Global Research in Higher Education
ISSN 2576-196X (Print) ISSN 2576-1951 (Online)
Vol. 8, No. 3, 2025
www.scholink.org/ojs/index.php/grhe

Original Paper

Research on Teaching Reform in Higher Education under the Perspective of Digital Transformation

Xinpeng Xu[1], Yankai Fu[2] & Xiaolei Qian[1]

[1] School of International Finance and Trade, Sichuan International Studies University, Chongqing, China

[2] Chongqing College of Humanities, Science & Technology, Chongqing, China

Received: July 10, 2025 Accepted: July 30, 2025 Online Published: August 16, 2025

doi:10.22158/grhe.v8n3p1 URL:http://dx.doi.org/10.22158/grhe.v8n3p1

Abstract

Against the backdrop of the global digital wave and the national innovation-driven strategy, Higher education teaching system is faced with the demand of profound transformation. Basing on the multi-dimensional perspective of policy guidance, industrial transformation and the intrinsic driving force of education, this research systematically dissects the urgency of teaching reform in higher education and the existing major contradiction from the perspective on digital transformation. The research finds that value cognition bias, institutional and mechanism deficiencies, and the gap in practical ability constitute the core obstacles. Through constructing a four-dimensional collaborative framework of "value-subject-tool-system", proposing the reshape of teaching objectives, energize teachers' development. Optimizing the Implementation Pathways of Governance Mechanisms. This research highlights the principle of being student-centered and technology-empowered in optimizing governance mechanisms. It proposes advancing the digital competence of faculty, upgrading intelligent infrastructure, and ensuring institutional innovation to support this transformation. The goal is to facilitate a shift in teaching practices from passive adaptation to proactive leadership. Ultimately, the study aims to provide both theoretical reference and practical guidance for building a high-quality education system that supports Chinese-style modernization.

Keywords

higher education, digital transformation, teaching reform, digital literacy, governance system

This paper is a research outcome of the Chongqing Municipal Education Commission's teaching reform project: Research on Teaching Reform in Higher Education under the Perspective of Digital Transformation (Project No. 233306). Research on the Construction of a Systematic Training Model for Master's Degree Programs in International Business under the New Liberal Arts Perspective (yjsjg202209).

The global digital technology revolution is profoundly reshaping industrial structures, knowledge systems, and the educational ecosystem. In July 2024, the Third Plenary Session of the 20th Central Committee of the Communist Party of China adopted the Decision of the CPC Central Committee on Further Deepening Reform Comprehensively to Advance Chinese Modernization. For the first time, it identified the "coordinated reform of systems and mechanisms for education, science and technology, and talent" as a national strategy. It clearly outlined key tasks such as deepening reforms in talent cultivation approaches, school operation models, governance systems, and support mechanisms, and called for the "extraordinary development of urgently needed disciplines and specialties." This strategic initiative is driven by a compelling practical necessity. As the world's largest industrial nation, contributing 30.7% of global manufacturing value added, China still faces technological bottlenecks in 35 key areas such as chip manufacturing and bio pharmaceuticals, along with a talent gap of 12 million in strategic emerging industries. Meanwhile, the digital-intelligent revolution is transforming "algorithms and data" into new forms of labor, challenging the traditional discipline-based academic system with a knowledge production paradigm driven by "intelligent agents." As the primary base for cultivating innovative talent, higher education institutions are urgently confronted with outdated academic structures and rigid teaching models. Against this backdrop, exploring how digital transformation can drive structural reforms in higher education teaching holds significant theoretical and practical value for meeting national strategic needs and building an independent and robust talent development system.

1. The Urgency of Teaching Reform in Higher Education from the Perspective of Digital Transformation

The digital transformation of higher education has evolved from a developmental option to a strategic necessity at the national level. Its urgency arises from systemic pressures formed by three interrelated dimensions: the imperative of international competition, the drive of national strategies, and the internal demands of education itself.

1.1 The Profound Transformation of Global Education Paradigms Creates an External Forcing Mechanism

The strategic restructuring of international competition patterns is compelling higher education to accelerate its transformation. The World Economic Forum's Schools of the Future Report established

the Education 4.0 framework, identifying adaptive learning systems, human-machine collaboration capabilities, and digital ethics literacy as the core competency matrix for future talent, marking the entry of global education into a new intelligent phase. UNESCO's Global Declaration on Digital Learning Transformation further promotes the construction of an "inclusive digital education ecosystem," requiring member states to formulate national strategies. Developed countries have already launched systematic plans: the EU's "Digital Education Action Plan 2021-2027" invests €6.2 billion to build a digital resilience system for education, while the U.S. CHIPS and Science Act allocates special funds to train 65,000 advanced manufacturing engineers. This strategic competition exerts dual pressure on China: on one hand, key technology sectors face restrictions on talent mobility, such as the U.S. "Sensitive Fields Research Restriction Plan," which hinders the return of overseas high-level talent; on the other hand, developed countries are competing for educational discourse power through technical standards like IEEE's Ethical Standards for Educational AI and the EU's Digital Education Content Certification Framework. Universities lacking in-depth digital transformation will continue to be marginalized in global academic resource allocation and talent competition.

1.2 Systematic National Strategic Deployment Imposes Binding Imperatives for Digital Transformation

China has positioned digitalization as the core engine for modernizing its education system. The *Outline for Building a Strong Education Nation (2024-2035)* issued by the CPC Central Committee and the State Council for the first time listed "AI-powered educational transformation" as a key project in the new educational infrastructure, setting a clear goal to establish a comprehensive digital education system covering all academic stages by 2030. The Ministry of Education's *Three-Year Action Plan for Digital Transformation in Education* further proposed the "three universal coverage" objectives: teaching applications for all teachers, learning applications for all students, and digital campuses for all schools. Supporting initiatives include: the National Development and Reform Commission's "New Educational Infrastructure" project focusing on 5G+smart education, the Ministry of Science and Technology's 2.36 billion yuan "Smart Education" R&D dedicated to educational large-scale models, and the Ministry of Industry and Information Technology's "Smart Educational Equipment" action plan. This top-level design not only reflects policy direction but also translates into mandatory resource allocation constraints—the success of digital transformation directly impacts universities' ability to secure national funding and development opportunities.

1.3 The Tension between Educational Scale Expansion and Quality Enhancement Drives Endogenous Momentum

The fundamental confronting the connotative development of higher education urgently requires digital solutions. With China's gross higher education enrollment rate reaching 62.7% and 48 universities exceeding one million students, traditional teaching models face severe challenges: 68.3% of classes are large-format lectures, while an 18:1 student-faculty ratio severely limits personalized guidance. The fivefold disparity in per-student digital resource investment between eastern and western universities

(4,200 yuan/year at 985 institutions vs. 800 yuan/year at local colleges) exacerbates educational inequality. More critically, structural misalignment exists between talent supply and industry demand: while the integrated circuit industry faces a 250,000 talent shortage, related majors graduate only 80,000 students annually, and smart manufacturing job remains below 50%. As McKinsey research confirms that 45% of traditional industry workers require digital skills upgrading, universities must reconstruct teaching content and methods through digital transformation to resolve the dual of mass-scale cultivation versus personalized empowerment, and knowledge delivery versus competency development.

2. Major Challenges of Teaching Reform in Higher Education under the Perspective of Digital Transformation

2.1 Systemic Deviations in Value Perception Restrict the Direction of Transformation

Cognitive dissonance characterized by strategic misalignment and the absence of ethical risk management constitutes a primary barrier to effective transformation. A prevailing misconception among institutional administrators equates digital transformation with hardware procurement. According to a survey by the Ministry of Education, only 32% of higher education institutions have integrated digital literacy into their curricula, and over 70% of these offer it solely as elective courses. Moreover, a disproportionate share of digitalization budgets is allocated to equipment purchases, while investment in faculty training remains minimal. At a deeper level, the misidentification of actors exacerbates the issue: a considerable proportion of educators exhibit "technological replacement anxiety," fearing the erosion of pedagogical authority by artificial intelligence. The lack of ethical governance mechanisms—evident in the widespread absence of algorithm ethics committees—has led to recurrent incidents of data misuse. These contradictions reflect a fundamental disjunction between educational purpose and technological tools, and the absence of a shared educational philosophy grounded in "human-machine collaboration."

2.2 Structural Deficiencies in Institutional Mechanisms Impede Systemic Advancement

Fragmented data governance and outdated evaluation systems have become institutional bottlenecks. On average, universities operate more than ten isolated digital systems, with data interoperability between departments below 30%. Critical systems for teaching and research management still rely on manually exported Excel spreadsheets, consuming substantial administrative resources annually. The lack of standardized data frameworks results in incomplete recording of basic information such as student IDs and names, with high redundancy in student data entry. Evaluation systems remain mired in path dependency, emphasizing quantitative metrics such as publication counts and research funding while neglecting core indicators of transformation—such as smart classroom utilization and learning analytics. This misalignment in resource allocation manifests in underutilization of digital infrastructure; for instance, in some institutions, virtual simulation laboratories operate at under 20%

capacity due to the absence of performance-based incentives. Consequently, investments in digital transformation fail to yield commensurate improvements in educational effectiveness.

2.3 Capability Gaps at the Operational Level Undermine the Effectiveness of Transformation

Superficial pedagogical reforms and faculty capacity deficits hinder the practical efficacy of digital transformation. Technological applications remain at a rudimentary stage: utilization rates of intelligent grouping systems and real-time learning diagnostics are low. In many institutions, "smart classrooms" are limited to upgraded projection equipment, with over 70% of renovated classrooms used primarily for PowerPoint presentations. Pedagogical innovation lags even further behind, with minimal adoption of new instructional models such as problem-based learning (PBL) and flipped classrooms. At the root lies a systemic deficiency in teachers' digital competence. Nationwide, digital training for university faculty is insufficient in both breadth and depth. Approximately 75% of training content is limited to tool operation, lacking integration with pedagogical practices—resulting in a widespread phenomenon of "can use but cannot teach." The absence of incentive mechanisms further stifles motivation: for example, the development of VR-based teaching resources, which may require 200 hours of effort, is credited with merely 0.5 teaching workload units, and digital teaching skills are often excluded from criteria for academic promotion.

2.4 Risk Spillover Effects Threaten Sustainable Development

Emerging risks—namely educational equity disparities and cultural heritage erosion—pose systemic threats to the sustainability of digital transformation. Disparities in household access to digital devices exacerbate academic performance gaps, while the accessibility rate of digital resources for visually impaired students remains below 30%. Braille e-textbook updates are delayed by as much as nine months, further marginalizing vulnerable groups. More critically, the marginalization of humanities education signals a crisis of cultural continuity: digital adaptation rates for literature, history, and philosophy courses remain below 30%. For instance, shifting classical Chinese literature to online self-study formats has resulted in a 70% reduction in teacher-student discussion time. Overreliance on technological rationality—particularly intelligent grading systems—has eroded students' critical thinking capacities, leading to formulaic writing and a measurable decline in argumentative depth among humanities students. These risks underscore the urgent need for an inclusive digital transformation framework that avoids falling into the trap of efficiency absolutism.

3. Pathways for Higher Education Teaching Reform from the Perspective of Digital Transformation

3.1 Establishing a Three-Dimensional Digital Literacy Framework and Implementation Principles

Construct an educational objective system integrating "tool application—thinking methodology—value ethics." The foundational layer focuses on cultivating operational skills in intelligent tools and data analysis, embedding Python, MATLAB, and similar tools into general foundational courses. The methodological layer emphasizes computational thinking and information discernment, enhancing decision-making rationality through algorithmic logic courses. The ethical layer fosters digital citizenship responsibility, incorporating mandatory modules on technology philosophy to address issues such as algorithmic bias and data ownership. Implementation should adhere to three core principles: human-centered education, ensuring technology serves holistic development; technology empowerment, leveraging AI and big data for precision teaching and personalized growth; and systemic synergy, promoting coordinated reforms in teaching, management, and evaluation systems. A tiered strategy should be adopted for undergraduate and graduate students: undergraduates should focus on "intelligent+" disciplinary integration, while graduate students should prioritize data-driven research training, alongside establishing a closed-loop system for monitoring industry demands and tracing talent quality.

3.2 Developing a Digital Competency Framework for Faculty

Innovate a tripartite faculty development model integrating "competency standards—training pathways—incentive mechanisms." First, establish a three-dimensional competency standard encompassing "intelligent tool application—data-informed instructional design—human-machine collaborative organization," covering 22 core competency indicators. Second, design systematic training pathways: create a national-level digital literacy training platform offering core courses such as educational big data analysis and intelligent instructional design; implement a three-tier "Smart Education Instructor" certification, with certified faculty receiving priority in promotion evaluations; and introduce an industry-academia "dual-appointment" system, enabling faculty to participate in corporate R&D to enhance teaching. Crucially, reshape incentive mechanisms by incorporating digital teaching achievements as key promotion criteria, equating digital course development with provincial-level teaching reform projects, and establishing an automated digital growth portfolio system to record faculty innovation contributions.

3.3 Building Intelligent Educational Governance Infrastructure

Develop an "educational neural network system" comprising a data hub and intelligent core. Integrate 12 operational systems—including academic affairs, student services, and research management—into a unified university-wide data hub, adopting standardized coding protocols to eliminate data silos and ensure "one-source, multi-use" data flow. Construct four intelligent cores: (1) a teaching core employing learning behavior analytics for real-time academic diagnostics and automated intervention

recommendations; (2) a resource core using demand-prediction models to dynamically allocate classrooms, equipment, and faculty; (3) an evaluation core establishing multi-dimensional assessment models for academic progress and innovation capability; and (4) a service core deploying AI chatbots to handle 85% of routine inquiries. Concurrently, integrate cutting-edge technologies such as blockchain and digital twins: use blockchain for immutable academic credentialing and virtual campus simulations to optimize emergency decision-making.

3.4 Innovating Governance Systems and Risk Mitigation Mechanisms

Establish a four-dimensional institutional framework encompassing "standards—organizational coordination—security safeguards—ethical review." Publish an Educational Data Governance White Paper defining 218 data standards and certify model institutions for data governance. At the organizational level, form a university-wide Data Governance Committee (30% faculty, 20% student representation) to ensure multi-stakeholder decision-making. Deploy a cybersecurity framework meeting China's *Classified Protection 2.0 Level-3* standards, with an AI security hub to neutralize cyber threats in real time. Ethical governance is pivotal: convene an Algorithmic Ethics Committee to review high-risk applications, issue Educational AI Ethics Review Guidelines mandating dual "technical safety + ethical compliance" certification for AI systems, and incorporate digital ethics into faculty and student evaluations. Continuously optimize systems using a four-dimensional efficacy metric (decision accuracy, resource utilization, response timeliness, stakeholder satisfaction).

3.5 Constructing a Student Digital Competency Development System

Enhance students' digital learning literacy through a tripartite framework of "foundational skills—advanced thinking—ethical accountability." Foundational training emphasizes intelligent tool usage and data acquisition, embedding Python programming and data analytics into general courses while modularizing skills like information retrieval and visualization. Advanced thinking cultivates computational and innovative thinking via algorithmic logic analysis and interdisciplinary digital projects in major courses. Ethical education instills digital citizenship through mandatory technology ethics modules examining data ownership and algorithmic bias. Implementation relies on intelligent learning platforms generating personalized digital profiles to dynamically allocate resources, while evaluation adopts a four-dimensional model (tool proficiency, information processing efficiency, digital creativity, and ethical decision-making). This forms a closed-loop ecosystem of curricular integration, platform support, and evaluative guidance, laying the foundation for lifelong learning in the digital era.

4. Conclusion

The digital transformation of higher education teaching is an imperative response to national strategic demands and competency reconfiguration in the intelligent era. This study reveals that transformation urgency stems from triple pressures—global competition, national strategy, and endogenous educational needs—while barriers include value cognition gaps, institutional flaws, capability deficits, and risk propagation. The solution lies in a "goal-actor-technology-institution" quadripartite framework: guiding education via three-dimensional digital literacy goals, activating reform through faculty competency building, underpinning technology with intelligent governance infrastructure, and safeguarding progress via ethical governance and efficacy evaluation. This pathway embodies a dialectical unity of technological empowerment and institutional innovation, propelling higher education from experiential to data-driven governance and from scale expansion to connotative development. Future efforts must deepen strategic synergy between educational and industrial digitization, breaking talent bottlenecks in critical fields like integrated circuits and quantum information, ultimately supporting Chinese modernization with high-quality human capital.

References

Deng, M. M. (2025). AI-empowered digital transformation of talent cultivation in higher education. *Shaanxi Education (Higher Education)*, (07).

Duan, S., & Shang, S. (2025). International Cooperation in Digital Education: China's Paradigm for Higher Education Internationalization in the Post-DeepSeek Era. *Journal of Hebei Normal University (Educational Science)*, *27*(3), 51-62.

Kan, Y., & Liu, L. (2025). Toward a Digital Compact: UNESCO's Value Framework, Operational Mechanisms, and Practical Experiences in Promoting Digital Transformation of Higher Education. *Journal of Hebei Normal University (Educational Science)*, *27*(3), 63-72.

Yu, G., Feng, Y. F., Li, S. J. et al. (2025). Research on digital transformation strategies for application-oriented universities. *Journal of Hubei Polytechnic University (Humanities and Social Sciences)*, *42*(04), 16-23.

Zhang, W., & Wang, Z. (2025). Data-Intelligence Empowered Graduate Education Management: Paradigm Evolution and Endogenous Mechanisms. *Tsinghua Journal of Education*, *46*(3), 69-77.

Zhang, Z., & Chen, C. (2025). The Phenomenon of "Institutional Suspension" in Digital Governance of Higher Education: Manifestations, Mechanisms, and Rectification Strategies. *Journal of Southwest University (Social Sciences Edition)*, 1-13. Advance online publication.