

The Challenges and Recommendations of Education Digital Transformation

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Abstract: The concept of "education digital transformation" is a prominent topic in the current field of education reform and practice, as well as an inevitable trend in future educational innovation and reform. Education digital transformation holds significant importance, not only enhancing the resilience of the education system but also actively promoting high-quality development while serving as an effective means to achieve educational equity. Currently, within the framework of establishing a high-quality education system, various challenges and opportunities for development exist. This paper aims to analyze and discuss the value and challenges associated with education digital transformation, proposing the following countermeasures: transforming digital infrastructure; improving access to digital educational resources; fostering digitally supported educational innovations; cultivating teachers' proficiency in digital literacy and skills; optimizing ethical considerations surrounding the use of digital technology by adhering to technical specifications related to it; strengthening data security measures.

1. Introduction

The current focus lies in digitally-driven educational transformation, which is also imperative for future education reform and progress. The digital revolution in education holds immense significance. Firstly, it can bolster the resilience of the education system, enabling swift adaptation to external changes. In response to societal shifts, it can proactively undertake self-reformation while maintaining sensitivity and flexibility to align with the needs and developmental trajectory of society. Secondly, it can fortify differentiated and personalized teaching methodologies by eradicating barriers among individual students, facilitating a shift from a "teacher-centered" to a "student-centered" approach that effectively supports autonomous student learning and fosters teachers' professional growth, thereby significantly enhancing teaching quality. Moreover, leveraging online learning platforms, open online courses, virtual schools, and other digital tools can expand access to high-quality educational resources while accommodating learners with special needs; bridging the "digital divide" across regions as well as urban-rural areas; and promoting equity in education.

In November 2021, UNESCO released a report titled "Reimagining Our Future Together: A New Social Contract for Education," which explicitly highlighted the imperative need for profound changes within education itself to foster a peaceful, equitable, and sustainable future. The report

further underscored the immense potential of digital technology in facilitating such transformations; however, an effective pathway to translate this potential into tangible reality remains elusive [1]. This perspective accentuates the coexistence of opportunities and challenges throughout the process of promoting digital educational transformation, necessitating meticulous contemplation and practical implementation to ensure genuine reform takes root. Consequently, it becomes essential to elucidate the significance of digital educational transformation while enhancing educators' awareness regarding existing issues and exploring pragmatic approaches to problem-solving to facilitate steady progress.

2. The challenges of digital transformation

Digitization will bring greater certainty to the field of education. Given the imperative for efficiency and scalability, digitization is poised to supplant certain functions traditionally performed by educators. However, it is important to acknowledge that digital technology itself is not flawless. Consequently, the process of digitally transforming education is bound to encounter various specific risks and challenges.

2.1. The professional domain of educators is under pressure, necessitating the reform of education and pedagogy.

The digitalization of education undoubtedly represents one of the most significant transformations in the field in recent years. It has revolutionized the traditional teaching approach, equipping educators with novel methods and tools that enable them to conveniently access and utilize educational resources. Moreover, it has empowered teachers with exclusive skills, surpassing human educators' capabilities in certain aspects. Notably, digital technology's ability to accurately employ and provide feedback on vast amounts of learning data partially replaces some functions traditionally performed by educators, thereby encroaching upon their professional space and challenging their professionalism and status.

The professionalism of teachers encompasses educational functions, activity organization, life management, and career guidance. The execution of these functions relies on the authority of educators, which is derived from their generalized status as "information hubs" within the socio-cultural context of education. However, with the widespread adoption of digital technology, students' learning and knowledge acquisition methods have undergone significant changes, rendering them more independent in their pursuit of learning and exploration. Consequently, this necessitates a transformation in the role of educators from mere knowledge imparters to that of learning guides and assistants; a shift that diminishes their authority and potentially impacts the performance of their professional duties.

2.2. Digital infrastructure inadequate, posing educational equity challenges

With the continuous advancement of information technology, the digital divide has become increasingly pronounced, significantly impacting the principles of education universality and fairness. The distribution of digital educational resources lacks equilibrium due to the requirement for economic investment and technical support to access them. Consequently, certain regions have witnessed widespread adoption of digital education with a concentration of high-quality resources, while others, particularly remote and rural areas, lag in their development and struggle to attain such resources.

The principle of equity for students with disabilities is encountering a significant challenge due to the insufficient provision of hardware and software support necessary for their complete

utilization of digital educational technologies. For instance, conventional electronic screens may not adequately cater to the reading requirements of visually impaired students, while specialized educational software and devices might be limited in availability due to their high cost or lack of adaptability.

2.3. Digital ethics norms not perfect and data security issues highlighted

Digital education has become an essential element of modern education. However, it is crucial to address privacy and data security issues that arise in the process. In digital education, a significant amount of educational data is collected, stored, and processed, including students' personal information, learning records, and achievement data. While this information has great value, it is also vulnerable to risks associated with data leakage and misuse due to legal constraints, technical limitations, and management challenges. Privacy concerns are particularly noteworthy in education because many students are minors who lack full awareness of the value and importance of personal privacy. Digital education platforms collect and store students' learning behavior details centrally, which may lead to potential abuse or misuse owing to insufficient guidance on digital ethics or human errors. Therefore, it is crucial to address how to collect, utilize, and safeguard educational data while adhering to laws and regulations. It is essential to ensure secure processes for data circulation to prevent leaks or abuses while guaranteeing integrity, availability, and confidentiality. Thus, addressing privacy and data security issues has become a formidable problem that needs resolution in digital education.

3. The recommendations of digital transformation

3.1. Enhance the development of digital infrastructure and resources to foster educational equality.

The improvement of digital infrastructure and educational resources is essential for intelligent teaching and personalized learning, as well as for achieving educational equity and universalization. This includes technical facilities, data, and educational resources. On the one hand, it is necessary to upgrade campus network facilities, promote emerging technologies like 5G and Wi-Fi6, and ensure fast, stable, and secure network services. On the other hand, it is crucial to advance the digitization and intelligence of instructional delivery modes, experimentation processes, scientific research endeavors, and management systems by connecting physical spaces with their digital counterparts. To facilitate the digital transformation of lifelong learning, there is a need to establish a public platform for digital learning that provides diverse digital resources and tools while expanding learning spaces to meet different groups' learning needs. This will help eliminate inequalities in digital education while cultivating lifelong learning abilities. For example, to bridge the digital divide gap and ensure educational equity within France's borders, the government launched the "Les territoires Numeriques Educatifs" project [2]. This initiative provides a wide range of training content and free access to teaching software and materials across different regions and schools.

In terms of digital resources, students require a diverse range of course content and comprehensive after-school service resources, encompassing fundamental knowledge, practical experiments, real-life cases, and interactive simulations. Additionally, they need access to online Q&A platforms, tutoring materials, and extensive exercise banks to cater to their personalized and diversified learning needs. Developed countries have established robust digital education resource service systems like the Open University of Education Resources initiated by UNESCO in collaboration with the Learning Community. This platform offers free educational materials and online courses that facilitate cross-national and cross-regional credit certification. Teachers must

continually update their training resources through various means such as online training programs, expert lectures from renowned professionals in the field, as well as engaging case studies. These efforts are essential for broadening their horizons and enhancing their pedagogical skills.

3.2. Enhancing the cultivation of teachers' and students' digital proficiency to facilitate education and teaching innovation

The focus of education reform lies in the classroom, and the key to digital transformation lies in classroom instruction. The seamless integration of information technology with the educational process and the deep fusion of information technology with teaching content have become prominent topics both domestically and internationally. To achieve digitization, we must commence by enhancing teachers' "teaching" abilities and students' "learning" capabilities. We should explore new ways to realize the data-driven education methods by strengthening the utilization of online learning platforms, establishing the mixed teaching methods of online and offline methods, and deepening the interdisciplinary integration of information technology. In the classroom teaching by building innovation model intelligent tutor [3] and learning partners to study the practical application of virtual reality and augmented reality (AR), finally to build a network connection, immersive experience and intelligent enhancement of new intelligent teaching model, will effectively promote the students' autonomous learning and collaborative learning.

The primary goal of the education system is to "foster individuals' growth" and "facilitate career decision-making and development" [4]. The phrase "fostering individuals' growth" underscores the profound value of education, as its fundamental purpose is to assist students in attaining self-awareness, understanding others, and embracing diversity. This process aims to cultivate independent thinking, emotional intelligence, and responsible individuals. To achieve this objective, educators need to transition from being mere knowledge transmitters to becoming learning guides and facilitators who prioritize students' subjectivity and personalized needs. The TPACK framework proposed by Koehler et al. emphasizes the dynamic interaction and collaborative development among subject content, teaching methods, and technological knowledge—a concept that has garnered significant attention and widespread recognition [5]. To enhance teachers' digital teaching abilities, it is crucial to address their professional development requirements by integrating online and offline training programs while also improving their information technology application skills. The European Framework for the Digital Competence of Educators issued by the EU offers educators a set of standards for evaluating and enhancing their digital competence[6].

In the process of promoting digital education, it is imperative to acknowledge and address potential challenges, such as information overload, cyberbullying, and the dearth of human care and emotional communication. Corresponding measures must be taken to resolve these issues. Henceforth, it is crucial to maintain a rational and cautious approach while recognizing that digital education is not a panacea. Educational automation systems driven by digital technology should adopt a "subjectivity inclusion" approach by encompassing and respecting individual autonomy, sociality, and self-awareness instead of attempting assimilation[7]. It is essential to ensure that technology serves the essence of education rather than replacing its core values.

3.3. Pay attention to digital technology and ethical norms, implement data security measures

The application of artificial intelligence in education has a profound impact on the lives of children and young people, as highlighted by Leaton Gray. However, in our pursuit of fairness, personalized teaching rights, data privacy rights, and effective use of data, we encounter challenges that the existing legal system struggles to address[8]. Therefore, countries and organizations worldwide highly value reasonable and safe ethical norms. These ethical norms for digital

technology applications encompass core principles such as respect for privacy, ensuring information security, promoting fairness and justice, and safeguarding human dignity. These principles are pivotal for the steady development of digital technology. On one hand, developers need to enhance their ethical awareness to prevent potential risks while users should adhere to regulations and guidelines. On the other hand, comprehensive regulatory mechanisms must be established to implement these ethical norms by defining the scope of digital technology usage and preventing data abuse; punitive measures should also be taken against violations.

The digital economy is spearheading the new wave of economic development, with data emerging as a fundamental resource and a vital productive force. Consequently, safeguarding data sovereignty, security, and privacy has become paramount. Firstly, it is imperative to establish and enhance a robust education data security system while conducting thorough security assessments and implementing multi-location backups for critical data. Secondly, there should be reinforced protection measures for teachers' and students' information, including standardized practices for information collection, transmission, and utilization along with strengthened oversight capabilities regarding the security of such processes.

References

- [1] UNESCO. *Reimagining our futures together: a new social contract for education: proceedings of the 41st session of the UNESCO General Conference, November 10, 2021*[C]. Paris: UNESCO, 2021.
- [2] <https://www.education.gouv.fr/les-territoires-numeriques-educatifs-306176>
- [3] Xu, Z., Wijekumar, K., Ramirez, G., Hu, X., & Irey, R. (2019). *The effectiveness of intelligent tutoring systems on K-12 students' reading comprehension: A meta-analysis*. *British Journal of Educational Technology*, 50(6), 3119-3137.
- [4] Qvortrup, L. *Society's Educational System-An introduction to Niklas Luhmann's pedagogical theory*. URL: [http://seminar.net/files.LarsQvortrup-SocietysEdSystem.pdf](http://seminar.net/files/LarsQvortrup-SocietysEdSystem.pdf) (date of circulation: 09.01. 2014).
- [5] Koehler, M. J., Mishra, P., & Cain, W. (2013). *What is technological pedagogical content knowledge (TPACK)?* *Journal of education*, 193(3), 13-19.
- [6] European Commission. 2017. *Digital Competence Framework for Educators (DigCompEdu)* [EB/OL]. [2022-04-21]. https://joint-research-centre.ec.europa.eu/digcompedu_en.
- [7] Fuchs, C., Sandoval, M. *Chapter 2: Culture and economy in the age of social media* [M]. New York: Routledge, 2015.52.
- [8] Leaton Gray, S. (2020). *Artificial intelligence in schools: Towards a democratic future*. *London Review of Education*, 18(2), 163-177.