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THE ETF DIGITAL EDUCATION REFORM FRAMEWORK 2.0

Focus areas and critical factors of contemporary digital education policies in Europe and beyond

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# CONTENTS

EXECUTIVE SUMMARY

Over the last five years, digitalisation has taken centre stage in education and training like never before. In 2020, the global wave of online learning set in motion by the COVID-19 pandemic revealed the potential of digital technologies to make lifelong learning systems more resilient, efficient and inclusive, but also highlighted important equity and exclusion challenges in digital education (European Training Foundation, 2020). A few years later, the growing popularity of generative AI (GenAI) tools, along with the opportunities and challenges these technologies bring to education, have sparked debates on how to best integrate them into educational settings. In response, countries are investing more in modernising their education systems to make them more digital. In parallel, experts seem to agree that, given the complexity of the field and the multiplicity of actors involved, policymakers in charge of digital education should be aware of the many existing policy options and their respective benefits and risks. They must also understand that the steps involved in implementing, running and monitoring a digital education initiative must be tailored to the dynamics of contemporary digital ecosystems.

In 2022, the European Training Foundation (ETF) launched the Digital Education Reform Framework (DERF), a tool aiming to support the efforts of governments and stakeholders in designing and monitoring inclusive, effective and human-centric digital education policies and initiatives. The DERF helps users understand which initiatives can be effectively applied in different areas and for what purpose, as well as which critical factors need to be considered in their implementation. Between 2023 and 2024, the DERF was used to inform policy analysis in several countries, including Algeria, Kosovo, Moldova and Ukraine.

Working with policymakers in these countries, the ETF realised that, given the speed of development of digital technologies and especially the mainstreaming of GenAI, the framework produced in 2022 needed to be updated by bringing in specific evidence from relevant policies in various national contexts. This would consider post-COVID policies and meaningfully contribute to similar efforts of international organisations, such as the 2024 UNESCO 'Six Pillars' framework (UNESCO, 2024b) or the World Bank's Conceptual Framework for Digital Pathways in Education and Skills Development (Rajasekaran et al., 2024). To achieve this, the ETF conducted an extensive mapping exercise, analysing more than 130 existing digital education policies and initiatives, primarily from EU Member States and EU Partner regions, including the Western Balkans, the Eastern Partnership countries, the Southern Mediterranean and Central Asia. It also conducted an in-depth analysis of 20 of these initiatives through desktop research and interviews with policymakers responsible for digital education. This work has improved our understanding of the current concerns and priorities of policymakers and enabled us to update the DERF by integrating the identified policy initiatives and new policy support tools. It has also allowed the most common societal objectives guiding digital education policymaking to be refined, as well as the main policy mechanisms that may help policymakers articulate key elements of digital education initiatives.

The results of this work are presented in the figure below.

The ETF Digital Education Reform Framework 2.0
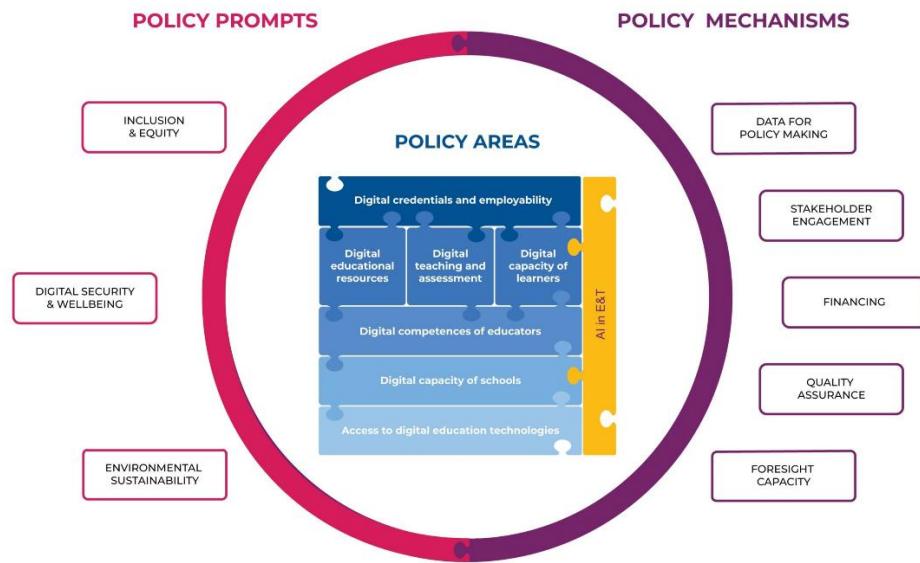
The DERF 2.0 identifies eight areas of contemporary digital education policymaking, starting from the bottom of the chart (see also Chapter 2.1):

- **Access to digital education technologies** is the prerequisite for the digitalisation of education systems and should ensure the availability of adequate digital devices and sufficient connectivity by prioritising inclusive and sustainable approaches.

- **Digital capacity of schools** is essential for blending traditional and digital teaching methods. Policies can address issues such as school leadership, data management, digital learning environments and virtual laboratories in schools, as well as digital learning environments at the regional and national level.

- **Digital competences of educators** deal with creating the necessary skills, knowledge and attitudes to use digital technologies effectively and confidently in teaching settings, as well as providing innovative initial and/or continuous professional development of educators.

- **Digital educational resources** of high quality and accessible, possibly through open licences, are a key component of digital education. A number of policies address fostering their use, as well as the capacity of educators and learners to produce and curate them.

- **Digital teaching and assessment** are needed to realise the potential of the digital revolution. Policies are increasingly promoting and monitoring the implementation of meaningful digital teaching and assessment across the curriculum.

- **Digital competences**, often referred to as *digital skills*, are essential in everyday life. Policies can be implemented by incorporating digital subjects into the curriculum and by developing digital capacities through informal learning, paying particular attention to digital citizenship

- **Digital credentials and employability** are a relatively new area of digital education policy that continues to receive attention due to the potential of micro- and digital credentials to boost employability and reskilling processes.

- **Artificial intelligence (AI) in education and training** is the newest policy area, which often deals with promoting ethical and human-centric AI, using it to innovate curricula and building AI literacy among educators and learners.

A desktop review and interviews with policymakers responsible for digital education show that, regardless of the areas prioritised within existing policies, there are some cross-cutting factors that are and should be driving the policy debate in different countries. Firstly, we have learnt that digital education policies respond to three main *policy prompts*:

- **Inclusion and equity.** Tackling digital and educational inequality should be a key driver of digital education policy, encompassing specific measures to ensure that digitalisation increases inclusion and the accessibility of education and training.

- **Digital security and well-being.** Digital education initiatives should consider the impact of digital education on (cyber)security and on the mental and physical well-being of teachers and learners, instilling virtuous circles of well-being support and development.

- **Environmental sustainability.** The environmental impact of digital practices in education should be considered to ensure that digital education reforms adhere to environmentally sustainable standards and foster the development of green skillsets among learners.

Secondly, the DERF 2.0 identifies five *policy mechanisms* that must be thoroughly understood and carefully considered when formulating digital education policies.

- **Data for policymaking.** Digital education policies should be based on sound evidence and promote data collection and analysis in line with international best practice. Care should be taken over how data is produced collected, stored and used.

- **Stakeholder engagement.** Policy design, implementation, monitoring and evaluation should meaningfully involve stakeholders, including teachers, through various channels. The contribution of commercial technology providers should be carefully managed.

- **Financing.** Available financial resources should be planned carefully, paying attention to the differentiation and sustainability of sources. Innovative funding mechanisms should be explored to ensure that the perspectives of all parties involved, such as learners' families, are considered.

- **Quality assurance.** Adequate mechanisms for quality assurance of digital education should be established, integrating new dimensions into existing systems to generate swift feedback loops and immediate programme adaptation in a technology-neutral way.

- **Foresight capacity.** Digital education initiatives should be based on a sound understanding of possible societal, technological and educational developments. To achieve this, policymakers must develop an in-depth understanding of the long-term impact and trends of digital technology.

The revised version of the DERF presented in this report (ETF DERF 2.0) and the knowledge base on which it is built represent and reflect the approach taken by the ETF when advising governments and stakeholders on designing human-centric, impactful and inclusive policy initiatives. The ETF DERF 2.0 is a tool that can be used in a variety of ways, for example to structure capacity-building activities, map existing developments in a given country or region and guide discussions with policymakers by identifying key policy factors. What makes it unique is that it derives from a mapping of actual post-COVID policies, complemented by expert analysis and discussions with policymakers. This provides a realistic, practical approach to benchmarking and benchlearning in the field of digital education policy.

INTRODUCTION

This report presents version 2.0 of the ETF Digital Education Reform Framework (DERF), a tool produced in 2022 to support governments and stakeholders in designing and monitoring inclusive, effective and human-centric digital education policies and initiatives. The ETF DERF 2.0 together with the knowledge base on which it is built, represents the ETF's approach to advising governments and stakeholders on designing policy initiatives in the field of digital education.

After reflecting on contemporary policymaking in digital education (Part 1), the report presents the structure of the DERF, the methodology used to develop the framework and how it can be used (Part 2). Part 3 provides a detailed overview of the primary policy areas of digital education, as identified through our research. This section is supplemented by the most prevalent types of initiatives and some policy examples. Part 4 introduces the cross-cutting factors that policymakers should consider, in the form of policy prompts and mechanisms. Part 5 offers general insights into the evolution of digital education policy in the post-pandemic and AI-driven landscape.

The DERF2.0 can be used in a variety of ways, for example to structure capacity-building activities, map existing developments in the field in a given country or region and guide discussions with policymakers by raising the right questions relating to the critical policy factors. The uniqueness of the DERF 2.0 derives from the fact that it is based on a mapping of actual policies, complemented by experts' analysis and discussions with policymakers, meaning that it provides a reality-based, actionable approach for benchmarking and benchlearning in the field of digital education policy.

1. UNDERSTANDING CONTEMPORARY DIGITAL EDUCATION POLICY

1.1 The impact of digitalisation on education and training

The impact of digital technologies and tools on the quality and relevance of education and training is a highly debated topic. While their potential to foster student engagement, collaboration, and self-regulated learning is clear, their effectiveness depends on thoughtful pedagogical strategies and careful planning. Without these, there is a risk is of digital technologies causing a cognitive overload and creating digital inequalities, leading to lower achievement (Forsström et al., 2025).

The positive impact of digital technologies on education and training systems in both formal and informal learning settings is multifaceted (Susskind and Susskind, 2017). Firstly, it widens **access to learning** by reaching potential learners who would find it difficult to participate in traditional learning formats due to barriers such as a lack of time during working hours or disabilities. Secondly, it can improve **learning quality** by fostering engagement among categories of learners who would not normally interact in physical spaces and favouring the creation of personalised learning paths based on the initial competences of different groups of learners. Thirdly, it can enhance the **relevance of learning** thanks to the digitally enhanced possibility of recognising competences, for example by simulating work situations and fostering digital literacy, i.e. a fundamental transversal competence for living, learning and working in contemporary societies (Giannoutsou et al., 2024).

Alongside these beneficial effects, an increased use of digital technologies in education and training can also contribute to a widening of existing divides and creating new ones. The issue of **digital inclusion**, which has been traditionally focused on access to digital technologies (Casado-Munoz et al., 2015; Graham, 2010), is now being framed in a way that goes beyond access, encompassing the necessary skills and motivation to use digital technologies in a meaningful way (Nguyen et al. 2020, Abah 2019, European Parliament, 2020). Furthermore, recent data suggests that digital technologies, such as Artificial Intelligence (AI) and robotics, are in fact creating an occupational divide between high-skilled and low-skilled workers by reducing the demand for intermediate-level skills (Bárány & Siegel, 2015).

1.2 Cycles of digital education policies

We use the term **digital education**[1] **policy** to refer to the various public policies and initiatives that seek to make education and training systems more effective and inclusive by fostering the use of digital technologies, while promoting digital skills. Such policies and initiatives may be developed by governments or public agencies at various levels (local, national or supranational), in collaboration with other stakeholders, and can manifest as parliamentary rules, ministerial documents, institutional statements, major projects, etc.

As early as 2011, all EU countries had developed national digital education policies, either as standalone initiatives or as part of broader national digitalisation strategies (European Commission, 2011). Examples of these policies include the IncoDe2030 initiative in Portugal and the Digital Pakt Schule in Germany. The systematic implementation of these strategies has become more common following the forced school closures related to the COVID-19 pandemic, primarily in the context of initial education. **During the pandemic**, stakeholders gained insight into the potential effectiveness and flexibility of digital education, as well as its drawbacks (European Training Foundation, 2020),

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[1] In line with the Digital Education Action Plan 2021–2027 of the European Commission, this report defines **digital education** as both 'the deployment of the vast and growing array of digital technologies (apps, platforms, software) to improve and extend education and training'' and 'the need to equip all learners with digital competences (knowledge, skills and attitudes) to live, work, learn and thrive in a world increasingly mediated by digital technologies' (European Commission 2022a, p. 2). In other words, the term 'digital education' in this document means both the use of digital technologies in education and training settings and the development of digital competences (as a dynamic combination of knowledge, skills and attitudes).

particularly in vocational and work-based learning settings (ILO, 2020). Since the offset of the pandemic, countries have been transitioning to a **'post-emergency' phase,** characterised by a deeper understanding of the challenges associated with digital education, the availability of new tools developed during the crisis and a growing awareness of the need to continue these reforms, extending beyond initial education to encompass the digital upskilling of adults (Safonov et al., 2022). The **complexity of digital education** and the interconnection of the different organisational, pedagogical and technological components of such initiatives (Marjanović, 2021) have become evident, as has **the need for digitalisation reforms to be systemic and multistakeholder**. Infrastructure and connectivity, which were the typical focus of the first wave of digital education policies, must be complemented by initiatives addressing digital leadership, pedagogical innovation and teacher professional development (UNESCO, 2024b; European Parliament, 2020). The challenge lies in moving beyond the assumption that the presence of connected digital devices in schools will organically lead to digital education. This requires a **shift in focus from the mere use of digital technologies to a comprehensive digital integration** that is fully embedded in the culture of educational systems. This integration involves redesigning school infrastructures, teaching approaches, curriculum structures, classroom practices and modes of assessment (European Commission, 2020; Cosgrove et al., 2013). This should be achieved by acknowledging the current *platformisation* of education (Rivas, 2021), where digital platforms, increasingly AI-powered and operated by edtech corporations, are often the main channels through which educational content and activities are delivered and managed. This has corresponding effects in terms of corporate agendas, algorithmic control and data commodification (Cobo and Rivas, 2024).

In 2023, the Council of the EU adopted the recommendation Key Enabling Factors for Successful Digital Education and Training, that urges all EU Member States to guarantee universal access to inclusive, high-quality digital education and training by implementing structural reforms. It calls on Member States to integrate digital technologies into teaching, support the development of digital educational tools, take cybersecurity measures in education and training and invest in connectivity, digital infrastructure, and digital accessibility in education and training.

From a policy perspective, the recommendation calls for:

- establishing coherent strategies that address digital education and skills;
- following up on and assessing digital education and training policies;
- rapidly integrating results to enhance policies;
- encouraging cooperation among various stakeholders, including the private sector;
- creating and reinforcing teacher associations and networks;
- promoting equitable investments for inclusive, high-quality digital education.

1.3 Scope, breadth and complexity of digital education policies

The scope and breadth of digital education reforms can vary depending on the history and complexity of the national context (Ferrante et al, 2024). **System-wide, cross-sectoral strategies** present challenges in terms of design, implementation and monitoring. However, they can support, through whole-government approaches, the development of coherent lifelong learning systems where digital competences and skills are built throughout the different stages of education. At the other end of the spectrum are **specific sectoral strategies**, such as those for higher education or VET. While these are easier to design, they may require greater harmonisation efforts in the long term. It is also possible to **combine strategies**, whereby different initiatives are developed within specific education sub-sectors, while minimum digital competence standards are agreed for each level of education. These standards should take into account the links to digital initiatives outside the education domain, such as general digital infrastructure plans (Butler et al., 2024). Another source of complexity is the degree of **autonomy of education providers** and the **role of regional and local authorities**. In several countries, the digital education strategies are set at the national level but implemented locally. For example, the German Deutschland Digital strategy sets out an overreaching vision for the country's education system, enabling States to experiment with models in order to identify locally relevant

approaches. Similarly, digitalisation of education in Sweden has taken place through high levels of autonomy at the municipal level within a clear national curriculum framework (Viennet and Pont, 2017). This complexity is confirmed by a 2021 report by the European Commission which identified the **common enabling elements of digitalisation initiatives** recently launched by EU Member States. These elements include policy and funding stability and continuity, resources secured from multiple sources, a multidimensional approach paying attention to both infrastructural and pedagogical development; the active involvement of schools and municipalities; and appropriate scaling to maximise impact. Within successful digitalisation reforms, these elements are often combined in a long-term perspective. In Finland, for instance, there have been six waves of national digital education strategies and hundreds of development projects have been implemented over the past 35 years. In Estonia, the high levels of school connectivity and teacher digital skills are the result of programmes that can be traced back to the 1990s, that were combined in 1997 within the Tiger Leap initiative and remain in place today (European Commission, 2021a).

2. THE ETF DIGITAL EDUCATION REFORM FRAMEWORK 2.0

2.1 Components of the framework

To help policymakers navigate the complexities of digital education and reach a comprehensive understanding of the potential implications of reform in the field, the ETF has mapped recent national and regional digital education policies (see Annex 1) with the aim of classifying the policy solutions currently being implemented and identifying the cross-cutting factors that need to be considered when designing, implementing and monitoring digital educational initiatives. To facilitate the holistic understanding of digital education by policymakers, and to allow for connections between policy areas and cross-cutting factors, the findings have been structured within a single framework (see Figure 1).

Figure 1. The ETF Digital Education Reform Framework
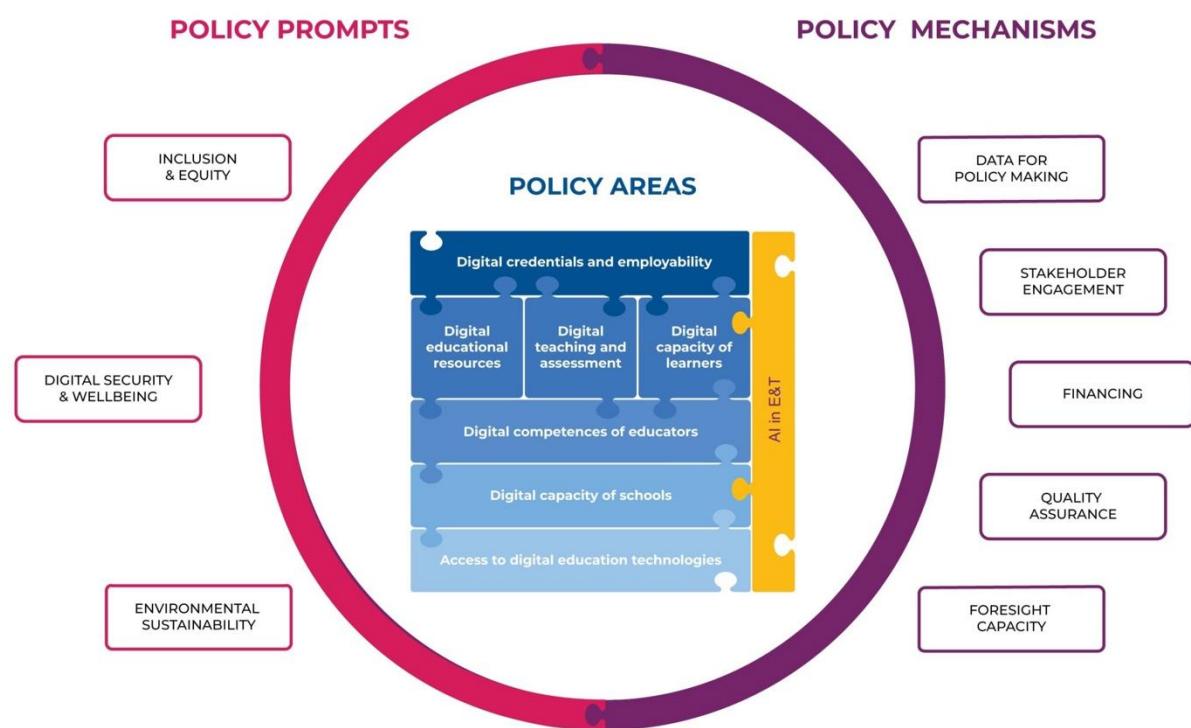
The framework has two parts.

The central part identifies eight possible **digital education policy areas** on which reforms and initiatives can focus. Starting from the bottom of the diagram, the preconditions for any sustainable digital education reform are access to digital education technologies, the digital capacity of schools, and the digital competence of educators. These are followed by the specific components of education and training that need to be addressed (either together or in different policy waves): digital educational resources, digital teaching and assessment, digital competence for learners, digital credentials, and the use of artificial intelligence in education and training. For each of these eight areas, some **policy pointers** have been identified, intended as typical policy initiatives that have recently been launched in these areas. The policy areas should be used as a 'compass' to inform the focus of policy discussions, based on an analysis of existing data on the state of digitalisation in education in a given context.

The framework also includes some transversal factors, around the eight areas, that must be considered in the design, implementation, monitoring and evaluation of digital education initiatives. Our analysis shows that digital education policies consider three main **policy prompts**: inclusion and equity, digital security and well-being, environmental sustainability. It also identifies five **policy**

mechanisms that must be well understood and carefully considered: data for policymaking, stakeholder engagement, financing, quality assurance and foresight capacity. By answering some key questions relating to these transversal factors, policymakers can understand the complex dynamics underlying digital education and determine the decisions that need to be made in each policy area.

2.2 Methodology for framework development

The first version of the ETF Digital Education Reform Framework (DERF) was launched in 2022, and was used, in 2023 and 2024, to inform ETF policy advice in countries such as Algeria, Kosovo, Moldova and Ukraine. By working with policymakers in these countries, the ETF realised that the initial framework needed to be updated in order to take into account both post-COVID policies and AI development. Also, an updated version would contribute to the efforts by other international organisations, such as UNESCO with its 'Six Pillars' framework (UNESCO, 2024b) and the World Bank with its Conceptual Framework for Digital Pathways in Education and Skills Development (Rajasekaran et al., 2024). To update the framework, the following methods have been applied:

1. Initial literature review to identify the relevant focus areas and the main challenges. An in-depth literature review was conducted, examining existing scientific and grey literature, exploring the prevailing patterns of digital education initiatives, as well as the impact of digitalisation on learning (see for example Forsström, S. et al., 2025). With a handful of exceptions, only literature published during and after the pandemic was reviewed. This has enabled the importance of the three key elements of the DERF to be calibrated: (i) the main possible areas of policy focus; (ii) the common challenges policymakers face when implementing initiatives in the focus areas concerned; and (iii) selected tools (such as frameworks, reports and toolkits) that policymakers can use.

2. Mapping of existing policies (identification of policy pointers and examples). Once the focus areas were defined, mapping was carried out on 130 policies and initiatives in the field of digital education, with an emphasis on transition economies and prioritising ETF partner countries, in line with ETF's mission. Where available, existing analyses of digital education policies were reviewed. During this phase, mainly policies launched after the pandemic were analysed (see Annex 1).

3. Analysis of selected policies. The next step was to select 20 policy cases, focusing on EU Member States and EU neighbouring countries and trying to achieve a balance between cases illustrating overall approaches to digital education and thematic/sectoral initiatives. The aim was to cover as many thematic areas as possible so as to provide a foundation for further review. This phase enabled us to understand how the policies in each thematic area can be operationalised and what typical initiatives may entail in terms of activities, expected impact, stakeholders and features (the 20 policy fiches resulting from this work are set out in Annex 2).

4. Scientific literature review (analysis of the main transversal factors). A review of scientific literature was conducted to understand the factors that can affect digital education initiatives and the key questions corresponding to each factor. To define these questions, the main perceived challenges of digital education policymaking were identified and extracted from recent literature and a list of the transversal factors common to all DERF 2.0 policy areas was compiled. The literature reviewed is set out in the references section.

5. Field research (in-depth interviews with five policymakers). Out of the twenty initiatives analysed, five were selected (from Jordan, Moldova, Serbia, Türkiye and Ukraine), ensuring that the different policy areas are covered as extensively as possible. As part of this phase, in-depth interviews were conducted with policymakers/shapers. By discussing policy genesis, the actual and potential impact of the initiatives and the mechanisms put in place to guarantee policy success, we were able to align DERF's transversal factors with the real concerns and dynamics of policymaking that emerged from the interviews.

2.3   Guidelines for using the framework

The DERF 2.0 aims to support the efforts of education and training policymakers and stakeholders in developing inclusive, effective, human-centric digital education policies and initiatives. The framework is designed **to inform decision makers and policy shapers about current policy trends and dynamics and to encourage critical policy reflection** on: (i) the types of digital education initiatives applicable in different policy areas (and their purposes); and (ii) the critical factors (prompts and mechanisms) that should be considered for their implementation. The DERF 2.0 is not prescriptive and can be used flexibly, depending on the situation, objective and context, both to monitor or evaluate existing initiatives in order to improve them, and to design future initiatives.

Working with the DERF 2.0 can help policymakers improve their capacity in the following areas:

- **Mapping digital education in a given country**. The DERF 2.0 can be used as a framework to 'map' the state of digital education in a given country by compiling existing intelligence, such as available administrative statistics and quantitative data from regular data collection instruments, and supplementing it with new, quantitative and qualitative data collected on demand through customised surveys and other instruments. Ideally, consultations should be organised to analyse and interpret the data, involving stakeholders from the public and private sectors, as well as educators, parents and learners. If relevant, donors should also be involved in this phase. This kind of work was carried out in Algeria (ETF, 2023a) and Moldova (ETF, 2024).

- **Designing or reviewing digital education initiatives.** Once the digital education situation in a given country is known, decision makers can use the policy pointers and examples set out in Annex 1 to review and adjust the existing initiatives and to develop new ones that focus on emerging priorities. During this phase, the involvement of national and/or international experts can facilitate the design of specific actions according to the context.

- **Supporting policy peer- and benchlearning.** A critical review of the 20 policy fiches analysed (set out in Annex 2) and all policies mapped (presented in Annex 1), preferably with the support of digital education experts, can facilitate the process of reflecting on the design and features of existing policies and identifying their impact, if applicable. This analysis can provide guidance on solutions that could work in comparable contexts.

- **Discovering international tools and standards.** There are several guidelines, checklists and frameworks that can help policymakers to design and continuously improve their policies in line with recognised, successful international practices. The DERF 2.0 contains a selection of such tools, privileging those used by policymakers and stakeholders across the policy areas identified. Becoming familiar with these tools can help in solving a variety of policy issues.

- **Developing a critical approach to digital education.** The DERF 2.0 provides a set of questions for every aspect of digital education. The aim is to ensure that policy approaches can be transformed from rigid and 'tech-first' to holistic, systems-oriented and human-centred, as advocated by international organisations (UNESCO, 2024b; European Commission, 2025). By systematically applying these questions, especially when involving relevant stakeholders, policymakers can develop policies that are data-based, digitally inclusive, balanced in terms of funding, environmentally sustainable and sensitive to learners' and teachers' wellbeing.

The ETF's experience of using the DERF in several countries has proven that the above approaches can and should be combined, depending on the specific cases. For example, the DERF can guide a mapping exercise around digital education in a given country, followed by a policy design phase. In other cases, it can be used to inform policy capacity-building activities or monitor the impact of a given policy in a flexible and modular way.

3. CURRENT FOCUS AREAS OF DIGITAL EDUCATION POLICIES

The European Commission's *Digital Education Action Plan 2021–2027* and the *2030 Roadmap on the Future of Digital Education and Skills* frame digital education as both the use of digital technologies to enhance the quality and inclusivity of education and training ecosystems, as well as the need for all learners to be equipped with digital skills and competencies. Indeed, achieving a **holistic understanding of digital education** requires policies and initiatives to be implemented across several areas, including infrastructure, strategy and leadership, the skills of teachers and learners, content, curricula and assessment (European Commission, 2020). The ETF Digital Education Reform Framework provides a detailed overview of digital education by identifying eight policy areas where digital education policy is currently focused and offering several policy pointers that exemplify typical digital education initiatives in each area.

Table 1: Policy areas and policy pointers for digital education

Policy area	Policy pointers
1. Access to digital education technologies	■ Embed education into general infrastructure policies ■ Increase access to digital devices in schools and among learners ■ Ensure high-speed connectivity in schools
2. Digital capacity of schools	■ Build digital leadership skills among school managers ■ Boost the data management capacity of schools ■ Develop digital education environments in and around schools
3. Digital competences of educators	■ Define the expected digital skills and competencies of teachers ■ Foster the professional development of teachers in digital education ■ Innovate teacher training through digital practices
4. Digital educational resources	■ Produce high-quality digital education resources. ■ Develop the skills of teachers and learners to create and use digital resources. ■ Encourage the creation and use of Open Educational Resources.
5. Digital teaching and assessment	■ Foster the use of digital teaching methods ■ Set up a monitoring system for digital teaching ■ Foster the use of digital technologies for assessment
6. Digital competences of learners	■ Innovate digital education curricula ■ Promote informal learning opportunities to build digital skills ■ Promote critical digital literacy among learners
7. Digital credentials and employability	■ Support and promote digital credentials, including micro credentials ■ Promote recognition of digital credentials for education and employment
8. AI in education and training	■ Promote the use of ethical and human-centric AI ■ Build AI literacy among teachers and students ■ Use AI for curricula innovation and flexibility

The following pages present real-life examples of initiatives and a selection of policy tools that can help with designing and implementing policies in each policy area.

3.1 Access to digital education technologies

Affordable internet connectivity and access to appropriate digital devices are crucial prerequisites for the digitalisation of education systems and ensuring effective, inclusive digital learning experiences. Access was the main focus of the first generation of digital education policies in the 1990s and the early 2000s. Today, however, it tends to be accompanied by other dimensions that are underpinned by pedagogical change (European Commission, 2020). Initiatives aimed at improving access to digital education require the identification of the minimum level of infrastructure for schools, teachers, households and other stakeholders. Following the COVID-19 pandemic, that has shown the level of inequalities of digital access within education systems (Thorn and Vincent-Lancrin, 2021; Vincent-Lancrin et al., 2022), almost half of OECD countries launched digital education strategies that prioritise access improvement. Finally, access is a key dimension of digital inclusion and should consider the needs of vulnerable groups of learners, including those with disabilities (OECD, 2023b).

Policy pointers and examples

P1. Embed education into general infrastructure policies. Policymakers responsible for education should build on existing general digitalisation policies, which usually include investment in digital infrastructure. Collaboration with the authorities responsible for these digitalisation initiatives can facilitate and speed up infrastructure updates, fostering adaptation and scalability (Conrads et al., 2017). One example of these policies is the **Digital Transformation Strategy of Bulgaria for the period 2020–2030**, which aims to deploy a secure digital infrastructure while focusing on incorporating digital subjects into curricula at all levels of education, including VET and adult learning (Government of Bulgaria, 2020). The **Digital Spain Agenda 2026** operates at several levels, including infrastructure, connectivity, cybersecurity, AI and other technologies (including in schools and vocational training centres), digitalisation of SMEs and public administrations and digital entrepreneurship (Government of Spain, 2020).

P2. Increase access to digital devices in schools and among learners. Properly equipped computers and mobile learning devices can make the difference between an average and a great digital education experience (Van der Vlies, 2020). Research shows that devices should be provided to learners to give them agency over their use, thereby ensuring that families are not pushed into costly schemes that they cannot afford (Williamson et al., 2020). Crucially, these devices must be supplied with appropriate educational software to support digital inclusion (Gouëdard et al., 2020). Countries are supporting the acquisition of high-tech devices to enable experimentation and the development of advanced digital skills. In **Türkiye**, for example, around 4 000 digital laboratories and innovative classrooms equipped with high-speed 3D printers, advanced computers, robotic coding kits, and mobile robot platform kits have been created since 2020 as part of the FATIH initiative. The project aims to equip all primary and secondary school classrooms with interactive boards and a national open-source operating system, in cooperation with more than 850 EdTech companies (Government of Türkiye, 2011). The procurement and delivery of digital equipment can be enhanced through partnerships with companies. For example, in **Bosnia and Herzegovina,** the education authorities have an agreement with Microsoft that allows them to purchase digital equipment under favourable conditions (Government of Bosnia and Herzegovina, 2021). In some countries, students are encouraged to use their own devices — an approach known as 'Bring Your Own Device' (UNESCO, 2023). In **Serbia**, the Centre for Educational Technology in the Western Balkans has initiated such a project in collaboration with UNICEF. The project aims to contribute to the discussion on effective investment models for ICT infrastructure. It assumes that infrastructure transformation must be holistic and start at the level of individual schools and classrooms (Centre for Educational Technology in the Western Balkans, 2023).

P3. Ensure high-speed connectivity in schools. Countries are working to ensure that educational institutions have a reliable, high-speed internet connection. For example, **Albania's** e-VET@Albania 2030 strategy aims to connect all schools to broadband internet by 2025 and establish multifunctional centres in public and private vocational institutions to promote effective digital learning (Government of Albania, 2020). Aside from wired broadband, mobile and satellite internet connections are used in schools and adult learning organisations located in remote areas and fragile settings, for example in

Ukraine and **Türkiye**. Free traffic for educational content is becoming increasingly widely accepted as a means of bridging the digital divide. In 2019, the Regulatory Agency for Electronic Communications and Postal Services (RATEL) of **Serbia** adopted *Guidelines for the Open Internet*, which contain a definition of 'zero rating' (free traffic) as a specific business practice whereby the internet service provider does not charge the end user for data usage generated by using certain educational applications or specific educational websites (Rolovic, 2023).

Tools to support policymaking

- To explore the importance of inclusive infrastructure, policymakers can refer to the OECD Digital Education Outlook 2023, which presents a number of implementation choices and the associated costs (procurement, maintenance, training and support) and highlights the conditions under which digital tools are most cost-effective (OECD, 2023).

- Low- and middle-income countries can take advantage of the UNICEF Giga strategy, an initiative that creates the necessary infrastructure for digital connectivity. GIGA has four main pillars: mapping every school's connectivity; developing regional business cases and bids to connect all schools; connecting every school and empowering young people with skills; and increasing the number and scale of proven digital public goods that can close connectivity gaps and support countries in scaling solutions (Generation Unlimited, 2021).

3.2 Digital capacity of schools

A second policy area for digital education reforms is the digital capacity of schools, as educators and learners need to work within a supportive digital ecosystem in terms of environment, methods and leadership. Evidence suggests that school development reforms can incorporate school leadership development, teacher training and curriculum and content updates (OECD, 2016). Specifically, a *whole-school approach to digital transformation* encompasses leadership and decision-making, strategies and codes of conduct, teaching and learning, assessment practices, curricula, infrastructure, hardware and software solutions, teaching methods and resources, professional development for teachers, extracurricular activities, and community links (Marjanović, 2021). School strategies on digitalisation need to consider the complexity of digital education. This includes considering what investments are justified, the role and responsibility of teachers and which obstacles should be removed as they negatively influence the establishment of online and blended teaching. These are relatively new issues for school managers (OECD, 2016), especially in VET systems (Van der Graaf et al., 2021). One of the policy challenges is to build learning ecosystems that simultaneously address school connectivity, equipment, digital capacity development, organisational culture, staff training, educational content, privacy and ethical standards, and go beyond the mere introduction of LMS solutions within schools (Giannoutsou et al., 2024).

Policy pointers and examples

P1. Build digital leadership among school managers. School leaders play a vital role in the sustainable implementation of digital education as they can prioritise and operationalise the issue by providing teachers with incentives, organising discussions on the subject in and outside the school, and ensuring that infrastructure and funding issues are properly addressed. In **Kazakhstan**, the Roadmap for the digital transformation of public administration in the field of pre-school, secondary, technical, vocational, post-secondary, special, and additional education and the protection of children's rights for the period 2024–2028 provides for upgrading and retraining courses for teachers and managers to improve their professional competences, including digital management and leadership (Ministry of Education of Kazakhstan, 2024). In **Moldova**, the EU, UNDP and UNICEF are supporting the digitalisation of schools by training teachers and school managers to enhance their leadership skills and facilitate the digital transformation of education (Ministry of Education and Research of Moldova, 2024). In **Slovenia**, the Sustainable and Digital Competences of Education Professionals project provides training in digital and green skills, as well as financial literacy, for education and training professionals and managers. The aim is to facilitate the comprehensive

transformation of green and digital education (Ministry of Education, Science and Sport of Slovenia, 2023).

P2. Boost the data management capacity of schools. Data can help school leaders steer the digital transition of schools, guide teachers in personalising students' experiences and assist policymakers in developing evidence-based education policies. It is therefore crucial that schools collect, store, and analyse relevant data to inform decisions at all levels. At the same time, it is important to consider the relationship between the datafication of education and the broader rise in surveillance mechanisms relating to learning analytics (Atenas et al., 2019), as well as establishing guidelines on the ethical use of data in education (European Parliament, 2020). **France** has included data mobilisation for the benefit of schools in its Digital Education Agenda 2023–2027 (French Ministry of National Education and Youth, 2022). **India** has introduced the Automated Permanent Academic Account Registry (APAAR ID Card), a digital ID card system for Indian students. The aim is to streamline academic record-keeping and identity verification for students across the country, enhancing access to educational services and improving administrative efficiency overall (Ministry of Education of India, 2023). **Japan** has incorporated learning analytics into its national digital education strategy, acknowledging their potential to provide valuable student data, while emphasising the importance of carefully managing access to this information (Ministry of Education, Culture, Sports, Science and Technology of Japan, 2022). In 2020, data protection officers from several higher education institutions in the **Philippines** volunteered to create data privacy guidelines specific to online learning in response to schools experiencing data breaches during the COVID-19 pandemic when using online platforms, social media, webcams and other devices (National Privacy Commission of the Philippines, 2021).

P3. Develop digital education environments in and around schools. These initiatives aim to build digital ecosystems around schools. For example, they allow teachers and support staff to exchange digital practices and engage parents in digital education (Van der Vlies, 2020). During the pandemic, many countries created national online platforms to facilitate the implementation of digital education across their systems (Williamson et al., 2020). These platforms have the potential to become the core of national digital education ecosystems by connecting high-quality content, tools, and services in a way that is both privacy-sensitive and ethical. At the same time, schools have been investing in setting up their own online teaching platforms, which often use proprietary solutions such as Google Classroom and tools such as Zoom. This raises concerns about the use of participants' data and online privacy — issues that should be addresses by digital education reforms. Over the last few years, the Educational Media Department (EBA) of **Türkiye** has developed a comprehensive system centred around schools, comprising well-stocked repositories, virtual classrooms and dedicated studios for educational filming, as well as expertise and know-how. This system was crucial in enabling a swift response in Türkiye during the 2020 lockdown: from the outset of distance learning, Turkish teachers were able to deliver virtual lessons based on the content co-created in previous years (European Training Foundation, 2020). **Austria** has launched an 8-Point Plan for Digital Learning, which seeks to improve communication between pupils, teachers and parents around a digital school portal that provides access to the most important education and public administration applications, such as Socrates, Eduthek, Moodle, LMS and MS Teams, through a single account (Austrian Federal Ministry of Education, 2020). **Ukraine** has developed the All-Ukrainian Online School, which provides a platform for distance and blended learning for students in grades 5–11, and offers pedagogical support to teachers. Since the beginning of the war with Russia, almost 400,000 users have been getting education through the platform (Ministry of Education and Science of Ukraine, 2021).

Tools to support policymaking

- The European Commission's Framework for Digitally-Competent Educational Organisations (DigCompOrg) is a (DigCompOrg) is a comprehensive tool that supports policymakers in assessing the digital capacity of schools. It encompasses 'control levers' of digitalisation within educational organisations across three dimensions: pedagogical, technological and organisational (Kampylis et al., 2015). DigCompOrg can be applied in practice through SELFIE, a self-assessment tool for school leaders, teachers, and students.

- The publication Whole School Approach to Online and Blended Teaching and Learning, (Marjanović, 2021) aims to facilitate discussion among policymakers, practitioners and other stakeholders on approaches and solutions that have emerged from twenty years of online teaching and learning practice, accelerated by the COVID-19 pandemic.

- The publication Meaningful and Ethical Use of Data in Schools by European SchoolNet (Andronikidis, 2023) explores the complexities and potential of the growing production of data in education. The topics covered include the *platformisation* of education, the use of algorithms and the impact on teachers' autonomy, teachers' interpretation of data use in education, generative artificial intelligence (AI) and assessment, ethics and the governance of data ecosystems.

3.3 Digital competences of educators

For digital education to be successful, it is essential to have a population of teachers and trainers with knowledge of emerging technologies (e.g. underlying concepts, general principles and mechanisms), who can teach using digital means (European Commission, 2022a). Although support for educators in applying emerging technologies is often a key component of digital education reforms, around 20 % of secondary education teachers in OECD countries report needing further digital training (OECD, 2023a), and around half of teachers and school managers report that a lack of economic and career-related incentives prevents them from participating in professional development (OECD, 2019b). Evidence also suggests that traditional forms of teacher professional development often does not meet teachers' needs (Vuorikari, 2018; Minea-Pic, 2020) and that approaches should shift from acquiring skills to finding ways to appropriately tailor technology to specific subjects and activities (Vuorikari et al., 2020; Kampylis et al., 2024). Furthermore, teachers' digital competences should be considered within the broader discourse on the key competences of citizens, as this would stimulate innovation in transition economies, as demonstrated by ETF's work in supporting key competence-driven reforms in Georgia and Ukraine (European Training Foundation, 2021).

Policy pointers and examples

P1. Define the expected teachers' digital skills and competences. A clear and shared understanding of the ideal set of competences that are integral to digital pedagogy can foster meaningful teachers professional development and increase career development opportunities for teachers. Building on its work on key competences (European Commission, 2018a), the **European Commission** has developed several frameworks and tools, such as the DigCompEdu digital competence framework for teachers and the self-assessment tool SELFIE for teachers. Building on this work, **Spain** has published its national framework for digital teaching, which comprises five main areas: information and data literacy, communication and collaboration, digital content creation, safety and problem-solving. The country has also established a national institute for teacher training, offering professional development opportunities to educators (European SchoolNet, 2018). The **African Union** Commission has developed the African Teacher Qualification Framework for Teacher Quality, Comparability and International Mobility, that includes knowledge and understanding of digital technologies for teaching and learning as a descriptor of initial teacher education (African Union Commission, 2019). Similarly, **Hong Kong** has developed a digital framework for teachers, which promotes the establishment of communities of practice among teachers to disseminate new digital pedagogical methods (UNESCO, 2018). **In Norway**, the Teachers' Digital Competences Framework is used to encourage discussions between school leaders and teachers about training sessions based on teachers' needs (Kelentrić et al., 2017).

P2. Foster the professional development of teachers in digital education. Digital education policy should prioritise equipping teachers with the necessary competences to effectively use digital technologies in their teaching (OECD, 2019a). The Digital Learning Landscape report notes that in countries such as **Kosovo**, **Serbia**, **Montenegro** and **North Macedonia,** in-service teacher training has been prioritised on a national scale (UNICEF, 2023). In 2024, the Government of **Morocco,** in cooperation with UNESCO and Huawei, launched a new initiative to enhance the digital skills of 10 000 teachers. The initiative aims to improve the quality of education in Morocco in line with Sustainable Development Goal 4 (Moroccan National Agency for the Fight against Illiteracy & UNESCO, 2024a). International donor projects can also be useful for building teachers' digital capacity. For example, in **Armenia** the online training course 'Bridging the Gap – Development of Digital and Crisis Management Skills for TVET Personnel', funded by the UNDP, aims to help TVET teachers and management staff familiarise themselves with digital educational technologies, improve the quality of learning materials, and make online classes more interactive and engaging for VET students (UNDP, 2021).

P3. Innovate teacher training through digital practices. Informal and collaborative teacher training methods, in addition to face-to-face training, are reportedly preferred by teachers (Conrads et al., 2017). At the same time, teachers who participate in professional development courses through online communities are more likely to use digital technologies in the classroom (Arjomand et al., 2013). According to the OECD (2019a), teacher training and teaching activities should rely on digital teaching resources and methods, recognising qualifications and validating non-formal and informal learning (European Parliament, 2020). In line with this, in 2024 **Tunisia** launched the initiative 'L'école de la Tunisie du futur', a comprehensive digital platform for students, parents and teachers. This includes a space for training teachers in digital pedagogies and distance learning, among other things (Ministry of Education of Tunisia, 2024). In 2022, **Türkiye** launched the Teacher Information Network (ÖBA): a platform that supports the professional development of teachers and school administrators through distance education. It includes applications such as distance learning, synchronous and asynchronous digital in-service training, a virtual library, professional development communities, teacher-administrator mobility programmes and a database of good practice carried out by teachers (Ministry of National Education of Turkey, 2022).

Tools to support policymaking

- The European Framework for the Digital Competence of Educators ([DigCompEdu](#)) is a scientifically robust tool that describes what it means for educators to be digitally competent. It has guided a number of initiatives in several EU countries. The framework can be implemented through the [SELFIEforTEACHERS](#) self-reflection tool, which is available in 24 languages.

- The ETF's [READY model](#) (Reference Model for Educators' Activities and Development in the 21st century) offers educators, education providers, administrators, researchers and policymakers a structured way to identify the professional practices and development needs of 21st century educators (Kampilys et al., 2024).

- The [UNESCO ICT Framework for Teachers](#) (ICT-CFT) is a tool designed to help countries develop national standards for the digital competency of teachers. The framework highlights the role technology can play in supporting major areas of focus in education, and is available in several languages.

- The 2022 UNESCO-UNEVOC report [Digital skills development in TVET teacher training](#) (Subrahmanyam, 2022) maps the main trends and challenges in the training of TVET teachers and trainers in the context of digitalisation and provides examples of successful innovative TVET teacher training efforts.

3.4   Digital educational resources

High-quality digital educational resources are a key component of digital education for three main reasons. Firstly, they can be updated by teachers, ensuring that they remain current. Secondly, if openly licensed, they facilitate participation by being accessible to students at no cost. Thirdly, they can foster teaching innovation through content co-creation processes. As noted by the European Commission, new trends relating to digital education content are emerging. On the supply side, traditional producers of educational content, such as publishers, are facing competition or complementary supply from digital content from public authorities, teacher-generated content, and new commercial digital players that are not necessarily from the education sector. On the demand side, teachers and students are taking advantage of the increased supply of digital educational content by becoming its creators and curators (European Commission, 2023). GenAI enables the automatic development of educational resources and the seamless curation of resources (including Open Educational Resources), complementing the existing educational offerings and responding to the growing need for upskilling and reskilling. However, it is important to balance the availability and quality of educational content, and quality assurance measures should therefore be applied. The pandemic has shown that a lack of digital educational resources can be challenging for educators and students, particularly those with disabilities or financial difficulties: whether AI-produced content can solve this challenge remains to be seen. Finally, the low proportion of educators who use digital content in the classroom to support student learning is problematic (IIEP Learning Portal, 2021).

Policy pointers and examples

P1. Produce high-quality digital educational resources. A mature digital education ecosystem requires high-quality content that can support online, in-person or blended teaching (European Commission, 2023). Educators should be encouraged to use digital content but also to create it, making it flexible and tailoring it to their students' needs (European Parliament, 2020). In **Lithuania**, the Digital Transformation of Education EdTech project involves developing technological solutions and the necessary digital teaching and learning resources (i.e. digital content) for educational institutions to enable personalised distance learning beyond the pandemic (Ministry of Education, Science and Sport of Lithuania, 2022). The goals of **Albania**'s 2022–2026 Digital Agenda Strategy include developing digital content and synchronous and asynchronous educational tools and platforms, and putting in place the necessary infrastructure and equipment (Ministry of Education, Sports and Youth of the Republic of Albania, 2022). The **Austrian** 8-Point Plan for Digital Learning calls for all digital teaching and learning resources to be aligned with curricula. According to the Plan, learning apps must be reviewed for use as educational media in blended and distance learning settings, based on international best practice. This will widen the range of content involving innovative and digital educational media (Austrian Federal Ministry of Education, 2020).

P2. Develop the skills of teachers and learners to create and use digital resources. For digital education resources to deploy their full potential, both educators and learners need capacity building and usage frameworks (Discovery Education, 2021). In **Israel**, Eureka World offers pupils a virtual, 3D creative learning experience, aiming to create an augmented reality human study companion that utilises 3D capabilities in new ways without losing the human connection (Israel Innovation Authority, 2019). In **Italy**, innovative laboratories were created as part of the 'School 4.0: Innovative Schools, New Classrooms and Labs' project, that provide computers and support for the use of AI and language learning, offering a new approach to acquiring foreign language skills and learning to create communicative content (Office of the Prime Minister, 2022). In **Bosnia and Herzegovina**, the project 'Business Unusual: Reimagining Education for Marginalised Girls and Boys during and after COVID-19' aims to enhance the capacity of VET authorities to deliver high-quality distance and blended learning. This will be achieved by strengthening the capacity of public education authorities to manage digital learning and by building the capacity of TVET providers to create, facilitate and implement digital learning, by strengthening collaboration between VET schools and the business community to reduce skills mismatches, as well as develop digital learning materials for key occupations and career guidance materials to encourage girls to choose STEM-intensive occupations (UNICEF, 2020).

P3. Encourage the creation and use of Open Educational Resources (OER). The possibility to legally use open educational resources (OER) can greatly enhance both inclusion and quality in training (UNESCO, 2019a). For this reason, open licensing of educational content should be a key component of digital education policies. In many countries, government platforms are supplemented by non-governmental OER developed by teachers, NGOs, universities, etc. (OECD, 2023b). In **Moldova**, the Advancing Quality Education and Lifelong Learning Opportunities for All programme will enhance the digital skills of teachers, support the development of digital educational resources and establish a national OER platform (Ministry of Education and Research of Moldova, 2024). Similarly, the Strategy for the Development of Digital Skills in the Republic of **Serbia** calls for the establishment of various training models to develop citizens' digital skills in public spaces, including 'traveling' training and online programmes via Massive Open Online Courses (MOOCs) (Ministry of Education, Science and Technological Development of the Republic of Serbia, 2020). In **Ukraine**, the Digital Diia.Education platform provides free access to the best educational practices, making lifelong learning more accessible and straightforward (Ministry of Education and Science of Ukraine, 2020).

Tools to support policymaking

- The European Commission's study Digital Education Content in the EU sets out an overview of digital education content across Europe, from early childhood to higher education (HE), identifying key challenges in the development of a robust digital education content framework at the EU and national level (European Commission, 2023).

- The Recommendation on OER (UNESCO, 2019a) and the more recent Dubai Declaration on OER (UNESCO, 2024b) are instruments that embrace openly licensed educational materials in education. They address several objectives, including building stakeholder capacity to create, access, reuse, adapt and redistribute OER, developing supportive policies, encouraging the creation of inclusive and equitable quality OER, and nurturing sustainability models for OER. They also facilitate international cooperation.

- The UNESCO Guidelines on the Development of Open Educational Resources Policies (UNESCO, 2019b) provide a systematic approach to developing and implementing OER policies. Through templates, theoretical underpinnings and practical examples, the guidelines help government officials and experts develop policies that are grounded in stakeholder needs.

- The Gateways to public digital learning initiative by UNESCO and UNICEF aims to help countries establish and improve their public digital learning platforms through a public and common-good approach. This involves study visits, online dialogues and policy analysis, aiming to facilitate international exchange and strength digital learning platforms and content.

3.5   Digital teaching and assessment

The COVID-19 pandemic has shown that simply moving teaching from face-to-face to distance learning settings without changing the pedagogical approach to more engaging and interactive methods does not improve the learning experience. In fact, it can lead to exclusion and isolation dynamics (Williamson et al., 2020). Conversely, the appropriate use of digital pedagogical approaches can enrich the learning experience. This provides learners with a wide range of resources and tools, which can be used in any field of study, allowing them to transform from mere consumers of knowledge into co-creators of knowledge. Digital education reforms should therefore seek to implement well-known pedagogical principles, such as personalisation, authentic learning and learner agency, in new ways while blending online and traditional learning methods (Masenya, 2021) with a focus on digital skills (UNESCO, 2020a). This is particularly necessary in the VET sector, where educators often fail to use learner-centred pedagogical approaches or create practical, real-life learning situations (ILO and UNESCO, 2020). In terms of challenges, there is often a lack of comprehensive monitoring and evaluation approaches for digital pedagogy, while quantitative outputs tend to receive the most attention (EIT Digital, 2022). For example, the focus tends to be on the number of educators trained rather than the quality of the training provided (Conrads et al., 2017). A general lack of flexibility in the implementation of digital education in curricula is also problematic, as

governments often maintain traditional formats and durations of school hours in digital settings, which has a negative impact on the engagement and motivation of both teachers and learners (Carretero Gomez et al., 2021).

Policy pointers and examples

P1. Foster the use of digital teaching methods. Digital education policies should prioritise pedagogical innovation, such as collaborative, experiential and embodied learning, over the mere adoption of digital technologies (Paniagua and Istance, 2018). New digital pedagogical approaches are often associated with co-creation dynamics. For instance, the Avanguardie Educative school network in **Italy** promotes the concept of going beyond traditional textbooks by engaging students in the collaborative development of their educational materials (INDIRE, 2021). **Israel**'s Eureka World is an initiative that enables joint creation and learning in multi-participant 3D environments. It combines physical interfaces such as 3D printers, robotics controllers and VR headsets and others, with teachers acting as mentors to the participating learners (Israel Innovation Authority, 2019). In the **Czech Republic**, the Ministry of Education has started disbursing funds for the purchase of digital teaching aids to kindergartens, primary and secondary schools, conservatories, voluntary association and municipalities. The Ministry of also providing methodological support tools (Ministry of Education, Youth and Sports of the Czech Republic, 2022).

P2. Set up a monitoring system for digital teaching. The implementation of digital pedagogies should be monitored to enable learning from work carried out and adjusting subsequent policies. The satisfaction levels of teachers, students and support staff can be monitored by enabling educators to regularly share aspects of their practice, such as content coverage and assessment criteria. This makes digital pedagogies more transparent and sharable. The Education Model Curriculum of **Türkiye** is a good example of a holistic model consisting of the basic approach of the curriculum, the student profile, the Virtue-Value-Action Framework and the skills framework components. Process and situation-based measurement and evaluation activities should be planned and carried out to support the teaching process at the highest level, provide constructive feedback and develop skills (Ministry of National Education of Türkiye, 2024). According to **Austria's** 8-Point Plan for Digital Learning, in order to widen the range of content involving innovative and digital educational media, learning apps must be evaluated in line with educational criteria. Essential criteria for innovative learning software include learning management, learning involvement, ease of use and data privacy (Austrian Federal Ministry of Education, 2020).

P3. Foster the use of digital technologies for assessment. The advantages of digital assessment include rapid marking and feedback, reduced human bias and error, addressing teachers' workload (Leaton Gray and Kucirkova, 2021) and adaptive tracking of academic progress (Veldkamp and Sluijter, 2019). However, challenges such as data safety (Timmis et al., 2015) and ethical issues (Wyatt-Smith et al., 2021) must be taken into account. In addition, assessments marked by algorithms may be less transparent and difficult to verify, particularly when AI tools are used (Veldkamp and Sluijter, 2019). **Albania** has introduced ICT-supported formative and summative assessments, including an online final-level exam for various programmes and schools within the e-VET@Albania policy initiative (Albanian National Agency for Vocational Education, Training and Qualifications, 2022). **Ireland**'s Digital Strategy for Schools until 2027 supports the embedding of digital technologies in teaching and assessment. This includes providing flexible professional learning for all teachers and school leaders in planning and using digital technologies. It also provides support to help schools assess their progress in embedding digital technologies (Department of Education and Skills of Ireland, 2022).

Tools to support policymaking

- The Open University's yearly [Innovating Pedagogy](#) report (Kukulska-Hulme et al., 2024) sets out a selection of powerful pedagogical approaches and innovations with the potential for transformative change, offering practical examples and insights.

- The [Digital Pedagogy Toolkit](#) by JISC (UK) aims to support academic staff in making informed choices about their use of technology by providing ideas and inspiration for overcoming barriers to technology use and promoting current approaches to curriculum design to ensure that technology meets the learning outcomes of the study programme.

- The [Digital Assessment Policy Guidelines](#), developed by the Dutch Agency for Digital Education (SURF, 2016), are intended for employees tasked with preparing and implementing digital assessment policies. They can be used to update an existing digital assessment policy or in cases where a policy has yet to be drawn up.

- The 2020 European SchoolNet report [Strategies to include digital formative assessment in the Danish school system](#) (Balanskat and Engelhardt, 2020) presents policy-relevant examples of digital formative assessments implemented in Danish schools. These examples are rooted in ten years of pioneering experience of digital assessment as part of national tests.

3.6 Digital competences of learners

Digital competences, often called digital skills, are essential for lifelong learning, employability and social participation. These skills are arguably the main focus of the digital education policies analysed for the purpose of this study, along with the EU Digital Decade Programme and the Union of Skills strategy (European Commission, 2025). Although most European education systems had reformed their curricula by 2019, introducing components such as computational thinking and AI, initiatives that connect curricula with broader labour market trends and challenges are still in the early stages of development (Van Roy et al., 2021; Cobo and Rivas, 2024). This is especially true for the VET sector. Between 2011 and 2018, almost all EU countries had started implementing policies that promoted digital competence in VET (Herrero et al., 225; Cedefop, 2020), including computational thinking. This was recognised as a means of enhancing students' employability and equipping them with the skills required for the job market (Bocconi et al., 2022). One of the main challenges is the difficulty of mapping the required digital skills. This is because these skills encompass not only technical abilities but also transversal skills necessary for living and working in the 21st century. At the same time, these skills overlap and interlock (European Training Foundation, 2022). In addition, the lack of out-of-school support for developing digital skills is a concern, particularly with regard to issues such as online privacy, internet safety, and digital identity management (Williamson et al., 2020).

Policy pointers and examples

P1. Innovate digital education curricula. In recent years, several countries have incorporated digital learning outcomes and/or dedicated subjects into their general education curricula, with a focus on areas such as coding, AI, and data analytics (Boeskens and Meyer, 2025). Other countries are integrating digital competence learning outcomes across curricula in order to develop digital skills in a transversal way. For example, the **Czech Republic** is implementing the 'School curricula fit for the digital age' project, which aims to revise primary and secondary school curricula to emphasise digital literacy and skills. These include subjects such as data processing and modelling, coding and programming, robotics, virtual and augmented reality and 3D printing. The initiative aims to develop digital skills as a key competence across all areas of education, including non-IT subjects (Ministry of Education of the Czech Republic, 2022). **Bulgaria's** Digital Transformation Strategy 2020-2030 stipulates that targeted efforts should be made to include technological disciplines and digital skills in curricula at all levels of education, including VET, as well as in reskilling systems, with particular attention to STEM subjects (Council of Ministers of the Republic of Bulgaria, 2020). **Italy** has recently aligned the curricula of VET institutes with the demand for digital skills required by the country's productive sectors, with the aim of promoting employability. This has been achieved by harmonising

training programmes with the specific needs of each local area (Ministry of Education, Universities and Research of Italy, 2022).

P2. Promote informal learning opportunities to build digital skills. Digital competences can be acquired independently, outside school, through peer interaction and cooperation at events such as hackathons or bootcamps. It is in these open contexts that learners can gain a better understanding of the digital world (European Commission, 2020). Digital skills development policies increasingly embrace both formal and informal settings. In **Montenegro**, for example, the 'Digital School Digionica' initiative forms the basis for creating a secure, supportive, efficient and comprehensive digital education system. It provides access to a variety of educational materials that can supplement school learning in line with the concept of UNICEF's Learning Passport (Ministry of Education, Science and Innovation, 2022). Other online platforms for informal learning include European Schoolnet (**EU**), Pix (**France**, **Belgium** and the **Netherlands**), Informal School of IT (**Romania** and **Moldova**) and e-VET Learning (**Azerbaijan**).

P3. Promote critical digital literacy among learners. An idea emerging in policy is that digital skills should be understood more broadly, encompassing not only technical skills, but also the capacity to critically and actively use digital technologies, whether within school activities or in informal learning settings. This approach is inspiring an increasing number of international efforts in this area, such as the DigComp framework of the European Commission (Cosgrove & Cachia, 2025). An example of critical literacy development in schools comes from the **UK**, where the Teachers' Standards set out teachers' responsibilities for safeguarding students' digital well-being, including protecting them from potentially harmful online content (European Commission, 2019). In the field of informal learning, there are many initiatives, including competitions such as the National Award for Digital Competences, which has been organised in **Italy** since 2021 and focuses specifically on digital and gender divides, as well as awareness-raising actions such as the **EU** Safer Internet Day. Launched in 2004, this initiative is now celebrated in approximately 200 countries worldwide and acts as a platform for the discussion of issues such as cyberbullying, social networking and digital identity. In **Denmark**, the National Strategy for Cyber and Information Security 2022–2024 aims to raise awareness of digital behavior and security issues, and to promote increased knowledge and interest in this area, as well as developing sound digital habits among citizens, through initiatives that are both motivating and engaging (Government of Denmark, 2021). In **Ireland**, the Digital Strategy for Schools until 2027 aims to support the development and dissemination of high-quality resources that promote the safe, responsible and ethical use of the internet and digital technology. These resources are informed by national and international policy and best practice (Department of Education and Skills of Ireland, 2022).

Tools to support policymaking

- The European Commission's Digital Competence Framework for Citizens (DigComp), identifies five areas and 21 specific competences, each with proficiency levels, examples of knowledge, skills and attitudes, as well as use cases in educational contexts. The framework has recently been updated, incorporating competences related to generative AI, cybersecurity, rights, choice and responsibility, digital wellbeing and disinformation.

- The 2022 report *Computational Thinking in Compulsory Education* by the Joint Research Centre of the European Commission (Bocconi et al., 2022) contains a review of the latest research findings and grassroot initiatives on critical digital skills in Europe's education landscape.

- The EU Code Week is an annual initiative across Europe comprising multiple grassroot initiatives aiming to foster creativity, problem-solving and collaboration through programming and other tech activities. In 2021, four million people in 80 countries worldwide world took part in EU Code Week.

- The Digital Education Hackathon is a free and open event organised with the support of the European Commission, aiming to solve current issues in digital education. Participants from all over Europe and beyond choose an open challenge, register on the portal, and then take part in the event online or in person.

3.7 Digital credentials and employability

In recent years, alternative credentials such as microcredentials and digital badges have emerged, helping to bridge the gap between educational and training provision and the skills required by the labour market, while increasing the efficiency of skills development systems (Beirne at al., 2020). At the same time, digital credentialing systems can capture, recognise and validate a broader range of learning outcomes than traditional certification schemes (UNESCO, 2022b). They save certificate issuers time and money, retain control over the validity of credentials, and increase the visibility of skills (European Council, 2022). They can also contribute to the recognition of informal learning by promoting 'Open Badges', for example, which can measure competency beyond a certificate (Ifenthaler and Shumacher, 2016). Digital credentials are based on relatively new technologies. Therefore, the first set of challenges relates to the trustworthiness of data, the interoperability of systems, and the ubiquity of technological standards (UNESCO, 2022b). In parallel, the cultural challenges relating to the risk of employers not easily accepting the move from traditional credentials to microcredentials must be mentioned, especially since stacking (the combination of microcredentials) may not always lead to coherent qualifications. While promoting the use of digital credentials, governments should update teacher training and recognise digital skills acquired by teachers and trainers through digital credentials. They should also ensure that the creation of digital credentialing ecosystems does not affect the inclusiveness of education systems in terms of gender, language, or digital literacy (Asian Development Bank, 2022).

Policy pointers and examples

P1. Support and promote digital credentials, including microcredentials. Since 2020, the **Australian** government is working on a national online microcredentials platform (Department of Education, 2020), providing a one-stop shop to help learners and workers identify educational opportunities. The online skills marketplace provides a consistent, nationwide platform for comparing course outcomes, duration, mode of delivery and credits value. Similarly, the Association of the Registrars of the Universities and Colleges of **Canada** (ARUCC) has recently launched MyCreds, a web platform that includes a credentials wallet for students. This allows the secure issuance, exchange and verification of official digital documents, badges, micro-credentials and diplomas from Canada and around the world (ARUCC, 2020). In **Flanders**, the Ministry of Education and Training provides a digital credentials platform called Learning and Experience Evidence Database (LED), which collects and makes accessible data from student credentials, integrating data from other Flemish government services also in non-education sectors. In **Wallonia**, the Wallonia-Brussels Federation provides primary and secondary schools with applications that supplement the national student register and support exam administration and digital credential management. For instance, schools can use DADI, an application that uses blockchain technology to encode and authenticate diplomas, further raising security standards (OECD, 2023a).

P2. Promote recognition of digital credentials for education and employment. The **European Union** is making swift progress on this issue, by promoting the European Digital Credentials for Learning. These credentials, that are sealed and tamper-proof, use open standards and are fully aligned with EU frameworks and instruments such as the EQF, ESCO and EUROPASS (European Council, 2022). With the support of the European Social Fund, Oulu University of Applied Sciences in **Finland** is developing a nationwide open badge ecosystem. This enables the verification of adults' problem-solving skills in technology-rich environments by identifying and recognising competences acquired outside the formal education system. Across **India**, the APAAR ID Card is a specialised identification system that has been introduced to create a single, integrated platform for tracking students' academic progress, and to allow employers and educational institutions to verify educational credentials (Ministry of Education of India, 2023).

Tools to support policymaking

- The report Landscape of Digital Skills Certification Schemes in the EU (Centeno et al., 2025) provides an analysis of the 27 most relevant schemes operating in the EU, in terms of organisational aspects, alignment with the DigComp framework, the services they offer, technical and quality assurance aspects, adoption, and impact.

- To increase transparency of qualifications, the European Commission has recently added a digital dimension to its EUROPASS. Connected to this, the Europass Digital Credential Issuer is a free web app that allows credential awarding bodies to prepare and issue European Digital Credentials for Learning in the form of degrees, diplomas or other learning credentials.

- The Digital Credentials for the European Union (DC4EU) project investigates the issuance of educational credentials and professional qualifications, developing the European Digital Identity Wallet (EUDIW). This is a fundamental element in the cross-sectoral and cross-border hybridisation of identity, signature, educational credentials and social security.

3.8 AI in education and training

The use of generative AI, particularly large language models such as ChatGPT, can have a disruptive impact on education by automating data processing, offering personalised learning solutions, and improving the efficiency and effectiveness of the system as a whole (Barth et al., 2025). Following initial resistances, policymakers are reflecting on how best integrate AI within educational ecosystems (Varsik and Vosberg, 2024), both incorporating AI-related components in specific policies (such as the inclusion of AI competences in the teacher training curricula) and designing vertical policies that address AI across all components of the digital education system. The situation is mixed: while **China** launched its first policy on AI in education in 2017, two-thirds of OECD member states have not adopted regulations on the use of generative AI in education, and only one-third of countries or jurisdictions have published non-binding guidance (OECD, 2023b). The challenge lies in creating mechanisms that can harness the potential of generative AI while navigating challenges such as algorithmic bias, cheating, plagiarism, skills attrition, and concerns relating to privacy, data security, intellectual property infringement and sustainability. Furthermore, policymakers must recognise that without proper targeted policies, issues related to accessibility, transparency and fairness in AI-based systems could result in discrimination and exclusion, further entrenching existing disparities and raising concerns about environmental impacts (UNDP, 2025).

Policy pointers and examples

P1. Promote the use of ethical and human-centric AI. Initiatives that aim to promote a socially responsible use of AI in education are often supported by consultations with scientists, educational professionals and entrepreneurs, and are driven by a pedagogical and didactical perspective (OECD, 2023b), typically supporting human oversight of AI developments and decisions (UNESCO, 2022a). Sometimes, these initiatives are specific to education. For example, the Policy Brief on Artificial Intelligence in Education launched by **Türkiye**'s Ministry of National Education will guide the work of its newly established AI Department. The Policy Brief calls for a collaborative approach involving all stakeholders to work on integrating AI into the country's education policy. This should start with successful examples and indicators, while keeping equity, global regulations, cost challenges, policy transparency, and an evidence-based approach among its priorities. In other cases, education forms part of broader AI strategies. For example, in **Bulgaria,** where the priority is to create a regulatory framework for the development and use of reliable AI in line with international regulatory and ethical standards, including in education and training (Ministry of Transport, Information Technology, and Communications of Bulgaria, 2020). Similarly, **Spain** has approved its Artificial Intelligence Strategy, which includes the establishment of an ethical and regulatory framework and considers education to be both an area of application and a means of ensuring the success of the strategy (Ministry of Economy, Commerce and Business of Spain, 2024).

P2. Build AI literacy among teachers and students. In order to ensure the ethical and responsible use of AI tools, it is essential to demystify their complexities for teachers (Cedefop, 2025). Several countries increasingly are emphasising AI literacy as a professional learning objective for teachers, which includes understanding how AI models and tools function and using AI tools (OECD, 2023b). Since 2023, the National Education Training Institute (IFEN) of **Luxembourg** has been incorporating AI topics into its teacher training courses. These cover subjects such as basics of AI, ethics, and future-proofing the classroom. They also explore how AI can be used to optimise teacher preparation in subjects such as art and foreign languages (National Education Training Institute of Luxembourg, 2023). In **Kazakhstan**, the Ministry of Education is implementing a pilot project in cooperation with Google, through which more than 6 000 students have had the opportunity to acquire advanced AI skills. Alongside educators, there is an emerging focus on cultivating AI literacy among students. Initiatives are underway in **Austria** and **Korea** to educate students on the fundamentals of AI, its societal impacts, and the associated risks and benefits (OECD, 2023b). In the **Netherlands**, the National Education Lab AI (NOLAI) aims to improve primary and secondary education by researching and proposing scalable, evidence-based AI prototypes, as well as investigating the consequences of responsible AI use in the classroom.

P3. Use AI for curricula innovation and flexibility. AI has the potential to transform how schools operate: learning analytics can enhance an institution's curriculum by analysing students' development and paths (OECD, 2021b). AI intelligent tutoring systems can personalise the curriculum and provide tasks based on the students' abilities and knowledge gaps (OECD, 2023b). Equity gaps can be reduced by providing students with 'real-time' feedback to enable them to progress at their own pace (OECD, 2021c). Policy examples are starting to emerge. **Malta's** Strategy and Vision for AI includes for example intelligent tutoring systems, AI-driven personalised learning applications, AI as a core part of course curricula across all areas of study and the development of AI-specific courses, and professional development for academics in AI-related areas (Office of the Prime Minister of Malta, 2019). Some counties are working on this together with vendors. One example is **Estonia**, which is collaborating with OpenAI to provide all secondary school students and teachers with ChatGPT Edu, a version of ChatGPT customised for education systems, to provide assistance with feedback, student support, studying and lesson planning. **Serbia's** Artificial Intelligence Strategy 2020–2025 recognises AI as a special cross-curricular competence in secondary education and is developing ways to embed it across the curriculum (Government of the Republic of Serbia, 2025).

Tools to support policymaking

- The EU Artificial Intelligence Act establishes a framework for AI systems across the EU. The aim is to ensure that these systems are safe, transparent, non-discriminatory and environmentally friendly. The Act introduces a risk-based approach, categorising AI systems, including those used in education, according to their potential impact on citizens' rights and safety.

- The European Commission's Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators (European Commission, 2022b) are designed to help educators understand the potential of AI and data applications in education, raise awareness of the possible risks, and enable positive, critical and ethical engagement with AI systems, which utilises their full potential.

- The publication 'OECD Digital Education Outlook 2023: Towards an Effective Digital Education Ecosystem' outlines a set of opportunities, guidelines, and guardrails for the effective and equitable use of AI in education. It is intended to guide countries on whether and how to integrate generative AI into their education systems.

- UNESCO's Recommendation on the Ethics of Artificial Intelligence (2022) is the world's first global standard on AI ethics. It aims to enable policymakers to translate core values and principles into action with regard to data governance, the environment and ecosystems, gender, education and research, and health and social wellbeing, among many other areas.

4. DIGITAL EDUCTATION POLICY PROMPTS AND MECHANISMS

When designing a digital education initiative, it is important for policymakers to understand that the choices they make can have several unexpected short-term and long-term impacts. The ETF Digital Education Reform Framework addresses these issues by identifying **three policy prompts** — the broader factors typically influenced by digital education and that should guide the policymaking process, and **five policy mechanisms** that should ideally be activated when designing a digital education initiative. This chapter presents these transversal factors alongside some thought-provoking questions. Reflecting on these questions can help policymakers determine how the critical factors of the DERF 2.0 can be considered in the policy design process.

Table 2: Policy prompts and mechanisms for digital education

Policy prompt	Key questions
Inclusion and equity	▪ Does the initiative consider the needs of digitally excluded and vulnerable groups, including the gender gap? How does it do this? ▪ Will the initiative produce new forms of inequalities yet to be measured? What prevention measures are being put in place?
Digital security and well-being	▪ Does the initiative address information security and trust? How? ▪ Does the initiative consider the impact of digital technology on the well-being of teachers and learners? How?
Environmental sustainability	▪ Does the initiative contribute to improving environmental sustainability? ▪ Does the initiative consider the impact of digital technologies on the environment? How?
Policy mechanism	**Key questions**
Data for policymaking	▪ Is the initiative based on actual data on developments in digital education? ▪ Does the initiative produce data that can be used to monitor progress and further develop digital education at system level? How is this data collected and stored?
Stakeholder engagement	▪ Is the initiative based on active involvement of the relevant stakeholders, including those specifically working in the digital sphere? ▪ Does the initiative take advantage of digital ways to continuously engage the relevant stakeholders?
Financing	▪ Does the initiative budget for all short-term and long-term costs of digital education? ▪ Does the initiative engage stakeholders, including private companies, in sharing the resources to support its activities? Under what conditions?
Quality assurance	▪ Does the education quality assurance system cover digital education? ▪ Does the initiative include continuous quality assurance mechanisms relating to both digital content and the technical solutions implemented?
Foresight capacity	▪ Is the initiative based on an analysis of expected developments in digital technology and education? ▪ Does the initiative include a component aimed at monitoring future digital education developments?

4.1   Environmental sustainability

Critical questions

- Does the initiative contribute to improving environmental sustainability?
- Does the initiative consider the impact of digital technologies on the environment? How?

Digital education is a key component of the general socioeconomic digital transition and is often linked to the green transition, as it has the potential to help combat climate change and create a greener society. The green and digital transitions are at the top of policy agendas across the EU and beyond, addressing distinctive priorities while being closely connected and interdependent. If deployed properly, digital technologies could enable the decarbonisation of the most polluting sectors, improve energy efficiency and foster the circular economy, provided that policy demand is strongly articulated and the workforce has the necessary skills and competences. At the same time, the environmental impacts of digitalisation are becoming an increasingly important policy concern. The wider use of digital technologies may increase carbon emissions, energy consumption and electronic waste. This should be considered when designing policies on digital education in order to balance the educational benefits with environmental costs (UNESCO, 2022a). In particular, policymakers should always prioritise 'green' technologies and sustainable choices, favouring digital solutions that do not consume precious environmental resources such as rare earth metals, require minimal power and water for development and use, have a neutral carbon footprint and can be recycled at a reasonable cost (UNESCO, 2022a). For example, the **Flemish** Ministry of Education has developed procurement guidance for schools, including non-binding criteria relating to environmental sustainability, that explicitly invites schools to purchase ICT equipment, digital tools and resources in line with the criteria identified (OECD, 2023b).

Suggested further reading: [Sustainability in Digital Education: A Systematic Review of Innovative Proposals](#) (García-Hernández et al., 2023).

4.2   Digital security and well-being

Critical questions

- Does the initiative address information security and trust? How?
- Does the initiative consider the impact of digital technology on the well-being of teachers and learners? How?

In 2022, the Council of the European Union agreed a common position on supporting well-being in digital education, stating that policy should aim to guarantee physical, cognitive, social and emotional contentment that enables all individuals to engage positively in digital learning environments. The Council also stressed the link between well-being and the development of critical thinking, digital empowerment and resilience (Council of the European Union, 2022). Nevertheless, although the transition to online education during the pandemic has been shown to contribute to mental health issues such as anxiety and depression (McLafferty et al., 2021), the impact of digital education on the well-being of teachers and learners is often neglected by current policies. While issues connected to well-being, such as cyberbullying and safety, are increasingly being included, more needs to be done. The challenge lies in designing digital education policies that equip citizens, especially vulnerable groups, with the knowledge and tools to use technology in a way that has a positive impact on their

well-being, paying particular attention to adolescents and younger age groups (Winter School Class of Future Female Leaders, 2022). For example, a Law on Non-Cognitive Skills has recently been approved in **Italy**, which introduces the development of non-cognitive and transversal skills in school curricula to support students' well-being, including their ability to navigate digital environments, for a three-year trial period. Finally, policymakers must first support evidence-based research into the effects of digital technologies on mental health and well-being, and exercise caution when engaging young people extensively with digital technologies for extended periods (UNESCO, 2022a; OECD, 2023b).

Suggested further reading: [Untangling Digital Safety, literacy, and Wellbeing in School activities](#) (Cowling et al., 2025) and [Well-being in digital environment in school](#) (European Schoolnet, 2025).

4.3 Inclusion and equity

> **Critical questions**
>
> - Does the initiative consider the needs of digitally excluded and vulnerable groups, including the gender gap? How does it do this?
> - Will the initiative produce new forms of inequalities yet to be measured? Which prevention measures are being put in place?

Promoting digital inclusion should be the driving force of any digital education policy (UNESCO 20220, p. 28). Research demonstrates that the introduction of digital education has the potential to improve social inclusion, transforming the life of learners with visual, hearing, or other disabilities. However, for this to happen, initiatives must be designed with inclusion in mind from the outset (European Commission, 2018b). For example, **Greece** has implemented a digitally inclusive initiative whereby all secondary education textbooks are available through assistive technologies for visually impaired learners, and several schoolbooks have been adapted into accessible digital formats for learners with intellectual and hearing disabilities (Anagnostou, 2015). Moreover, given the growing involvement of the private sector in digital education, an **equity-informed design should be adopted by all stakeholders**, including developers, vendors, and platform operators, who may be inclined to prioritise time, cost and quality without necessarily considering equity (UNDP, 2024). On the other hand, the introduction of digital education during the COVID-19 pandemic has shown that, without an inclusive approach, the gap between students from different social backgrounds and, more generally, between high-performing and low-performing students can increase (Gottschalk and Weise, 2023). AI can certainly amplify these effects (Varsik and Vosberg, 2024). When discussing digital inequalities, **researchers refer to multiple levels of exclusion** (Ragnedda, 2020): access to hardware, software and connectivity; disparities in use, which have implications for socially disadvantaged individuals and groups; and disparities arising from algorithmic decision-making. To mitigate this third and lesser-known dimension, it is important to promote the critical thinking and the practical skills necessary to understand how algorithms and artificial intelligence tools work. It is also crucial to ensure that these technologies are transparent and do not exacerbate social inequalities, including gender disparities, in participating in digital society. The digital gender divide is a particularly important issue. In the EU, for example, there are proportionally more men than women with basic digital skills, and this disparity grows with increasing age and skill complexity (European Commission, 2018b).

Suggested further reading: [Digital equity and inclusion in education: An overview of practice and policy in OECD countries](#) (Gottschalk and Weise, 2023).

4.4   Data for policymaking

Critical questions

- Is the initiative based on actual data on developments in digital education?
- Does the initiative produce data that can be used as evidence to monitor progress and develop digital education at system level? How is this data collected and stored?

Over the last two decades, a number of studies have emphasised the importance of using data to inform policy decisions in education (Slavin, 2020), while international organisations such as the European Commission and the OECD have increasingly encouraged countries to make policy decisions based on evidence (Pellegrini and Vivanet, 2021). In the context of digital education, alongside the data collected through traditional methods such as questionnaires, censuses, and opinion polls, the existence of learning analytics and big data coming from educational settings can help policymakers improve educational policies (Van der Vlies, 2020). However, the issues of datafication present education decision makers with complex, technical, and often opaque challenges (Pasquier Di Dio, 2022). Data gathering mechanisms should be established through national and international co-operation platforms to ensure the exchange and optimal use of data, and promote a data culture (Conrads et al., 2017). In other words, the proper use of big data, enhanced by AI, can greatly improve the educational policymaking cycle, but this must be accompanied by mechanisms that guarantee the data is used securely, appropriately and ethically. This should include the safeguarding the privacy and confidentiality of students' personally identifiable information (UNESCO, 2022a). Countries are addressing the use of data in digital education policies in various ways. In **Türkiye**, big data is generated by various platforms created within the FATIH project. These include the national educational content network, the teachers' informatics network, the foreign language learning platform, and the Public Education Centres Informatics Network. They are also connected also through the newly established AI and Big Data Applications Department (Government of Türkiye, 2025).

Suggested further reading: CEPS-Google Index of Readiness for Digital Lifelong Learning (Beblavý et al., 2019).

4.5   Stakeholder engagement

Critical questions

- Is the initiative based on active involvement of the relevant stakeholders, including those specifically working in the digital sphere?
- Does the initiative take advantage of digital ways to continuously engage the relevant stakeholders?

Promoting high-quality and inclusive digital education requires a collective effort across society. This involves governments at all levels (whole-government approach) as well as education and training institutions and private and public actors, through an ecosystem approach (European Commission, 2020). Stakeholder consultations should be conducted during the policy design phase and maintained through specific governance structures responsible for monitoring and adjusting policy implementation. This approach was piloted in the 'Opening Up **Slovenia**' initiative and the 'Digital Schools of Distinction' project in **Ireland** (Conrads et al., 2017). Crucially, policymakers must engage with teachers by drawing on their feedback, practices and beliefs. This will foster a sense of ownership

and determine teachers' and school principals' willingness to take on responsibilities and risks (Pierce et al., 2003). Also, when establishing partnerships in the field of digital education, policymakers should be aware that the pandemic has increased the influence of private sector actors on national education systems. This has boosted the processes of privatisation of education services, in response to the need to find with solutions to school closures within a very short period of time (Cobo and Riva, 2024). Finally, stakeholder engagement should be ongoing and support the entire policy cycle. Good examples can be seen in **Scotland,** where the ecosystem surrounding the Curriculum for Excellence initiative encompasses a variety of stakeholder groups (OECD, 2021a), and in **Iceland**, where a cooperation committee has been overseeing the national digital education policy from the outset, involving community leaders, the teachers' union, local educational authorities and government institutions (Gouëdard et al., 2020).

Suggested further reading: Guidelines for ICT in education policies and masterplans (UNESCO, 2022a).

4.6   Financing digital education

Critical questions

- Does the initiative budget for all short-term and long-term costs of digital education?
- Does the initiative engage stakeholders, including private companies, in sharing the resources to support its activities? Under what conditions?

When estimating the cost of digital education reform initiatives, it is important to consider not only the initial investment and maintenance costs, but also the dimensions of social inclusion and equity. It is also crucial to recognise that the requirements for digital education systems evolve over time (Komljenovic et al., 2023), and that producing and delivering quality digital courses does not necessarily incur lower costs compared to the cost of face-to-face courses (European Commission, 2022a). According to the OECD (2017) cooperation with business stakeholders is crucial. If a government lacks sufficient funds, it can provide loan guarantees and foster public-private partnerships to support investment in school equipment and infrastructure, considering the potential cost-saving factor of digital education policy in the long term (OECD, 2016). In **Ireland**, for example, at a time of funding cuts, the government has partnered with large commercial organisations to maintain existing initiatives, demonstrating the value of a stable steering committee in ensuring policy sustainability (Conrads et al., 2017). Transparency is crucial when selecting edtech solution providers, particularly in the early stages of product development, to help identify and address potential risks associated with data privacy and security. Developers should provide comprehensive information about their data handling practices to ensure users are aware of how their data is used, stored, and protected (Belgian Presidency of the European Union, 2024). Finally, policymakers in low- and middle-income countries should bear in mind that **International Financing Institutions** can play an important role in financing digital education, particularly the initial costs, through loans, credits, and grants. For instance, with the financial support from the EU, UNICEF and UNDP are collaborating with the Ministry of Education to enhance the quality of education in **Moldovan** schools (Ministry of Education of Moldova, 2024).

Suggested further reading: UNESCO Toolkit Financing the digital transformation of education (UNESCO, 2025).

4.7   Quality assurance

Critical questions

- Does the education quality assurance system cover digital education? If not, what is missing?
- Does the initiative include continuous quality assurance mechanisms, relating to both digital content and the technical solutions implemented?

The impact of digital education initiatives should be evaluated in the context of quality monitoring, quality assurance and quality improvement of educational provision, through the work of external bodies and internal self-evaluation practices. Existing quality assurance agencies must have the capacity to understand and analyse the implications of digital education, expanding their tools and frameworks to include digital systems (European Commission, 2017). The quality assurance of digital content for learning is key, especially given the potential of AI in terms of content production: teachers and online professional networks can play a role in this regard (European Council, 2023). The quality assurance of technical solutions involves determining whether the chosen or developed digital tools are fit for purpose and beneficial to learners, as well as addressing issues such as cost, technical support and security. While public-private partnerships are important for considering the latest technologies, not every solution can be tailored to educational needs. This is why it is important to involve practitioners and learners in the piloting of digital education tools (Perris and Mohee, 2020), as is the case in **Austria** and **Brazil**, where only those textbooks that meet certain quality criteria are made available to schools (OECD, 2023b).

Suggested further reading: [Quality assurance frameworks for digital education](#) (Brown, 2024).

4.8   Foresight capacity

Critical questions

- Is the initiative based on an analysis of expected developments in digital technology and education?
- Does the initiative include a component aimed at monitoring future digital education developments?

Despite the growing interest in digital education, fuelled in part by the current AI hype, many critical aspects of the digitalisation of education remain understudied and the existing evidence on successful approaches remains under-shared (NORRAG, 2022). Although we can learn a lot from the past, digital education policies must also be open to change, being aware of the current *platformisation* of education and the new roles for governments that this brings (Rivas, 2021). To do so, policymakers responsible for digital education must leave space for emerging solutions and ideas (European Commission, 2020), alongside a system for analysing stakeholders' readiness for digital education. This system should continuously inform the adaptation of policies in this area. Making informed choices when selecting from the many emerging digital solutions is a complex challenge that requires a *future-proof learning* perspective. As suggested by UNESCO (2022a), a mechanism needs to be put in place for examining and validating commercial digital solutions against humanistic principles and educational needs, to enable policymakers to assess the business models behind digital tools and understand what is necessary to enable schools to take advantage of them.

Suggested further reading: [Constructing Optimal Futures for Education - Technology Foresight in Educational Policy and Planning](#) (Thayer, 2014).

5. FINAL CONSIDERATIONS

The DERF 2.0 cannot be considered as a compendium of general recommendations for policymakers in the field of digital education; on the contrary it is based on the assumption that policy reforms and initiatives should be tailored to a given country's specific demands, priorities and institutional system. Nevertheless, the analysis reveals some insights and observations relating to key trends in contemporary digital education policymaking, enabling us to compare the current situation to that of the immediate post-pandemic era, when the first version of the DERF was produced.

- **Digital education is a growing policy priority and an integral part of education reforms.** The digital dimension of education is emerging as a key means of building resilient, scalable, and adaptable education and training systems, and almost every country has a digital education strategy, with an increased focus on the transversal issues such as digital lifelong learning, digital citizenship and digital inclusion. Platforms and initiatives boosted by the COVID-19 pandemic are now being equipped with 'AI features', and governments are trying to keep up with – and in some cases anticipate – technological developments.

- **The governance of digital education is changing.** The key role that edtech companies played during the pandemic, coupled with the growing importance of relying on the latest AI-ready tools, is influencing the governance schemes of digital education policy. Global edtech actors have gained power, creating asymmetrical dynamics that threaten data privacy and the cyber security of users. In response, international bodies such as the European Commission and UNESCO are advocating human-centred digital education, emphasising that principles such as safety and ethics must remain non-negotiable.

- **Digital education policymaking is maturing.** While the development of digital skills remains the most common objective of digital education initiatives, policymakers are increasingly taking a holistic approach. They are tackling many of the DERF 2.0 policy areas and combining diverse policy mechanisms. At the same time, they are seeking cross-government policies and connecting digital education to broader digitalisation policies. There are reasons to believe that a new generation of digital education policymakers is emerging who are able to connect the different policy areas and technologies and engage public and private stakeholders.

- **Policy continuity is key.** In line with the rapid pace at which technology evolves, the digital transition is increasingly being perceived as an ongoing process. This should be reflected in a culture of continual adaptation and improvement, ensuring that digital education policies build on previous efforts, amid changing needs and emerging technologies. Analysis shows that, when such a dynamic approach is present, the long-term impact of digital education on national lifelong learning (LLL) systems is more profound. However, policy continuity is still not the norm.

- **AI in education is emerging as a new policy area.** Despite AI solutions having only recently arrived in the educational sphere, the uptake of AI tools in the classroom is growing steadily. Policymakers are striving to equip their systems with AI-related regulations and initiatives, and are trying to steer the introduction of AI and algorithmic dynamics in education in an ethical and safe way through guidelines for educators and schools. International bodies such as the European Commission, the OECD, the World Bank and UNESCO emphasise the irreplaceable role of educators, who are key to ensuring that learners develop into responsible citizens.

- **Impact analysis is still not mainstream.** Despite the significant increase in data produced by digital education, recent research confirms our findings that robust, data-based impact assessment is still not the norm. On the contrary, especially during periods of rapid technological development, research should inform policy investments and initiatives. At the same time, policymakers must properly fund and promote digital education research, ensuring that scientific evidence is publicly available and fostering knowledge transfer between researchers, teachers and employers.

- **Digital education policy developments vary between sectors of education.** According to our analysis, digital education policymaking often focuses on general and higher education, while VET and adult learning are frequently overlooked. However, given the importance of digital technologies in the workplace and in the economy, VET policymakers and stakeholders need to take a more proactive approach, either by launching specific digital skills policies or by linking the VET skills system to general digital education policies.

ANNEX 1. EXAMPLES OF DIGITAL EDUCATION INITIATIVES

Policy area	Policy pointer	Selected countries examples
1. Access to digital education technologies	Include education within system infrastructure policies.	National Plan for Broadband 2020-2025 (Albania) Digital Transformation for the period 2020-2030 (Bulgaria) Recovery and Resilience Plan (Germany) National Strategic Roadmap for the EU Digital Decade (Ireland) Digital Spain Agenda 2026 (Spain) Digital Uzbekistan – 2030 Strategy (Uzbekistan)
	Increase access to appropriate digital devices in schools and among learners.	e-VET@Albania 2030 (Albania) Technical Standards for ICT in Education (Bosnia and Herzegovina) Education System Digitalization Strategy 2022-2027 (Montenegro) Concept Development and Practice of Bring Your Own Device (Serbia) FATIH Project (Türkiye) A laptop for every teacher (Ukraine)
	Guarantee high-speed connectivity for schools.	School Connectivity and Security Standard (Czech Republic) Connected Classrooms Initiative (Morocco) Tunis Future School (Tunisia) Digital My Job Project (Türkiye)
2. Digital capacity of schools	Build digital leadership among school managers.	Roadmap for digital transformation 2024-2028 (Kazakhstan). Advancing Quality Education and LLL Opportunities for All (Moldova) Sustainable and digital competences of education (Slovenia)
	Boost the data capacity of schools.	Digital Education Agenda 2023-2027 (France). APAAR ID Card (India)
	Develop digital environments around schools.	Virtual school (Azerbaijan) EBA platform (Türkiye) All-Ukrainian Online School (Ukraine)
3. Digital competences of educators	Define the digital skills and competences of teachers.	African Teacher Qualification Framework (African Union Commission) Common framework for teaching (Hong Kong) Digital Competence Framework for Teachers (Norway) ICT training framework for teachers (Spain)
	Foster the professional development of teachers in digital education.	Strengthening Digital VET (Armenia) The Good School reform (Italy) Initiative to advance literacy learning (Morocco) Digital Education Strategy (Québec, Canada)
	Innovate teacher training through digital practices.	Portal for digital development of teachers (Belgium) Initiative to advance literacy learning (Morocco) Tunis Future School (Tunisia) Teacher Information Network (ÖBA) (Türkiye) Virtual EdCamps (Ukraine)
4. Digital educational resources	Produce high-quality digital education resources.	Digital Transformation of Education (EdTech) (Lithuania). 2022-2026 Digital Agenda Strategy (Albania) 8-Point Plan for Digital Learning (Austria)
	Develop skills of to create and use digital resources.	Eureka World (Israel) School 4.0 - innovative schools, new classrooms and labs (Italy) Business Unusual (Bosnia and Herzegovina)

Policy area	Policy pointer	Selected countries examples
	Foster the creation and use of Open Educational Resources.	Advancing Quality Education and LLL Opportunities for All (Moldova) Strategy for the Development of Digital Skills (Serbia) Diia.Education (Ukraine)
5. Digital teaching and assessment	Foster the use of digital teaching.	School curricula fit for the digital age (Czech Republic) Eureka World (Israel)
	Set up a monitoring system for digital teaching.	8-Point Plan for Digital Learning (Austria) Century of Türkiye Education Model Curriculum (Türkiye)
	Foster the use of digital technologies for assessment.	e-VET@Albania 2030 (Albania) Digital Strategy for Schools to 2027 (Ireland) Digital Education Strategy 2024-2030 (Malta)
6. Digital competences of learners	Innovate curricula for digital education.	School curricula fit for the digital age (Czech Republic) Digital Transformation Strategy (Bulgaria) Reform of technical and vocational education institutions (Italy)
	Promote informal learning opportunities to build digital skills.	Digital school "Digionica" (Montenegro) Informal School of IT (Romania, Moldova) e-VET Learning (Azerbaijan)
	Promote critical digital literacy among learners.	Strengthened efforts for digital education (Denmark) Strategy for Cyber and Information Security 2022-2024 (Denmark) Digital Strategy for Schools to 2027 (Ireland)
7. Digital credentials and employability	Support and promote digital credentials and microcredentials	Learning and Experience Evidence Database (LED) (Flanders) SIEL- Signalétique des Élèves L) (Vallonie)
	Promote recognition of digital credentials	APAAR ID Card (India) Generative AI courses (Kazakhstan)
8. AI in education and training	Promote ethical and human-centric AI.	Generative artificial intelligence (AI) in education (policy paper) (UK) National Education Lab AI – NOLAI (Netherlands) Artificial Intelligence Strategy (Spain)
	Build AI literacy for teachers and students.	Incorporating AI topics into teacher training courses (Luxembourg) Generative AI courses (Kazakhstan) National Education Lab AI – NOLAI (Netherlands)
	Use AI for curricula innovation and flexibility	Strategy and Vision for Artificial Intelligence (Malta) Artificial intelligence development strategy (Serbia) Programme on Development and Use of Artificial Intelligence (Slovenia) Estonia and OpenAI to bring ChatGPT to schools nationwide (Estonia)

ANNEX 2. POLICY FICHES ON DIGITAL EDUCATION

National Plan for Digital Skills, Spain

Look also at	#Ireland Digital Strategy for Schools to 2027, #Malta National eSkills Strategy, #France Digital Strategy for Education, #Kosovo Digital Skills Programme
Brief description	**Objectives** ■ Ensuring no Spanish citizen is left behind and promoting digital inclusion. ■ Bridging the gender digital divide by taking action to increase the number of women studying, graduating and working in ICT. ■ Supporting the acquisition of digital skills for education among teachers and students, and at all levels of the education system. ■ Fostering the development of advanced digital skills amongst workers. **Planned results** ■ Promoting women's career development in ICT. ■ Promoting digital skills for teachers and students at all levels; fostering digital skills in education and the private and public sectors, and equipping citizens with advanced digital skills. ■ Expanding the talent pool of ICT experts to match increasing demand. ■ Promoting women's career development in ICT. ■ Promoting digital skills for teachers and students at all levels; fostering digital skills in education and the private and public sectors, and equipping citizens with advanced digital skills. ■ Expanding the talent pool of ICT experts to match increasing demand. **Expected impact** 80 % of the population should have basic digital skills by 2025.
Actors involved	Government of Spain, Ministry for Economic Affairs and Digital Transformation Spain, Ministry of Education and Vocational Training Spain
Distinctive features	■ Comprehensive national strategy for the entire population ■ Building key competences and new skills ■ Addressing gender digital divide
Geographical scope	National, regional, local
Policy/initiative date/duration	2021–2025
Language	English/Spanish
Policy/initiative URL	https://espanadigital.gob.es/sites/espanadigital/files/2022-08/National%20Plan%20for%20Digital%20Skills.pdf
DERF Policy areas	All, with main focus on 1. Access to digital education technologies, 3. Digital competences of educators and 6. Digital competences of learners
DERF Transversal dimensions	All, particularly Inclusion and equity

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Funding schemes for libraries to become digital skills hubs, Romania

Look also at	N/A
Brief description of the policy/initiative	**Objectives** The action aims to enhance the basic digital skills of citizens living in disadvantaged communities who currently have limited access to training. It will build on the existing network of public libraries to support the creation of a network of digital hubs and facilitate the development of digital skills.
	Actions and phases ■ launch of the call: 2022 ■ project submission, evaluation, selection and contracting: 2023 ■ implementation: 2023–2026
	Planned results A minimum of 1 135 libraries will benefit from the investment: ■ 105 libraries, including five county library headquarters and 100 municipal or rural libraries, will be undergo renovation and will be equipped with computers and other technical equipment ■ 1 030 libraries will benefit from new or upgraded IT equipment.
	Expected impact The project will develop basic skills such as digital literacy, communication, media literacy, digital content creation, digital security and digital entrepreneurship among 100 000 citizens from disadvantaged communities. According to the European Digitalisation Strategy, Romania aims to increase the proportion of its citizens with basic digital skills from 34.4% in 2022 to 80% in 2030.
Actors involved	Ministry of Research, Innovation and Digitisation (Authority for the Digitisation of Romania under the jurisdiction of the Ministry)
Distinctive features	■ Using the network of public libraries to enhance the basic digital skills of citizens ■ Building key competences and new skills ■ Increasing social inclusion of learners ■ Sensitivity towards vulnerable groups
Geographical scope	National
Policy/initiative date/duration	2022–2026
Language	Romanian
Policy/initiative URL	https://oipsi.gov.ro/pnrr-investitia-i17-scheme-de-finantare-pentru-biblioteci-pentru-a-deveni-hub-uri-de-dezvoltare-a-competentelor-digitale-componenta-7-transformarea-digitala/
DERF Policy areas	1. Access to digital education technologies, 2. Digital capacity of schools, 4. Digital educational resources, 7. Digital competences of leaners
DERF Transversal dimensions	Data for policy-making, Inclusion and equity, Stakeholder engagement, Environmental, sustainability, Digital security and well-being

Introduction of vouchers for developing green and digital skills, Croatia

Look also at	#Jordan Digital Skills for a Better Future Programme #Kosovo Digital Skills Programme
Brief description of the policy/initiative	**Objectives** The objective of the initiative is to increase the employability of workers and better match labour market supply and demand by supporting lifelong learning and the acquisition of new skills, particularly green and digital skills.
	Actions and phases The action finances participation in educational programmes based on the Croatian Qualifications Framework (CROQF) and is implemented through accredited institutions in accordance with the Adult Education Act. The policy is implemented in two phases: ▪ The first phase (2022–2023) covered the delivery of vouchers for the acquisition of digital and green skills under the National Recovery and Resilience Plan (NRRP) funded by the European Union (Next Generation EU). ▪ Extended program offer. The so-called general areas were added to the Voucher system in June 2023 through European Social Fund Plus (ESF+).
	Planned results 224 education providers throughout Croatia are involved in implementation. A website for selecting providers (by location and skills offered) is operational. About 15 000 people have already benefited from the measure. The overall level of satisfaction of voucher users is 92 %.
	Expected impact The goal is to award 40 000 vouchers to beneficiaries, of which at least 12 000 should be long-term unemployed, inactive persons, or young people not in employment or education.
Actors involved	Croatian Employment Services under the Ministry of Labour, Pension System, Family and Social Policy, EURES (European Employment Services)
Distinctive features	▪ Financial support (the voucher is a financial instrument for learning) ▪ New learning content ▪ Micro-credentials, partial and full qualifications delivered in periods up to 12 months ▪ Digital and green skills for adults: 60% and 40% of funding respectively ▪ Sensitivity towards vulnerable groups ▪ Application-supported system
Geographical scope	National
Policy/initiative date/duration	2022–2026
Language	Croatian/English
Policy/initiative URL	https://vauceri.hzz.hr/vauceri-besplatno-stjecanje-vjestina/
DERF Policy areas	2. Digital capacity of schools, 5. Digital teaching and assessment, 8. Digital competences of leaners, 7. Digital credentials and employability
DERF Transversal dimensions	Data for policymaking, Inclusion and equity, Stakeholder engagement, Financing, Environmental sustainability, Digital security and well-being, Foresight capacity

School curricula fit for the digital age, Czech Republic

Look also at	#Israel Eureka World #Tunisia Future school Tarbia.tn
Brief description of the policy/initiative	**Objectives** The measure aims to revise the curricula of primary and secondary schools with a view to emphasising the importance of digital literacy and IT skills. The revised curricula will be implemented gradually by September 2025.
	Actions and phases The reform reinforces the importance of IT learning in pupils' education and extends its scope to include other areas such as data processing and modelling, coding and programming, robotics, virtual and augmented reality, and 3D printing. It is implemented under the Czech Recovery and Resilience Plan (Components 3.1 and 3.2). Methodological support is available online (https://edu.cz/digitalizujeme). Educational courses on the new informatics are being developed for principals and teachers. The Cyber Prevention Catalogue (a key tool for child safety online) has been developed
	Planned results At least 400 schools throughout the Czech Republic will receive methodological support in the long term.
	Expected impact Contributing to the prevention of the digital divide.
Actors involved	Ministry of Education, Youth and Sports, National Pedagogical Institute of the Czech Republic
Distinctive features	▪ Innovate the teaching curricula with emphasis on IT skills ▪ Supportive management (Methodological support to schools) ▪ Building key competences and new skills
Geographical scope	National
Policy/initiative date/duration	2022–2025
Language	Czech
Policy/initiative URL	https://www.edu.cz/npo/komponenty-npo-v-gesci-msmt/komponenta-3-1-inovace-ve-vzdelavani-v-kontextu-digitalizace/
DERF Policy areas	All, with main focus on '4. Digital teaching and assessment' and '3. Digital competences of educators'
DERF Transversal dimensions	Data for policymaking, Inclusion and equity, Financing, Digital security and well-being

Digital Skills Programme, Kosovo

Look also at	#Croatia Introduction of vouchers for developing green and digital skills #Jordan Digital Skills for a Better Future Programme #Uzbekistan Youth Digital Skills program #Ireland Digital Strategy for Schools to 2027
Brief description of the policy/initiative	**Objectives** The initiative aims to bridge the skills gap between the target group and the digital economy's market needs, as a means of creating employment and economic growth while simultaneously enhancing inter-ethnic dialogue and understanding. **Actions and phases** The initiative will increase digital skills via bootcamps in six major areas: digital design, digital marketing, web development, networking, mobile applications and data engineering. This approach is called Digital Skills for All (DS4A). ▪ Phase 1. Needs assessment survey with companies ▪ Phase 2. Bootcamp development ▪ Phase 3. Tailor-made training on soft and technical skills ▪ Phase 4. Assisting with bridging through freelancing partners **Planned results** ▪ Through the DS4A, the project will upskill 150 women and men and enable 100 young women to access online freelancing opportunities. ▪ Young women and men aspiring to strengthen their digital knowledge will be equipped with employment-ready programming skills in the ICT sector. **Expected impact** ▪ Young women have improved opportunities to work online ▪ Digital skillset improved through the Digital Skills for All (DS4A) bootcamps ▪ Improved labour market knowledge base for evidence-based decision making
Actors involved	UNDP, GIZ, Kosovo Government, Italian Ministry for Foreign Affairs
Distinctive features	▪ ICT training followed by job placement ▪ A gender focused intervention ▪ Digital skills development in a specific sector: tourism ▪ Sensitivity towards vulnerable groups ▪ Addressing gender digital divide
Geographical scope	Trans-national, national, specific organisation
Policy/initiative date/duration	2022–2023
Language	English
Policy/initiative URL	https://open.undp.org/projects/01000034
DERF Policy areas	2. Digital capacity of schools, 4. Digital educational resources, 5. Digital teaching and assessment, 7. Digital competences of leaners, 8. Digital credentials and employability
DERF Transversal dimensions	Data for policymaking, Inclusion and equity, Stakeholder engagement, Financing, Digital security and well-being, Foresight capacity

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Eureka World, Israel

Look also at	#Tunisia Future school Tarbia.tn #Czech Republic School curricula fit for the digital age
Brief description of the policy/initiative	**Objectives** Eureka's vision is to create a human study companion in 'augmented reality' and to utilise the wonderful capabilities of 3D technology to bring new worlds to life, all while maintaining the human connection and active community.
	Actions and phases Eureka World offers pupils a virtual 3D, creative learning experience. The 3D Metaverse for Training and Education is a world of creation and shared learning in three-dimensional multi-user environments, combined with physical interfaces, such as 3D printers, robotics controllers and VR headsets. This allows for the quality integration of learning patterns for 21st century students. The website/platform is already operational. Every year, 100 schools from across the country and worldwide, ranging from primary to tertiary level, participate in the programme. There are 12 000 registered members. In the last three years, more than 150 teachers have served as mentors for pupils participating in Eureka's 3D environments.
	Planned results Expanding activity to dozens more schools, both in Israel and abroad.
	Expected impact The student will receive the best tool set possible for life in the 21st century.
Actors involved	Israel Innovation Authority, Ministry of Education, Other central authorities, Municipalities
Distinctive features	▪ Education policy recognizes the value of innovation (Innovative policy idea on game based digital/creative learning) ▪ Use of digital technologies for teaching and learning ▪ Cooperation with overseas schools ▪ Takes learning beyond a 45-minute lesson in the classroom ▪ Networking and support platform ▪ Startup initiative ▪ New assessment approaches
Geographical scope	Trans-national; national; local.
Policy/initiative date/duration	2019 – ongoing
Language	Hebrew/English/Arabic/Spanish/Russian
Policy/initiative URL	https://www.eurekaworld.co.il
DERF Policy areas	All, apart from digital credentials and employability
DERF Transversal dimensions	Inclusion and equity, Stakeholder engagement, Financing, Environmental sustainability.

Digital Skills for a Better Future Programme, Jordan

Look also at	#Croatia Introduction of vouchers for developing green and digital skills
Brief description of the policy/initiative	**Objectives** The programme aims to equip marginalised and underserved young people with the digital skills they need to enhance their employability and open doors to promising future opportunities.
	Actions and phases ■ In-depth market research into the Jordanian job market, focusing on the new concept of micro-work ■ Training on digital skills ■ Launching Bridge.Outsource.Transform (B.O.T), the first impact sourcing platform in Jordan, providing managed freelance and micro-work opportunities for young people. ■ Female participation rate: 69 %. ■ Refugee participation rate: 36 %.
	Planned results ■ Development of new curricula to meet the needs of the job market. ■ Establishment of a digital platform connecting vulnerable communities with employment opportunities
	Expected impact 214 training courses have been delivered across 88 training centres located across the kingdom's 12 governorates. 9 520 participants have completed the training programmes.
Actors involved	DOT (Digital Opportunity Trust) Jordan, UNICEF, Ministry of Digital Economy and Entrepreneurship, Ministry of Youth, 17 CBOs, University of Jordan, Korea International Cooperation Agency (KOICA), Government of the Netherlands.
Distinctive features	■ Focus on digital skills for young people to enhance youth employment ■ A programme implemented by a youth-led movement of daring social innovators ■ International cooperation ■ Networking and support platform ■ Building key competences and new skills ■ Sensitivity towards vulnerable groups ■ Addressing gender digital divide
Geographical scope	Trans-national, national, regional, specific organisation
Policy/initiative date/duration	2020 to date
Language	English/Arabic
Policy/initiative URL	https://www.unicef.org/jordan/stories/digital-skills-essential-youth-learn-and-earn
DERF Policy areas	2. Digital Capacity of schools, 4. Digital educational resources, 5. Digital teaching and assessment, 6. Digital competences of leaners, 7. Digital credentials and employability
DERF Transversal dimensions	Data for policymaking, Inclusion and equity, Stakeholder engagement, Financing

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Quality Education and Lifelong Learning Opportunities for All, Moldova

Look also at	#National Plan for Digital Skills of Spain #France Digital Strategy for Education
Brief description of the policy/initiative	**Objectives** The initiative aims to strengthen the education system and create learning opportunities for all children in a modern and inclusive environment.
	Actions and phases The project will improve the digital skills of teachers, support the development of digital educational resources, and create the Open Educational Resources Platform.
	Planned results ■ 35 model schools have been selected by Moldova's government for renovation and equipment to increase access to quality education for pupils, especially children from disadvantaged backgrounds Strengthening the National Institute for Education and Leadership
	Expected impact Improved access to education for all children, including the children with special educational needs
Actors involved	Ministry of Education and Research, European Union, UNICEF, UNDP
Distinctive features	■ Lifelong learning approach, multi-donor initiative ■ Reconceptualisation of the system for professional development of teachers and school managers ■ Donation of equipment and materials ■ Availability of open-source versions ■ Increasing the social inclusion of learners
Geographical scope	National
Policy/initiative date/duration	2024
Language	English
Policy/initiative URL	https://www.undp.org/moldova/press-releases/eu-unicef-and-undp-launch-programme-advancing-quality-education-and-lifelong-learning-opportunities-all
DERF Policy areas	All apart from Artificial Intelligence and Digital Credentials and employability
DERF Transversal dimensions	Inclusion and equity, Stakeholder engagement, Financing, Digital security and well-being

Tunis Future School, Tunisia

Look also at	#Israel Eureka World #Czech Republic School curricula fit for the digital age
Brief description of the policy/initiative	**Objectives** The initiative aims to improve communication between stakeholders in the education system and provide parents, students and teachers with an effective monitoring system. The platform provides dedicated portals for each group, streamlining administrative processes, facilitating distance learning, and offering real-time student monitoring.
	Actions and phases A memorandum of co-operation has been recently signed to inaugurate a digital educational platform in Tunisia to be used throughout the entire education system by students and teachers, educational leaders and parents alike. ▪ Phase 1: The new digital platform will be implemented at 500 educational institutions, including primary, middle, and high schools, before nationwide expansion ▪ Phase 2: Nationwide expansion
	Planned results Approximately 2.5 million students will benefit from the action.
	Expected impact Ensuring the right to learn for all students.
Actors involved	Ministry of Education of the Republic of Tunisia, Arab Organisation for Education, Culture and Science (ALECSO), Classera company, emerging global leader in education technology
Distinctive features	▪ A means for virtual communication between stakeholders. This innovative platform offers a solution for reporting incidents of violence within schools, a space dedicated to services for education personnel, as well as specific sections for primary, middle and high schools. ▪ Tarbia.tn allows parents to access a range of services – check their children's grades, their absences, as well as those of their teachers. The platform offers teachers the possibility of sending homework to students or providing online support courses. ▪ Supportive management ▪ Networking and support platform
Geographical scope	National
Policy/initiative date/duration	2024 to date
Language	French/Arabic
Policy/initiative URL	http://www.tarbia.tn./fr
DERF Policy areas	All apart from Artificial Intelligence and Digital Credentials and employability
DERF Transversal dimensions	All, particularly Stakeholders' engagement

Digital Lab of National Education, Morocco

Look also at	#Israel Eureka World #Tunisia Future school
Brief description of the policy/initiative	**Objectives** Enhance learning outcomes and the performance of educational institutions by developing innovative digital solutions for teachers and students. As a collaborative platform, it brings together public and private actors, both national and international, to develop and deploy digital solutions accessible to all Moroccan students. The initiative focuses on developing and implementing digital educational solutions that are tailored to the needs of Moroccan schools and are evaluated rigorously to assess their effectiveness. The ultimate goal is to establish a dynamic and innovative Moroccan EdTech ecosystem that can become a leader in Africa and the MENA region. **Actions and phases** ▪ The Digital Lab will operate in three modes: acquisition of existing solutions, adaptation of existing solutions to national education needs, and development of new specific solutions. ▪ The Digital Lab will serve as a catalyst for the development of start-ups that aim to make a positive impact on Moroccan society. **Planned results** The digital solutions developed within the framework of the Digital Lab will address the main pedagogical challenges of Morocco's educational reform, such as remediation and academic support, strengthening language skills, digitalising lessons, and assessing and monitoring academic achievement. **Expected impact** The Digital Lab seeks to enhance learning outcomes, reduce dropout rates and promote student well-being.
Actors involved	Ministry of National Education, Preschools and Sport, Ministry of Economy and Finance, Ministry of Digital Transition and Administrative Reform, Deposit and Management Fund, Private sector partners
Distinctive features	▪ Good example of collaboration of public and private actors, both national and international, to develop digital solutions accessible nationally ▪ Support to startups ▪ Increasing social inclusion of learners ▪ Networking and support platform
Geographical scope	National
Policy/initiative date/duration	2023–2026
Language	English/French
Policy/initiative URL	https://resilient.digital-africa.co/en/blog/2024/02/29/digital-transformation-in-morocco-connected-schools-to-modernize-education/
DERF Policy areas	All apart from Artificial Intelligence and Digital Credentials and employability
DERF Transversal dimensions	Inclusion and equity, Stakeholder engagement, Environmental sustainability

Education System Digitalization Strategy, Montenegro

Look also at	#France Digital Strategy for Education #Czech Republic School curricula fit for the digital age #Morocco Digital Lab of National Education
Brief description of the policy/initiative	**Objectives** The digitalisation of the educational system should encourage the greater use of ICT in teaching in order to improve the quality and inclusiveness of the process, but also to influence the development of the digital competences of students and employees in educational institutions. In addition, it seeks to modernise all processes within the education system, from electronic pedagogical records to data exchange and the launch of a range of electronic services for citizens and other institutions. **Actions and phases** The Digital School Online Learning Platform has been launched. The Digital school is a platform for learning, teaching, communication and co-operation in a digital environment. The digital school is designed to bring together learning resources for children and adolescents, as well as for parents, carers, educators, teachers and other professionals in the education system, and to support all in developing their digital skills through the use of digital tools and distance learning services. **Planned results** ■ Improved education information system ■ better developed and improved digital ecosystem, and ■ Enhanced digital skills and competences. **Expected impact** Improved and modernised processes in the education system, from electronic pedagogical records to data exchange and the launch of a range of electronic services.
Actors involved	Ministry of Education of Montenegro
Distinctive features	■ All-round strategy covering all DERF areas and dimensions ■ Networking and support platform ■ Availability of open-source versions ■ Increasing social inclusion of learners ■ Donation of equipment, materials
Geographical scope	National
Policy/initiative date/duration	2022 to 2027
Language	English
Policy/initiative URL	https://www.unicef.org/montenegro/media/22611/file/Education%20System%20Digitalization%20Strategy.pdf
DERF Policy areas	All, with focus on 2. Digital capacity of schools, 3. Digital competences of educators and 7. Digital competences of leaners
DERF Transversal dimensions	All, particularly Stakeholder engagement and Inclusion and equity.

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e-VET@Albania 2030, Albania

Look also at	# Ukraine Professional Education Online #Morocco Digital Lab of National Education #Malta National eSkills Strategy, Malta
Brief description of the policy/initiative	**Objectives** Reinforce a sustainable modernisation process to achieve the vision of an ICT-supported Albanian VET, that enables young Albanians to contribute to their country's economic performance and societal welfare. **Actions and phases** Multifunctional centres (public and private VET schools and vocational centres) will be supported to reinforce their ICT-supported modernisation efforts, selecting a tailor-made support from a modular offer in three areas: ■ Training and coaching: helping teachers, administrative staff, technical support, CD, CPD, as well as school principals, acquire the needed pedagogical, digital and management skills. ■ Support for managing change and quality: improving and re-designing their processes, structure and offer in different areas, such as e-content creation, pedagogical and technical support, peer exchange, data management or budgeting. ■ Provide Infrastructure: renew and expand their ICT hardware and connectivity focused on supporting effective learning. They will be provided with a learning platform with a comprehensive collection of e-content and interactive features. **Planned results** ■ Connect 100 % of schools to 1 Gbps broadband internet by 2025. ■ Provide quality education and training for approximately 30 000 students at multi-functional vocational centres across Albania ■ Strengthen national agencies to lead the process and support individual development paths of VET schools, providing effective support for teachers, technical staff, and directors, based on a clarified regulatory framework. ■ Strengthen the integration of resourceful national and international donors and business partners to contribute to market-oriented VET. **Expected impact** Better meet labour market needs and foster decent work as well as innovation in industry
Actors involved	National Agency of Vocational Education Training and Qualifications (NAVETQ), National Agency for Employment and Skills, UNDP, Swiss Development Agency
Distinctive features	■ Comprehensive digital VET roadmap guiding the policy ■ New pedagogical approaches ■ New learning content ■ Donation of equipment, materials ■ Networking and support platform
Geographical scope	National
Policy/initiative date/duration	2022–2030
Language	English
Policy/initiative URL	https://skillsforjobs.al/wp-content/uploads/2022/10/e-VET-modernization_Roadmap.pdf
DERF Policy areas	All, with focus on 2. Digital capacity of schools, 3. Digital competence of educators and 7. Digital competences of leaners
DERF Transversal dimensions	All, particularly Stakeholder engagement

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Youth Digital Skills Program, Uzbekistan

Look also at	#Croatia Introduction of vouchers for developing green and digital skills #Jordan Digital Skills for a Better Future Programme #Kosovo Digital Skills Programme
Brief description of the policy/initiative	**Objectives** The goal of the program is to empower young people, especially women, by building digital entrepreneurship skills, digital tools and improving the enabling environment. The program is contributing to increasing employment opportunities, competitiveness, and reducing inequality, ensuring inclusive, innovative and sustainable growth and job creation. **Actions & phases** ▪ Short-term courses in computer literacy and basic knowledge of planning and implementing successful business projects for young women. ▪ Business Development Support Centres, a digital mentoring program for micro, small and medium enterprises, and other areas. ▪ YouthLab, a national coordination platform for supporting innovative entrepreneurial initiatives in the form of a public-private dialogue on IT. ▪ Digital Pulse tool, which is a digital diagnostic tool for commercial organizations, helped diagnose the level of digitalization of business processes in more than 250 companies. ▪ Development of the Business Process Outsourcing (BPO) methodology, and support is provided for the launch of new services and directions. ▪ Digital literacy courses have been organized for 4 500 young people living in the regions. **Planned results** ▪ 2 000 young women trained in computer literacy and basic knowledge of planning and implementing successful business projects (short-term courses). ▪ At least 10 000 young people living in the regions will have completed the courses. ▪ Digital mentoring initiatives for 50 young entrepreneurs will be conducted. **Expected impact** These initiatives are expected to help develop the country's IT industry. Thousands of young entrepreneurs, especially women living in rural areas, will receive the modern computer literacy skills they need to digitally transform their businesses.
Actors involved	Ministry of Economic Development and Poverty Reduction, IT Park, UNDP
Distinctive features	▪ A programme focused on young people ▪ Addressing the gender digital divide ▪ Increasing the social inclusion of learners ▪ Building key competences and new skills
Geographical scope	National
Policy/initiative date/duration	2022 to date
Language	English
Policy/initiative URL	https://www.undp.org/uzbekistan/press-releases/some-results-youth-digital-skills-program-launched-ministry-economic-development-it-park-and-undp
DERF Policy areas	2. Digital capacity of schools, 4. Digital educational resources, 7. Digital competences of leaners
DERF Transversal dimensions	Data for policymaking, Inclusion and equity, Stakeholder engagement, Foresight capacity

Digital Transformation of Education EdTech, Lithuania

Look also at	# Moldova Advancing Quality Education and Lifelong Learning Opportunities for All #National Plan for Digital Skills of Spain #France Digital Strategy for Education
Brief description of the policy/initiative	**Objectives** The project aims to transform the Lithuanian education system by fostering a culture of innovation and equipping educational institutions with the necessary tools. **Actions and phases** ■ Implementation of the latest educational technologies in the education sector to enable the development and testing of digital educational innovations (EdTech Innovation Development and Testing Platform), as well as strengthening the digital competences of educators. ■ Developing technological solutions and the necessary digital teaching and learning resources (digital content) in educational institutions to enable personalised distance learning beyond the pandemic. ■ A key innovation of the project is the EdTech Centre founded to transform the education system in Lithuania. The Centre will engage in a wide range of activities aimed at fostering a culture of innovation. These include providing innovative educational tools to all levels of educational institution, testing new gamified digital learning solutions, improving digital education systems by soliciting user feedback, and offering online digital skills training to teachers to support their performance in the classroom. **Planned results** ■ The project seeks to bring about change at the national level, transforming both digital infrastructure and human resources in education through the implementation of new hardware and the provision of digital skills training for teachers and lecturers. ■ The EDtech platform will link start-ups and innovators with schools to meet their training needs and enable the testing of innovative solutions. **Expected impact** ■ Schools and universities adapt to rapid societal changes. ■ Through the NextGenerationEU project, Digital Transformation of Education (EdTech), the government aims to address the needs of teachers and students alike by embracing digitalisation in the classroom and establishing Lithuania as a leader in EdTech.
Actors involved	Ministry of Education, Science and Sport, Colleges and universities
Distinctive features	■ EdTech Centre (national level) providing innovative educational tools to educational institutions at all levels ■ Digitalisation in the classroom covering all levels of education: schools and universities ■ Personalisation and differentiation of learning ■ Innovate the teaching curricula ■ Networking and support platform
Geographical scope	National
Policy/initiative date/duration	2023 to 2025
Language	Lithuanian
Policy/initiative URL	https://www.e-tar.lt/portal/lt/legalAct/ 254ed330b95e11ec8d9390588bf2de65
DERF Policy areas	All but 8. Digital credentials and employability and 9. AI
DERF Transversal dimensions	Stakeholder engagement, Digital security and well-being

National eSkills Strategy, Malta

Look also at	#Spain National Plan for Digital Skills of Spain #Kosovo Digital Skills Programme #Ireland Digital Strategy for Schools to 2027 #Ukraine Professional Education Online
Brief description of the policy/initiative	**Objectives** The Strategy aims to promote and ensure the availability of digital skills, both now and in the future, while taking into account the domestic national, sectoral and specialist strategies and initiatives that affect the digital skills domain. **Actions and phases** The strategy addresses different aspects of the development of digital skills: ▪ Education: integrating digital skills into the education system at all levels – from primary to tertiary. It emphasises the importance of STEM (Science, Technology, Engineering, and Mathematics) education, as well as the inclusion of digital literacy as a core competence. ▪ Society: bridging the digital divide by ensuring that all segments of the population have access to basic digital skills. ▪ Workforce: The strategy emphasises the need for continuous reskilling and upskilling of the workforce to meet the demands of an evolving digital economy. ▪ ICT professionals: promoting ICT careers, ensuring that professionals have access to the latest training and development opportunities, and encouraging diversity within the ICT sector. **Planned results** ▪ Society acquiring more digital awareness and confidence ▪ Public administration pursuing its digital transformation ▪ Enterprises being increasingly willing and able to adopt digital transformation ▪ The educational system evolving further at all levels to ensure it meets the current and future needs of the digital economy in terms of skills ▪ Having more ICT professionals available in the local labour market **Expected impact** Reshaping Maltese society and economy through digital skills and competencies
Actors involved	eSkills Malta Foundation, Ministry of Education, Youth, Research and Innovation, Malta Employers Association, the Malta Chamber of Commerce, Enterprise and Industry, and the Chamber of SMEs, Academia and training institutions
Distinctive features	▪ Comprehensive and inclusive approach to all cohorts of society ▪ Innovate the teaching curricula ▪ New learning content ▪ Building key competences and new skills ▪ Increasing social inclusion of learners
Geographical scope	National
Policy/initiative date/duration	2022 to 2025
Language	English
Policy/initiative URL	https://sustainabledevelopment.gov.mt/wp-content/uploads/2024/10/National-eSkills-Strategy-2022-2025.pdf
DERF Policy areas	All, with focus on 5. Digital teaching and assessment and 7. Digital competences of leaners
DERF Transversal dimensions	All, particularly Inclusion and equity

Professional Education Online, Ukraine

Look also at	#Albania e-VET@ Albania 2030 A Roadmap to ICT-supported modernization of Albanian VET #Morocco Digital Lab of National Education #Tunisia Future school Tarbia.tn
Brief description of the policy/initiative	**Objectives** The goal of 'Professional Education Online' aims to ensure that users have equal and free access to high-quality, relevant educational materials in vocational education. **Actions and phases** ■ Developing the platform at the request of the Ministry of Education and Science of Ukraine with the support of the International Labour Organisation. ■ Filling the platform with content with the support of experts from the Recovery and Reform Support Team of the Ministry of Education and Science of Ukraine (as part of the URA project, supported by the EBRD's Multilateral Donor Fund for Stabilisation and Sustainable Development of Ukraine). ■ Formulating recommendations for blended and distance learning using the platform's educational materials have been developed for teachers. **Planned results** ■ Digitally cover more TVET occupations and boosting lifelong learning ■ Current plans include adding retraining courses for adult learners. This will particularly benefit unemployed and displaced workers, as well as companies seeking to upskill their staff to keep their businesses going. ■ Introduction of virtual reality modules to facilitate the rapid acquisition of practical skills. ■ Maintaining, improving, and enlarging the architecture of the platform. **Expected impact** Improving competences of 225 000 Ukrainian TVET students.
Actors involved	Ministry of Education and Science, ILO, EBRD
Distinctive features	■ Video lessons, tests and tasks for VET students ■ Mass open online courses, not a full-fledged e-learning platform ■ Personalisation and differentiation of learning ■ New learning content ■ Innovate the teaching curricula ■ Increasing social inclusion of learners ■ New pedagogical approaches ■ Use of digital technologies for teaching and learning ■ Networking and support platform ■ Availability of open-source versions
Geographical scope	National
Policy/initiative date/duration	2022 to date
Language	Ukrainian
Policy/initiative URL	https://profosvita.online
DERF Policy areas	All but 8. Digital credentials and employability and 9. AI
DERF Transversal dimensions	Data for policymaking, Inclusion and equity, Stakeholder engagement, Digital security and wellbeing

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Strategy for the Development of Digital Skills in the Republic of Serbia

Look also at	#Malta National eSkills Strategy #Spain National Plan for Digital Skills of Spain #France Digital Strategy for Education
Brief description of the policy/initiative	**Objectives** The strategy aims to facilitate the monitoring of ICT technology development across all sectors, meeting the needs of the economy and the labour market. **Actions and phases** ▪ Aligning the National Qualifications Framework (NQF) with the European Qualifications Framework (EQF) with regard to digital skills; ▪ Improving curricula related to digital competences; ▪ Accreditation of training programmes for the development of digital skills; ▪ Encouraging Publicly Recognized Organizers to implement programmes for the acquisition of professional digital skills; ▪ Establishment of various training models for the development of citizens' digital skills in public spaces; ▪ Fostering the organisation of Training for Trainers (ToT) and encouraging all forms of peer education to develop citizens' digital skills; ▪ Promote peer-to-peer (P2P) education and the exchange of good practices; ▪ Raising citizens' awareness of the need to adopt digital skills; ▪ Conducting an educational campaign for children on the safe use of internet and modern technologies (IT Caravan) **Planned results** ▪ Improving digital competences in the education system ▪ Improving basic and advanced digital skills for all citizens ▪ Developing digital skills in relation to the needs of the labour market **Expected impact** Improved digital skills of all citizens, including members of vulnerable social groups.
Actors involved	Ministry of Trade Tourism and Telecommunications, Ministry of Education, Science and Technological Development, UNICEF, USAID
Distinctive features	▪ Digital skills for LLL of citizens and ICT professionals ▪ Personalisation and differentiation of learning ▪ Increasing social inclusion of learners ▪ New pedagogical approaches ▪ Building key competences and new skills ▪ Availability of open-source versions
Geographical scope	National
Policy/initiative date/duration	2020 to 2024
Language	Serbian
Policy/initiative URL	https://pravno-informacioni-sistem.rs/eli/rep/sgrs/vlada/strategija/2020/21/2/reg
DERF Policy areas	All but 8. Digital credentials and employability and 9. AI
DERF Transversal dimensions	Data for policymaking, Inclusion and equity, Stakeholder engagement, Quality assurance

Digital Strategy for Schools to 2027, Ireland

Look also at	#Malta National eSkills Strategy #Spain National Plan for Digital Skills of Spain #France Digital Strategy for Education #Kosovo Digital Skills Programme
Brief description of the policy/initiative	**Objectives** The Strategy aims to provide further support to the school system, ensuring that all learners have the opportunity to acquire the knowledge and skills necessary for successfully navigating an ever-evolving digital world. It sets out the high-level objectives under three pillars: 1) Support for embedding digital technologies in teaching learning and assessment; 2) Digital technology infrastructure; and 3) Looking to the future **Actions and phases** The first Implementation Plan will run from 2022 to 2024. Towards the end of this phase, a midterm review will be carried out to inform the next implementation plan with a time horizon from 2025 to 2027. ▪ Supporting teachers and school leaders through training, support and resources ▪ Infrastructure development, connectivity and technical support ▪ Online safety ▪ Research and innovation taking account of new and emerging trends **Planned results** Increasing the share of adults with at least basic digital skills to 80 % by 2030. **Impact** Ireland has achieved 72.9 % basic digital skills coverage, compared to the EU average of 55.6 % (2024). The percentage of ICT specialists in employment has reached 6.2 % surpassing the EU average of 4.8 % (2024).
Actors involved	Department of Education and Skills of the Government of Ireland, Non-governmental, industry, and academic stakeholders
Distinctive features	▪ Development of digital skills from a life-long learning (LLL) perspective ▪ Includes self-assessment of schools and covers teaching and school management, includes a foresight component ▪ Addresses AI ▪ Personalisation and differentiation of learning ▪ New learning content ▪ Innovate the teaching curricula ▪ Increasing social inclusion of learners ▪ New pedagogical approaches ▪ Building key competences and new skills
Geographical scope	National
Policy/initiative date/duration	2022 to 2027
Language	English
Policy/initiative URL	https://assets.gov.ie/221285/6fc98405-d345-41a3-a770-c97e1a4479d3.pdf
DERF Policy areas	All but 8. Digital credentials and employability and 9. AI
DERF Transversal dimensions	All, particularly Inclusion and equity and Foresight capacity

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Roadmap for digital transformation of public administration, Kazakhstan

Look also at	#Tunisia Future school Tarbia.tn
Brief description of the policy/initiative	**Objectives** The roadmap aims to develop a digital transformation plan for the Ministry of Education, enabling its institutions to adapt effectively to changes in the business environment and to successfully implement digital transformation.
	Actions and phases ▪ Facilitating the use of new technologies (e.g. AI, educational platforms based on blockchain technology, AR, VR, IoT, gaming, data analysis technologies such as Big Data, adapted learning technologies, virtual labs, simulations and digital textbooks) in education ▪ Automation of pre-school education and quality assurance ▪ Developing a mobile app for use in pre-school education institutions ▪ Upgrading and retraining courses for teachers and managers to improve their professional competence at all levels of education ▪ Organisation of a competition called 'The Best Teacher' ▪ Quality assurance of educational institutions ▪ Other actions for the digitalisation of management and support systems ▪ Examination of textbooks ▪ Grant for 'The Best VET Education Organisation' ▪ Organisation of national and international professional skills competitions
Actors involved	Ministry of Education (General Education Committee, Education Quality Assurance Committee, Child Rights Protection Committee, Department of Technical and Professional Education, Pre-school Education Department, Upbringing and Additional Education Department, Inclusive and Special Education Department, Department for Digitalisation and Automation of Public Services, JSC 'Taldau' National Centre of Research and Evaluation of Education), Local self-governance
Distinctive features	▪ Edtech, addresses AI ▪ Increasing social inclusion of learners ▪ New pedagogical approaches ▪ Building key competences and new skills ▪ Sensitivity towards vulnerable groups
Geographical scope	National
Policy/initiative date/duration	2024 to 2028
Language	English
Policy/initiative URL	https://www.gov.kz/memleket/entities/edu/documents/ details/723603?directionId=3599
DERF Policy areas	All, with focus on 2. Digital competences of educators and 3. Digital capacity of schools
DERF Transversal dimensions	All, particularly Quality assurance and Inclusion.

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FATİH Project, Türkiye

Country	Türkiye
Look also at	#Spain National Plan for Digital Skills of Spain #France Digital Strategy for Education #Montenegro Education System Digitalisation Strategy
Brief description of the policy/initiative	**Objectives** The project aims to integrate state-of-the-art technology into public education system in Türkiye, covering IT and infrastructure systems, digital skills, research and development, innovation, ecosystem development, and digital content development. **Actions and results** ■ To date, 626 441 interactive boards have been installed in classrooms. ■ Online learning support platforms for digital readiness have been created: Education Informatics Network (EBA), Teacher Informatics Network (ÖBA), and Public Education Centres Informatics Network (HEMBA). ■ EBA Academy, an online learning platform offering online courses and micro-credentials was developed in 2024. ■ About 4 000 IT laboratories and innovative classrooms, 10 robotic coding kits, and three mobile robot have been launched. ■ 21 575 teachers participated in 60 online ÖBA (Teacher Informatics Network) training sessions in 2024. ■ AI education programmes are being conducted across 81 provinces, 21 online courses on AI, coding and machine learning are available on ÖBA for all educators. ■ A National AI Policy Paper in Education has been drafted, and an Action Plan on artificial intelligence in education has been developed ■ An additional 5 000 innovative-future classrooms will be created by 2026. **Expected impact** Inclusive and equitable education for all and recognition of talented students, providing integration between the education system and IT for the training qualified manpower.
Actors involved	Ministry of National Education, Ministry of Transport, Communications and Maritime Affairs
Distinctive features	■ All-round strategy covering all DERF areas and dimensions ■ Education policy that recognises the value of innovation ■ Innovating the teaching curricula with an emphasis on IT skills ■ Availability of open-source versions ■ Personalisation and differentiation of learning ■ Supportive management (methodological support for schools) ■ Support to start-ups
Geographical scope	National
Policy/initiative date/duration	2011 to date
Language	Turkish/English
Policy/initiative URL	https://yegitek.meb.gov.tr/
DERF Policy areas	All, with focus on 1. Digital infrastructure, 2. Digital competences of educators, and 6. Learning environments.
DERF Transversal dimensions	All, particularly Financing, Environmental sustainability, Quality assurance, and Teachers' and learners' well-being'.

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ACRONYMS

AI	Artificial intelligence
APAAR	Automated Permanent Academic Account Registry (India's national student digital ID system)
AR	Augmented reality
ARUCC	Association of Registrars of the Universities and Colleges of Canada
CEDEFOP	European Centre for the Development of Vocational Training
CEPS	Centre for European Policy Studies
CFT	Competency Framework for Teachers
CNL	Creating New Learning
COVID-19	Coronavirus disease pandemic
CPD	Continuous professional development
DADI	Diploma authentication system using blockchain (Wallonia)
DERF	Digital Education Reform Framework
EBA	Eğitim Bilişim Ağı – Türkiye's Education Informatics Network
ECNU	East China Normal University
EIT	European Institute of Innovation and Technology
EQF	European Qualifications Framework for Lifelong Learning
ERI-SEE	Education Reform Initiative of South-Eastern Europe
ESCO	European Classification of Skills, Competences, Qualifications and Occupations
ETF	European Training Foundation
EU	European Union
EUDIW	European Digital Identity Wallet (DC4EU project)
EUR	Euro currency code

EUROPASS	EU framework for qualifications and mobility documents
FATIH	Türkiye's national digital education initiative (Fırsatları Artırma ve Teknolojiyi İyileştirme Hareketi)
GIGA	UNICEF–ITU global initiative to connect all schools to the internet
HE	Higher Education
ICDE	International Council for Open and Distance Education
ICT	Information and communication technologies
ID	Identification
IFEN	Institut de Formation de l'Éducation Nationale
IIEP	UNESCO International Institute for Educational Planning
ILO	International Labour Organisation
INDIRE	Istituto Nazionale di Documentazione, Innovazione e Ricerca Educativa (Italy)
IT	Information Technology
JISC	Joint Information Systems Committee
LED	Learning and Experience Evidence Database
LLL	Lifelong learning
LMS	Learning management system
MOOC	Massive Open Online Course
NOLAI	National Education Lab Artificial Intelligence
NORRAG	Network for International Policies and Cooperation in Education and Training
OECD	Organisation for Economic Co-operation and Development
OER	Open educational resource
RATEL	Regulatory Agency for Electronic Communications and Postal Services
SELFIE	Self-reflection on Effective Learning by Fostering the use of Innovative Educational technologies (free tool for schools)

STEM	Science, technology, engineering and/or mathematics
TVET	Technical and vocational education and training
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNEVOC	International Centre for Technical and Vocational Education and Training
VET	Vocational education and training
VR	Virtual reality
WB	World Bank
WBL	Work-based learning
XR	Extended reality

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