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HUMAN-CENTRED DIGITAL TRANSFORMATION IN COMPARATIVE PERSPECTIVE

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ABSTRACT:

Digital transformation has become an important dimension of contemporary education, influencing teaching practices, learning environments, institutional governance, and the development of learners' competencies. However, the increasing integration of digital technologies also raises fundamental questions concerning educational equity, human agency, ethical responsibility, and the purposes of education. This paper examines human-centred digital transformation through the complementary perspectives of Tawil and Miao (2024), UNESCO (2023a, 2023b, 2024), and Verbeek (2005). It explores the relationship between educational technology and human development, the limitations of technology-driven approaches, the importance of inclusive digital learning environments, and the role of global citizenship education in promoting responsible participation in digital societies. Verbeek's philosophical account of technological mediation provides a conceptual foundation for understanding how digital tools influence human perception, action, and decision-making. UNESCO's policy frameworks extend this perspective by emphasizing equity, peace, human rights, sustainability, and responsible technological governance. The review argues that meaningful digital transformation requires more than technological access or innovation; it demands pedagogical relevance, ethical oversight, teacher empowerment, and a commitment to educational values.

Keywords:digital transformation, human-Centred education, educational technology, technological mediation, global citizenship education, human rights, sustainable development

Human-Centred Digital Transformation in Comparative Perspective

INTRODUCTION:

The rapid development of digital technologies has significantly influenced educational systems, creating new opportunities for teaching, learning, communication, assessment, and institutional management. Digital platforms, online learning environments, artificial intelligence, and digital educational resources can facilitate access to information, support flexible learning arrangements, and enable learners to engage with knowledge beyond conventional classroom boundaries. Nevertheless, the growing presence of technology in education also raises questions about its educational value, ethical implications, and influence on human relationships.

Tawil and Miao (2024) provide an important perspective on this issue by examining UNESCO's human-centred approach to steering digital transformation in education. They emphasize the need to govern digital transformation in ways that advance public interests, strengthen human capacities, reduce inequalities, and protect human well-being. Their approach suggests that technology should remain subordinate to educational purposes rather than determine the direction of educational development.

This position is reinforced by UNESCO's (2023a) Global Education Monitoring Report 2023: Technology in education—A tool on whose terms?, which examines the conditions under which technology can contribute meaningfully to educational improvement. The report highlights the importance of relevance, equity, scalability, and sustainability when evaluating technological interventions. It also draws attention to the possibility that digital technologies may reproduce existing inequalities when access, implementation, and educational outcomes are not carefully considered (UNESCO, 2023a).

The ethical dimensions of digital transformation become particularly significant when education is understood as a means of promoting peace, human rights, sustainable development, and responsible citizenship. UNESCO's (2023b) Recommendation on education for peace, human rights and sustainable development establishes a broader normative perspective for educational practice, while UNESCO's (2024) Global citizenship education in a digital age: Teacher guidelines emphasizes the preparation of learners to participate ethically and responsibly in interconnected digital and physical environments.

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A philosophical foundation for interpreting these developments can be found in Verbeek's (2005) what things do: Philosophical reflections on technology, agency, and design. Verbeek argues that technologies mediate human experiences and actions rather than functioning as entirely neutral instruments. Applied to education, this perspective suggests that digital platforms, algorithms, and learning systems influence what learners encounter, how they interpret information, and how they make decisions.

Drawing on these complementary perspectives, the present review examines the relationship between human-centred digital transformation, technological mediation, educational equity, ethical responsibility, and global citizenship. It argues that sustainable educational transformation depends on integrating technological innovation with pedagogical judgment, human agency, democratic values, and inclusive educational opportunities.

HUMAN-CENTRED DIGITAL TRANSFORMATION IN EDUCATION:

Human-centred digital transformation places learners, teachers, communities, and educational purposes at the centre of technological decision-making. Rather than measuring progress primarily through the availability of devices, digital platforms, or automated systems, this approach evaluates technology according to its contribution to meaningful learning, human development, inclusion, and social well-being.

Tawil and Miao (2024) argue that digital education requires appropriate governance to ensure that technological developments serve the public interest and remain accountable to society. This position is particularly important because educational technologies are not introduced into neutral environments. Their design and implementation are shaped by institutional priorities, commercial interests, infrastructure, public policy, and assumptions about learning. Decisions about which platforms to adopt, what information to collect, and how learning outcomes are assessed can influence educational opportunities and relationships.

A human-Centred perspective therefore requires educational institutions to consider not only what technology can accomplish but also whether its use is necessary, appropriate, equitable, and consistent with educational objectives. For example, an online learning platform may expand access to instructional resources, but its educational value depends on the quality of those resources, the accessibility of the platform, teachers' capacity to use it effectively, and learners' opportunities to participate. Similarly, automated assessment may provide rapid feedback, yet it should not replace professional judgment when evaluating complex learning outcomes.

UNESCO's (2023a) report supports this cautious approach by questioning the assumption that the presence of technology automatically produces educational improvement. Technological interventions must be evaluated in relation to the problems they are intended to address and the circumstances in which they operate. This requires attention to the quality of evidence, the needs of learners, implementation costs, and the sustainability of educational initiatives.

Human-Centred transformation also involves protecting the social dimensions of education. Learning is not merely the acquisition of information; it includes dialogue, cooperation, emotional development, ethical reflection, and relationships between teachers and learners. Digital technologies can support these processes by enabling communication and collaborative learning. However, excessive reliance on automated instruction or digital interaction may weaken important interpersonal dimensions if technological efficiency becomes the dominant institutional priority.

Accordingly, human-centred digital transformation should be understood as a process of educational improvement guided by human needs and public values. Technology becomes educationally meaningful when it strengthens teachers' professional capacities, supports learners' development, expands equitable opportunities, and preserves the relational foundations of teaching and learning (Tawil& Miao, 2024; UNESCO, 2023a).

TECHNOLOGY, HUMAN AGENCY, AND TECHNOLOGICAL MEDIATION:

Verbeek's (2005) philosophical perspective provides a useful framework for understanding how technology influences educational experiences. His account of technological mediation challenges the assumption that technologies are simply passive instruments through which individuals pursue independently determined goals. Instead, technological artefacts help shape human perceptions, actions, and interpretations of the world.

This perspective has important implications for digital education. Learning management systems, recommendation algorithms, educational applications, and artificial intelligence tools influence which materials become visible, how information is organized, and which activities are encouraged. Consequently, technological design can shape educational experiences even when these effects are not immediately apparent to teachers or learners.

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For example, a digital platform that emphasizes measurable performance may encourage learners and teachers to prioritize activities that generate easily quantifiable results. Although such measurements can support monitoring and feedback, they may inadequately represent creativity, critical reflection, collaboration, and ethical development. Similarly, recommendation systems can make learning resources easier to discover, but their selection mechanisms may restrict exposure to alternative perspectives or reinforce existing assumptions.

Verbeek's (2005) approach suggests that human agency should not be understood as entirely independent of technological environments. Rather, agency develops through interactions between people, material artefacts, social contexts, and available choices. In educational settings, this means that learners' autonomy depends partly on how digital systems structure participation, present information, and distribute opportunities for action.

Recognizing technological mediation does not require rejecting digital tools. Instead, it encourages educators and policymakers to examine how technologies influence educational values and behaviour. Questions about platform design, algorithmic transparency, data collection, and automated decision-making become integral to educational planning rather than secondary technical concerns.

This perspective also strengthens the case for involving teachers and learners in decisions about educational technologies. When users can question technological recommendations, understand the limitations of automated outputs, and exercise meaningful choice, technology is more likely to support rather than diminish agency. Professional judgment remains essential because educational situations involve contextual factors, interpersonal relationships, and ethical considerations that cannot always be reduced to standardized procedures.

The relationship between technological mediation and human-centred governance is therefore complementary. Verbeek (2005) explains why technologies must be examined in terms of their influence on human experience, while Tawil and Miao (2024) emphasize the institutional and policy conditions required to direct digital transformation toward public purposes. Together, these perspectives support an approach in which technological design, educational practice, and ethical responsibility are considered interconnected dimensions of digital learning.

EDUCATIONAL EQUITY AND THE LIMITATIONS OF TECHNOLOGY-DRIVEN APPROACHES:

Educational equity is a central concern in digital transformation because technological opportunities are unevenly distributed. Differences in internet connectivity, access to devices, digital literacy, language, disability-related accessibility, socioeconomic circumstances, and institutional resources influence learners' ability to benefit from digital education.

UNESCO's (2023a) Global Education Monitoring Report frames educational technology as a tool whose value depends on the conditions of its use. Its central concern is not whether technology should be incorporated into education in every circumstance, but whether particular applications are relevant, equitable, scalable, and sustainable. This perspective challenges policies that treat technological adoption as an independent indicator of educational progress.

A human-centred approach requires educational institutions to address these interconnected barriers. Digital learning materials should be accessible to learners with different abilities, available in appropriate languages, and designed for varied levels of digital competence. Where reliable connectivity cannot be assumed, institutions should consider flexible approaches, including downloadable resources and suitable offline learning opportunities. Teachers should receive ongoing professional support rather than being expected to adapt to new systems without adequate preparation.

Technology-driven approaches can also create new forms of exclusion when institutional decisions prioritize efficiency over contextual needs. Automated systems may disadvantage learners whose circumstances or abilities are inadequately represented in their design. Similarly, digital assessment practices may privilege certain forms of performance while overlooking differences in access, learning environments, or opportunities for preparation.

UNESCO (2023a) consequently provides a basis for evaluating educational technology through its actual contribution to inclusion and learning rather than through assumptions about innovation. The relevance of a technological intervention must be established in relation to specific educational needs, while its sustainability requires consideration of financial, institutional, and environmental implications.

Tawil and Miao (2024) further emphasize the importance of addressing digital divides and digital gender inequality within human-centred digital education. These concerns demonstrate that inclusion requires deliberate institutional action. Without such action, digital transformation may reproduce existing social inequalities or introduce additional barriers to educational participation.

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Equity therefore needs to function as a foundational principle throughout the process of technological planning, procurement, implementation, and evaluation. Digital technologies can contribute to more inclusive education, but their potential depends on the distribution of resources, the quality of pedagogical support, and the willingness of institutions to prioritize disadvantaged learners.

EDUCATION FOR PEACE, HUMAN RIGHTS, AND SUSTAINABLE DEVELOPMENT:

Digital transformation also raises questions about the broader social purposes of education. Educational institutions are responsible not only for developing academic knowledge and technical competencies but also for cultivating ethical judgment, respect for human dignity, democratic participation, and responsibility toward society and the environment.

UNESCO's (2023b) Recommendation on education for peace, human rights and sustainable development provides a normative framework for connecting educational practice with these wider responsibilities. It positions education as an important means of fostering peaceful societies, respect for human rights, and sustainable development. From this perspective, digital transformation should be assessed according to whether it supports these educational commitments.

Digital environments offer opportunities to explore diverse perspectives, exchange ideas across geographical boundaries, and engage with social and environmental challenges. Online collaboration can enable learners to investigate global problems, communicate with different communities, and participate in educational activities that extend beyond local contexts. Digital resources can also increase access to information about human rights, environmental sustainability, and social justice.

The connection between technological development and human rights is particularly important. Educational institutions must consider how personal information is collected and used, whether digital participation is accessible, and whether automated decisions can be questioned. Privacy, dignity, fairness, and meaningful participation should remain important considerations when digital systems are introduced into educational environments.

Sustainability provides another essential dimension. Digital infrastructure requires resources, energy, maintenance, and ongoing investment. Institutions should therefore consider the environmental and financial consequences of technological decisions alongside their pedagogical benefits. A sustainable approach avoids equating continuous technological replacement with educational improvement and instead prioritizes appropriate, durable, and context-sensitive solutions.

UNESCO's (2023b) framework thus complements the human-centred perspective advanced by Tawil and Miao (2024). While the latter emphasizes governance that protects human capacities and public interests, the former establishes broader educational commitments to peace, rights, and sustainability. Together, these perspectives suggest that digital transformation should be guided by a clear ethical purpose rather than by technological availability alone.

GLOBAL CITIZENSHIP EDUCATION IN A DIGITAL AGE:

Global citizenship education offers an important connection between digital learning and the development of socially responsible individuals. UNESCO (2024), in Global citizenship education in a digital age: Teacher guidelines, emphasizes the role of teachers in preparing learners to act ethically and responsibly in both digital and physical environments. This approach recognizes that contemporary citizenship increasingly involves participation in interconnected information networks, online communities, and transnational discussions.

Digital citizenship extends beyond knowing how to operate technological devices. It includes the ability to evaluate information critically, communicate respectfully, protect personal information, recognize harmful online behaviour, and understand the social consequences of digital participation. Global citizenship adds a wider perspective by encouraging learners to consider interdependence, cultural diversity, human rights, justice, peace, and sustainable development.

The educational importance of this approach lies in its integration of knowledge, skills, attitudes, and values. Learners need knowledge about digital systems and global challenges, but they also need the capacity to interpret information, assess competing claims, and reflect on the ethical implications of their actions. Such learning supports informed participation rather than passive consumption of digital content.

Teachers have a particularly important role in developing these capacities. They can design learning activities that encourage critical inquiry, intercultural dialogue, collaborativeproblem-solving and responsible online engagement. For example, learners might compare how different sources represent a global issue, examine the credibility of digital information, or collaborate on projects addressing sustainability and community well-being.

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These activities can help learners understand how digital communication shapes public knowledge and social relationships.

UNESCO's (2024) guidance also highlights the importance of preparing teachers to integrate global citizenship education into teaching and learning. Effective implementation requires more than adding isolated lessons about online safety. It involves connecting digital competencies with curriculum objectives, classroom relationships, assessment practices, and opportunities for reflection.

Verbeek's (2005) concept of technological mediation deepens this discussion by demonstrating that digital environments influence how individuals encounter information and engage with others. A learner's understanding of global issues may be shaped by platform recommendations, the visibility of particular viewpoints, and the organization of digital content. Consequently, critical digital citizenship should include reflection on how technologies structure access to knowledge and influence public discussion.

TEACHERS, PEDAGOGY, AND INSTITUTIONAL RESPONSIBILITY:

Teachers are central to the successful integration of digital technologies because educational outcomes depend on pedagogical decisions rather than technological provision alone. Digital tools can expand instructional possibilities, but teachers determine how resources are selected, how learning activities are structured, and how learners receive guidance and feedback.

Tawil and Miao (2024) emphasize the importance of supporting teachers within integrated digital education systems. This position challenges the assumption that educators can be expected to incorporate new technologies effectively without appropriate training, institutional support, or opportunities for professional learning.

Teacher preparation should include both technical and pedagogical dimensions. Educators need to understand how digital tools operate, but they must also be able to assess their relevance to learning objectives, recognize limitations, protect learners' interests, and adapt activities to diverse educational contexts. Professional development should therefore encourage critical evaluation rather than unreflective adoption.

Verbeek's (2005) perspective suggests that teachers should also examine how technological systems mediate classroom relationships and learning experiences. For instance, automated feedback may help learners identify errors quickly, but teachers need to consider whether the feedback is accurate, understandable, and appropriate to the learner's circumstances. Likewise, digital monitoring may provide information about participation, yet it should not be treated as a complete representation of learning or used without appropriate safeguards.

UNESCO's (2023a) emphasis on relevance and evidence-based evaluation reinforces the need to assess technological initiatives according to their educational contribution. UNESCO's (2023b) commitment to rights and sustainability further indicates that institutional decisions should consider ethical and social consequences alongside operational efficiency.

Effective digital transformation consequently requires a shared responsibility among teachers, educational leaders, policymakers, technology providers, and communities. Technology can support educational improvement when these stakeholders work together to ensure that innovation remains aligned with learning needs, professional judgment, and the public purposes of education.

INTEGRATING THE CONCEPTUAL PERSPECTIVES:

The five references collectively support an integrated understanding of digital transformation in education. Verbeek (2005) offers a philosophical account of how technologies mediate human action and experience. Tawil and Miao (2024) extend the discussion to the governance of digital education, emphasizing human capacities, inclusion, public interests, and accountability. UNESCO (2023a) provides an evaluative perspective on the educational relevance, equity, scalability, and sustainability of technological interventions. UNESCO (2023b) establishes the importance of peace, human rights, and sustainable development, while UNESCO (2024) connects digital participation with global citizenship and responsible conduct.

These perspectives can be synthesized into four interrelated principles.

First, pedagogical purpose should guide technological adoption. Institutions should identify the educational problem they intend to address and determine whether a particular technology offers an appropriate response. This principle avoids treating innovation as an end in itself.

Second, equity and inclusion should shape design and implementation. Educational technology should respond to differences in access, ability, language, resources, and learning circumstances. Inclusion must be considered throughout implementation rather than addressed only after inequalities become visible.

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Third, human agency and ethical responsibility should remain central. Learners and teachers need opportunities to question technological outputs, exercise professional and personal judgment, and participate meaningfully in decisions affecting their learning. Transparency, privacy, and accountability are therefore important elements of responsible digital education.

Fourth, digital competence should be connected with citizenship and sustainability. Education should prepare learners not merely to use technology but also to understand its social consequences, evaluate information critically, respect human rights, engage across cultural differences, and contribute to sustainable communities.

Together, these principles provide a conceptual foundation for evaluating digital transformation beyond technological adoption. They connect philosophical reflection, educational policy, pedagogical practice, and civic responsibility within a human-centred framework.

CONCLUSION:

Digital transformation presents significant opportunities to expand access to educational resources, support innovative teaching practices, and strengthen global communication. Nevertheless, these opportunities cannot be separated from questions of equity, agency, ethics, and institutional responsibility. This comparison demonstrates that educational technology should not be treated as an independent solution to complex educational challenges.

The synthesis indicates that meaningful digital transformation requires a balanced approach combining technological innovation with pedagogical judgment, inclusive access, ethical governance, teacher empowerment, and civic learning. Educational institutions should therefore evaluate technologies according to their contribution to human capabilities and educational purposes rather than their novelty or technical sophistication.

Ultimately, a human-centred approach recognizes that the success of digital education depends not simply on what technologies can do, but on the educational, social, and ethical purposes they are designed to serve. By placing learners, teachers, human rights, and sustainable development at the centre of decision-making, educational systems can pursue digital transformation that is more inclusive, responsible, and consistent with the wider aims of education.

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