

The Panorama of Digital Education in the XXI Century

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This chapter aims to analyse digital education in the twenty-first century, a complicated topic with tremendous advancements and challenges. We analyse digital education from different angles and like this we want to analyse his substantial significance in the modern education framework. This approach highlights several benefits, such as extensive educational opportunities, engaging and dynamic learning opportunities, and tailored training that meets each learner's needs. However, we also discuss the inherent challenges that the digital education brings to us nowadays, they include the availability and fairness, the technology limitations, and the absence of in-person social interaction. Another important aspect to analyse is the significant impact of the digital education on the pedagogical approaches and how the digital education could affect globalisation, specifically how it might help people engage across cultural boundaries and overcome specific constraints. To conclude, we also analyse new trends like gamification, virtual and augmented reality, and artificial intelligence to find possible future directions for digital education. The chapter ends by stating that to fully realise the potential of digital education and create an inclusive and successful learning environment for the future, these opportunities and challenges must be continuously explored.

Keywords: digital education, artificial intelligence, ict tools, challenges, opportunities

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Introduction

Goals

The chapter look to the perspectives and experiences of digital education in the education institutions. This is a very important topic since recent studies indicate that digital education can significantly influence students' learning experiences and outcomes (Nurmalisa et al., 2023; Gutiérrez-Ángel et al., 2022; Brown, 2020). The aim is to try to analyse the different perspectives from the education setting, which includes students and teachers, which is probably the most important group to listen to in times like this. So let's enter into a fruitful discussion in the following sections.

Background and History of Digital Education

Digital education, which is sometimes also known as e-learning, has become a crucial element of the modern educational organisation since it has changed how our knowledge is disseminated and acquired (Smith, 2018). The digital technologies and their subsequent integration into educational settings have significantly transformed the education as we have today, and these technologies have greatly expanded education's scope, facilitated personalised learning, and fostered global collaboration (Johnson & Adams, 2011).

The 1980s was the initial phase of integrating digital technologies into educational settings. This period saw the introduction of computers into the classrooms, which paved the way for using digital tools in the teaching and learning processes (Johnson & Adams, 2011). But even if most of the time the computers were there, actually they were not operating since the teachers' lack of formation. This period testifies to the change and transformation from traditional teaching methods to innovative ones with digital tools. This was the beginning of the role of digital technologies in the educational process with the integrating of computers into the educational setting. This has opened the way for a more interactive and engaging learning experience, marking the first step towards a digital revolution in education (Bates, 2015).

The rise of the Internet in the 1990s has transformed education by increasing the accessibility of educational resources and, at the same time, allowed the exchange of knowledge beyond geographical boundaries, something never imagined until then. This time marked the beginning of a modification from the traditional classroom-based education to a more flexible and accessible way of learning inside and outside our classrooms. The World Wide Web had opened the door to an incredible scale of possibilities by providing not only the door, but also the keys to a vast set of information that was previously isolated from the common public. Suddenly the world had access to online resources such as, e-books, educational websites, and digital libraries. We pass from traditional classroom-based education to a more flexible, innovative and accessible way of learning. This enabled the learners to have access to educational content anytime, anywhere (Clark & Mayer, 2016). Of course, there is still difficulty in how these aspects reshape the school environment. Shifting from the traditional to an equilibrium of the digital age is a hard process that needs to be understood and continued work by all.

The turn of the millennium, entering the XXI century, saw the rise of virtual classrooms and Massive Open Online Courses (MOOCs). It was a time for great innovation and creation, and the so called virtual classrooms, allowed a real-time interaction within the classroom environment. Like this the education

system could break geographical barriers, turning education more accessible to all. The MOOCs, on the other hand, were offering free, and high-quality, courses from a wide range of known universities worldwide. These types of platforms have democratised education by enabling anyone with a moderate internet connection to access courses from some of the world's best institutions (Bates, 2015). So, a proliferation of online courses and digital resources in Higher Education Institutions (HEI) reshaped the educational ecosystem. The start of digital education has seen a significant expansion in the online offerings of many of the world's largest universities. They quickly embrace this opportunity, offering various online courses and degree programs (Hollands & Tirthali, 2014). Institutions like Harvard, MIT, and Stanford have been leading this process of online education revolution, proposing courses and programs to students globally (Christensen et al., 2013).

Besides the universities, there were also new companies that start to providing online courses to the general public, they also have marked the digital education system. Companies like Coursera, Udacity, and Khan Academy have made high-quality educational content accessible to millions worldwide (Shah, 2020), and these, often called ed-tech startups, have stated a democratised access to education. These platforms offer a wide range of courses, from K-12 to higher education and professional development, most of the times they have partnerships with top universities to ensure the quality of what they are offering to the public (Sharma, 2024). The rise of these companies represents a significant shift in the education sector, with online learning becoming an increasingly mainstream option for a very large percentage of people (eSchool News Staff, 2020).

So, integrating digital technologies into education has revealed new opportunities, such as the fact that education can reach a wider audience, provide flexible learning options, and offer a diverse range of educational resources (Brown, 2020).

In one hand, the rise of digital education has taken numerous opportunities to the education panorama, but also had introduced new challenges. Issues related to digital literacy have become increasingly important, essentially because not all learners possess the necessary skills to surf and learn from online platforms effectively (Van Deursen & Van Dijk, 2019). Other very important issue is the data privacy that has shaken the world (not only that time but even more nowadays). Since almost all the online learning platforms often collect a significant amount of personal data from the users, this start to raise questions about how this information is stored, used, and protected (Sullivan & Egelman, 2020).

Moreover, the gap between those with access to digital technologies and those without has also increased the turn to online learning, potentially worsening existing educational inequalities (Robinson et al., 2015). We know that not everyone has equal access to digital education, which makes digital education even more exclusive for some.

Despite all the significant changes made in digital education, there are still several issues that remain as major obstacles, another one is the internet connectivity. This is one of the major issues, since it is a fundamental requirement for digital education; yet, a significant portion of the global population still misses a good internet access. If we pay attention to the United Nations' International Telecommunication Union (ITU) (2020), in 2019 only 53.6% of the world population have Internet access, this study also says that in 2023 approximately 67% of the world's population was using the Internet, leaving around 2.6 billion people still offline. This is a huge gap, particularly in the developing countries, where internet penetration rates are very low. The lack of internet connectivity is due to many aspects, some of them are related to infrastructure problems, affordability, and the digital literacy also plays a key role. In many rural and remote areas, the necessary infrastructure for internet connectivity simply didn't exist, even if in some areas there exist infrastructure, the real cost of internet services that are provided can be very high for the common public. Even when the public have access to the Internet, there is still a lack of digital literacy skills that didn't allow these persons to use effectively the digital educational resources (Van Dijk, 2006). This digital gap has significant implications for education since it exacerbates existing educational inequalities, as, for instance, those without internet access cannot benefit from online educational resources. This type of problems has been particularly notice during the COVID-19 pandemic, when almost every educational institutions turned to the online process. Students that didn't have a reliable internet access were significantly in disadvantaged comparing to their colleagues. In this way we have open even more the educational breach (Reimers & Schleicher, 2020). So, dealing with the issue of internet connectivity is one of the crucial steps for the future of digital education. There should be made efforts to improve infrastructure, making internet services more affordable to the general public, enhancing also the digital literacy skills. Only then, we can start thinking on a fully accomplished digital education – in a world where high-quality education is accessible to all, regardless of location or socioeconomic status.

Nevertheless, this extraordinary evolution/revolution was achieved due to the many individuals and organisations that played important roles. Investi-

gators like Seymour Papert have introduced innovative concepts that really form the basis of many modern educational technologies (Papert & Harel, 1991). Companies and organizations, like the Khan Academy, have made significant contributions by providing free, high-quality educational content online, thereby democratising access to education (Khan, 2012). These type of contributions have changed the digital education environment, carrying the world to innovation and expanding the way to learning. As we move forward, the technology rapid development continues, which redefine a new frontier on education, offering new possibilities for teaching and learning. However, to be a real opportunity, the existing disadvantages need to be considered in the equation. Education should be for everybody.

So, the digital education landscape continually evolves, becoming increasingly complex as new technologies and trends emerge daily. The rapid pace of technological advancement presents both opportunities and challenges in education.

The new technologies can transform the teaching and learning process, because they can make education more interactive, engaging, personalised and like this open the persons to new communication, collaboration, and creative expression possibilities. For example, advancements in artificial intelligence and machine learning enable the development of adaptive learning systems that can fit the individual needs of each student, while virtual and augmented reality technologies are creating new opportunities for immersive, experiential learning (Weller, 2021). On the other side, the speed that these technologies appear, can make it very difficult for educators and institutions to keep up. The integration into the classroom always requires a financial investment, which most of time mean, government support. Even when we have good conditions and proper tech, it is very important to spend a significant amount of time and efforts to learn how to use them effectively. Everybody know that the change can promote instability and uncertainty, this is something that usually happens also on the educators side when using the technology. It is possible that they may feel pressure to keep up constantly updated, for this reason, the knowledge triangle (professors, students, community) must stay connected on the technological change, carefully evaluating new technologies' potential benefits and challenges before adopting them to the classroom (Facer & Selwyn, 2021).

Another very important toll is the Virtual reality (VR) integration in education. It has gained significant attention, particularly in HEI, since VR can provide students with teaching aids closer to real life, rich and diverse personalised learning environments, and change traditional classrooms (Ding &

Li, 2022). The VR technology has been described as a learning aid for the 21st century, there are studies showing that students retain more information and can better apply what they learn after engaging in VR exercises (Rogers, 2019; Krokos et al., 2019). The use of VR with students has been analysed by some authors, these studies shown that they could have positive effects, mainly because they can affect students' behaviours and learning results (Ding & Li, 2022). But, it is also notice that most of the time students often miss guidance and training while using the VR equipment. This can have implications on the effectiveness of VR in education (Ding & Li, 2022). Other important aspect is that the equipments often used in HEI are mainly computers and headsets, which are not portable enough yet (Ding & Li, 2022). This highlights the need for more portable and user-friendly VR devices in education to enhance the learning experience for students. Something that started to be considered by the major companies since the latest breaks through and novelties.

Another emerging trend is using Artificial Intelligence (AI) in personalised learning. AI has the potential to revolutionise education by providing personalised learning experiences tailored to each student's unique needs and abilities. Still, this needs to be handled with caution.

These AI systems can lead to more effective learning outcomes by ensuring students are challenged at the appropriate level and receive the support they need to succeed (Weller, 2021). The AI systems can adjust learning according to the requirements of each student, providing a differentiated level of education and transforming the education sector with a smart content such as digitalised books, video lectures, and lecture notes (Hyder, 2022). This smart content makes access to education easy as it can be accessed remotely, expanding learning opportunities. Moreover, AI applications assist teachers in various tasks, allowing them to concentrate on tasks that require a personal touch. These applications use various techniques to collect and analyse accurate data to predict students' learning patterns and identify their educational needs (Hyder, 2022). Another important aspect is that AI can help students to plan each step of the learning process, such as pre-class preparation and searching for learning materials. It can provide personalised tutoring based on the preferences of the students and also facilitate the distance education (Al-Emran et al., 2022).

Nevertheless, and like always happens when breakthroughs exist, it is important to note that while AI provides many advantages in the education service, it also comes with ethical risks. This main aspect truly scared the common population and the education community. Within this risks, we include the potential for data security breaches, the risk of educational inequality

due to the provision of discriminatory data by AI applications, and the potential for students to become dependent on fragmented digital information (Al-Emran et al., 2022). The ethical implications of AI in education must be carefully considered by all intervenientes.

Other important change in last year's education panorama was the COVID-19 pandemic, because it has also significantly impacted digital education in that moment and for the future. Suddenly, the pandemic has forced a shift by all of us to the remote learning. While doing this, it has accelerated the implementation of digital education. This change has presented several challenges and opportunities, since the educators, students, families, had been forced to adapt quickly to new types of teaching and learning. On the other side, it has also showned the potential of digital education to provide flexible, accessible learning opportunities, even in times of crisis (Hodges et al., 2020).

In spite of these obstacles and challenges, the digital education has tremendous potential. According to Brown (2020), when we use digital education reforms, and how we instruct and are instructed, makes the learning process more open, individualised, and collaborative. But, to properly capitalise on the promise of digital education, it is necessary to find possible solutions to the problems that we mention before, this way we ensure that it is inclusive and available to everyone.

If we take a look to the future, experts in this field of research, have made several predictions based on the current trends. According to Facer and Selwyn (2021), the integration of advanced technologies like the previous ones, VR and AI in education is expected to continue, and the change towards remote learning is likely to persist. This suggests that digital education will continue to play a significant role in the future of education. Fernández-Batane-ro et al. (2022) highlight, the significant role of online education during the COVID-19 pandemic, suggesting that online education is the future direction in HEI which means that institutions have to invest even more in online education platforms and improve faculty training plans. This shows the importance of the continued investment, that could ensure that the institutions are always prepared for the challenges, at the same time they need to continue providing high-quality and accessible education to all students.

Views on Digital Education

Perspectives from Educators

When we focus on the educator side, they usually view the digital education as a transformative force in teaching and learning, and they appreciate its flexibility, allowing students to learn at their own pace and on their schedule.

They also understand the great value of digital tools to provide immediate feedback, which can help the students to identify weak areas, allowing to focus their study. But, educators also express concerns and afraid about the digital divide and the potential for digital education to extend even more the educational inequalities. They are worry that students could be left behind because due to the poor access to technology (Selwyn, 2016).

In the context of HEI, the digital transformation is often understand as a double-edged blade. In one hand, it can enhance accessibility and inclusivity, reducing inequality by making rich content and innovative curricula available online (Alenezi et al., 2023), but, on the other side, educators express their concerns about the potential to create a division between 'elite' students (have access to high-quality face-to-face education) and the 'masses' who are relegated to distance learning (Rogozin et al., 2022, pp. 271–286).

Moreover, educators are aware of the challenges that come with digitalising education. They recognise that introducing digital technologies in the classroom requires a shift in traditional teaching paradigms and can place additional pressure on students (Alenezi et al., 2023). They also acknowledge that the effective implementation of digital education goes beyond merely equipping schools with the latest technology, this is not enough. It requires a comprehensive approach that considers teachers' attitudes, motivation, mastery of methodology, and other organisational factors (Szyszka et al., 2022, p. 3).

Despite these challenges, educators remain committed to using the potential of digital education. They consistently use the digital teaching aids and are willing to experiment with different forms of ICT in their teaching practice (Szyszka et al., 2022, p. 15). They also identify the importance of having support from the school management in facilitating the digital transformation of education (Szyszka et al., 2022, p. 15). An aspect directly connected to the leadership in institutions since the management needs to foster a culture of trust and openness to embrace the change. This can help alleviate the resistance to digital transformation and encourage teachers to experiment with different forms of ICT in their teaching practice.

While educators acknowledge the potential of digital education to revolutionise teaching and learning, they also recognise the challenges and complexities involved in its implementation. As such, they believe in a balanced and thoughtful approach to digital transformation that considers all students' diverse needs and circumstances.

Perspectives from Students

The majority of students have a positive attitude towards learning through digital means. They value its convenience and adaptability, particularly those who see their education with other commitments such as a job or family. They also point out the flexibility that this brings to their lives, they can tailor their educational experience, giving them control, knowing when and how they acquire new knowledge. Despite this, students expressed concerns over the possibility of isolation and the absence of face-to-face interaction that may result from using digital education (Margaryan et al., 2015).

Further research indicates that students actively seek ways to improve their learning experience through digital means (Yu & Bryant, 2019). They appreciate the intersection of their personal, digital, and educational lives, which shapes their learning experience. Digital storytelling and narrative techniques have been found to engage student learning, replace assessments, create new knowledge, and support creative writing and teaching (Yu & Bryant, 2019) in the digital environment.

Today's learners are much more autonomous than ever, and the digital age offers them a wealth of information at a hand of distance. This autonomy is not just about having access to information but also about the ability to critically evaluate, interpret, and apply this type of information in several contexts. So, the digital environment has transformed the traditional learning landscape, enabling these students to take control of their learning pathways. They can now choose what, when, and how the learning could happen. While doing this, they create personal networks, collaborate with peers, and use ICT to access relevant information (Selwyn & Gašević, 2020; Tondeur et al., 2017). This action of integrating, for instance, social media platforms and other digital tools into the learning process has also brought different challenges, such as social isolation, pressure, and engagement (Teräs et al., 2020).

Despite these challenges, students have developed personal interpretations of their identity within the community. They have formed personal and professional connections through tutorials, lectures, peer-assisted groups, and various societal meetings and hope to keep these connections even after graduation (Kasa et al., 2021). So, the perspective is slightly different from the point of view of the teacher, who tends to find digital education as the key solution rather than another tool to promote knowledge.

Perspectives from Education Community

The educational community recognises digital education's potential but acknowledges its challenges. Still, it considers that implementation and ongoing

ing support are required for digital education to be really effective. So, the community continues to explore this field, seeking to understand how best to use digital tools for learning and teaching and to address the challenges that arise (Teräs et al., 2020; Kivunja, 2014).

Despite all the normal inherent complexities, several initiatives aim to link the digital divide and enhance access and equity within the education system. We could present some interesting examples. For instance, the ERASMUS+ program, a European Union (EU) initiative, that support education, training, youth, and sport in Europe, it provides to over 4 million European Citizen the opportunity to study, train, gain experience, and be a volunteer abroad. Similarly, Horizon 2020, another EU research and innovation program, had nearly €80 billion of funding available during the last years (2014 to 2020) to ensure Europe produces world-class science, removes barriers to innovation, and makes it easier for the public and private sectors to work together in delivering innovation. We can also present more interesting projects:

- The 'One Laptop per Child' initiative – this project aimed to provide each student (developing countries) with a robust, low-cost, low-power, connected laptop. The goal was to create educational opportunities for the most disadvantaged children;
- The Khan Academy – A non-profit organisation that provides free online materials and resources to support personalised education for learners of all ages (depending on the internet connection);
- Google's 'Project Loon' – A project that aimed to provide internet access to rural and remote areas using high-altitude balloons placed in the stratosphere to provide a signal in non-signal areas. It was a very ambitious project;
- Microsoft's 'Airband Initiative' – This project had the goal to connect broadband to rural communities in the United States over the last years (another big investment);
- The 'Global Learning XPRIZE' – A competition that incentivised teams to develop open-source, scalable software solutions to allow children in developing countries to teach themselves basic reading, writing, and arithmetic.

These examples, among many others, are efforts to connect the digital divide and improve global access and equity in the educational system, from primary to HE.

Despite this, significant digital material access gaps still result in unequal learning possibilities. According to Kivunja (2014), the community recognises the requirement for more action to guarantee equitable access to digital resources for all learners. Educational researchers and the broader educational community also see digital education as a rich field for exploration. They are interested in understanding how digital tools can enhance learning and how they can be best integrated into teaching practices. They are also concerned with issues of access and equity and understanding how digital education impacts different groups of students. However, they caution that digital education is not a panacea and must be thoughtfully implemented to be effective (Selwyn, 2016). The year 2020, due to the pandemic, was a milestone in the history of digital technology in the education sector, allowing us to try to promote a sustainable education using ICT. The world was facing a pandemic crisis without precedents that forced, in a few days, a global transformation from traditional classroom teaching to online teaching, consequently forcing the use of Digital Education (Sousa et al., 2022). The same authors showed that the significant predictors of maintaining the online format were the characteristics of online classes, support from the school and professors, online classes vs. face-to-face classes, and gender. The probability of choosing to keep online classes increases exponentially with these factors (Sousa et al., 2022).

We could conclude that the educational community sees and comprehends the full potential of digital education but also acknowledges its challenges in an unbalanced world. On one corner are the top countries that can provide the ultimate solutions and tools, and unfortunately, on the other, the poor countries that strive to grow in every possible aspect – digital education is only one of them. Unfortunately, most of the time, this is not of the utmost importance for governments.

From Past to Emerging Trends – The AI

Several authors (Akour & Alenezi, 2022; Yang et al., 2022) studied the different stages that have occurred in the last years. It is important to take a close look at their findings. Starting with a timeline split:

Budding stage (2000–2006) – During this period, digital technology started to become a part of the lives of children from the moment they were born. The research of educational technology advances in HE began to be discussed and debated, with various laws, projects, and strategies offered. However, many digital divisions still exist, affecting the younger generation and their digital futures. Universities and teaching had to undergo significant

shifts to prepare students for the technology-rich society they would be living in (Yang et al., 2022);

Slow Development Stage (2007–2017) – The growth of internet-based technologies altered the academic environment and helped colleges and universities transition to the digital environment. These technologies proved particularly helpful in improving communication between students and teachers in HE. However, the effectiveness of students' use of e-learning platforms was different, and students' opinions of the platforms utility and usability were related to their desire to use them successfully. Therefore, institutions were encouraged to support integrating e-learning platform functions into teaching-learning activities (Akour & Alenezi, 2022);

Rapid Development Stage (2018–2022) – This stage was marked by a significant shift due to the COVID-19 pandemic, which quickly and unexpectedly compelled institutions and the educational system to transform digitally. This transformation was brought about by changes in industry knowledge and competency standards, social changes taken by an increasingly digitalised world, new developments in didactics reflecting ongoing discussions in the field of didactics and learning theory, and new uses of digital technologies that were likely to result in the creation of new learning environments and methods of instruction. HEI had to train their staff (professors and non-professors) to meet the demands of educational institutions and digital transformation (Yang et al., 2022; Akour & Alenezi, 2022).

The evolution of technology has brought substantial changes across various sectors, with Education being a prime example. The nowadays trends indicate that the education system is progressively venturing into the 'new world' of AI (Brynjolfsson & McAfee, 2014). This 'new world' is an expansive terrain teeming with various tools and options constantly being discovered and developed at every second. The future of this landscape is intriguing, as it is impossible to predict the zenith of this technological slope (Bostrom, 2014). The continuous advancements in AI and machine learning technologies suggest that we are at the beginning of this journey, with much more to explore and understand (Russell & Norvig, 2016).

The potential of AI in education is deep and vast, from personalised learning experiences to efficient administrative tasks, and the possibilities are continually expanding (Luckin et al., 2016). As we move forward, it is crucial to ensure that these technologies are used responsibly and ethically, keeping the best interests of students at the forefront (Brynjolfsson & McAfee, 2014).

In this rapidly evolving landscape, the education community (students, educators, policymakers, and tech specialists) must work together to overcome

the challenges and grasp the opportunities presented by AI in education. The goal should be to harness the power of AI to enhance learning outcomes and prepare students for a future where AI will be an integral part of their personal and professional lives (Blikstein, 2013).

One good solution may be integrating AI with existing digital tools, using this approach we can leverage the strengths of various technologies at the same time, creating a more comprehensive and effective educational experience (Zawacki-Richter et al., 2019). For instance, combining AI with Learning Management Systems (LMS) can provide personalised learning paths for students and adapt to their learning styles and pace (Klašnja-Milićević et al., 2020). This aligns with adaptive learning, where AI systems collect student learning behaviour data and plan the optimal learning path for students (Huang et al., 2021).

Also, integrating AI with digital assessment tools can facilitate more efficient and fair grading processes and release valuable time for educators to focus on instruction and student interaction (Liu et al., 2020). AI technologies such as image recognition, prediction systems, and computer vision can make teaching evaluations more diverse, scientific, and accurate (Huang et al., 2021).

Similarly, combining AI with collaborative tools can foster a more engaging and interactive learning environment, promoting critical thinking and problem-solving skills (Chen et al., 2021). The development of virtual reality (VR), augmented reality (AR), hearing, and sensing technologies with the help of AI can reform the teaching environment, creating virtual classrooms and laboratories that turn to the future (Huang et al., 2021). The combined process of AI with other digital tools can lead to an enriched learning experience, enhancing the teaching and learning processes in the digital age (Zawacki-Richter et al., 2019) for the triangle vertex of education: students, educators and parents. After all, AI will not take out the educator role but has the potential to enrich student learning and complement the teacher's work without dispensing with them (Reiss, 2021).

Ultimately, education is evolving regarding instructional methods and anticipation of the skills that must be taught, including previously unrecognised non-cognitive, technological, organisational, and programme administration characteristics. AI could assist educators in equipping young students, undergraduates, executives, or/and digital learners with the necessary skills to navigate and succeed in this 'new world' of AI and digital transformation.

As we navigate the 21st century, we are witnessing the emergence of new professions that were unimaginable just a few decades ago. These jobs, many

of which have yet to be invented, are largely driven by technological advancements, particularly in AI, data science, and digital transformation (Bursali & Yilmaz, 2019; Dong et al., 2020). The evolving industries demand a workforce well-versed in technologies and adaptable to future innovations. Therefore, today's students must be well-prepared to face these challenges. They must have a robust foundation in STEM and skills such as critical thinking, creativity, and adaptability (Chang & Lu, 2019). Furthermore, they must be lifelong learners, something that the latest generations have done, always ready to continually update their knowledge and skills in response to the ever-changing technological landscape (Bergamin & Hirt, 2018). Educators, policymakers, and industry leaders must work together to ensure that our education systems are effectively preparing students for the jobs of the future, many of which remain unknown to us today (Reiss, 2021; Tuomi, 2018).

Opportunities and Challenges in Digital Education

Despite its huge potential, Digital Education also presents several challenges. One of the most important is the infrastructure that institutions have. The pandemic highlighted the difficulties that most have in supporting platform access when many students simultaneously need to connect.

On the other hand, while students are growing interested in exploring deeper Digital Education with all these new tools (AI is just one example), the unprecedented experience of the COVID-19 pandemic has highlighted a renewed appreciation for face-to-face teaching. The rapid change to remote learning during the pandemic revealed simultaneously the potential and the continuing challenges of online education. While technology facilitated continuity in education during school closures, many students faced issues related to a lack of access, motivation, and face-to-face interaction (Wang et al., 2020). Research indicates that most students miss the social aspects of face-to-face learning, which play a crucial role in their academic experience and overall well-being (Johnson et al., 2020). Furthermore, the effectiveness of online learning varies among students, with some benefiting from its flexibility while others struggle without the structure of a traditional classroom (Schwartzman, 2020).

So, we are witnessing a world of changes and evolution that is far from well established right now. Having this in mind, we present some ideas for the future of Digital Education in the form of opportunities and challenges congregated from several studies done in the last years:

Digital Divide – The digital divide is about access to technology and the ability to use it effectively. Gabriel et al. (2023) mention that teachers who are

not confident using digital technologies in their work will avoid using them and instead engage in traditional activities with which they may have experienced previous success. This highlights the importance of providing access to technology and ensuring that teachers and students are confident and competent in using it. Male (2016) further emphasises that a transformation in the attitude and behaviour of teachers is required to maximise the possibilities and opportunities offered by digital technologies. Also, the education workforce tends to lag in terms of technological capability, suggesting that they are in the process of almost learning a new language;

Quality of Online Education – The effectiveness of digital technologies can vary, and students' opinions of the platforms' utility and usability are related to their desire to use them successfully. Gabriel et al. (2023) state that an effective education system should help students to deal with the rapid development of technologies and continuous access to vast amounts of new knowledge and information while fostering critical thinking, sensemaking, creativity and collaboration skills. The quality of online education is not just about the technology itself but also about how it is used to enhance learning and develop key skills. Male (2016) adds that the interactivity of digital devices with Internet access provides the opportunity to change how teachers work with their students and encourage networking, collaborative learning, and problem-solving situations;

Data Privacy and Security – Data privacy and security issues have become more prominent with the increased use of digital technologies in education. These issues can be particularly challenging in a digital learning environment where personal data is often stored and shared (Yang et al., 2022);

Changes in Teaching Practices and Institutional Policies – The shift to digital education requires significant changes in teaching practices and institutional policies. Gabriel et al. (2023) note that countries such as Portugal and Slovenia rely strongly on professional networks to promote peer learning, exchange good practices, upskill teachers' digital competency and boost their confidence. Professional development and peer learning are key strategies for teachers adapting to digital education. This sentiment is echoed by Male (2016), who argues that in order to make the most of the possibilities and opportunities afforded by digital technologies, educators need to undergo a metamorphosis in both their mindset and their behaviour;

Keeping Up with Technological Advancement – Keeping up with the rate of technological advancement is a significant challenge. Gabriel et al. (2023) state that the coming generation of citizens and emerging workforce must be capable and comfortable with a broad range of technologies to survive

and thrive. They also mention the importance of continual professional development for teachers to integrate and update the technologies used in their classrooms, something very important in a life-long cycle. So ongoing learning and development are crucial for keeping up with technological advancements. Male (2016) addresses that digital technologies are a core feature of the current era, which presents the possibility for a shift from passive acquisition of someone else's ideas to active learning experiences that empower people to inquire, critique, create, collaborate, problem solve, and create understanding.

These challenges highlight the complexity of the digital education landscape and the need for thoughtful and strategic approaches to its implementation and ongoing development. Still, many situations and concerns exist in the Digital Education environment.

However, one certainty is that youngsters will need the most advanced and updated tools to face the challenges of the 21st century. These skills required for 21st-century jobs are often connected to soft skills, even though we may not know exactly what these new jobs will entail. These soft skills are increasingly important in a world where digital technologies are transforming the workplace and how we interact with information. Male (2016) notes that the online world has redesigned communication in and outside the workplace, and young people are now accustomed to accessing multiple open sources of information for solutions. As a result, more collaborative technologies have enabled the development of soft skills such as cooperation, collaboration, and problem-solving.

Furthermore, the shift from pedagogy/andragogy (teacher-centred), to a heutagogy approach (student-centred) – self-determined learning that focuses on the importance of knowing how to learn – recognises that discipline-based knowledge is inappropriate for preparing for living in modern communities and workplaces. This shift emphasises the development of a skill-based curriculum designed to deal with a rapidly changing world (Male, 2016). In the context of education, the same author suggests that the 'holy trinity' of the student vision for educational experience includes socially-based and collaborative learning, which are highly valued soft skills in the 21st-century workplace.

Therefore, it is crucial to focus on developing these soft skills in educational settings to prepare students for the demands of the 21st-century labour market.

Conclusion

Moving along the way, we can see that technological improvements are changing the education landscape forever. Integrating different tools in the educational context, for instance, AI, which is growing very fast, and others like VR or AR, can significantly alter the teaching and learning experiences for all the actors. These technologies can provide personalised learning experiences, foster immersive learning environments, and potentially transform how knowledge is transmitted and acquired.

However, the ethical implications of some, like the latest AI in education, such as data privacy and algorithmic bias, must be carefully considered and addressed. As we adopt these technologies, we must ensure they are used responsibly and ethically, considering the student's best interests and growth.

Another aspect is that the COVID-19 pandemic has highlighted the significance of digital education, accelerating the transition towards remote learning in some cases. This change has presented both obstacles and opportunities at the same time. On the one hand, it has brought issues such as the digital divide and the need for digital literacy, which must be addressed to guarantee equitable access to digital education. On the other hand, it has demonstrated the capability of digital education to provide flexible and adaptable learning experiences. Balance is what we need to achieve.

As described, educators', students' and stakeholders' perspectives offer valuable insights into the future of digital education. While educators recognise the transformative potential of digital education, they are also concerned about its potential to exacerbate educational inequalities in the school environment. Students have widely recognised digital education's convenience and adaptability. The flexibility to learn at their own pace and access educational content from anywhere at any time has been particularly beneficial during the COVID-19 pandemic. Despite these advantages, students have longed for the social interaction and in-person engagement that traditional classrooms offer. Understandably, the classroom is more than just a space for knowledge acquisition, it is a social environment where students learn from their peers and develop essential social and emotional skills for life. While digital education is crucial in today's world, it is equally important to find ways to incorporate opportunities for social interaction and in-person engagement, thereby creating a more holistic learning experience.

The future of Digital Education should be governed by a balanced strategy that capitalises on the potential of technological advancements while resolving the challenges they pose. It should provide equitable, engaging, and effective learning experiences that meet students' diverse requirements and

preferences. This will require ongoing research, deliberative policymaking, and the active participation of all stakeholders in the educational community.

While advancing into the future of education, we are also revisiting and reinterpreting past educational practices. The future is not about completely new methods but a blend of new technologies and traditional pedagogical approaches. It is about integrating the digital with the physical, the new with the old, and balancing technological benefits with the essential human elements of learning.

In a nutshell, the future of digital education is a fusion of the past and the present, shaping a holistic approach to future learning.

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Panorama digitalnega izobraževanja v 21. stoletju

To poglavje obravnava digitalno izobraževanje v 21. stoletju, kompleksno in dinamično področje, ki se sooča s hitrim tehnološkim napredkom ter številnimi izzivi. Digitalno izobraževanje analiziramo z različnih vidikov, s čimer želimo poudariti njegov ključni pomen v sodobnem izobraževalnem ekosistemu. Med najpomembnejšimi prednostmi digitalnega izobraževanja so širše dostopne izobraževalne priložnosti, interaktivno in dinamično učno okolje ter

prilagojeni učni pristopi, ki ustrezajo individualnim potrebam učencev. Kljub tem prednostim pa digitalno izobraževanje prinaša tudi pomembne izzive, kot so vprašanja dostopnosti in pravičnosti, tehnološke omejitve ter zmanjšana neposredna socialna interakcija. Poseben poudarek namenjamo vplivu digitalnega izobraževanja na sodobne pedagoške prakse ter njegovi vlogi v procesu globalizacije, zlasti pri spodbujanju medkulturnega sodelovanja in premagovanju geografskih ter družbenih omejitev. Za zaključek analiziramo tudi nove trende, kot so igrifikacija, virtualna in obogatena resničnost ter umetna inteligenca, da bi našli možne prihodnje usmeritve za digitalno izobraževanje. Poglavje se zaključí s trditvijo, da je za popolno uresničitev potenciala digitalnega izobraževanja in ustvarjanje vključujočega ter uspešnega učnega okolja za prihodnost treba te priložnosti in izzive nenehno raziskovati.

Ključne besede: digitalno izobraževanje, umetna inteligenca, orodja IKT, izzivi, priložnosti