training needs analysis conducted and gaps identified	- ICT Center is operational with its organization and budget - Number of staff and focal points at municipal levels - Number of technical, pedagogical and support teams - Results of the staff training needs are ready for decision making
	A4.					
	A5.	Mid-term	2027-2029	- MESTI: issue policy mandate - Ministry. of Finance: financial support - International organizations (UN and EU) and NGOs - Educational institutions and faculties of Education	- The Fund is established and publicized - Cooperation mechanisms and partners are defined	- Number of partners involved - Number of initiatives and solutions created
	A6.	Mid-term	2027-2029	- MESTI: develop framework with priority areas - MEDs: provide consultation	- Framework with financial mechanisms developed - Prioritized areas identified - Potential public, private and international funders are identified	- Budget line created for digitalization in education % of secured co-financing
	A7.	Urgent	2026	- MESTI: coordinate and oversee the process - Ministry of Finance: fiscal and financial support of the process - Municipalities: provide information on budgets and needs	Procurement frameworks and processes identified	- Unallocated budget identified % budget disbursed
	A8.	Mid-long term	2027-2030	MESTI: responsible for establishing the monitoring system, M&E and KPIs	- Kosovo monitoring and evaluation system is developed. - Mechanisms and data collection systems are in place and gathering feedback	Kosovo monitoring system is functional extent of data and feedback collected
	A9.			- Municipalities: provide required baseline information about schools - NGOs and teacher unions		

Pillar	Action/Activity	Priority	Indicative Timeframe	Actors/ Responsibilities	Milestones	Indicators/KPIs
P2. Infrastructures, learning environments and resources	A1.	Urgent	2026	- MESTI: lead, coordinate - MEDs: provide school-level data - KREN: technical input	Kosovo digital infrastructure map completed	- Mapping report published % of regions and schools covered
	A2.	Short-term	2026–2027	- MESTI: define standards, coordinate budget disbursement - Municipalities: provide consultation - Ministry of Finance: allocate budget - Schools: implement	- Minimum standards adopted - Schools equipped with devices and secure access	- Dissemination of minimum standards package % of schools meeting minimum standards - Student-device ratio
	A3.	Short-term	2026–2027	- MESTI: Policy development lead - Ministry of Finance: funding and allocation mechanisms - NGOs: inclusion advocacy	- Digital equity policy developed and accepted - Implementation plan adopted	- Policy in place and approved % of funds allocated for digital inclusion
	A4.	Short-term	2026–2027	- MESTI: mandate consolidation, oversight - KREN: central management, technical deployment and support - Municipalities: report on LMS use and their needs	Consolidated central LMS operational	- Number of systems consolidated % of schools using LMS - Number of platforms integrated % of users with SSO access
	A5.				Kosovo SSO system live	
	A6.	Mid-term	2026–2028	- MESTI and municipalities: awareness campaigns - Schools: adoption and implementation - Teacher trainers: capacity building	- Training and advocacy campaigns completed - Usage integrated in classrooms	- Number of teachers trained % of classrooms using LMS
	A7.	Mid-term	2027–2029	- MESTI: develop and advice standards and frameworks - Universities: curate resources - NGOs: contribute	- OER/OEP guidelines issued - Repositories operational	- Number of resources developed and adopted % of teachers accessing repositories
	A8.	Mid-term	2028–2029	- MESTI: set up board - Universities and teachers: co-create content	- QA board functional - Content quality framework adopted	- Number of content reviews conducted % of approved resources
	A9.	Mid-long term	2027–2030	- MESTI & municipalities: promote & partnerships - EdTech sector: innovation pilots	Pilot projects with EdTech companies launched	- Number of pilots - Number of partnerships established
	A10.	Urgent	2026	- MESTI: policy design and dissemination - IT/ICT sector: provide technical logistics and support - Schools: adoption - NGOs: awareness	- Cybersecurity policies and guidelines enforced in schools - Technical protocols and support system developed	- Number of municipalities adopted the policy % of schools with protocols implemented - Number of reported/resolved incidents

Pillar	Action/Activity	Priority	Indicative Timeframe	Actors/ Responsibilities	Milestones	Indicators/KPIs
P3. Curriculum integration and student digital competences	A1.	Urgent, mid-term	2026–2027	- MESTI: lead curriculum reform and integrate digital competences, policy mandate - Universities and teacher educators: provide expertise and research inputs - SMEs: provide disciplinary inputs - MEDs: support pilots	- Curricula in all stages updated with list of competences in the Curriculum Reform - Curriculum reform approved - Updated Life Skills and ICT textbooks approved - Cross-curricular digital skills and transversal competences developed and integrated	- Digital Competence added to the list of curriculum competences % of subjects included digital competence outcomes % of education levels integrated cross-curricular skills and transversal competences
	A2.			- MESTI: lead framework design - Universities: adapt global frameworks - International partners: provide benchmarking	National digital competence framework developed	- Framework published - Number of schools implementing it
	A3.	Mid-term	2026–2027	- MESTI: draft reforms and facilitate regulatory coordination, update ICT books - Municipalities and Schools: adopt reforms and revised laws	- Legal and regulatory changes enacted - ICT books updated accordingly	- Number of revised laws/policies % of schools authorized to use digital resources - Number of revised and updated textbooks
	A4.	Mid-term	2027–2028	- MESTI: curriculum reform - Kosovo Agency of Statistics: provide labor market data - Schools: pilot integration	Life and Work curriculum revised	% of curriculum aligned with labor market needs - Number of school modules updated
	A5.	Mid-long term	2027–2029	- MESTI: lead tool design - Professional Development Unit: technical development - International partners: benchmarking	Assessment tools piloted at three key stages	% of students assessed - Data reports produced
	A6.	Mid-long term	2027–2030	- MESTI and municipalities: design and coordinate initiatives and projects - Ministry of Finance & local/ international funders: funding and financial support - Schools: integrate projects - EdTech/ IT sector & NGOs: support civic engagement and technical support	- Frameworks and structure are developed - Funding secured for projects and initiatives - Pilot projects implemented	- Number of initiatives, hackathons, ICT& tech clubs - Student participation rates % of remote regions and girls engaged
	A7.	Long term	2027–2030	- MESTI: policy and design, coordinate integration - Universities, International Partners: design micro-credentials - International partners: support the implementation in line with MESTI needs - Municipalities and schools: piloting and integration	Micro-credentials piloted and scaled in different subjects and grade levels	- Number of micro-credentials developed - Number of schools are using them % of students earning them

Pillar	Action/Activity	Priority	Indicative Timeframe	Actors/ Responsibilities	Milestones	Indicators/KPIs
P4. Teacher digital competences and professional development	A1.	Urgent	2026	- MESTI: lead coordination, endorsement and adoption - Universities and Faculties of Education: alignment with curricula - International partners: provide expertise and benchmarking	- Kosovo Digital Competence Framework (NDCF) developed - NDCF used for designing the training modules for CPD	- NDCF approved and enacted - Number of institutions adopting it in teacher education
	A2.	Mid-long term	2027-2029	- MESTI: define incentive mechanisms and integration - Institutes and universities: design modules - Accreditation Agency in MESTI: accredit CPD programs - Kosovo Accreditation Agency: accredited the reformed curricula including the design modules	- CPD curriculum and structure with modules developed - Incentive mechanisms with measures linked to the professional development defined and applied	- Number of accredited CPD modules - Number of pilot programs - Number of teachers enrolled and trained % of teachers promoted through programs % of CPD linked to career progression
	A3.	Mid-term	2026-2027	- MESTI: design and oversee rollout the programs - Universities, Institutes and NGOs: deliver training, facilitate local platforms	- Approved CPD programs on AI literacy, cybersecurity, Robotics, XR and subject-specific digital tools - CPD programs piloted and scaled Kosovo-wide	- Number of programs established and piloted - Number of teachers trained % of teachers certified
	A4.	Medium-term	2026-2027	- MESTI: advice and adapt platforms - MEDs: promote peer networks and communities - Teacher unions: advocacy	- Peer learning communities are active - Platforms introduced and utilized - Practices and examples are promoted in schools	- Number of peer communities established - Number of platforms used for sharing resources and practices
	A5.	Short-mid term	2026-2027	- MESTI: define areas and mandates - MEDs: contextualize local needs and identify candidates - Faculty of Education, NGOs and Institutes: provide training	- Master trainers are trained - Pool of ICT master trainers established - ICT specialists are active at schools/municipal level	- Number of ICT specialists per municipality - Number of master trainers
	A6.	Mid-long term	2027-2030	- MESTI: oversee tool design and in collaboration with operators provides the technical development - Municipalities: ensure implementation	- Kosovo teacher digital competence assessment tool created - Monitoring system with dashboards are functional	% of teachers assessed annually - Effectiveness of the assessment tool for CPD - Data reports generated
	A7.	Mid-long term	2027-2030	- Universities and Schools: curate OER/MOOC resources - NGOs: provide support - MESTI and MEDs: provide support and infrastructure - Schools: adopt blended models - International partners: provide models	- Blended learning/teaching pilots implemented in schools - OERs and MOOCs curated and mechanisms for using them defined - Incentives for creators and adaptors of University of Prishtina/Priština EdTech lab promoted	- Number of teachers using OERs/MOOCs % of teachers trained in blended learning/teaching - Number of schools adopted OERs/OEPs

Pillar	Action/ Activity	Priority	Indicative Timeframe	Actors/ Responsibilities	Milestones	Indicators/KPIs
P5. Emerging technologies and AI	A1.	Short- mid term	2026- 2027	MESTI: lead drafting and coordinate the process	Strategy Framework developed	Framework published and enacted
	A2.			- MESTI: curriculum reform and oversight of implementation - EU and international partners: benchmarking	AI curriculum with learning outcomes across grades developed	AI syllabi in curriculum subjects and learning outcomes
	A3.	Short- mid term	2026- 2028	- Universities, institutes and NGOs: deliver training and integrate into teacher education, update teacher ed. curricula - MESTI: oversee CPD programs - Accreditation bodies: certification	- AI competencies embedded in pre-service and in-service training - AI-focused CPD programs piloted	% of schools applying policies - Number of teachers trained and certified - Teacher confidence survey results % of teacher ed. programs with AI content
	A4.	Mid- term	2027- 2028	- MESTI: set QA framework - ICT Center: oversight	- Kosovo guidelines and regulations approved and implemented - QA standards published and enforced	- Number of policies adopted - Number of schools/municipalities adapted protocols and quality assurance standards
	A5.	Mid- long term	2027- 2029	- Ministry of Finance and international funders: allocate funds - MESTI: oversee disbursement and coordination efforts - Municipalities and schools: implement and promote	- Funding secured and allocated - AI-enabled programs piloted - Schools are involved	- Amount of funding allocated - Number of students are benefiting - Number of schools participating

Annex B: List of documents and frameworks for desk review

	Document	Description and relevance
1	Curriculum Framework for Pre-University Education in Kosovo (2016)	Establishes the foundation for implementing and enhancing competencies and learning outcomes.
2	Kosovo Education Strategy (2022-2026)	Highlights the need for digital transformation in education and proposes strengthening digital skills for both students and teachers.
3	Kosovo Digital Agenda 2030 (2021)	The KDA 2030 provides a strategic framework that defines priorities and policies for advancing digital transformation.
4	Kosovo's Strategy for Electronic Governance 2023–2027	It is a strategic document that focuses on the key areas of digitalizing the public sector, supporting the vision set out in the Kosovo Digital Agenda 2030 to transform it into a leader in digitalization. These key areas include vision and leadership, technology, and digital skills
5	Education's Digital Readiness Assessment for Kosovo (World Bank, 2024)	Assesses the current state of digital competencies, infrastructure, and governance by identifying key challenges and recommendations.
6	Analysis of Kosovo's Education System (2018)	Reviews the needs and shortcomings of the education system in Kosovo, including digital skills gaps.
7	Transforming Education in Kosovo with the Learning Passport (UNICEF, 2024)	Provides insights into Kosovo's digital learning platform, Shkollat.org, and policy takeaways to strengthen digital learning.
8	DigComp 2.2: The Digital Competence Framework for citizens (2022)	Defines key areas of digital competence, including knowledge, skills, and attitudes necessary for all citizens.
9	DigComp 3.0: European Digital Competence Framework	Provides a granular view of digital competences and transversal integration of AI across the framework.
10	DigComp Edu: The Framework for Digital Competence of Educators (2017)	Provides a reference framework for digital competence in teaching, including pedagogy, professional development, and assessment.
11	UNESCO ICT Competency Framework for Teachers (ICT CFT, 2023)	Offers guidelines for policy development and capacity building on digital technologies in pre-service and in-service teacher training.
12	Transforming education in the Western Balkans (2022)	Analyzes student outcomes, equity in performance, and the learning environment in the Western Balkans based on PISA data.
13	Digital Education Action Plan (2021-2027)	Outlines an EU-wide strategy for digital education transformation and adapting education systems to the digital age.
14	Index of Readiness for Digital Lifelong Learning in EU member states (CEPS, 2019)	Specifies challenges and trends in digital learning in Europe across different education levels.

15	Digital Competence Framework for the European Schools (2020)	Outlines best practices for integrating digital competencies into school curricula across Europe.
16	Azerbaijan Digital Skills Assessment (ITU, 2024)	Offers a comparative perspective on assessing digital skills in education and strategies for enhancing digital literacy.
17	ICT competences for teacher profile (TKAEDITE ICT Teacher profile, 2024)	A deliverable from the EU funded project, tkaedite.eu
18	Digital Competence of K1-12 Teachers in Kosovo (TKAEDITE, 2024a)	A deliverable from the EU funded project, tkaedite.eu assessing teachers' digital competences through the lens of DigCompEdu and TPACK (Technological Pedagogical Content Knowledge).
19	ICT competences in pre-university curricula (TKAEDITE, 2024b)	A deliverable from the EU funded project, tkaedite.eu analyzing ICT competences from the lens of EU and Kosovo frameworks.
20	UNICEF Educators' Digital Competence Framework	Provides a structured framework outlining the digital skills, knowledge, and attitudes educators need to effectively integrate technology into teaching and learning.
21	UNICEF Digital Education Strategy 2025-2030	Outlines UNICEF's global strategic vision for transforming education through digital technologies with a focus on equity, foundational digital skills, and teacher empowerment.
22	UNESCO AI competency framework for students (AI CFS, 2024)	Defines the AI-related knowledge, skills, and ethical attitudes students should acquire to thrive in an AI-driven world, structured across different education levels.
23	UNESCO AI Competency Framework for Teachers (AI CFT, 2024)	Offers guidance on AI literacy and pedagogical integration for educators detailing the competencies needed to teach about and with AI responsibly and effectively.
24	MESTI Catalogue of approved programs for teacher professional development and educational staff (2019, 2020, 2022, 2024)	Lists accredited training programs offered to educators in Kosovo, including courses on ICT, pedagogy, and continuous professional development.
25	Kosovo Pedagogical Institute, Digital competence of teachers' textbooks (2023)	Analyzes the integration of digital competence in teacher practices and evaluates how digital topics are represented in pre-university school textbooks.
26	AI Literacy Framework (AILit), 2025	Complementing DigComp 2.2, this framework supports teachers and education policymakers in understanding and advancing AI literacy in primary and secondary education.
27	Kosovo Rapid Education Diagnosis (RED), EFT 2023	Providing evidence-based analysis of the entire education system by addressing three core thematic areas: inequality, financing, and governance.
28	Digital Competence Framework for the European Schools (DCF), 2020	An operational framework based on DigComp providing areas for digital competence development for students.
29	Life Skills 1-5; Technology and ICT 6-9; ICT 10-12	School Textbooks

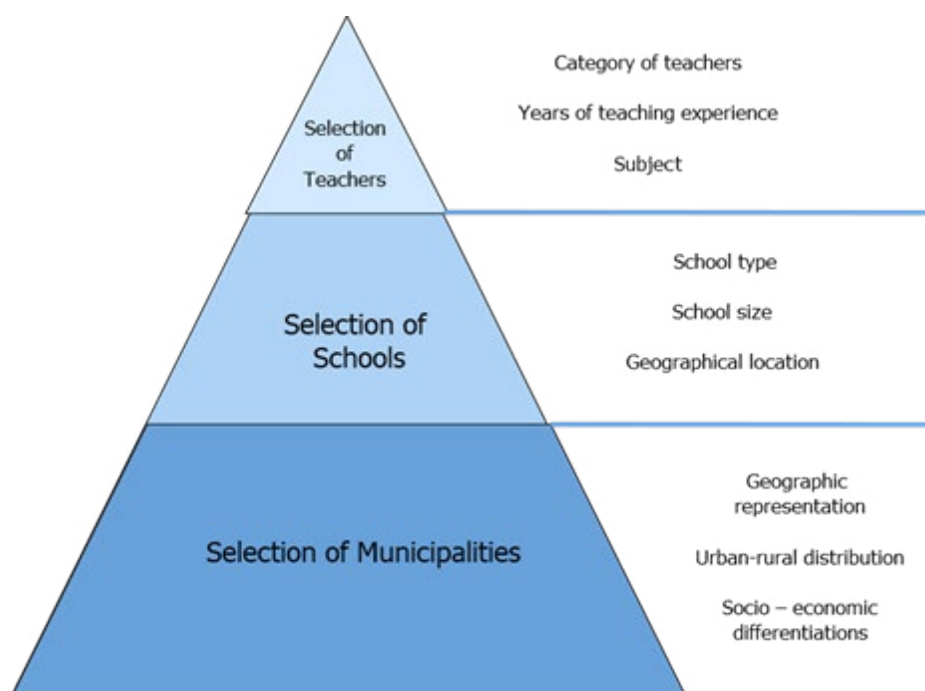
Annex C: **List of Stakeholders for KII**

	Name	Title/Role	Institution	Email
1	Fehime Llapashtica	Chief of Curriculum Unit	MESTI	Feime.Llapashtica@rks-gov.net
2	Samir Shahini	Director of Education	Directorate of Education Prishtina Municipality	samir.shahini@rks-gov.net
3	Rasim Hasani	Director of Education	Directorate of Education Lipjan Municipality	rasim.hasani@rks-gov.net
4	Eranda Kumnova Baci	Director of Education	Directorate of Education Gjakova Municipality	eranda.baci@rks-gov.net
5	Pleurat Rudi	School Principal	School "Zekria Rexha"	
6	Liridon Maliqi	School Principal	Model School "Qamil Batalli"	liridonmaliqi@live.com
7	Vjollca Jupolli	School Principal	School "Xhemaj Mustafa"	vjollcakupolli@gmail.com
8	Shqipe Bruqi	Acting Head of Department for Digitalization	MESTI	shqipe.bruqi@rks-gov.net
9	Agim Kukaj	Head of Department for Digitalization	Ministry of Economy	agim.kukaj@rks-gov.net
10	Habibe Buzuku	Division for Teacher Professional Development	MESTI	habibe.buzuku@rks-gov.net
11	Osman Beka	Teacher Professional Development	MESTI	osman.beka@rks-gov.net
12	Blerim Saqipi	Dean of the Faculty of Education	University of Prishtina	blerim.saqipi@uni-predu
13	Dukagjin Pupovci	Education Expert / former Deputy Minister who started the digitalization in education reform	Kosovo Education Center	dpupovci@kec-ks.org
14	Haxhere Zylfiuj	Researcher	Kosovo Pedagogical Institute	zylfiuhaxhere@yahoo.de
15	Hatixhe Zeka	Executive Director	Kosovo Organization for Talent and Education (TOKA)	hatixhe@toka-ks.org
16	Antigona Uka	Executive Director	Kosova Center for Digital Education	antigona.uka@kcde-ks.org
17	Petrit Tahiri	Executive Director	Kosovo Education Center	ptahiri@kec-ks.org
18	Eroll Bilibani	Head of Dokulab	Dokulab	erollb@dokufest.com

Annex D: **Teacher selection criteria for FGD**

Criteria	Description
Number of participants	8 – 12 teachers per focus group (total of 3 groups), ideally 2 schools represented per municipality
School location (Urban/Rural)	Target 60% rural/village schools and 40% urban/town center schools per municipality to ensure balanced representation
Education level	Aim for representation from: - 2 teachers from Primary (Grades 1–5) - 2 teachers from Lower Secondary (Grades 6–9) - 2 teachers from Upper Secondary (Grades 10–12)
Years of experience	Include a mix of early-career and experienced teachers to capture diverse experiences
Subject specialization	Ensure participation of teachers from key subjects: - Albanian - Mathematics - English - Technology/Informatics - Biology - Chemistry - Geography - Physics
Geographical coverage	Focus group 1: Prishtina/Priština, South Mitrovica, Podujeva Focus group 2: Lipjan, Kačanik Focus group 3: Gjakova, Deçan

The selection process, carried out in close coordination with MESTI, applied three key criteria: (i) geographic representation, (ii) urban–rural distribution, and (iii) socioeconomic diversity. Six municipalities were selected: Prishtina/Priština, South Mitrovica, Podujeva, Lipjan, Kačanik, and Gjakova, to reflect a broad spectrum of educational environments across Kosovo. In each municipality, two schools were chosen in consultation with the Municipal Education Directorates (MEDs), ensuring balance between school size and urban–rural settings. Teachers were then invited to participate based on additional criteria, including school level (Primary, Lower Secondary, Upper Secondary), years of teaching experience, and subject area (covering General Education, STEM, Social Sciences, and interdisciplinary fields).



Annex F: Engagement of the Reference Group

Chaired by MESTI, a Reference Group (RG) was convened to support the review of the analysis and ensure its quality, relevance, and accuracy. The RG included representatives from key divisions within MESTI (such as the Division for Curricula and School Textbooks, the Division for Teacher Professional Development and the newly established Digitalization Department), Municipal Education Directorates (Gjakova and Lipjan), the Faculty of Education, and civil society organizations and NGOs specializing in education. Throughout the process, the RG engagement involved sharing progress updates, preliminary findings, and early analysis for review and feedback to discuss opportunities for advocacy and utilization of the study outcomes. Beyond formal meetings, the RG also provided ongoing support through document sharing, facilitating access to additional resources, and reviewing draft versions of the analysis. Their contribution was essential to ensure the study reflects sector needs, aligns with Kosovo's digital transformation goals, and provides actionable recommendations for policy and program development.

Annex E: Using NLP for document analysis

The study applied natural language processing (NLP) techniques to examine three key sets of documents: (1) Kosovo curriculum frameworks, (2) teacher professional development catalogs, and (3) textbooks for “Life and Skills”, “Technology and ICT”, and “ICT” (grades 1–12). This two-phase process began with lexicon-guided screening, extracting keywords such as “digital competence”, “technology”, “ICT”, “digital skills” from policies and training programs to map references to digital education. The second phase involved human validation and expansion, in which manual review contextualized the results, verified their relevance, and extended the scope to applied terms such as “video editing”, “web design”, “multimedia tools”, “electronic portfolios”, “e-learning”, “smart devices” and more. The human-led screening ensured both conceptual relevance and accuracy in interpreting how digital skills are explicitly or implicitly integrated into curricula and teacher development programs. Further in-depth analysis of each chapter for textbooks was analyzed in line with the EU Digital Competence framework, as well as for teacher training professional programs.

References

European Commission (2022). DigComp2.2: The digital competence framework for citizens. <https://doi.org/10.2760/115376>

European Commission (2017). European Framework for the Digital Competence of Educators: DigCompEdu. <https://publications.jrc.ec.europa.eu/repository/handle/JRC107466>

European Commission (2016). DigComp 2.0: The Digital Competence Framework for Citizens. <https://publications.jrc.ec.europa.eu/repository/handle/JRC101254>

European Training Foundation (2023). Kosovo: Rapid Education Diagnosis (RED)– Addressing the weak links.

Eurostat (2019). "Households - Individuals' Level of Digital Skills" < https://ec.europa.eu/eurostat/databrowser/view/ISOC_SK_DSKL_I_custom_355577/default/table>, accessed 13 April 2025.

ICILS (2023). Database Accessed: <https://www.iea.nl/studies/iea/icils/2023>

MESTI (2022). Education strategy 2022–2026. Government of the Republic of Kosovo

MESTI (2022b). Education strategy 2022–2026: Action plan. Government of the Republic of Kosovo

MESTI (2016). Curriculum framework for pre-university education in the Republic of Kosovo.

MESTI (2016a). Core Curriculum for the pre-primary grade and primary education of Kosovo (Grades 0, I, II, III, IV and V)

MESTI (2016b). Core Curriculum for the lower secondary education of Kosovo (Grades VI, VII, VIII and IX).

MESTI (2016c). Core Curriculum for the Higher secondary education of Kosovo (High Schools - Grades X, XI, XII).

OECD (2018). PISA Database. Accessed: <https://www.oecd.org/pisa/data/2018database/>

OECD (2022). PISA Database. Accessed: <https://www.oecd.org/pisa/data/2022database/>

OECD (2025a). Results from TALIS 2024: The state of teaching. <https://doi.org/10.1787/90df6235-en>

OECD (2025b). Empowering learners for the age of AI: An AI literacy framework for primary and secondary education (Review draft). OECD. Paris. <https://ailiteracy-framework.org>

Pireva Nuci, K., Dalipi, F., Masiello, I., Celik, I., Laru, J., Saqipi, B., Susuri, A., & Imran, A. S. (2025, publication in progress). Assessing digital competence of K1–12 teachers in Kosovo: A study through the lens of DigCompEdu and TPACK.

Rogers, P. (2014). Theory of Change, Methodological Briefs: Impact Evaluation 2, UNICEF Office of Research, Florence.

Salib, M. (2022). *Theory of Change Workbook: A Step-by-Step Process for Developing or Strengthening Theories of Change*. USAID. <https://preparecenter.org/wp-content/uploads/2022/08/USAID-Learning-Lab-Theory-of-Change-Workbook-2022.docx>

TKAEDITE (2025a). ICT teacher profile. <https://tkaedite.eu>

TKAEDITE (2024b). Analyzing the EU and National frameworks for ICT competences in pre-university Curricula. <https://tkaedite.eu>

UNESCO (2024). AI competency framework for students. <https://doi.org/10.54675/JKJB9835>

UNICEF (2019), Digital literacy for children: exploring definitions and frameworks. UNICEF Office of Global Insight and Policy.

UNICEF (2022), DIGITAL LEARNING LANDSCAPE in Bosnia and Herzegovina, Kosovo, Montenegro, and North Macedonia: A policy analysis. UNICEF Innocenti – Global Office of Research and Foresight.

UNICEF Kosovo. (2023). Reimagine education with the Learning Passport platform: The case of Kosovo.

World Bank (2024). Kosovo: Digital Readiness Assessment of the Education System. <https://hdl.handle.net/10986/42761>

unicef  | for every child

UNICEF Kosovo

Web: www.unicef.org/kosovoprogramme
Facebook: UNICEF Kosovo Programme
Instagram: [unicefkosovoprogramme](https://www.instagram.com/unicefkosovoprogramme)
X: UNICEFKosovo
TikTok: [unicefkosovo](https://www.tiktok.com/@unicefkosovo)

for every child, every right

