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Digital Transformation in Vietnamese Higher Education: Current State, Bottlenecks and Policy Implications

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Abstract

Purpose: Vietnam has placed higher education at the centre of its national digital transformation agenda, yet evidence on how far universities have actually changed, and why progress remains uneven, is scattered across policy texts, ministerial reports and small single-institution studies. This paper assesses the current state of digital transformation in Vietnamese higher education, identifies the bottlenecks that slow it down and derives implications for policy in the 2026-2030 period.

Design/methodology/approach: The study applies qualitative document analysis to a corpus of 18 policy and legal instruments issued between 2020 and 2026, triangulated with official statistics from the Ministry of Education and Training (MOET), the higher education management information system (HEMIS) and published empirical studies. Coding combined a deductive frame of six barrier categories drawn from the international literature with inductive codes specific to Vietnam.

Findings: The legal architecture has matured quickly. Between late 2024 and mid-2026 Vietnam adopted a new Higher Education Law that defines a 'digital higher education' model, laws on personal data protection, digital transformation and artificial intelligence, and a circular regulating the use of technology and AI in universities. Data infrastructure has also expanded, with HEMIS holding records on about three million learners. Outcomes, however, lag behind intent. Six interlocking bottlenecks are identified: Regulatory fragmentation, chronic under-funding (public spending of about 0.27% of GDP), weak data interoperability, a growing learner-to-lecturer ratio (30.1 in 2025-26) that squeezes time for pedagogical redesign, an input-based quality assurance regime, and rising risks to data security and academic integrity in the generative AI era.

Originality/value: The paper offers the first integrated assessment that covers the post-2025 legal reforms, proposes a bottleneck map that links enabling-environment, capability and outcome-integrity constraints, and sets out a phased policy roadmap with actor-specific responsibilities.

Keywords: Digital Transformation, Higher Education, Vietnam, Education Policy, HEMIS, Generative AI, University Autonomy

JEL Classification: I23; I28; O33

1. Introduction

Digital transformation has moved from the margins of higher education policy to its core. Universities everywhere are being asked to do more than move lectures online: They are expected to rebuild teaching, assessment, research support and administration around data and digital platforms (Benavides *et al*., 2020; Mohamed Hashim *et al*., 2022) [1, 31]. The pandemic years made the urgency visible, but they also showed how thin the line is between genuine transformation and what Hodges *et al*. (2020) [21] called emergency remote teaching. A university can run every class on a video platform and still be organised exactly as it was a decade earlier.

Vietnam offers an instructive case. Education and training was named one of eight priority sectors in the National Digital Transformation Programme to 2025, with a vision to 2030 (Prime Minister, 2020) [41]. Two years later, Decision 131/QĐ-TTg set specific targets for information technology and digital transformation in education, including the development and pilot of a 'digital higher education' model (Prime Minister, 2022) [42]. Since then the pace of policy-making has accelerated sharply. Resolution 57-NQ/TW of December 2024 made science, technology, innovation and digital transformation a national

breakthrough (Politburo, 2024) [39], and Resolution 71-NQ/TW of August 2025 did the same for education and training (Politburo, 2025) [40]. In December 2025 the National Assembly passed a new Higher Education Law that, for the first time, defines digital higher education as a model of organising training on digital platforms (National Assembly, 2025b) [33]. Laws on personal data protection, digital transformation and artificial intelligence followed within months, and in June 2026 MOET issued Circular 49/2026/TT-BGDĐT on the use of technology and AI in higher and vocational education (MOET, 2026).

The system these policies govern is large and still growing. In the 2025-26 academic year Vietnam had about 2.53 million undergraduate students, 140,000 master's students and 16,200 doctoral candidates (Giao duc Viet Nam, 2026a) [14]. Yet public spending on higher education has hovered around 0.27% of GDP, well below regional peers (Dai bieu Nhan dan, 2023a) [4], and the number of learners per full-time lecturer climbed from 24.3 to 30.1 in just two years (Tien Phong, 2026) [47]. Ambitious digital goals are therefore being pursued under tight resource constraints.

Existing research on the Vietnamese case is useful but partial. Several studies describe opportunities and challenges at single institutions or through small surveys (Le *et al*., 2024; Hoang, 2024) [23, 20]. Nguyen (2024) [36] applied epistemic network analysis to 21 policy documents and found that administration, vision, quality and infrastructure dominate the policy discourse. Le (2024) [22] reviewed public documents on digitalisation before and after the pandemic. None of these studies covers the legal reforms of 2025-2026, and few link the macro policy picture to the operational constraints that university leaders face. This gap matters because the new legal framework shifts responsibility to institutions: Circular 49/2026 requires every university to adopt its own rules on AI use, data governance and academic integrity, while autonomy reforms expect institutions to finance much of their own digital investment.

This paper addresses three questions. What is the current state of digital transformation in Vietnamese higher education, measured against national policy goals? What bottlenecks explain the distance between policy intent and observed outcomes? And what policy adjustments would help close that distance by 2030? The study contributes in three ways. It provides an updated, integrated assessment that spans policy, data infrastructure, human resources, teaching and learning, and risk. It proposes a bottleneck map that organises six constraints into enabling-environment, capability and outcome-integrity groups. And it translates the analysis into a phased roadmap with clear responsibilities for the state, MOET and institutions.

The remainder of the paper is organised as follows. Section 2 reviews the literature and sets out the analytical framework. Section 3 describes the method. Section 4 presents the current state, Section 5 analyses the bottlenecks, Section 6 discusses the findings against international evidence, Section 7 sets out policy implications and Section 8 concludes.

2. Literature review and analytical framework

2.1 What digital transformation means for a university

Definitions of digital transformation come mainly from information systems and management research. Vial (2019) [50] describes it as a process in which digital technologies trigger disruptions that organisations answer by changing their value-creation paths, while managing the structural changes and barriers that follow. In the public sector, Mergel *et al*. (2019) [25] stress that transformation concerns services, processes and relationships with citizens rather than technology adoption as such. Applied to universities, this implies a shift that goes well beyond digitisation (converting analogue records into digital form) and digitalisation (using digital tools to improve existing processes).

Benavides *et al*. (2020) [1] reviewed the early literature on digital transformation in higher education institutions and concluded that none of the proposals they found treated the subject holistically; most focused on a single dimension such as e-learning or administrative systems. Later work broadened the view. Mohamed Hashim *et al*. (2022) [31] frame digital transformation as a strategic source of competitive advantage that touches governance, the student experience and the business model of the university. Gkrimpizi *et al*. (2024) [17] argue that the concept in higher education should cover teaching and learning, research, administration and the external relations of the institution together.

For the purpose of this paper, digital transformation in higher education is understood as an institution-wide and system-wide change in how universities teach, assess, conduct research, govern themselves and interact with students and society, enabled by data and digital technologies and supported by matching changes in regulation, finance, skills and culture. This definition is close to the one now written into Vietnamese law: The 2025 Higher Education Law describes digital higher education as a model of organising training on a digital platform that updates new technology, ensures data connection and sharing, and draws on open educational resources (National Assembly, 2025b) [33].

2.2 Barriers and enablers

A large body of work catalogues why digital transformation stalls. The most complete synthesis is the systematic review by Gkrimpizi *et al*. (2023) [16], which identifies twenty distinct barriers and groups them into six categories: environmental, strategic, organisational, technological, people-related and cultural. Environmental barriers include regulation and funding; strategic barriers include the absence of a clear vision or leadership; organisational barriers cover rigid structures and silos; technological barriers involve legacy systems and interoperability; people-related barriers refer to skills and workload; and cultural barriers concern resistance to change.

Two further strands matter for the Vietnamese case. The first concerns staff capability. The European DigCompEdu framework (Redecker, 2017) [44] and the DigComp 2.2 framework for citizens (Vuorikari *et al*., 2022) [53] show that digital competence is multi-dimensional, ranging from information literacy to content creation, safety and problem solving. Vietnam's Circular 02/2025/TT-BGDĐT, which sets out a learner digital competence framework of six domains and 24 component competences, draws on the same tradition (MOET, 2025a) [28]. The second strand concerns artificial intelligence. Reviews by Zawacki-Richter *et al*. (2019) [54] and Bond *et al*. (2024) [2] show that AI applications in higher education are dominated by adaptive systems, profiling and prediction, and assessment, and that

ethical and pedagogical questions are under-researched. The rapid spread of generative AI since 2023 has made questions of assessment design and academic integrity far more pressing (UNESCO, 2023) [49].

At the system level, the OECD (2023) [37] emphasises that effective digital education depends on an ecosystem: interoperable data standards, procurement rules that avoid lock-in, public digital infrastructure and governance arrangements that protect privacy. This ecosystem perspective is useful because it highlights constraints that individual universities cannot remove on their own.

2.3 Evidence from Vietnam

Vietnamese studies of the past five years fall into three groups. Pandemic-era studies documented the rapid move to online teaching and the factors behind student acceptance (Pham & Ho, 2020; Ho *et al*., 2021) [38, 19]. Descriptive and normative studies, many published in domestic journals, discuss opportunities and challenges at individual universities and propose solutions (Hoang, 2024; Le, 2024) [20, 22]. A smaller group uses surveys or document analysis. Le *et al*. (2024) [23] surveyed 193 managers, lecturers and learners and identified five factors that shape digital transformation in higher education. Nguyen (2024) [36] analysed 21 policy documents and found that the policy discourse centres on administration, vision, quality and infrastructure, with less attention to pedagogy and learners.

The literature converges on a familiar set of challenges: infrastructure gaps, limited funding, insufficient digital skills among staff and the absence of a coherent national framework. Its limitations are also clear. Most studies predate the 2025-2026 legal reforms, rely on small convenience samples or single cases, and list challenges without examining how they interact. The present paper responds by grounding the analysis in the full set of recent policy instruments and official statistics, and by organising the challenges into a structured bottleneck map.

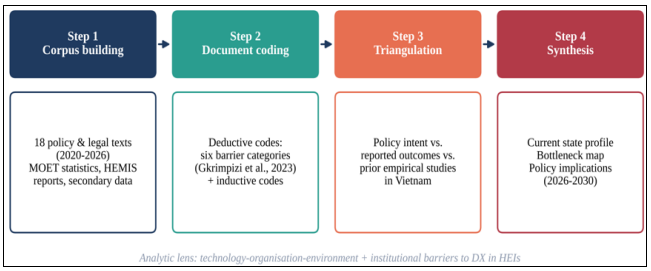
2.4 Analytical framework

The analysis combines the six barrier categories of Gkrimpizi *et al*. (2023) [16] with the technology-organisation-environment logic of Tornatzky and Fleischer (1990) [48]. Bottlenecks are read at two levels: the system level, where the state and MOET set rules, funding and shared infrastructure; and the institutional level, where universities make decisions about platforms, staff and curricula. The framework also adds a dimension that is weakly represented in earlier barrier taxonomies but central after 2023: outcome integrity, meaning the ability to show that digitally mediated learning and assessment produce valid, secure and trustworthy results. Fig 1 summarises how the framework was operationalised.

3. Methodology

3.1 Research design

The study uses qualitative document analysis, a systematic procedure for reviewing and evaluating printed and electronic documents in order to elicit meaning and build empirical knowledge (Bowen, 2009) [3]. Document analysis is well suited to policy research because policy texts are themselves the object of interest, and because official statistics and reports allow the stated intent of policy to be compared with reported outcomes. The design is summarised in Fig 1.



Source: Authors' design

Fig 1: Research design and analytical procedure

3.2 Corpus

The corpus comprises 18 policy and legal instruments issued between June 2020 and June 2026 that bear directly on digital transformation in higher education (Table 1). Documents were selected if they were issued by the Politburo, the National Assembly, the Government, the Prime Minister or MOET, and if they contained provisions on digital technology, data, online or distance training, digital competence or AI in higher education. Statistical evidence was drawn from MOET annual higher education reports as published by national media, the HEMIS reports presented at MOET events, the national higher education network plan (Decision 452/QĐ-TTg), DataReportal country reports and published empirical studies on Vietnam. Where several figures existed for the same indicator, the most recent figure attributed to MOET or the Ministry of Finance was retained and the source year is stated. Circular 56/2026/TT-BGDĐT of 7 July 2026, which replaced Circulars 08/2021/TT-BGDĐT and 28/2023/TT-BGDĐT as the undergraduate training regulation, was issued after the cut-off date of the corpus and is not analysed here.

Table 1: Policy and legal corpus analysed (n = 18)

S. No	Instrument	Issuer	Date	Relevance to digital transformation in HE
1	Decision 749/QĐ-TTg	Prime Minister	03/06/2020	National Digital Transformation Programme; education one of eight priority sectors
2	Circular 38/2020/TT-BGDĐT	MOET	06/10/2020	Online and blended joint programmes with foreign partners
3	Circular 08/2021/TT-BGDĐT	MOET	18/03/2021	Undergraduate training regulation; online delivery up to 30% of programme volume
4	Decision 131/QĐ-TTg	Prime Minister	25/01/2022	ICT and DX in education 2022-2025, vision 2030; pilot of a 'digital HE' model
5	Decision 4740/QĐ-BGDĐT	MOET	30/12/2022	Index and criteria for assessing DX of HEIs
6	Circular 28/2023/TT-BGDĐT	MOET	28/12/2023	Regulation on distance training at undergraduate level
7	Resolution 57-NQ/TW	Politburo	22/12/2024	Breakthrough in science, technology, innovation and national DX
8	Decision 1705/QĐ-TTg	Prime Minister	31/12/2024	Education development strategy to 2030, vision 2045
9	Circular 02/2025/TT-BGDĐT	MOET	24/01/2025	Learner digital competence framework (6 domains, 24 competences)
10	Decision 452/QĐ-TTg	Prime Minister	27/02/2025	HE and teacher education network plan 2021-2030; scale and staffing targets
11	Law 91/2025/QH15	National Assembly	26/06/2025	Personal data protection (effective 01/01/2026)
12	Resolution 71-NQ/TW	Politburo	22/08/2025	Breakthrough in education and training
13	Resolution 281/NQ-CP	Government	15/09/2025	Government action programme implementing Resolution 71-NQ/TW
14	Law 125/2025/QH15	National Assembly	10/12/2025	Higher Education Law; defines the 'digital higher education' model
15	Law 134/2025/QH15	National Assembly	10/12/2025	Artificial intelligence (effective 01/03/2026)
16	Law 148/2025/QH15	National Assembly	11/12/2025	Digital transformation (effective 01/07/2026)
17	Decree 356/2025/NĐ-CP	Government	31/12/2025	Detailed rules implementing the Personal Data Protection Law
18	Circular 49/2026/TT-BGDĐT	MOET	30/06/2026	Use of technology and AI in higher and vocational education (effective 15/08/2026)

Source: Compiled by the authors. DX = digital transformation; HE = higher education; HEIs = higher education institutions

3.3 Coding and analysis

Analysis proceeded in two rounds. In the first, each document was coded deductively against the six barrier categories of Gkrimpizi *et al*. (2023) [16], recording whether the document set a goal, assigned a responsibility, allocated resources or established a measurement mechanism. In the second, inductive codes were added for issues specific to Vietnam that the deductive frame did not capture well, such as the 30% ceiling on online delivery, the interaction between financial autonomy and capital investment, and the requirement for institutional AI codes of conduct. Codes were then grouped into six bottlenecks. For each bottleneck, policy intent was compared with reported outcomes and with findings from prior Vietnamese studies.

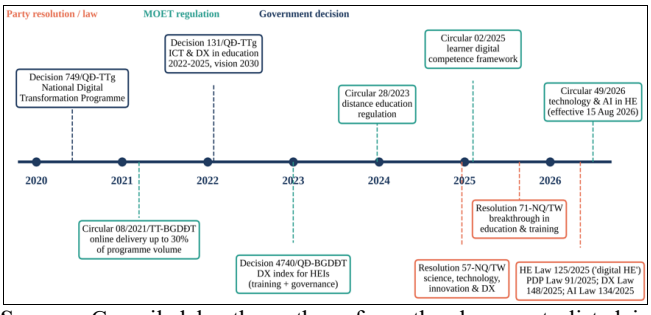
3.4 Trustworthiness and limitations of the design

Triangulation across legal texts, official statistics and independent studies was used to reduce the risk of reading policy intent as achievement. Two limitations should be noted at the outset. Aggregate results of the institutional self-assessments required by Decision 4740/QĐ-BGDĐT have not been published, so the paper cannot report the distribution of universities across maturity levels. In addition, some statistics come from different reporting dates and definitions; they are used to describe direction and scale rather than to support precise comparisons. These limitations are revisited in Section 8.

4. Current state of digital transformation

4.1 A rapidly maturing policy and legal architecture

The most striking change since 2020 is the density of the policy framework (Fig 2). The early phase (2020-2023) was programme-driven. Decision 749/QĐ-TTg placed education among the priority sectors, Decision 131/QĐ-TTg set targets for 2025 and 2030, Circular 08/2021/TT-BGDĐT allowed regular programmes to deliver up to 30% of their volume online, and Decision 4740/QĐ-BGDĐT introduced an index for assessing the digital transformation of universities (MOET, 2021, 2022) [26, 27].



Source: Compiled by the authors from the documents listed in Table 1

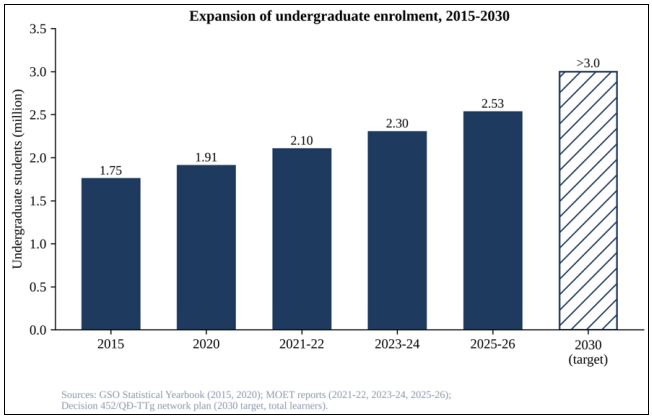
Fig 2: Key policy and legal milestones for digital transformation in Vietnamese higher education, 2020-2026

The second phase, from late 2024, is law-driven. Resolutions 57-NQ/TW and 71-NQ/TW raised digital transformation and education to the level of national breakthroughs. The National Assembly then passed a cluster of laws in 2025: the Law on Personal Data Protection (No. 91/2025/QH15), effective 1 January 2026; the Higher Education Law (No. 125/2025/QH15), effective the same day; the Law on Artificial Intelligence (No. 134/2025/QH15), effective 1 March 2026; and the Law on Digital Transformation (No. 148/2025/QH15), effective 1 July 2026 and replacing the 2006 Law on Information Technology (National Assembly, 2025a, 2025b, 2025c, 2025d) [32, 33, 34, 35]. Circular 49/2026/TT-BGDĐT, effective 15 August 2026, then consolidated earlier regulations on websites, e-mail and online training into a single framework for the use of technology across all university activities (Vietnamplus, 2026) [51].

Three features of this new architecture deserve attention. Digital higher education is now a legal category rather than a policy aspiration. Second, responsibility is pushed downwards: Circular 49/2026 requires each institution to issue its own regulations or code of conduct on the use of AI in teaching, assessment, research, governance and services, and to comply with a national digital architecture so as to avoid fragmented investment. Third, the framework explicitly links digital transformation to data protection and academic integrity, listing violations such as using AI to cheat, plagiarism, falsifying data and failing to disclose AI use when required (MOET, 2026) [30].

4.2 System scale and human resources

Digital transformation is unfolding in a system that is expanding quickly. Undergraduate enrolment rose from about 1.75 million in 2015 (GSO, 2021) [12] to about 2.53 million in 2025-26 (Giao duc Viet Nam, 2026a; Fig 3) [14]. Decision 452/QĐ-TTg sets a target of more than three million learners by 2030, equivalent to 260 students and 23 postgraduates per 10,000 people, with a gross enrolment ratio of 33% for the 18-22 age group (Prime Minister, 2025) [43]. The same plan targets 110,000 full-time lecturers, of whom at least 40% should hold a doctorate.



Note: Values for different years come from different reporting sources and are indicative of trend rather than strictly comparable

Fig 3: Undergraduate enrolment, 2015-2025/26, and the 2030 target

Staff qualifications are improving. The share of lecturers holding a doctorate rose from 32.6% in 2023-24 to 36.3% in 2025-26, and the number of lecturers increased from 86,048 in 2022 to 95,198 in 2026 (Giao duc Viet Nam, 2026b; Tien Phong, 2026) [15, 47]. Between 2023-24 and 2025-26, however, the number of learners per full-time lecturer climbed from 24.3 to 30.1 (Tien Phong, 2026; Fig 4) [47]. Enrolment is growing faster than teaching capacity. This has a direct bearing on digital transformation, because redesigning courses for blended delivery, producing digital learning materials and adapting assessment to generative AI all require staff time that a rising teaching load erodes.

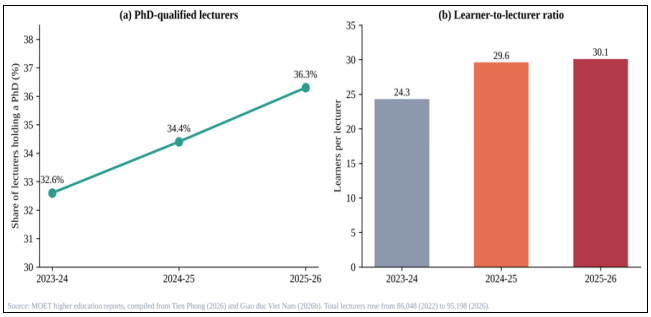


Fig 4: Lecturer qualifications and learner-to-lecturer ratio, 2023-24 to 2025-26

Capacity is also unevenly distributed in space. The Red River Delta, with 23.5% of the population, hosts 44.2% of higher education institutions and 39.9% of students, whereas the Mekong River Delta, with 17.7% of the population, has 6.9% of institutions and 8.2% of students (Dien tu Ung dung, 2025; Fig 5) [11]. Digital delivery is often presented as a way to reduce such gaps, but it can only do so if regional institutions have the platforms, content and staff to deliver it.

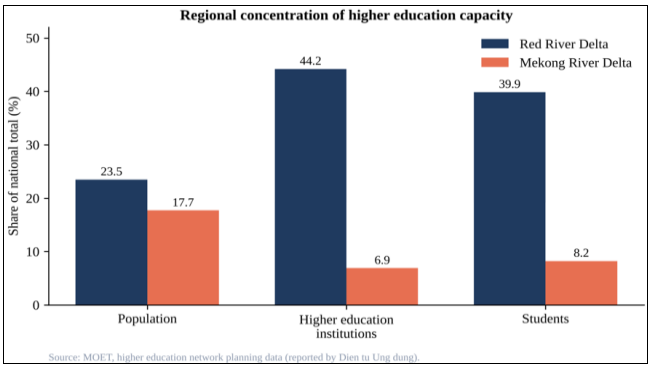


Fig 5: Regional distribution of population, institutions and students

4.3 Data infrastructure and digital governance

The most tangible progress is in data infrastructure. Since 2022 MOET has operated HEMIS, the higher education management information system. By 2026 it held data on about 470 institutions and member units, more than 25,000 training programmes, more than 100,000 staff records and almost three million learner records (SGGP, 2026) [45]. Links with other national databases are still being built: an early pilot matched about 97,000 graduates to social insurance records, roughly two-thirds of those reported as employed, using data that had not yet been cleaned (Dai Doan Ket, 2023) [6], and in 2026 MOET was still developing the mechanism for exchanging employment, social insurance and tax data (SGGP, 2026) [45]. Fig 6 summarises these figures. The 2025-26 annual report on higher education was itself compiled from HEMIS data as of 30 June 2026 (Giao duc Viet Nam, 2026a) [14], which signals a shift from paper reporting to administrative data.

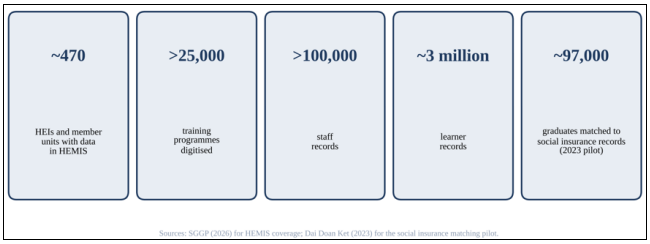


Fig 6: Scale of the national higher education database (HEMIS) and the 2023 social insurance matching pilot

At institutional level, Decision 4740/QĐ-BGDĐT provides the main yardstick (Table 2). The index has two groups of criteria, digital transformation in training and digital transformation in governance, each scored out of 100 and classified into three levels. Institutions self-assess, update the results on the sector database by 31 December each year, and MOET is responsible for external review and publication. The criteria are largely about inputs and processes: whether a plan or regulation for online training has been issued, whether a learning management system and digital library exist, the share of courses examined on computers, and the share of lecturers able to produce digital learning materials (MOET, 2022) [27]. Few indicators measure learning outcomes, student experience or the use of data in decision-making.

Table 2: Structure of the digital transformation index for HEIs (Decision 4740/QĐ-BGDĐT)

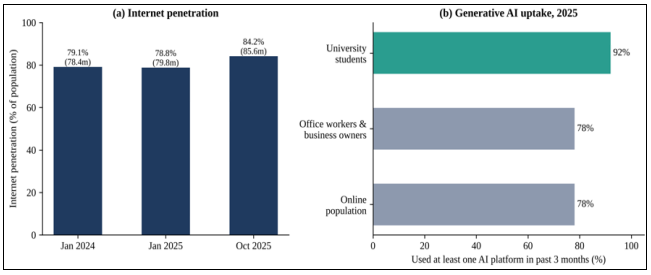
Component	Maximum score	Illustrative criteria
Digital transformation in training	100	Plan and regulation for online training; online teaching platform or LMS; digital library; regulation on computer-based examinations and share of course units examined on computers; share of lecturers able to use digital teaching tools and to produce digital learning materials; IT laboratories
Digital transformation in governance	100	Designated unit in charge of IT and DX (mandatory condition); management information systems for training, staff, finance and assets; compliance with technical data rules and full data exchange with the national HE database (HEMIS)
Maturity levels (per component)	-	Below 50: not yet meeting basic requirements; 50-75: basic level; above 75: good level, meeting basic and some advanced requirements
Process	-	Annual self-assessment approved by the head of institution and uploaded to the sector database by 31 December; MOET conducts external review, recognises the level and publishes results

Source: MOET (2022) [27]

4.4 Teaching, learning and the arrival of generative AI

The external environment for digital learning is favourable. Internet penetration reached 84.2% of the population in October 2025, with 85.6 million users (DataReportal, 2026) [9], and social media and mobile use are close to universal among young people. Online and blended teaching, which became routine during the pandemic, has continued at many institutions within the 30% limit that applied to regular programmes until mid-2026. Large institutions report substantial e-learning portfolios; Thai Nguyen University, for instance, reported more than 900 course units delivered with e-learning in 2024-25, alongside a rise of nearly 14,000 learners in distance programmes (Luat su Viet Nam, 2025) [24].

Generative AI has spread faster than any previous technology in the sector. A national consumer survey found that 92% of university students had used at least one AI platform in the previous three months, compared with 78% of the online population as a whole (Decision Lab, 2025) [10]. A survey of more than 500 students at universities in Hanoi reported that 98.9% used AI for study or leisure (Ta, 2025) [46]. Fig 7 places these figures alongside connectivity data. The policy response arrived in 2026, when Circular 49/2026 allowed AI-supported and data-driven personalised training while requiring institutions to authenticate learners, ensure traceability of assessment data and set out sanctions for misuse.



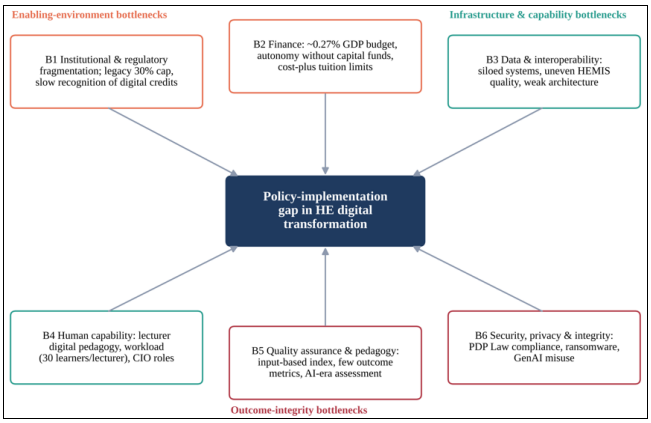
Sources: DataReportal, 2024, 2025, 2026; Decision Lab, 2025

Fig 7: Internet penetration and generative AI uptake in Vietnam

Taken together, the evidence describes a sector in which the legal framework and national data infrastructure have advanced quickly, while the institutional base on which they rest, in terms of funding, staff time and regional capacity, has changed far more slowly. Section 5 examines why.

5. Bottlenecks

Coding of the corpus and the statistical evidence yielded six bottlenecks (Fig 8 and Table 3). They are grouped into enabling-environment bottlenecks (B1, B2), infrastructure and capability bottlenecks (B3, B4) and outcome-integrity bottlenecks (B5, B6). The grouping is analytical; in practice the bottlenecks reinforce each other.



Source: Authors' synthesis

Fig 8: Bottleneck map of digital transformation in Vietnamese higher education

Table 3: Bottleneck-evidence matrix

Bottleneck	Barrier category (Gkrimpizi *et al.*, 2023) [16]	Key evidence	Policy response to date	Remaining gap
B1 Regulatory fragmentation	Environmental; strategic	Online delivery rules spread across several circulars; 30% cap for regular programmes (until July 2026); uncertain credit recognition for external digital courses	Circular 49/2026 consolidates rules on technology use; HE Law 2025 defines digital HE	Effects of the July 2026 training regulation (Circular 56/2026) on delivery caps and credit recognition not yet observable; implementing guidance pending
B2 Finance	Environmental; organisational	Public HE budget about 0.27% of GDP; actual disbursement about 0.18%; about 330 USD per student (2020)	Resolution 71 calls for greater investment; targeted schemes for selected universities	No earmarked, formula-based funding for shared digital infrastructure
B3 Data and interoperability	Technological	HEMIS holds ~3 million learner records, but institutions run siloed systems; MOET still calls for complete and consistent data	National digital architecture required by Circular 49/2026	Shared data standards and APIs; data used for management, not only reporting
B4 Human capability	People-related; cultural	Learner-to-lecturer ratio 24.3 to 30.1 in two years; skill gaps in instructional design; shortage of specialist staff	Learner digital competence framework (Circular 02/2025)	No binding competence framework or workload recognition for lecturers
B5 Quality assurance and pedagogy	Strategic; organisational	Index based on inputs and processes; aggregate results unpublished; 92% of students use AI	Circular 49/2026 requires transparent assessment criteria and traceability	Outcome indicators; discipline-specific guidance on AI-resilient assessment
B6 Security, privacy, integrity	Technological; environmental	155 million records leaked nationally in H1 2025; new PDP obligations from 2026; GenAI misuse	PDP Law 2025, Decree 356/2025, AI Law 2025, Circular 49/2026	Institutional data protection capacity; incident reporting; integrity culture

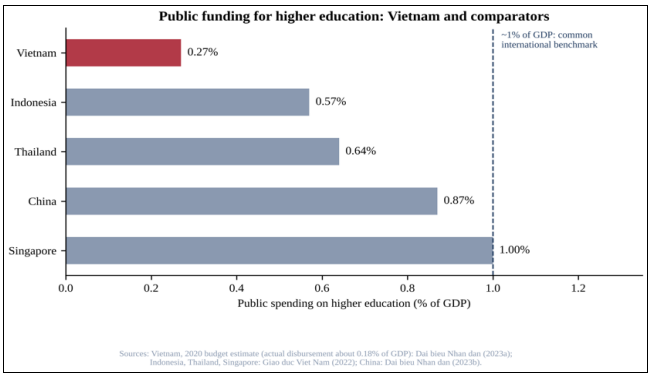
Source: Authors' synthesis from the corpus and statistics cited in Sections 4 and 5

5.1 B1: Institutional and regulatory fragmentation

The number of instruments is not the problem; their alignment is. Between 2020 and 2026, the rules governing digital teaching were spread across circulars on regular training, distance training, online joint programmes and the use of IT in online training, each with its own definitions and limits. Circular 49/2026 consolidates part of this, but during the period studied the training regulation capped online delivery at 30% of a regular programme, reflecting a pre-pandemic logic in which online learning is treated as a deviation from face-to-face teaching rather than as one mode within a blended design. Circular 56/2026/TT-BGDĐT replaced that regulation in July 2026; whether it removes this constraint in practice is a question for follow-up research. Recognition of credits earned on external platforms such as MOOCs also remains uncertain, which limits inter-institutional sharing of digital courses. Without a coherent, system-wide roadmap, digital transformation risks becoming a patchwork of local fixes that meet individual indicators without changing how the system works.

5.2 B2: Finance

Public spending on higher education has been estimated at about 0.27% of GDP, compared with 0.57% in Indonesia, 0.64% in Thailand and around 1% in Singapore (Giao duc Viet Nam, 2022; Fig 9) [13]. The 2020 budget estimate of 16,703 billion VND amounted to about 330 USD per student (Dai bieu Nhan dan, 2023a) [4], and actual disbursement has been reported at only about 0.18% of GDP (Dai bieu Nhan dan, 2023a) [4]. Autonomy reforms since 2019 have allowed many public universities to raise tuition and decide their own spending, but they have also shifted the cost of capital investment, including digital infrastructure, onto institutional revenues that are themselves constrained by tuition ceilings and enrolment competition. The result is a pattern in which well-placed universities invest steadily while smaller provincial and private institutions buy fragmented tools as budgets allow.



Sources: Dai bieu Nhan dan, 2023a, 2023b; Giao duc Viet Nam, 2022

Fig 9: Public spending on higher education as a share of GDP, Vietnam and selected countries

5.3 B3: Data and interoperability

HEMIS has created a national backbone, but data quality depends on what institutions upload, and many universities still run separate systems for admissions, training management, finance, human resources and libraries that were procured at different times from different vendors. MOET's guidance for the 2025-26 academic year asked institutions to complete their databases and ensure that information on HEMIS is complete, accurate, timely and consistent (MOET, 2025b) [29], an instruction that implies these qualities cannot yet be assumed. Circular 49/2026 now requires compliance with a national digital architecture. Until shared data standards and application programming interfaces are in place, data will continue to be collected for reporting rather than used for management, early warning or research.

5.4 B4: Human capability

Two constraints combine here. The first is skills. Domestic studies consistently report that many lecturers use digital tools at a basic level but lack the instructional design

competence needed for high-quality blended and online courses (Le *et al*., 2024) [23]. The second, often overlooked, is time. With 30.1 learners per lecturer in 2025-26, the time available for redesigning courses, producing digital content and rethinking assessment is shrinking. Institutions also report shortages of specialist staff, such as data engineers, information security officers and learning designers, whom public salary scales struggle to attract. Circular 02/2025 sets a competence framework for learners, but there is no equivalent binding framework for university teachers.

5.5 B5: Quality assurance and pedagogy

The digital transformation index under Decision 4740/QĐ-BGDĐT rewards the presence of plans, regulations, platforms and capabilities. It says little about whether digital provision improves learning. Self-assessment results are not published in aggregate, which limits peer comparison and public accountability. Accreditation standards likewise treat digital resources mainly as inputs. In an environment where 92% of students already use AI tools, assessment designed for a pre-AI world loses validity. Circular 49/2026 calls for authentication, traceability and transparent assessment criteria, but translating these principles into redesigned assessment across thousands of courses is a pedagogical task, not a technical one.

5.6 B6: Security, privacy and academic integrity

Universities hold large volumes of personal data and are attractive targets for cyber-attacks. In the first half of 2025, Vietnam recorded about 155 million leaked data records and ransomware damages above 10 million USD (VnEconomy, 2025) [52]. From January 2026, the Law on Personal Data Protection and Decree 356/2025/NĐ-CP impose new obligations on data controllers, including the designation of data protection personnel and responses to data subject requests, backed by administrative and criminal sanctions (National Assembly, 2025a; Government, 2025) [32, 18]. Many institutions have yet to build the governance capacity these obligations require. Academic integrity is the other face of this bottleneck: the same AI tools that can personalise learning can also produce assignments that are indistinguishable from student work, and detection technologies are an unreliable safeguard on their own (UNESCO, 2023) [49].

6. Discussion

The Vietnamese case confirms much of the international literature while adding two nuances. The confirmation is that technology is rarely the binding constraint. Connectivity is high, students adopt new tools quickly, and the national data backbone exists. What holds transformation back are the environmental, organisational and people-related barriers that Gkrimpizi *et al*. (2023) [16] identified: rules that lag behind practice, funding models that do not reward digital investment, siloed systems and limited staff capacity.

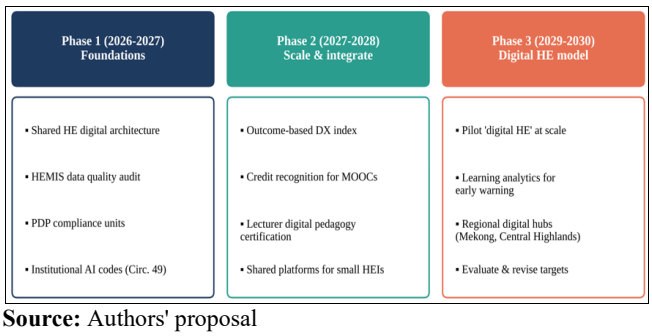
The first nuance concerns the sequence of reform. In many countries institutional experimentation preceded national regulation. In Vietnam the opposite is happening: a dense legal framework has been put in place within roughly eighteen months, and institutions are now expected to implement it. This top-down sequence has advantages, notably clarity and speed, but it risks producing compliance-oriented transformation in which universities issue the required plans and codes without changing practice. Nguyen's (2024) [36] finding that the policy discourse emphasises administration and infrastructure over pedagogy is consistent with this risk.

The second nuance concerns the interaction between autonomy and digital investment. Autonomy is usually seen as an enabler of digital transformation because it gives institutions freedom to choose platforms and redesign programmes (Mohamed Hashim *et al*., 2022) [31]. In a system where public funding is low and capital grants are scarce, autonomy can also widen gaps. Large, well-reputed universities can fund digital infrastructure from tuition and services; smaller institutions, especially in under-served regions, cannot. Without a shared infrastructure layer, the policy goal of using digital delivery to widen access could be undermined by the very mechanism meant to promote innovation.

The arrival of generative AI sharpens both points. International reviews warn that research and practice on AI in higher education have paid limited attention to ethics, pedagogy and context (Bond *et al*., 2024) [2]. Vietnam's regulatory response through Circular 49/2026 is comparatively early and explicit. Its success will depend less on the text than on whether lecturers have the time and support to redesign assessment, and whether institutions can implement learner authentication and data protection without creating new burdens that discourage innovation.

7. Policy Implications

The analysis points to a set of adjustments that would help convert the new legal framework into measurable change. They are organised as a three-phase roadmap for 2026-2030 (Fig 10) and summarised by responsible actor in Table 4.



Source: Authors' proposal

Fig 10: Proposed policy roadmap for digital transformation in higher education, 2026-2030

Move from input indicators to outcome indicators. Decision 4740/QĐ-BGDĐT should be revised so that a meaningful share of the score depends on outcomes, such as completion and progression in blended courses, student satisfaction with digital services, time to issue digital diplomas and the use of data in decisions. Aggregate self-assessment and external review results should be published each year.

Treat shared infrastructure as a public good. Rather than expecting every institution to procure its own learning management system, identity services and security operations, MOET could support shared platforms, framework contracts and regional digital hubs, giving priority to the Mekong River Delta, the Central Highlands and the northern mountains. A modest earmarked fund tied to the national digital architecture would reduce duplication and lock-in.

Update the rules on digital delivery and credit recognition.

In implementing the new training regulation (Circular 56/2026), fixed ceilings on online delivery in regular programmes should give way to quality-based conditions, so that institutions with demonstrated capacity can design blended programmes according to pedagogical needs. Guidance on recognising credits from accredited MOOCs and from other institutions' digital courses would make shared content economically viable.

Invest in people. A binding digital competence framework for university teachers, aligned with Circular 02/2025 and DigCompEdu, should be linked to professional development, workload recognition and promotion criteria. Course redesign for blended delivery and AI-resilient assessment should be counted in teaching workload. Institutions also need specialist roles such as chief information or digital officers, data protection officers and learning designers.

Make data protection and integrity routine. Each institution should establish a personal data protection function, conduct impact assessments for systems that process learner data and publish an AI code of conduct as required by Circular 49/2026. National guidance on assessment design in the presence of generative AI, with exemplars by discipline, would be more effective than reliance on detection software.

Table 4: Policy recommendations by actor and time horizon

Actor	Short term (2026-2027)	Medium term (2028-2030)	Indicators to monitor
National Assembly and Government	Issue implementing decrees for the HE Law and DX Law with explicit provisions on digital HE; earmark funding for shared HE digital infrastructure	Raise public HE spending towards the 0.5-1% of GDP range recommended by experts; tie part of funding to digital outcomes	Public HE spending (% GDP); share disbursed; investment in shared platforms
MOET	Revise Decision 4740 towards outcome indicators; publish aggregate index results; issue AI assessment guidance by discipline	Apply quality-based rather than fixed-cap conditions for online delivery; recognise credits from accredited MOOCs; scale the digital HE pilot	Distribution of HEIs by maturity level; number of shared courses; HEMIS data completeness
Universities	Adopt AI codes of conduct and data protection functions; map and integrate core information systems	Redesign programmes for blended delivery; use learning analytics for early warning; certify lecturers' digital pedagogy	Completion in blended courses; student satisfaction with digital services; share of certified lecturers
Lecturers and learners	Participate in digital pedagogy training; disclose AI use as required	Co-design AI-resilient assessment; contribute open educational resources	Integrity incidents; OER contributions; learner digital competence levels

Source: Authors' proposal

8. Conclusion

Vietnam has built, in a short time, one of the most comprehensive legal frameworks for digital transformation in higher education in the region. The 2025 Higher Education Law recognises digital higher education as a model, a cluster of new laws governs data, digital transformation and AI, and Circular 49/2026 sets rules for the use of technology across university activities. National data infrastructure has expanded, connectivity is high and students have embraced new tools.

The distance between this framework and practice remains considerable. The paper has identified six bottlenecks that explain it: Regulatory fragmentation, under-funding, weak interoperability, constrained human capability, an input-based quality assurance regime, and rising risks to data security and academic integrity. These bottlenecks reinforce one another, which is why piecemeal measures have had limited effect. The proposed roadmap emphasises outcome measurement, shared infrastructure, updated delivery rules, investment in people and routine data protection.

The study has limitations. It relies on documents and secondary statistics rather than primary data, and aggregate results of the institutional digital transformation index are not publicly available. Some figures come from different sources and reporting dates. Future research could use HEMIS microdata, if access is granted, to link digital investment with student outcomes; conduct multi-site case studies of how universities implement Circular 49/2026; and survey lecturers on the time costs of course and assessment redesign. Comparative work with other ASEAN systems would also help determine whether the top-down sequence observed in Vietnam produces faster or merely more visible transformation.

9. References

1. Benavides LMC, Tamayo Arias JA, Arango Serna MD, Branch Bedoya JW, Burgos D. Digital transformation in higher education institutions: A systematic literature review. Sensors. 2020; 20(11):3291. Doi: https://doi.org/10.3390/s20113291
2. Bond M, Khosravi H, De Laat M, Bergdahl N, Negrea V, Oxley E, *et al*. A meta systematic review of artificial intelligence in higher education: A call for increased ethics, collaboration, and rigour. International Journal of Educational Technology in Higher Education. 2024; 21:4. Doi: https://doi.org/10.1186/s41239-023-00436-z
3. Bowen GA. Document analysis as a qualitative research method. Qualitative Research Journal. 2009; 9(2):27-40. Doi: https://doi.org/10.3316/QRJ0902027
4. Dai bieu Nhan dan. Tỷ lệ 215 sinh viên/vạn dân của Việt Nam còn quá thấp so với khu vực [Vietnam's ratio of 215 students per 10,000 people remains far below the region]. Dai bieu Nhan dan Newspaper, 2023a. https://daibieunhandan.vn/ty-le-215-sinh-vien-van-dan-cua-viet-nam-con-qua-thap-so-voi-khu-vuc-10304505.html
5. Dai bieu Nhan dan. Chi phí đào tạo một tiến sĩ ở Việt Nam trung bình khoảng 16 triệu đồng/năm, quá thấp [The cost of training a doctoral student in Vietnam averages about VND 16 million a year, too low]. Dai bieu Nhan dan Newspaper, 2023b. https://daibieunhandan.vn/chi-phi-dao-tao-mot-tien-si-o-viet-nam-trung-binh-khoang-16-trieu-dong-nam-qua-thap-10322436.html
6. Dai Doan Ket. Minh bạch thống kê việc làm sinh viên [Transparency in graduate employment statistics]. Dai Doan Ket Newspaper, October 10, 2023.

https://daidoanket.vn/minh-bach-thong-ke-viec-lam-sinh-vien-10263648.html
7. DataReportal. Digital 2024: Vietnam. Kepios, 2024. https://datareportal.com/reports/digital-2024-vietnam
8. DataReportal. Digital 2025: Vietnam. Kepios, 2025. https://datareportal.com/reports/digital-2025-vietnam
9. DataReportal. Digital 2026: Vietnam. Kepios, 2026. https://datareportal.com/reports/digital-2026-vietnam
10. Decision Lab. The state of consumer AI in Vietnam 2025. Reported in Advertising Vietnam, 18 August 2025, 2025. https://advertisingvietnam.com/thi-truong-ai-tieu-dung-viet-nam-2025-voi-78-dan-so-truc-tuyen-da-dung-ai-nguoi-viet-chon-nen-tang-nao-cho-tung-tac-vu-p26978
11. Dien tu Ung dung. Hà Nội là nơi có số lượng cơ sở giáo dục đại học lớn nhất cả nước [Hanoi has the largest number of higher education institutions in the country]. Dien tu va Ung dung Magazine, March 7, 2025. https://dientuungdung.vn/apicenter@/print_article&i=8213
12. General Statistics Office (GSO). Statistical yearbook of Viet Nam 2020. Hanoi: Statistical Publishing House, 2021.
13. Giao duc Viet Nam. ĐBQH: Cần lộ trình tăng tỉ lệ đầu tư cho giáo dục đại học, giáo dục nghề nghiệp [Deputies call for a roadmap to raise investment in higher and vocational education]. Giao duc Viet Nam, 2022. https://giaoduc.net.vn/dbqh-can-lo-trinh-tang-ti-le-dau-tu-cho-giao-duc-dai-hoc-giao-duc-nghe-nghiep-post230703.gd
14. Giao duc Viet Nam. Bức tranh giáo dục đại học Việt Nam: Từ số lượng trường đến quy mô đào tạo [The picture of Vietnamese higher education: From the number of institutions to enrolment]. Giao duc Viet Nam, 2026a. https://giaoduc.net.vn/buc-tranh-giao-duc-dai-hoc-viet-nam-tu-so-luong-truong-den-quy-mo-dao-tao-post263116.gd
15. Giao duc Viet Nam. Tuyển sinh STEM khởi sắc, giảng viên trình độ tiến sĩ tăng nhưng còn khoảng cách giữa các cơ sở GDĐH [STEM enrolment improves and PhD-qualified lecturers increase, but gaps remain between institutions]. Giao duc Viet Nam, October 3, 2026b. https://giaoduc.net.vn/tuyen-sinh-stem-khoi-sac-giang-vien-trinh-do-tien-si-tang-nhung-con-khoang-cach-giua-cac-co-so-gddh-post263119.gd
16. Gkrimpizi T, Peristeras V, Magnisalis I. Classification of barriers to digital transformation in higher education institutions: Systematic literature review. Education Sciences. 2023; 13(7):746. Doi: https://doi.org/10.3390/educsci13070746
17. Gkrimpizi T, Peristeras V, Magnisalis I. Defining the meaning and scope of digital transformation in higher education institutions. Administrative Sciences. 2024; 14(3):48. Doi: https://doi.org/10.3390/admsci14030048
18. Government of Vietnam. Decree No. 356/2025/NĐ-CP detailing a number of articles and measures to implement the Law on Personal Data Protection. Hanoi, 2025.
19. Ho NTT, Sivapalan S, Pham HH, Nguyen LTM, Pham ATV, Dinh HV. Students' adoption of e-learning in emergency situation: The case of a Vietnamese university during COVID-19. Interactive Technology and Smart Education. 2021; 18(2):246-269. Doi: https://doi.org/10.1108/ITSE-08-2020-0164
20. Hoang TQT. Digital transformation: Opportunities and challenges for higher education institutions. Journal of Educational Equipment, 2024. https://vjol.info.vn/tctbgd/article/view/96808
21. Hodges C, Moore S, Lockee B, Trust T, Bond A. The difference between emergency remote teaching and online learning. EDUCAUSE Review, March 27, 2020. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning
22. Le TTT. Digitalization of higher education in Vietnam. Journal of Comparative & International Higher Education. 2024; 16(2):56-64.
23. Le T, Chu B, Nguyen B. Exploratory study on factors influencing digital transformation in higher education in Vietnam. American Journal of Education and Information Technology. 2024; 8(1). Doi: https://doi.org/10.11648/j.ajeit.20240801.14
24. Luat su Viet Nam. Đại học Thái Nguyên: Quyết tâm nâng cao chất lượng đào tạo, đổi mới phương thức khảo thí [Thai Nguyen University: Improving training quality and renewing assessment]. Luat su Viet Nam Magazine, October 4, 2025. https://lsvn.vn/dai-hoc-thai-nguyen-quyet-tam-nang-cao-chat-luong-dao-tao-doi-moi-phuong-thuc-khao-thi-a164136.html
25. Mergel I, Edelmann N, Haug N. Defining digital transformation: Results from expert interviews. Government Information Quarterly. 2019; 36(4):101385. Doi: https://doi.org/10.1016/j.giq.2019.06.002
26. Ministry of Education and Training. Circular No. 08/2021/TT-BGDĐT promulgating the regulation on undergraduate training. Hanoi, 2021.
27. Ministry of Education and Training. Decision No. 4740/QĐ-BGDĐT on the index and criteria for assessing digital transformation of higher education institutions. Hanoi, 2022.
28. Ministry of Education and Training. Circular No. 02/2025/TT-BGDĐT on the digital competence framework for learners. Hanoi, 2025a.
29. Ministry of Education and Training. Official Letter No. 6400/BGDĐT-GDĐH on tasks for higher education and teacher-training colleges in the 2025-2026 academic year. Hanoi, 2025b.
30. Ministry of Education and Training. Circular No. 49/2026/TT-BGDĐT on the application of technology in higher education and vocational education. Hanoi, 2026.
31. Mohamed Hashim MA, Tlemsani I, Matthews R. Higher education strategy in digital transformation. Education and Information Technologies. 2022; 27(3):3171-3195. Doi: https://doi.org/10.1007/s10639-021-10739-1
32. National Assembly of Vietnam. Law on Personal Data Protection No. 91/2025/QH15. Hanoi, 2025a.
33. National Assembly of Vietnam. Law on Higher Education No. 125/2025/QH15. Hanoi, 2025b.
34. National Assembly of Vietnam. Law on Artificial Intelligence No. 134/2025/QH15. Hanoi, 2025c.
35. National Assembly of Vietnam. Law on Digital Transformation No. 148/2025/QH15. Hanoi, 2025d.
36. Nguyen HL. Digital transformation in Vietnamese higher education: An epistemic network analysis of policy documents. Journal of International Cooperation

in Education, 2024. Doi: https://doi.org/10.1108/JICE-03-2024-0010
37. OECD. OECD digital education outlook 2023: Towards an effective digital education ecosystem. OECD Publishing, 2023. Doi: https://doi.org/10.1787/c74f03de-en
38. Pham HH, Ho TTH. Toward a 'new normal' with e-learning in Vietnamese higher education during the post COVID-19 pandemic. Higher Education Research & Development. 2020; 39(7):1327-1331. Doi: https://doi.org/10.1080/07294360.2020.1823945
39. Politburo of the Communist Party of Vietnam. Resolution No. 57-NQ/TW on breakthroughs in science, technology, innovation and national digital transformation. Hanoi, 2024.
40. Politburo of the Communist Party of Vietnam. Resolution No. 71-NQ/TW on breakthroughs in education and training development. Hanoi, 2025.
41. Prime Minister of Vietnam. Decision No. 749/QĐ-TTg approving the National Digital Transformation Programme to 2025, with orientation to 2030. Hanoi, 2020.
42. Prime Minister of Vietnam. Decision No. 131/QĐ-TTg approving the scheme on strengthening ICT application and digital transformation in education and training, 2022-2025, with orientation to 2030. Hanoi, 2022.
43. Prime Minister of Vietnam. Decision No. 452/QĐ-TTg approving the planning of the network of higher education and teacher education institutions for 2021-2030, with a vision to 2050. Hanoi, 2025.
44. Redecker C. European framework for the digital competence of educators: DigCompEdu. Publications Office of the European Union, 2017. Doi: https://doi.org/10.2760/159770
45. SGGP. Hệ thống đại học chạy đua hoàn thành chuẩn hóa dữ liệu [Universities race to complete data standardisation]. Sai Gon Giai Phong Newspaper, October 7, 2026. https://www.sggp.org.vn/he-thong-dai-hoc-chay-dua-hoan-thanh-chuan-hoa-du-lieu-post875362.html
46. Ta TV. Sinh viên Việt Nam với việc sử dụng trí tuệ nhân tạo: Thực trạng, nhận thức và định hướng [Vietnamese students and the use of artificial intelligence: Practice, awareness and orientation]. Tạp chí Quản lý nhà nước [State Management Review], 2025. https://www.quanlynhanuoc.vn/2025/05/27/sinh-vien-viet-nam-voi-viec-su-dung-tri-tue-nhan-tao-thuc-trang-nhan-thuc-va-dinh-huong/
47. Tien Phong. Cả nước có 95.198 giảng viên đại học, hơn 36% có trình độ tiến sĩ [Vietnam has 95,198 university lecturers, over 36% hold a doctorate]. Tien Phong Newspaper, October 1, 2026. https://tienphong.vn/ca-nuoc-co-95198-giang-vien-dai-hoc-hon-36-co-trinh-do-tien-si-post1881478.tpo
48. Tornatzky LG, Fleischer M. The processes of technological innovation. Lexington Books, 1990.
49. UNESCO. Global education monitoring report 2023: Technology in education: A tool on whose terms? UNESCO, 2023. Doi: https://doi.org/10.54676/UZQV8501
50. Vial G. Understanding digital transformation: A review and a research agenda. The Journal of Strategic Information Systems. 2019; 28(2):118-144. Doi: https://doi.org/10.1016/j.jsis.2019.01.003
51. Vietnamplus. Bộ GD-ĐT ban hành quy định về sử dụng AI trong đào tạo, nghiên cứu khoa học [MOET issues rules on the use of AI in training and research]. VietnamPlus, 2026. https://www.vietnamplus.vn/bo-gd-dt-ban-hanh-quy-dinh-ve-su-dung-ai-trong-dao-tao-nghien-cuu-khoa-hoc-post1121996.vnp
52. VnEconomy. Ransomware gây thiệt hại hơn 10 triệu USD tại Việt Nam nửa đầu 2025 [Ransomware caused over 10 million USD in damage in Vietnam in H1 2025], 2025. https://vneconomy.vn/ransomware-gay-thiet-hai-hon-10-trieu-usd-tai-viet-nam-nua-dau-2025.htm
53. Vuorikari R, Kluzer S, Punie Y. DigComp 2.2: The digital competence framework for citizens. Publications Office of the European Union, 2022. Doi: https://doi.org/10.2760/115376
54. Zawacki-Richter O, Marín VI, Bond M, Gouverneur F. Systematic review of research on artificial intelligence applications in higher education: Where are the educators? International Journal of Educational Technology in Higher Education. 2019; 16:39. Doi: https://doi.org/10.1186/s41239-019-0171-0