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European Expert Network
on Economics of Education

Digital transformation in blended learning environments

Executive summary

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Luxembourg: Publications Office of the European Union, 2024

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EN PDF ISBN 978-92-68-06756-7 DOI: 10.2766/091790 NC-05-23-282-EN-N

Please cite this publication as:

Caplanova, A., Dunajeva, J., Rodriguez, P. (2024). 'Digital transformation in blended learning environments', Executive Summary, *EENEE report*, Luxembourg: Publications Office of the European Union. doi: 10.2766/091790

ABOUT EENEE

EENEE is an advisory network of experts working on economics of education and training. The establishment of the network was initiated by the European Commission's Directorate-General for Education and Culture and is funded by the Erasmus+ Programme. PPMI is responsible for the coordination of the EENEE network. More information on EENEE and its deliverables can be found on the network's website www.eenee.eu. For any inquiries, please contact us at: eenee@ppmi.lt.

Contractor:The logo for PPMI, consisting of the letters 'PPMI' in a bold, blue, sans-serif font. A small orange triangle is positioned above the letter 'i'.

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Executive summary

Blended learning

Blended learning, a pedagogical approach that uses a mix of different physical environments as well as digital and non-digital learning tools, has emerged as a cornerstone of modern education. In particular, integrating traditional face-to-face teaching with technology-mediated instruction has gained momentum through the digital revolution and the exigencies of the COVID-19 pandemic, offering flexible, personalised and inclusive learning experiences. Blended learning undoubtedly possesses transformative potential to enhance the engagement, learning outcomes and critical thinking skills of students within an increasingly digitalised educational context. Blended learning can prove especially advantageous for students with special needs as well as those in remote areas, for whom it offers the potential to ensure educational continuity amid disruptions and to increase inclusivity. In realising these benefits, however, the present report underlines the importance of well-designed blended learning models, pedagogical strategies, teacher training and equitable access to technology.

In the European Union (EU), blended learning is increasingly recognised as pivotal to shaping effective education policies. One milestone in this direction was the Council Recommendation of 29 November 2021, which established a unified European understanding of blended learning. It urged Member States to create supportive educational ecosystems at primary and secondary education levels that are more flexible and inclusive of a broad range of learner needs, changing circumstances and pedagogical approaches. The Recommendation aligns with the European Pillar of Social Rights by promoting high-quality and inclusive education. Digital technology is central to the feasibility of blended learning approaches.

The Digital Education Action Plan (DEAP) 2021-2027 sets out a common vision of high-quality, inclusive and accessible digital education in Europe through two strategic priorities. These are to foster the development of a high-performing digital education ecosystem, and to enhance digital skills and competences for the digital transformation. In response to these priorities, two Council Recommendations were adopted in 2023: one regarding the key enabling factors for successful digital education and training, and one on improving the provision of digital skills and competences in education and training. Collectively, these policy initiatives emphasise collaborative efforts among local, regional and national authorities to establish a resilient educational ecosystem that is supportive of all learners, with blended learning as a key component.

This report

The present report has been commissioned by the European Expert Network on Economics of Education (EENEE) and focuses on blended learning. In its broad sense, blended learning refers to blended education that allows learning in a variety of ways. Specifically, the report examines the significance of the digital dimension of blended learning within the changing landscape of European education. It seeks to analyse ways in which blended learning is integrated into education policies, and to identify strategies for teacher professional development to support the implementation of blended learning. Lastly, the report explores the limitations of and future directions for the digital transformation of blended learning.

A literature review was conducted during period from June 2023, followed by multiple rounds of revisions using search engines such as Web of Science, Scopus and Google Scholar, and including grey literature available via the internet. This search strategy favoured the most recent research in the area of blended learning. The study is based on secondary literature, with no primary data being collected to inform this research.

Current blended learning practices and accessibility

Several **EU-level initiatives** promote blended learning at various levels of education. These initiatives highlight the importance of developing frameworks and guidelines for blended learning and of identifying good practices for its adoption:

- The Working Group on Schools “Pathways to School Success” – part of the European Education Area (EEA) strategic framework – has produced reports assessing policy conditions and opportunities for implementing blended learning, with a focus on educational inclusion.
- The European Trade Union Committee for Education (ETUCE) and the European Agency for Special Needs and Inclusive Education (EASNIE) have contributed guidelines and research on effective blended learning practices.
- Erasmus+ plays a pivotal role in funding research and pilot projects in blended learning. Projects such as the European Maturity Model in Blended Learning (EMBED) and Blended Learning for Inclusion (BLENDI) aim to promote social inclusion, improve digital skills and foster collaboration among educational stakeholders.

National policies and perspectives on blended learning vary between EU Member States. While there are no initiatives that focus solely on blended learning, several national strategies emphasise the foundational role of digital education. Such policies aim to ensure access to digital education by providing adequate infrastructure and training teachers to effectively use digital educational technology. Blended learning practices in primary, secondary and tertiary education are still evolving. Meanwhile, higher education institutions have adopted various blended learning models to promote critical thinking, collaboration and self-directed learning.

In terms of access, the report finds that **various factors influence access to blended learning with a digital dimension**. These can be broadly grouped into IT-related factors, social factors, institutional factors and skills. More specifically, IT-related factors such as digital infrastructure and internet connectivity are critical considerations in ensuring equitable access to blended learning. Beyond this, social factors – including parental engagement and socio-economic status – as well as skills such as digital literacy and teaching competencies, are imperative in building effective blended learning environments. Moreover, institutional factors such as funding strategies and collaborative partnerships between educational institutions and external stakeholders are crucial in overcoming barriers and creating an inclusive framework for successful blended learning initiatives.

Professional development in blended learning

The professional development of educators is a critical pillar in advancing blended learning. Initiatives in various EU countries illustrate a **proactive approach to integrating blended learning into teacher development**. Examples include structured professional training, massive open online courses (MOOCs) and collaborative platforms that foster peer support and knowledge-sharing among teachers. Such initiatives enable teachers to enhance their pedagogical practices, to engage students more effectively, and to create immersive learning experiences using digital tools such as simulations, virtual reality and gamification. These efforts underline a shift towards digitally driven professional growth, which is essential for effectively navigating hybrid teaching models.

Non-state programmes and supranational initiatives complement formal education channels. Moreover, partnerships with industry stakeholders can further enhance these efforts by bringing cutting-edge technological insights and real-world applications into educational settings.

Challenges and future trends

While the benefits of blended learning include enhanced accessibility, as well as the flexibility to accommodate diverse learning needs and schedules, significant challenges exist. These mainly stem from **disparities in digital infrastructure and technological access** among educational institutions, teachers and students. These disadvantages disproportionately affect rural and economically disadvantaged areas. Another challenge is a **lack of systematic assessment of blended learning effectiveness**, which requires nuanced evaluation frameworks and the integration of data analytics to inform instructional strategies and policy decisions.

Looking ahead, emerging trends such as AI-driven adaptive learning, immersive technologies such as virtual reality (VR) and augmented reality (AR), and the integration of metaverse environments, offer promising avenues for the further enhancement of blended learning experiences. However, to realise these opportunities, policy-makers need to address multiple challenges; namely, navigating ethical considerations and ensuring equitable access to educational technologies. Continuous evaluation and data analytics will be pivotal in optimising the effectiveness of blended learning and informing future educational practices.

Conclusions

By exploring the development, impact and effectiveness of blended learning within educational systems, the present study focuses on the **digital and non-digital aspects of teaching practices and technologies in blended learning**. Findings highlight the transformative potential of blended learning, particularly in fostering personalised, student-centred education that is accessible to all. By integrating digital and traditional methods, educators can boost student engagement, enhance learning outcomes, and cultivate important skills such as critical thinking and digital skills. Importantly, effective blended learning models and strategies depend on appropriate teacher training and equitable access to technology.

Consequently, **continuous investment in digital resources** and infrastructure is necessary to support the smooth integration of blended learning into educational systems. After exploring the effects and outcomes on education of the COVID-19 pandemic, the study concludes that the pandemic significantly accelerated the digitalisation of education and highlighted the importance of providing universal access to technology in order to bridge socio-economic disparities and ensure equitable learning opportunities. In addition, the report emphasises the need for **comprehensive professional development programmes** to enhance digital competencies and pedagogical skills. Adequate training ensures that teachers can make effective use of digital tools and create immersive learning experiences, which is essential for navigating hybrid teaching models.

The study also shows that a blended learning approach is indeed conducive to meeting the diverse needs of learners and supporting inclusive education. To enable blended learning and digital skills to be integrated effectively into education systems, the report calls for **ongoing research and assessment** to refine blended learning practices and evaluate their long-term impact. This is necessary to optimise the effectiveness of blended learning and to inform evidence-based decision-making. In the future, new trends and possibilities such as AI and adaptive learning, online collaborations, open educational resources, gamification, immersive technologies and data-driven decision-making will impact blended learning, introducing innovative ways to blend digital and traditional methods of education. So far, collaborative partnerships between educational institutions, NGOs and the private sector have proved essential in providing resources, expertise and ongoing support for the successful implementation of blended learning.

Overall, the report finds that the digital dimension of blended learning represents a transformative force in education, offering a pathway to inclusive, effective learning

environments globally. By leveraging technological advances, fostering educators' competencies and aligning with robust policy frameworks, stakeholders can collectively realise the full potential of blended learning to meet the evolving needs of learners. As education continues to change, sustainable educational innovation in blended learning will require ongoing collaboration, investment and adaptation to ensure equitable access for all learners.

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