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Challenges and Opportunities of Higher Education Transformation in the Era of Digital Intelligence and Sustainable Development

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Abstract: Higher education is currently at a historic intersection of dual transformations toward digital intelligence and sustainability. While digital transition accelerates progress toward Sustainable Development Goals (SDGs), its fundamental orientation must center on the sustainable development of humanity. This paper identifies systematic challenges confronting higher education across four dimensions: disciplinary frameworks, teaching curricula, evaluation criteria and educational practices. Specifically, siloed disciplines fail to address complex real-world challenges; teaching content overemphasizes techno-economic metrics while neglecting environmental accountability; assessment systems prioritize memorization and computational skills easily replaceable by machines; industry-education integration remains peripheral rather than embedded into core educational operations. To tackle these issues, four countermeasures are proposed: formulating strategic plans for coordinated digital transformation and green transition; dismantling disciplinary and industrial barriers to advance systematic industry-education integration; reinforcing the foundational and overarching role of STEM education; and boosting cross-border and inter-university collaboration to co-develop standards incorporating sustainable development principles. This paper stresses that such transformation of higher education is not an optional initiative but a strategic imperative for today's educators, calling for holistic, systematic reforms instead of piecemeal adjustments.

Keywords: digital intelligence era; higher education transformation; sustainable development; coordinated digital transformation and green transition; industry-education integration; STEM education

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On June 6, 2026, the "Global Future Higher Education Summit: A New Ecosystem for AI-Driven Industry-Academia Collaborative Talent Development" was held in Shenzhen, China. Invited by the conference committee, the author delivered a keynote speech at the

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Summit (Figure 1).



Figure 1 Keynote speech at the Global Future Higher Education Summit (Shenzhen, June 6, 2026)
(Photo: WFEO Engineering Capacity Building for Africa Programme (ECBAP))

1 A New Era Intertwined with The Dual Transformations of Digital Intelligence and Sustainable Development, And the Role of Education

Today, the wave of digital transformation is surging, followed closely by intelligent transformation. However, such evolution does not represent the full picture of the era[1]. There exists another far more fundamental transformation bearing on humanity's shared future: the shift toward sustainable development. More than two-thirds of the timeline for the UN 2030 Agenda for Sustainable Development has elapsed, yet only around one-third of its targets are on track[2,3]. Crises including climate change, biodiversity loss, environmental degradation and public health emergencies have not abated; instead, they have grown more acute and intertwined in intricate ways. Against this backdrop, harnessing scientific and technological innovation as a critical lever to accelerate the achievements of the Sustainable Development Goals (SDGs) has become a shared responsibility of all humankind. Meanwhile, the rapid advancement of digital intelligence, as UN Secretary-General António Guterres has noted, brings renewed hope for advancing the SDGs.

From this perspective, we are living in an era marked by the intertwining of the dual transformations of digital intelligence and sustainable development. These two transformations are not parallel tracks moving independently; instead, they share a relationship of goal and pathway. Sustainable development sets the ultimate direction for all transformations, while digital intelligence serves as both the pathway and accelerator to deliver such goals[4]. Neither the digital intelligence nor the sustainable development transition can advance automatically. Humans are both the actors driving these changes and the ultimate beneficiaries they serve. Hence, the critical question is whether education can cultivate a new generation of talent capable of driving and adapting to this dual transformation. This requires higher education itself to undergo an internal transformation integrating digital intelligence and green transitions (namely digital intelligence and sustainable development). This is the context of our times, our educational mission, and our inescapable responsibility: education must prepare the talent needed for this dual transformation (Figure 2).



Figure 2 Education must cultivate the talent needed for the dual transformations of digital and sustainable development

2 Challenges Facing the Transformation of Higher Education

Against the historical backdrop of an era intertwined with the dual transformations of digital intelligence and sustainable development, higher education confronts severe multifaceted challenges in fulfilling its core functions, which can be examined from at least the following four dimensions.

2.1 Disciplinary Silos and Fragmented Knowledge in Higher Education

The practical challenges we face, such as carbon neutrality and smart cities, are complex

systemic challenges issues that demand interdisciplinary collaboration to resolve. Nevertheless, university disciplines operate in isolation. The current academic framework features overly fragmented majors with rigid divides between fields. Worse still, strict disciplinary boundaries confine students within narrow single-subject scopes, leaving them without integrated interdisciplinary thinking and competencies.

This structure fails to meet the demands of digital intelligence and green transitions. Real-world issues including carbon neutrality, smart cities, biodiversity conservation and environmental governance are all complex systemic projects that cannot be tackled independently by one or a handful of disciplines[5]. The siloed disciplinary model prevalent across global universities, shaped during the industrial age, not only hinders solutions to intricate real-world problems but also restricts students to narrow academic spheres. Equipping students to break free from such constraints and build capacities for interdisciplinary communication and collaboration stands as the first major challenge.

2.2 Lack of Green Concepts and Content in Higher Education Curricula

Compared with the urgency of the sustainable development agenda, current teaching programs still overemphasize technological efficiency and economic indicators, while paying insufficient attention to environmental impact and the social responsibility of sustainable development[6,7]. If green transformation content cannot be strengthened in the short term, today's digital intelligent economy may not move toward a green economy; instead, it risks sliding toward a grey or even black economy, accelerating the crisis of unsustainable development.

2.3 Higher Education Assessment Systems Prioritize Memorization and Computational Skills

In terms of the assessment system, higher education still places excessive emphasis on knowledge memorization and computational skills, precisely the two areas where intelligent machines excel[8,9]. An educational model that treats students' minds merely as storage devices and calculators risks making their skills increasingly replaceable by rapidly advancing artificial intelligence[10]. Humanity's true strengths lie in values, creativity, empathy, and emotional experience. How to shift the focus of education toward these uniquely human strengths, while simultaneously harnessing and making good use of machines' capabilities, constitutes the third major challenge that higher education must urgently address.

2.4 Disconnection Between Higher Education Processes and the Realities of Economic and Social Development

In terms of the educational process, there remains a significant disconnect between current education and the actual functioning of the economy and society. Despite years of repeated emphasis by various countries and UN organizations on the closer integration between higher education and industry, many universities remain in their "ivory towers". Practical teaching is marginalized, and industry mentors and industry training are merely external add-ons to the education system, often treated as extra attachments to the traditional educational model rather than core components. Industry mentors and practical training have yet to become fully integrated into the heart of the education system. How to truly break down barriers, achieve deep integration, and build an open innovation ecosystem and a completely new system of industry-education integration, rather than simply adding industry internships or external mentors, constitutes the fourth challenge.

The above four dimensions, disciplinary structure, teaching content, assessment priorities,

and educational process, all demonstrate that the challenges are comprehensive and systemic in nature, rather than localized or patchwork issues. This indicates that the required transformation cannot be achieved through piecemeal fixes, but must be a fundamental, systemic reform.

3 Opportunities for the Transformation of Higher Education

The comprehensive, systematic and severe challenges confronting higher education also unlock new opportunities for reflection and strategic choice, enabling the higher education system to pursue all-round transformation spanning strategic planning, concrete implementation, senior administration, and teacher-student interaction.

3.1 Formulating Strategies for Coordinated Digital intelligence and Green Transitions

The top priority of higher education transformation lies in strategic adjustment. A pivotal opportunity for such adjustment is to formulate strategies and top-level designs for the coordinated digital intelligence and green transitions at national, regional and institutional levels. This strategy needs to achieve two integrations: first, integrating the internal logic of digital intelligent advancement and green development; second, aligning the strategy with local and institutional realities.

Digital intelligence empowers education to boost its efficiency. Meanwhile, education guides digital intelligence transformation onto a sound-track, moving toward green development, serving humanity, and promoting sustainable development. This entails both "empowering education with digital intelligence" and "educating for digital intelligence transformation", using human values, emotions, and creativity to safeguard the correct course of digital intelligent development (Figure 3).

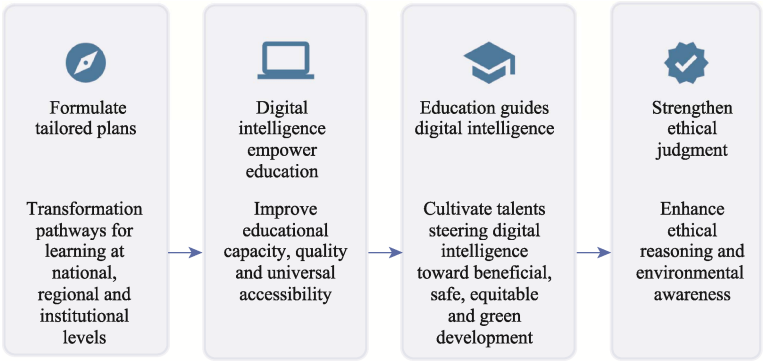


Figure 3 Core contents of top-level strategic design for coordinated digital intelligence and green transformation in higher education institutions

3.2 Breaking Down Barriers and Implementing Systematic Integration of Industry and Education

Breaking down barriers and implementing systematic integration of industry and education is the most difficult challenge in achieving higher education transformation. It requires not only breaking down the barriers between disciplines and specialties, but also eliminating the boundaries between universities and industries, so as to build an open and interconnected learning ecosystem that enables students to engage with industry practice at an early stage. At the same time, the concept of lifelong learning demands that we also remove boundaries in the temporal dimension. Achieving this goal requires profound reforms in faculty appointment systems, curriculum redesign, and student assessment methods, forming a

systemic synergy (Figure 4).

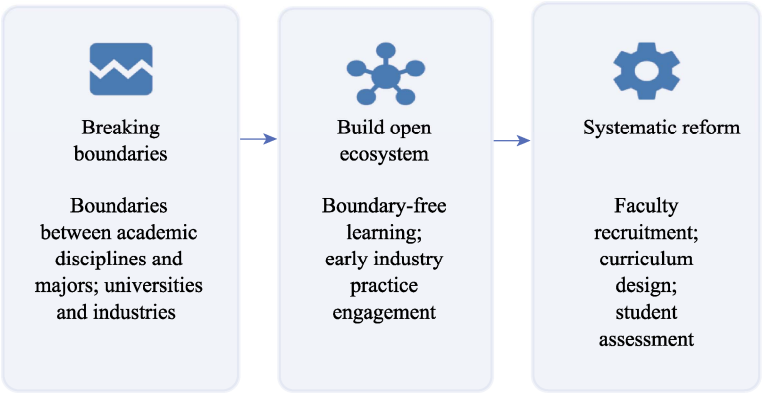


Figure 4 Core contents of higher education initiatives: breaking boundaries, open ecosystem and systematic reform

3.3 Consolidating the Foundational and Overarching Strategic Role of STEM Education

We must strengthen the foundational and overarching strategic role of Science, Technology, Engineering and Mathematics (STEM) education amid the overall educational transformation. STEM education is not a simple combination of four separate subjects. Instead, it is an educational model built around real-world challenges, especially practical issues related to sustainable development, delivered via interdisciplinary teaching and centered on hands-on problem-solving[11]. This model can serve as an effective starting point to advance the digital intelligence and green transformation of education itself.

3.4 Strengthening Cross-Institutional and Cross-Border Cooperation

A significant opportunity for higher education institutions during the digital intelligence and green transformation lies in strengthening cross-institutional and international cooperation. Such cooperation will help higher education find the right direction, avoid detours, learn from each other's strengths, and have the opportunity to play a central and leading role on the frontiers of innovation during its successful transformation in the new era. This cooperation goes beyond merely exchanging educational experiences and sharing educational resources between institutions and countries; more importantly, it involves jointly developing a standards system that integrates the SDGs and the coordinated digital intelligence and green transformation into teaching content and educational processes, thereby promoting the overall green and digital intelligent transformation of global higher education.

4 WFEO's Engineering Capacity Building for Africa: A Practical Example

As Chair of the WFEO Special Task Force on the Engineering Capacity Building for Africa Programme (ECBAP), I led the launch of this initiative. This programme has been officially endorsed as a Programme of the United Nations International Decade of Sciences for Sustainable Development (IDSSD)[12]. Under this programme, several engineering capacity building centers will be established across Africa. It aims to cultivate cohorts of engineers equipped to contribute to digital intelligence and sustainable development across Africa. A full suite of training courses, practical tools, and an ecosystem for exchanging field experience will be provided to strengthen their expertise, ultimately advancing the successful digital intelligence and green sustainable transitions across the African

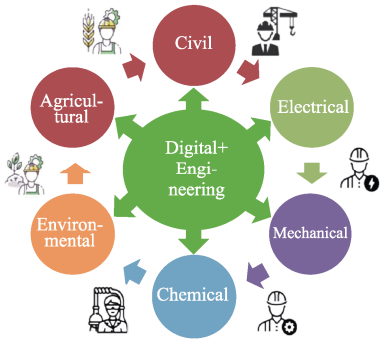


Figure 5 Core concept of the ECBAP

continent[13] (Figure 5).

5 Conclusion

To sum up, the digital intelligence and green (i.e., sustainable development) transformation of higher education is by no means an optional task, but a strategic proposition that all modern educators must address. The challenges confronting higher education are comprehensive and systemic, requiring profound and coordinated reform rather than isolated or incremental adjustments. This transformation requires both strategic foresight and meticulous, coordinated implementation. Entrusted to us by this remarkable era, this great undertaking demands collective collaboration. Only by fully leveraging the power of digital intelligent technologies can we jointly cultivate outstanding future-oriented talents for global sustainable development.

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