Hertie School
Jacques Delors Centre

Policy Brief

Digital Education in Europe and the EU's role in upgrading it

15 February 2021

Maarja Kask, Policy Fellow
Nils Feller, Guest Author

#DigitalEducation
#Upskilling
#DEAP

A key political priority of Ursula von der Leyen's Commission is making Europe fit for the digital age. It promised to create playing rules for Artificial Intelligence (AI) within the first 100 days of its mandate. This urgency underlines the importance of digital transformation for the Commission. We have not seen the same sense of urgency regarding digital education, however. In this policy brief, Nils Feller and Maarja Kask explain why stronger EU engagement in digital education and upskilling is crucial not only for the Union's labour market but its overall competitiveness. They show where the Commission stands, what challenges it faces and how they can be addressed.

The technologies brought about by the Fourth Industrial Revolution – Artificial Intelligence (AI), cloud computing, robotics, genome editing and 3D-printing, amongst others – will transform the fabric of individual countries, their institutions, industries and societies. As with previous revolutions, the choices made today will shape the opportunities and risks this revolution creates in terms of productivity, income levels and quality of life. The Fourth Industrial Revolution is intersecting with the biggest shock our modern societies have witnessed: the Covid-19 pandemic. In 2020, globalised economies, their supply chains and key sectors such as education and travel were effectively frozen for several months. Yet, the coronavirus crisis also provides a unique window of opportunity to redesign existing systems. Education, in particular, requires a general overhaul after decades of lagging badly behind digital progress. If Europe wants to keep track with these changes, its education systems should be upgraded in a way that allows learners to receive a modernised education matching the needs of the changing labour market.

The Covid-19 pandemic sheds new light on the need for reform as it accentuates existing shortfalls. Europe lacks digitally qualified labour, while schools suffer from a slow uptake of digital solutions. In the absence of a qualified "homegrown" labour force, Europe has to import qualified workers while losing its own highly skilled individuals to the world's most innovative digital hubs such as Silicon Valley. In addition, the pandemic accentuates existing territorial and socio-economic divides. Nordic school systems perform substantially better across indicators of hardware ownership, teacher capacity and digital uptake, leaving students in these countries much better equipped to succeed in globalised economies. If such divides across member states,

regions and social strata persist, economic and social inequalities will grow and grow, thereby putting Europe's cohesion at risk.

The European Commission has recognised these shortfalls and risks and reacted by releasing an updated Digital Education Action Plan (DEAP) in September 2020. It outlines the direction in which education systems in Europe should head and proposes supportive actions in line with the EU's limited competences in the field of education. It groups them under two relevant strategic priorities: developing the necessary digital infrastructure for education as well as providing education concerning the digital realm, aka up- and re-skilling. In this policy brief, we review the DEAP and argue that more ambitious EU action should be taken. What is needed to future-proof education and life-long learning in Europe, both in terms of digital solutions for education as well as upskilling to fit the changing labour market? What stands in the way of reforming European education systems? And what can and should the European Union do?

1. Education & the EU

In 2013, Eurozone finance ministers agreed that the ESM should become the "backstop" to the When it comes to reforming educational systems, the question of competence comes into play. Namely, each EU country is responsible for its own system. According to Articles 6 and 165 of the Treaty on the Functioning of the European Union (TFEU), the EU cannot pass legislation concerning education policy and possesses solely supportive competences. The EU has thus limited capacities and member states are in the lead. The EU, however, can provide frameworks for coordination between member states and make suggestions, as well as help address common challenges. Article 165 of the TFEU states that EU actions shall be aimed at, among others:

- encouraging mobility of students and teachers

- encouraging mutually recognised diplomas

- promoting cooperation between educational establishments

- developing exchanges of information on common issues, and

- encouraging the development of distance education.

Moreover, Article 166, which covers vocational education, includes the following among the Union's aims:

- facilitate adaption to industrial changes, in particular through vocational training and retraining

- improve vocational training for integration and reintegration into the labour market.

The EU's main tool for influencing education policy is the strategic framework for European cooperation in education and training (ET 2020). In accordance with this, the Commission released a Communication on the Digital Education Action Plan (DEAP) in 2018. This was updated in September 2020 against the backdrop of the COVID-19-crisis. The plan's aim is to reform and modernise education systems in a way that brings them fit for the major digital developments that have taken place. It further aims to enhance digital skills of people at different life stages. All of this is to guarantee that the education and skills provided by the different levels of Europe's education system prepare people to find suitable jobs within a fast-changing labour market, while helping employers gain and retain access to qualified labour.

The DEAP has two strategic priorities:

1. **Fostering a high-performing digital education ecosystem**

    This is the technical part of the plan. It includes developing the necessary digital infrastructure, including the provision of equipment. It also includes the software and content which is in alignment with European values of safety and privacy. As an important element, it also envisions teachers and other educational staff with the necessary digital skills.

2. **Enhancing digital skills and competences for the digital age**

    This concerns the provision of basic digital skills. These skills include understanding new technologies like AI and cloud computing, but also general digital literacy and information-acquiring skills. It also embraces increasing the number of girls and women with advanced digital skills and working in digital careers.

To fulfil these two strategic priorities, the Commission has planned a number of concrete actions. These include, for example:

- Launching a Strategic Dialogue with member states to facilitate digital education

- Developing a European Digital Education Content Framework

- Launching a Connectivity4Schools initiative

- Including AI and digital skills in the European Digital Competence Framework

- Developing a European Digital Skills Certificate recognised across Europe

- Promoting advanced digital skills development, including through Digital Opportunity traineeships

- Creating a European Digital Education Hub, which will acquire a supportive role in implementing the Action Plan.

2. Operational challenges in implementing the DEAP

1. **Limited digital sovereignty**

Through the Digital Education Action Plan the EU aims at "fostering the development of a high-performing digital education ecosystem" (DEAP, Strategic Priority 1). For this, however, the Union will have to overcome its dependency on non-European technology providers. Today, non-European companies act as de facto regulators in EU digital markets as they design and provide the vast majority of digital products and spaces. The EU's limited capacity to effectively govern and manage its digital sphere calls into question Europe's ability to establish a true digital education ecosystem while safeguarding data protection.

The vulnerability of education data – at large or associated with specific users – becomes clear when assessing current dependencies. Europe's data and analytics infrastructure is largely located extra-territorially, mainly in the US and China. The EU's landmark legislation on data protection (General Data Protection Regulation (EU) 2016/679) does strongly protect data hosted inside the EU. However, data hosted on foreign servers is only partially protected by the GDPR. Regulators should therefore be wary about whether foreign technology providers adhere to European regulations.

Establishing a fully-fledged digital education ecosystem under DEAP hinges on Europe's ability to effectively govern and manage the native digital sphere. Funding from the Recovery and Resilience Facility (RRF) provides a much-needed boost to high-capacity broadband connectivity, yet broader capacity building on a grand scale is urgently needed. Actions under DEAP Priority 1 focus on dialogue rather than tangible investments and are thus insufficient to close capacity gaps in the short- to medium term. Without groundwork, Europe will be unable to deploy the envisioned *"vast and growing array of digital technologies"* at the required speed.

2. Europe's digital hardware divide

Under Strategic Priority 1 the DEAP foresees "effective digital capacity planning and development, including up-to-date organisational capabilities" for the proposed ecosystem. The actions underlying this objective – including strategic dialogue, EU support for connectivity in schools and digital transformation plans – are but a drop in the ocean for swaths of the EU's education landscape. This is brought home by the most recent benchmark report on progress in ICT in schools.

The report highlights substantial structural inequalities across the EU's territory and inadequate performance across most indicators,[1] except for Nordic countries which are the class leaders and perform substantially better across all indicators.

In terms of hardware ownership, teaching personnel see insufficient levels of tablets and (portable) computer equipment as the biggest obstacle to embracing digital technologies in education institutions. Only 35% of primary schools are digitally well equipped, whereas 52% and 72% of lower and upper secondary schools respectively are considered well equipped and connected. In primary schools, 18 students on average share a computer, as compared to seven in lower secondary and eight in higher secondary education. Similarly, access to a Wireless LAN and to high-speed internet[2] differs widely across Europe, with Nordic countries in the lead. Wireless LAN access is lowest in primary schools (46%) but only slightly higher in lower secondary (52%) and higher secondary (67%). Similarly, the availability of high-speed internet is lowest in primary education (11%) and not much higher across lower and higher secondary education (17% and 18% respectively).

Digital uptake levels mirror the overall underperforming hardware endowments of schools. In lower and higher secondary schools respectively one in five and one in four students (almost) never use a computer at school. Only 52% of students in lower secondary school used a computer at least once a week at school, rising to just 59% in upper secondary school. As for using personal equipment at home, few students used personal laptops for schoolwork except in Nordic countries. The shock caused by Covid-19 across Europe's education institutions can be expected to significantly alter the uptake of digital equipment for schoolwork. At the same time, however, this will further accentuate the role played in academic success by economic status.[3]

The results of the second benchmark report on ICT in schools underline structural differences between Nordic countries and the rest of the EU. At the same time, they underline that European educational institutions need a comprehensive push into the digital age if they want to keep abreast with the technological revolution students face upon graduation.

3. Changing skill requirements and diverse labour markets

The Commission's plan to strengthen "digital literacy, computing education and good knowledge and understanding of data-intensive technologies" under DEAP is confronted by the rapidly changing role of humans in the economy.[4]

While European manufacturing industry has historically been strong, it will lose this advantage if it does not adjust to market transformations. Manufacturing is seeing rapid changes in technology. The use of AI and machine learning applications is transforming the production process and putting a greater emphasis on the services provided along with products. In order to adapt to these changes, the industry needs a workforce with the necessary digital skills. Currently, the heart of the technological world is Silicon Valley and many people with expert digital skills prefer to work there. So, Europe finds it hard to attract people with the necessary skills, but also faces a significant brain drain of digitally highly skilled Europeans. This needs to change. The World

---

[1] The benchmark report provides a "detailed and up-to-date information related to access, use and attitudes towards the use of technology in education by surveying head teachers, teachers, students and parents covering the EU-28, Norway, Iceland and Turkey" (p.7).

[2] Defined here as above 100 mpbs.

[3] Students stated that the most widely used piece of electronic equipment was, in fact, their smartphone in 30% and 53% of cases across lower and upper secondary school respectively.

[4] In recent years, large volumes of research have been dedicated to the changing nature of work due to digitalization, albeit with mixed conclusions.

Economic Forum (WEF) predicts that the share of task hours performed through automation will increase from 29% in 2018 to 58% in 2022 (across the 12 industries analysed). Researchers from the Mannheim Centre for European Economic Research (ZEW) examined the relationship between education, wages, and the likelihood of computerisation, suggesting that automation threatens 42% of jobs (in Germany). The risk, however, differs dramatically when taking education levels into consideration. Workers attaining only primary education levels were at an 80% risk of losing their job to automation, with a sharp decline to only 18% for those holding a doctorate. On an optimistic assessment, the WEF suggests that the ratio of declining

occupations to total employment will decrease from 31% in 2018 to 21% in 2022, whereas the proportion of emerging professions will go up from 16% to 27% in the same period. Raising digital educational attainment thus holds enormous prospects for managing employment in a rapidly changing economy.

In the EU, it is expected that between 37% and 69% of jobs could be partly automated, while 14% of jobs face a very high risk of automation. While approximately 8.7 million people were working in ICT in the EU in 2020, there was still an estimated gap of 500,000 workers (and this holds true today). Fourteen EU countries may suffer from shortages of ICT graduates by 2030. Moreover, the threat of automation is not uniform throughout Europe. For example, in Norway, automation threatens 6% of jobs, while in Slovakia the threat reaches 33%. On the other hand, 1.75 million new jobs are expected to be created in the ICT industry within the EU by 2030 and data professions are expected to increase above 4% by 2025.

Given the difficulty of assessing the overall economic impact of the Fourth Industrial Revolution, the picture gets ever more complex when analysing the systems' impact across industries, sectors, and countries. This has vast implications for the EU-27. Without a clear understanding of the skills and education required by future labour markets across EU countries and industries, existing education systems cannot provide the general or specific digital skills needed in tomorrow's labour market.

The Commission needs to substantiate its plans to strengthen *"digital literacy, computing education and good knowledge and understanding of data-intensive technologies"*. Without concrete actions in this field, the DEAP and by extension national education systems risk losing relevance for the job markets of the present and future. At the European level, thus, the DEAP should provide concrete guidance on relevant *"digital skills and competences for the digital transformation"*.

3. Moving forward

Ursula von der Leyen's Commission can contribute to making education in Europe fit for the digital age by sharpening the focus and enhancing the weight of the DEAP. In line with Articles 6 and 165 of the TFEU, the Commission should support its member states through concrete actions that empower Europe's education systems. Such actions should target gaps identified in the DEAP, from a truly sovereign European digital sphere to upgrading national infrastructure and providing future-ready certification systems. This needs to take into consideration learners across age groups, from pre- and primary schools to adult learning.

1. **Design and execute a truly sovereign digital sphere and digital ecosystem**

For the European Union to create a true digital education ecosystem, a **joint strategy is needed to shape the future of learning across the EU**. Europe requires a comprehensive strategy for a European technology infrastructure that can deliver digital education as a public service and that enables native concepts for digital education. The strategy needs to be built on the design principles of "modularity, interoperability, openness and transparency".

The **EU should design and help put to work a unified digital education platform for teaching and learning solutions "Made in Europe"**.[5] Such a platform could be hosted on the GAIA-X technology stack to ensure a highly scalable and secure platform for pupils across Europe. Allowing publishers and software developers to create education software and content on the platform, the solutions could be translated and adopted by education institutions across Europe following the good

---

[5] Developing a framework for European Digital Education Content is one of the actions in the DEAP, as well as launching a study on the creation of a European exchange platform.

practice of the popular Elements of AI course developed by the University of Helsinki.[6] This would allow the platform to evolve into a one-stop-shop for pupils, teachers and education experts and provide high-quality and continuously improving education-as-a-service "Made in Europe".

2. Level and upgrade the playing field for digital education

Building on this strategy layer, the EU should provide **targeted funding mechanisms for education institutions to upgrade hardware and infrastructure across primary, secondary and tertiary education**. In current prices, the size of the Recovery and Resilience Facility is 725.4 billion euro, of which 337.1 billion is grants. The RRF is divided into six pillars, with the second one being "Digital transformation" and the sixth "policies for the next generation, children and youth, including education and skills". While there is no clear allocation of how much of the RRF each pillar gets, at least 20 percent of the total plan allocation should go to digital measures. There is no target for the size of the sixth pillar. The latter, however, states that the actions taken should address inequalities experienced by youth, including access to digital tools, internet connection and online education. The Commission thus provides sufficient capacities for infrastructure funding.

Priority should be assigned to underprivileged geographic areas with a view to closing the capacity gap between regions within the EU. In this respect, Nordic countries can provide a blueprint for country-wide capacity upgrades in schools, with a view to designing strategies for procurement and rollout as well as operational and service guidelines. This will allow education systems in less privileged European member states to match the best when it comes to educating tomorrow's workforce.

Ensuring uptake of digital equipment, the EU should employ comprehensive change management. This needs to include the development and dissemination of guidelines and online training materials to civil servants and teachers. In addition, performance management systems can be developed cheaply using the platform's functionalities to ensure widespread adaptation across member states.

3. Formulate digital skills for Europe

The EU should support its member states in **formulating a digital education framework and certification system for child and adolescent learning**. For this, the EU can rely on a robust and growing body of research. Focusing on the primary to tertiary sectors, the future of digital education and training in the EU will inevitably need to combine ICT-generic, -specialist and -complementary skills to provide pupils with a foundation to compete in a continuously evolving labour market. The DQ Global Standards for Digital Competitiveness, as presented during the 2020 T20 Task Force Meetings, as well as relevant studies from the OECD and others, provide a robust starting point for EU Commission and its member states to build and formulate their digital education and skills framework. The full framework would enable national education systems to adapt and provide relevant ICT-generic, -specialist and -complementary skills to children and adolescents – the labour market of the future.

Similarly, the **EU should coordinate a European up- and re-skilling framework for adult learning that is mutually recognized across the bloc**. If Europe wants to remain competitive, it needs to build a strong digitally skilled workforce. This requires a new framework for coordinating national up- and re-skilling plans. It should provide a methodology to assess ICT-generic, -specialist and -complementary skills needs across territorial and economic sectors, a current state assessment across member states and thereupon provide a way forward to strengthen adult up- and re-skilling in all countries. This would, in turn, allow member states to act in unison here and at the same time decrease disparities between them. Ultimately, this will lead to less inequality between the various national labour forces.

All of the necessary actions to be taken in order to reform the education system and prepare for the digital future require investment. Effective deployment of the funds provided by the EU requires **a coherent investment plan for education to be created** to help member states direct money where necessary. As the global pandemic disrupts economies, individual EU countries

---

[6] **The course Elements of AI is a compilation of free online materials created by Reaktor and the University of Helsinki to familiarise citizens with the theory and practical applications of AI.**

lack resources, and reforming education systems should receive financial support from Brussels. While the RRF provides some instruments, there is no coherent overall plan from the European Commission for investments to reform education systems. Without strategic investments, however, the momentum for change brought forth by the pandemic will stall and the opportunity for swift and effective reform will be lost.

Friedrichstraße 194
D – 10117 Berlin
Tel.: +49 (0)30/259 219 107

Online: delorscentre.eu
E-Mail: info@delorscentre.eu
Twitter: @delorsberlin

7/7