Rethinking Education in the Digital Age

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Abstract: The paper "*Rethinking education in the digital age*" highlights the changes that took place in the education systems in Europe during the Covid-19 pandemic. The digital transformation has changed society and the economy, with an increasing impact on everyday life. However, before the COVID-19 pandemic, its impact on education and training was much more limited. The pandemic has shown that it is essential to have an education and training system ready for the digital age. It also demonstrated the need for more developed digital capabilities in the field of education and training. Moreover, it has exacerbated challenges and inequalities between those with access to digital technologies and those without access, including those from disadvantaged backgrounds. In the face of accelerated digital change, it is essential that education and training systems are properly adapted. While responsibility for the content of education and the organization of education systems lies primarily with the EU Member States, in recent years we have seen an increase in the willingness to distribute and exchange best practices on digital education, as well as to develop tools and common frameworks at EU level. The EU can play a more active role in identifying, distributing and scaling up good practice and supporting member states and the education and training communities as a whole with tools, frameworks, guidance, technical qualification and research. The crisis caused by the COVID-19 pandemic has led to a growing awareness of the need to improve the use of technology in education and training, to adapt pedagogies and to develop digital skills.

Keywords: digital education; Covid-19; education systems; digital abilities; performance

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1. Introduction

The COVID-19 pandemic has led to the closure of schools in many countries worldwide. This affected millions of children, from preschoolers to high schoolers, who had very disrupted last school years. The pandemic has severely affected education and exacerbated social inequities. Children from low-income families, children living in rural areas with poor infrastructure, children from ethnic and linguistic minorities, children with disabilities, migrant and refugee children, children in conflict with the law, children and young people not attending educational institutions, boys and girls living in difficult conditions or abusive homes were already facing significant barriers to participation in education and learning and had lower education and social benefits than those of the same age. Schools are not only a place for academic education, but also for learning social and emotional skills, interaction and social support. Children have lost basic reading and arithmetic skills. Globally, the disruption of education systems has led to the enrollment of millions of children who have lost a significant amount of knowledge that they would have learned if they had been present in the classroom.

The closure of schools has not only disrupted the children's education process, but also access to school meals, welfare support and referral to basic medical and social services. In addition to learning loss, the closure of schools has had a negative effect on children's mental health, has reduced their access to a regular source of nutrition and has led to an increased risk of child abuse. There is growing evidence that the COVID-19 pandemic has caused high levels of anxiety and depression among children and young people, with some studies showing that girls, adolescents and those living in rural areas are more likely to experience such problems.

The challenge for teachers, school principals, education officials and local and national decision-makers is significant. If this challenge is not met, the impact on children, young people, families, communities and societies at a wider level will be felt throughout life, both socially and economically. Therefore, improving the resilience of the education system, by planning a quality inclusive education for the most marginalized children, should be a top priority for the coming months and years and should be the basic principle of rebuilding a better education and better schools.

2. Digital Education in the Context of Covid-19

Digital education, on the one hand, involves a set of knowledge that an individual must have regarding the use of a digital system, i.e to be able to use its minimum functionalities. On the other hand, digital education often refers to digital methods that replace the classical methods that education has always used.

Even outside the context of the pandemic, digital education has become, over the years, a growing need for both teachers and students. However, the pandemic has exacerbated this need and brought it to the level of vitality for any society and for most education systems in the world. In Romania, for example, schools have been closed overnight, so all education had to move to the online system.

The digital transformation has changed society and the economy, with an increasing impact on everyday life. However, before the COVID-19 pandemic, its impact on education and training was much more limited. "The pandemic has shown that it is essential to have an education and training system ready for the digital age" (Dempsey, 2021). It also demonstrated the need for more developed digital capabilities in the field of education and training. Moreover, it has exacerbated challenges and inequalities between those with access to digital technologies and those without access, including those from disadvantaged backgrounds.

Education and training are key elements for personal fulfillment, social cohesion, growth and innovation. The rapid digitalization of the last decade has transformed many aspects of work and everyday life. Driven by innovation and technological evolution, digital transformation is reshaping society, the labor market and the future of labor. "Employers are facing difficulties in recruiting highly skilled workers in several sectors of the economy, including the digital sector".(Johnston & Lopez, 2021). Too few adults are perfecting their skills or retraining to fill these vacancies, often because training is not available at the right time and place.

The education and training system is increasingly part of the digital transformation and can capitalize on its benefits and opportunities. However, it must also effectively manage the risks of digital transformation, including the risk of a digital divide between urban and rural areas, in which case some people may benefit more than others. The digital transformation in education is supported by advances in connectivity, the widespread use of digital devices and applications, the need for individual flexibility and the ever-increasing demand for digital skills. The crisis

caused by the COVID-19 pandemic, which severely affected education and training, accelerated change and provided a learning experience.

Digital technology, when used skillfully, fairly and effectively by teachers, can fully support the goal of high quality, inclusive education and training for all learners. It can facilitate more personalized, flexible and student-centered learning at all stages of education and training. Technology can be a powerful and engaging tool for collaborative and creative learning. It can help learners and teachers access, create and distribute digital content. It can also take place beyond the walls of the classroom or workplace, giving you more freedom from the constraints of physical space and schedule. Learning can take place in a completely online or mixed way, at a time, place and pace adapted to the needs of the individual learner. However, the type and design of technological tools and platforms, as well as the digital pedagogy used, can directly influence the inclusion or exclusion of people in relation to learning.

It is necessary to use a wide and growing range of digital technologies (applications, platforms, software) to improve and expand education and training. "Online, distance and blended learning are specific examples of how technology can be used to support teaching and learning processes" (Chan, Bista & Allen, 2021). A second key aspect of digital education is the need to equip all learners with digital skills to live, work, learn and thrive in a world increasingly influenced by technology. Addressing these two aspects of digital education requires policies and actions on several fronts, including infrastructure, strategy and leadership, teaching skills, learning skills, content, curricula, assessment and national legal frameworks.

Efforts to control the COVID-19 epidemic have led to the closure of buildings, campuses and other places of education and training, and to a forced shift to emergency digital education. These urgent modalities have included the widespread adoption of online and distance learning. "This unprecedented mass use of learning technology has revealed many opportunities for teachers to organize their teaching differently and to interact with students in a more personalized way, focusing on their specific needs" (Pal, Quang Cuong & Nehru, 2021). At the same time, many EU member states have experienced systemic shortcomings and a widespread lack of digital training. Although digital technologies have enabled many pupils, students and adult learners to continue learning, they have also proved to be a major obstacle for others when access, equipment, connectivity or skills are lacking.

This crisis requires rethinking the way in which education and training are designed and delivered across all disciplines, in order to meet the demands of a highly dynamic and increasingly digital world. Today's quality and inclusive education should be informed by the needs of our present and future society. To this end, it is important to consider how all stages of education and training can effectively and strategically include digital technologies in educational practices.

The COVID-19 pandemic crisis has highlighted the key drivers of effective digital education and training: connectivity and appropriate digital equipment for learners and teachers; teachers and trainers who are confident and competent in the use of digital technology to support teaching and adapted pedagogy; leadership skills; collaboration and sharing of good practices and innovative teaching methods. Experiences from this period show that education and training systems and institutions that have previously invested in their digital capacity have been better prepared to adapt teaching approaches, maintain the level of student involvement and continue the education and training process. In particular, the urgency confirmed the need for all teachers to have the skills to use digital technologies effectively in the teaching and training process, as well as the need to ensure that all children can participate in digital education. It also confirmed that online teaching requires different pedagogical approaches. Teachers and learners also need to develop their skills and know-how for this different way of learning.

3. Adapting Education and Training Systems to the Digital Age

In the face of accelerated digital change, it is essential that education and training systems are properly adapted. While responsibility for the content of education and the organization of education systems lies primarily with the EU member states, in recent years we have seen an increase in the willingness to distribute and exchange best practices on digital education, as well as to develop tools and common frameworks at EU level. Joining forces and working together in the field of digital education has never been more important. The EU can play a more active role in identifying, distributing and scaling up good practice and in supporting member states and the education and training communities as a whole with tools, frameworks, guidance, technical qualification and research.

"The crisis caused by the COVID-19 pandemic has led to a growing awareness of the need to improve the use of technology in education and training, to adapt pedagogies and to develop digital skills" (Swartz, Nyman & Livingston, 2021). The

following guiding principles are essential to ensure that education and training adapt to the digital transformation and further improve the quality and inclusion of education in Europe.

High quality and inclusive digital education, which respects the protection of personal data and ethical principles, must be a strategic objective for all bodies and agencies active in the field of education and training. Prior to the pandemic, digital education was often the responsibility of a team or division within educational institutions, ministries, or government agencies. The crisis has shown that digital education is not a marginal issue, but a central component of learning, teaching and assessment in the 21st century. All actors in the field of education need to strategically reflect on how digital technologies can be integrated into education and training.

Transforming education for the digital age is a task for society as a whole. This transformation should include in-depth dialogue and stronger partnerships between teachers, the private sector, researchers, municipalities and public authorities. Parents, businesses, civil society and learners themselves, including young learners, should be more involved in making high-quality, accessible and inclusive digital education and training a reality for all. These should be based on facts and data to monitor progress and improve our understanding of the challenges and opportunities of the digital transformation in education.

Adequate investment in connectivity, equipment and organizational capacity and skills should ensure that everyone has access to digital education. "Education is a fundamental human right and access to it must be guaranteed, regardless of the environment in which it takes place - physically, digitally or a combination of the two" (Ko & Rossen, 2019).

Digital education should play a central role in increasing equality and inclusion. Digital skills are essential to be able to develop and implement digitally accessible and inclusive systems. The lack of digital skills and accessibility has also meant that many disadvantaged groups, teachers and families have been unable to continue working and learning during travel restrictions. Not only has this increased the risk of poverty and disadvantage, but it has also increased inequality in education and training.

Digital skills should be the core competencies of all teachers and staff involved in education and training and should be integrated into all areas of teacher professional development, including initial training. Teachers are highly qualified and competent specialists who need confidence and skills to use technology

effectively and creatively to engage and motivate learners, to support the acquisition of digital skills by learners, and to ensure that tools and the digital platforms used are accessible to all learners. "Teachers and trainers should have access to continuous learning and professional development opportunities tailored to their needs and discipline" (Ko & Rossen, 2019). Digital teaching methods and innovation in digital education should be integrated into all initial teacher training programs and promoted in the education and training of people working with young people.

Leading education staff play a key role in digital education. They need to understand how and when digital technologies can improve education, provide adequate resources and investment, encourage teachers, learn from best practices and support relevant organizational change and a culture that values and rewards innovation and experimentation. Education and training systems need to evolve and adapt, and for this it is necessary for all actors to bring about this change, including the leadership of institutions and policy makers.

Digital skills are essential for life in a digitalized world. In the context of computers and algorithms mediating many of the day-to-day activities, it is important for people of all ages to be educated about the impact of digital technology on well-being and how information technology systems work. This is essential for developing an understanding of the risks and opportunities of digital technology and for encouraging the healthy, safe and relevant use of digital technology. Excessive information and the lack of effective ways to verify information lead to the need for people to have the ability to critically approach, evaluate and filter information, and to be resilient to manipulation. Digital education and skills should also consider the impact of the use and development of digital equipment and services on the environment and climate.

Basic digital skills should become part of the key transferable skills that everyone should have in order to be able to develop personally, become involved in society as an active citizen, use public services and exercise fundamental rights. "A solid understanding of the digital world should be part of the formal and non-formal education provided in every education and training institution" (Smith & Budhai, 2021).

In order to support competitiveness, citizens need to have the latest advanced digital skills to support the digital double transition to a green economy of society, public services and all components of the economy. The use of technology affects

jobs and everyday life. This makes investing in lifelong learning even more important, by promoting, providing and recognizing training and retraining for the digital economy.

High quality educational content is needed to stimulate the relevance, quality and inclusion of European education and training at all levels. Educational institutions have an increasingly important role to play as lifelong learning providers. Digital technology should be leveraged to facilitate the provision of flexible and accessible learning opportunities, including for adult learners and professionals, to help them retrain, improve or change their careers. More ambitious efforts are needed in terms of content, tools and platforms for digital education. These efforts should encourage the adoption, quality assurance, validation and recognition of courses and learning opportunities in all sectors of education and training. Promoting short courses that are recognized can play a key role in training and retraining.

4. Priority Areas and Actions

> *Encourage the development of a high performance digital education ecosystem.*

Promoting high-quality, inclusive digital education must be a common goal of society as a whole. Governments, education and training institutions, the private and public sector must all be involved in this endeavor to develop a high-performance digital education ecosystem. Policies relevant to digital education need to be better connected, and the EU can contribute to this at all levels. Key actors, especially teachers and trainers, should be better prepared and trained to participate more effectively in the digital transformation of education and to understand the opportunities it can bring when used effectively.

Effective digital capacity planning and development are vital for education and training systems. This requires the development and ongoing review and updating of digital strategies that address technology gaps in infrastructure and devices and develop relevant organizational capabilities in education, including the ability to provide hybrid learning and teaching modalities (distance and on-site). "The capacity to ensure accessibility to assistive technologies and accessible digital content should be developed and, more generally, to address unequal access, for example on socio-economic grounds or on the differences between rural and urban areas". (Pal, Quang Cuong & Nehru, 2021) Institutionalized support is essential for such planning and development, as are interdisciplinary teams, which include

management staff, technical specialists and training authors, focusing on the needs and experience of staff involved in education and training.

High-capacity internet connectivity is essential for education. The demand for connectivity is growing due to the intensive use of broadband communications, such as video streaming, video conferencing, cloud computing technology and other emerging applications (such as virtual and augmented reality). Providing fast and reliable internet to educational institutions and learners has an important role to play in ensuring effective and engaging learning experiences. This means that internet access is not limited to a particular class or computer lab. In addition, teachers consider reliable access to the Wi-Fi network to be a prerequisite for the reliable use of technology in teaching. The recent period of educational disruption and the closure of physical spaces has highlighted the need to ensure that students have access to devices and the Internet in order to be able to continue learning at home or in other settings.

The content of digital education and training in digital skills - including digital teaching methods - will be essential for staff. They will benefit from stronger support for online, in-person or mixed teaching, depending on the context and needs of the learner. Teachers should be encouraged to adopt innovative methods, to be aware of the impact of digital technologies and services on the environment and the climate so that they can work together on the most sustainable options, to engage in mutual learning and to share their experiences. "A reliable digital education ecosystem requires high-quality content, easy-to-use tools, value-added services, and secure platforms that maintain confidentiality and meet ethical standards" (Tate, 2021). Accessibility, inclusion and student-centered design are vital. The development of European digital educational content should promote the highest pedagogical and educational quality and respect the diversity and cultural richness of the EU member states.

➢ *Intensifying digital skills and competences for digital transformation.*

A changing society and the transition to a digital economy require strong digital skills. Promoting digital skills at all levels supports growth and innovation, as well as building a more equitable, coherent, sustainable and inclusive society. Having digital skills and digital literacy can help people of all ages to be more resilient, more involved in democratic life and safe in the online environment. Equipping workers and jobseekers in Europe with digital skills will be critical to the economic recovery in the coming years. In addition to digital skills, the digital economy also

needs additional skills such as adaptability, communication and collaboration skills, problem solving, critical thinking, creativity, entrepreneurship and a willingness to learn.

Digital literacy has become essential for everyday life. A solid understanding of digital information, including personal data, is vital to navigating an increasingly algorithmic world. Education should more actively help learners to develop the ability to approach, filter and critically evaluate information, mainly to identify misinformation and to manage information overload, as well as to develop their financial literacy. Education and training institutions can support the formation of resilience to over-information and misinformation, which are becoming more widespread in times of crisis and major disruption in society. Combating misinformation and harmful discourse through education and training is crucial for the effective participation of society and democratic processes, especially young people. "Over 40% of young people believe that critical thinking, the media and democracy are not sufficiently taught in school". (Chan, Bista, Allen, 2021) The challenge is especially relevant for young learners, who are almost all online every day.

Computer education in schools enables young people to gain a deeper understanding of the digital world. The introduction of computer science to students from an early age, through innovative and motivating teaching approaches, both in formal and non-formal settings, can support the development of problem-solving skills, creativity and collaboration. Actions to promote high-quality, inclusive IT education can also have a positive impact on the number of girls pursuing higher education in the field of IT and subsequently working in the digital sector or in digital jobs in other sectors of the economy.

A thorough and scientific understanding of the digital world can build on and complement the broader development of digital skills. It can also help young people see the potential and limitations of IT in addressing societal challenges. However, many young people in Europe still drop out of school without being exposed to computer education.

In 2019, one in five young people in Europe reported that they did not have a basic level of digital skills, with young people with a low level of education being more than three times more likely to have insufficient digital skills than those with a higher level of education. This prevents many young people from fully participating in the labor market.

To thrive in a technology-driven economy, European citizens need digital skills. Everyone, including learners, jobseekers and workers will need to have digital skills and confidence that they will succeed in a rapidly changing environment and adapt to new and emerging technologies. Digital skills levels in the EU are still low, although they are gradually improving, while the digital transformation is accelerating. „90% of jobs in all sectors will require some form of digital skills in the future, however 35% of European workers do not have these skills". (Dempsey, 2021) The demand for digital skills will increase, from basic to advanced skills, digital skills in the field of data, supercomputing and cybersecurity.

All member states face a shortage of digital experts, including data analysts, cybersecurity analysts, digital accessibility specialists and machine learning experts. „58% of companies looking to hire digital specialists report recruitment difficulties and 78% of companies report a lack of appropriate skills as the main obstacle to new investment (Dempsey, 2021) There is a demand for an increase in the number of EU master's programs in artificial intelligence and cybersecurity. This will provide access to high quality and relevant learning opportunities in advanced digital fields across the EU.

"Women accounted for 54% of EU tertiary education students in 2017, but very few are present in the digital sectors. Women hold only 17% of jobs in the technology sector'. (Swartz, Nyman & Livingston, 2021) Teachers, parents, and science, technology, engineering, and math professionals need to engage, motivate, and inspire female learners, as greater inclusion of women in the digital economy and increased labor market diversity can bring social and economic value to in terms of competition, growth and innovation in Europe. Efforts to combat gender stereotypes and gender bias in the digital sector are also much needed to improve the gender balance in the sector.

Everyone should gain a basic understanding of new and emerging technologies. This will help them to interact positively, critically and safely with this technology and to be aware of potential issues related to ethics, environmental sustainability, data protection and privacy, children's rights, discrimination and prejudice, including gender and disability and ethnic and racial discrimination. Greater representation and participation of young people, women and underrepresented groups in artificial intelligence research should also be encouraged, by supporting existing initiatives and by promoting knowledge sharing and collaboration. To understand the applications and implications of artificial intelligence for education, both teachers and learners need new and digital data skills. Education and training

institutions need to be aware of the opportunities and challenges posed by artificial intelligence.

5. Conclusions

Digital education as a set of knowledge and skills that an individual has when it comes to digital systems is, without question, the future. The individuals who will have a broad digital education will be the ones who will be the target of future jobs. Online courses have become increasingly popular, regardless of discipline, as the pandemic has been able to demonstrate that desire and perseverance are what matter and not physical presence in a space.

The COVID-19 pandemic has severely affected education and training systems. In particularly difficult circumstances, this has accelerated the digital transformation and led to rapid, widespread change. Developments that could have taken years have taken place in just a few months. We are currently facing both challenges and opportunities. This means that we need to use the lessons of the last few months to intensify our efforts and gradually evolve from a temporary and emergency distance education to a more efficient, sustainable and equitable digital education as part of a system of education, creative, flexible, modern and inclusive education and training.

EU member states should encourage the trend of recent yaers, with a view to developing a high-quality, accessible and inclusive digital teaching, learning and assessment system. All Europeans, whether living in urban or rural areas, on the outskirts or in the capital, and regardless of their age, should have the digital skills they need to live, work, learn and thrive in the 21st century. Transforming education and training systems is an essential part of the vision of a digital Europe.

However, such a transformation will not take place overnight. This requires strategic and concerted action, as well as pooling resources, investment and political will to move forward at EU and national level. Making the digital leap in education and training will be vital for citizens to reach their full potential without leaving anyone behind. It will also be essential to demonstrate the efficiency, relevance and legitimacy of education and training systems in preparing - and shaping - the future.

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