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From Technological Determinism to Technological Impetus: A Strategic Roadmap for Reconfiguring University Culture in the Age of Artificial Intelligence

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Abstract

Artificial intelligence, as a principal driver of transformation in recent years and those to come, has redefined the role of universities in global competition and in the provision of scientific and educational services. Aiming to design a strategic roadmap for reconfiguring university culture in this context, this article examines changes in norms, roles, and customary practices in higher education. This transformation rests on three pillars—transformed leadership, faculty readiness, and access to advanced infrastructures—and has been reinforced by the post COVID acceleration of digital transformation in higher education. Methodologically, the study adopts a conceptual synthesis approach and proposes a staged model to explain cultural transformation. The model comprises three successive stages: first, an organizational flexibility stage that emphasizes local meanings and actor networks; second, an institutional consolidation stage in which rules and procedures are stabilized; and third, a technological impetus stage in which data driven infrastructures and emerging information architectures play a decisive role in shaping organizational culture. Across all stages, mediating and moderating mechanisms—including transparent data governance, algorithmic accountability, enhanced digital competence and literacy among faculty members, and equitable access—play a pivotal role. Building on this model, the article proposes an operational, stage based roadmap for policymaking, implementation, and evaluation, organized around three axes: strengthening transparent and effective data governance, enhancing the digital competence of all university actors, and reducing inequalities in access to infrastructures and opportunities in Iranian

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universities. The roadmap is designed to support the responsible adoption of AI while preventing the reproduction of existing educational inequalities and fostering a culture of accountability, equity, and lifelong learning.

Keywords: Technological Impetus; University Culture; Data Governance; Data-Driven Decision-Making; Transparency; Digital Competence; Educational Equity.

1. Introduction and Problem Statement

Human history has witnessed profound technological transformations, each imparting a new face to societies and scientific institutions. The four industrial revolutions, each with its distinct characteristics, not only revolutionized economic and social structures but also redefined the roles and missions of universities.

While previous industrial revolutions primarily focused on mechanization and mass production, the Fourth Industrial Revolution, centered on artificial intelligence, has transformed the nature of cognition, decision-making, and knowledge production in universities (Hilbert, 2022; Schwab, 2016).

Artificial intelligence, as the central axis of the Fourth Industrial Revolution, has not merely provided universities with technological tools but has also transformed how interaction, learning, research, and decision-making occur within these institutions. Studies indicate that leading global universities, such as MIT and Stanford University, have integrated comprehensive AI programs across all educational and research levels, with over 75 percent of their curricula aimed at developing components related to the acquisition of AI skills (Zwetsloot, 2021).

Universities, more than any other institution, are cultural entities; they are not only sites for the production and transmission of knowledge but also arenas for the formation and reproduction of social values and norms. The introduction of AI into universities is not merely a technological shift; rather, it is a "profound cultural transformation" that impacts all domains of academic life (EDUCAUSE, 2024).

In the era of AI, academic culture is no longer a fixed set of norms and values but a dynamic and interactive system that must keep pace with technological impetus. This necessitates the design of a strategic roadmap that encompasses not only appropriate policymaking but also operational implementation strategies and continuous evaluation mechanisms. As a transformative technology, AI is profoundly altering the role of universities in a knowledge-driven society. Unlike previous transformations that predominantly focused on structural and educational changes, AI simultaneously affects all levels—from learning and teaching to research, management, and governance.

This transformation has prompted leading global universities to place AI at the heart of their educational strategies. In these institutions, AI systems are utilized to personalize learning, automate assessments, and adapt course content to individual student needs (Hart & Mok, 2023). The use of machine learning algorithms for analyzing large datasets, automating experimental processes, and optimizing research methodologies has enabled scientists to focus on more complex problems. Studies show that over 65 percent of top-tier universities worldwide have launched specialized programs for AI-related research (MacGregor, 2023).

Despite this transformation and the growing attention universities are paying to AI, much of the existing scientific literature still focuses on the technical and economic aspects of AI. Its cultural consequences—particularly how shared meanings,

fundamental beliefs, and collective behaviors change—remain comparatively underexplored. This gap highlights the necessity of formulating an analytical framework to comprehend these impacts.

In this study, "cultural impacts" refer to profound changes in the ways stakeholders think, feel, and act—ranging from the transformation of fundamental values and beliefs to the reconfiguration of social norms, power relations, and collective identity. This understanding clarifies the essential distinction between "cultural transformation" and "technological change," enabling us to track the transformation of meanings and practices beyond the mere deployment of tools.

On the other hand, the new generation of generative AI, based on large language models such as ChatGPT and Claude, possesses the capability to generate text, code, images, and more, and is increasingly being utilized in teaching, research, and problem-solving within higher education. The outcome of this trend is the emergence of cultural transformations across multiple domains of academic culture; domains that are conceptualized within the core functions of higher education (for instance, from learning and teaching to research and innovation) (Carnegie Learning, 2020).

Against this backdrop, the central problem guiding this study is as follows: as the penetration and use of AI in universities accelerate, how can its cultural consequences be systematically analyzed to provide an analytical framework for academic policymaking and action? This study addresses this gap and offers an analytical framework for understanding these cultural impacts. Furthermore, the article pays specific attention to the Iranian context, where local needs (including the level of awareness, technological access, and cultural prerequisites) must be explicitly incorporated into the design of the transformation pathway.

In terms of innovation, this study differs from earlier work that largely conceptualizes digital transformation as a technological-structural process and focuses on the adoption of tools (e.g., technology acceptance models). Its contribution lies in shifting attention from the deployment of tools to the reconfiguration of deep cultural layers (inspired by Schein's model). The proposed three-stage model does not merely describe successive phases of system deployment; rather, it shows how a university can move from a state of technological determinism—where technology dictates culture—to a state of conscious technological impetus, in which culture guides the use of technology. In addition, by integrating institutional theory with the concept of technological impetus, the study provides a framework that, for the first time, illuminates the tensions between traditional academic values and the algorithmic logic of AI.

2. Research Objectives and Questions

Following the problem statement and the elucidation of the conceptual context, this research—with the ultimate goal of formulating a stage-based roadmap for policymaking, implementation, and the responsible adoption of artificial intelligence in

Iranian universities—focuses on three interconnected axes: first, transparent and effective data governance; second, enhancing the digital competence and digital literacy of actors; and third, addressing the reduction of access gaps. Accordingly, the objectives of this article are as follows:

- Establishing and elucidating transparent data governance frameworks: To enhance transparency, algorithmic accountability, and institutional trust in universities. This objective entails designing clear rules for data collection, retention, processing, and application, as well as independent oversight mechanisms.
- Enhancing digital competence and digital literacy: Among all academic actors (faculty, students, and staff), aimed at empowering them for the effective and ethical use of AI tools in learning, research, and management (Digital Transformation Skills, 2023).
- Ensuring access equity: Reducing geographical and institutional gaps in access to infrastructures and opportunities and ensuring that improvements in technological capacity do not lead to the reproduction of educational inequalities (MacGregor, 2023).

Taken together, these objectives form an integrated framework that seeks to advance privacy protection, mitigate algorithmic bias, and strengthen a culture of lifelong learning, in the context of the growing penetration and use of AI across the functions and services of higher education.

In alignment with the aforementioned objectives, this study seeks to answer the following questions:

A. How can academic culture be reconfigured for the responsible adoption and integration of AI?

B. What policies and operational strategies can facilitate cultural transformation at the levels of teaching, research, and university management?

C. How can existing barriers be overcome by relying on transparent data governance, the enhancement of digital competence, and the assurance of equitable access?

3. Theoretical Framework and Key Concepts

A. Theoretical Framework

To analyze the cultural impacts of artificial intelligence in universities, a theoretical framework based on a three-layered model has been employed. In this model, culture is understood at three levels: "artifacts and visible signs," "espoused values and norms," and "unwritten basic assumptions." A key assumption of this framework is that technological change is considerably easier than deep cultural change: the mere addition of new tools does not necessarily transform fundamental values and assumptions unless conscious and targeted interventions are made in the underlying cultural layers.

This framework serves as an analytical lens to demonstrate which observed changes in universities are merely changes in artifacts, and which are accompanied by a transformation of fundamental values and assumptions. Particularly in the domain of teaching and learning, evidence indicates that AI, in addition to transforming tools, has imparted new meaning to the roles of the professor and the student as well as the nature of learning, thereby also affecting the deep layers of classroom culture.

The theoretical framework of this article is built upon a conceptual synthesis of institutional theory and the theory of technological disruption. The proposed conceptual model entails three successive stages, including:

- Stage One: Organizational Flexibility. In this stage, universities must provide a space for trial and error, the network participation of various actors, and the local interpretation of novel technologies (Gkrimpizi, Peristeras, & Magnisalis, 2023). Emphasizing local meanings and actor networks, this stage paves the way for the initial adoption of AI.
- Stage Two: Institutional Consolidation. Following initial testing, institutional rules and procedures must be formulated to ensure the sustainability of the transformation. This includes formal policymaking, the standardization of processes, and the establishment of governance structures (Pisica et al., 2023).
- Stage Three: Technological Impetus. In this stage, data-driven infrastructures and emerging information architectures play a decisive role in shaping organizational culture. AI algorithms become the primary decision-making tools, and academic culture shifts from traditional determinism toward data-driven dynamism (Kumar & Raman, 2022).

Across all the aforementioned stages, three fundamental mediating and moderating mechanisms operate:

Transparent Data Governance: Ensuring how data is collected, stored, processed, and utilized in decision-making. This transparency is essential for maintaining the trust of academic actors (Zeide, 2019).

Enhancing Digital Competence: All academic actors—from faculty to students and administrative staff—must be equipped with the necessary skills to interact effectively with AI technologies (Digital Transformation Skills, 2023).

Ensuring Access Equity: Reducing gaps in access to technologies among different universities and ensuring that all students, regardless of their geographical or economic situation, have equitable opportunities to benefit from AI and its tools (MacGregor, 2023).

B. Key Concepts

The most significant concepts addressed in this study are examined below:

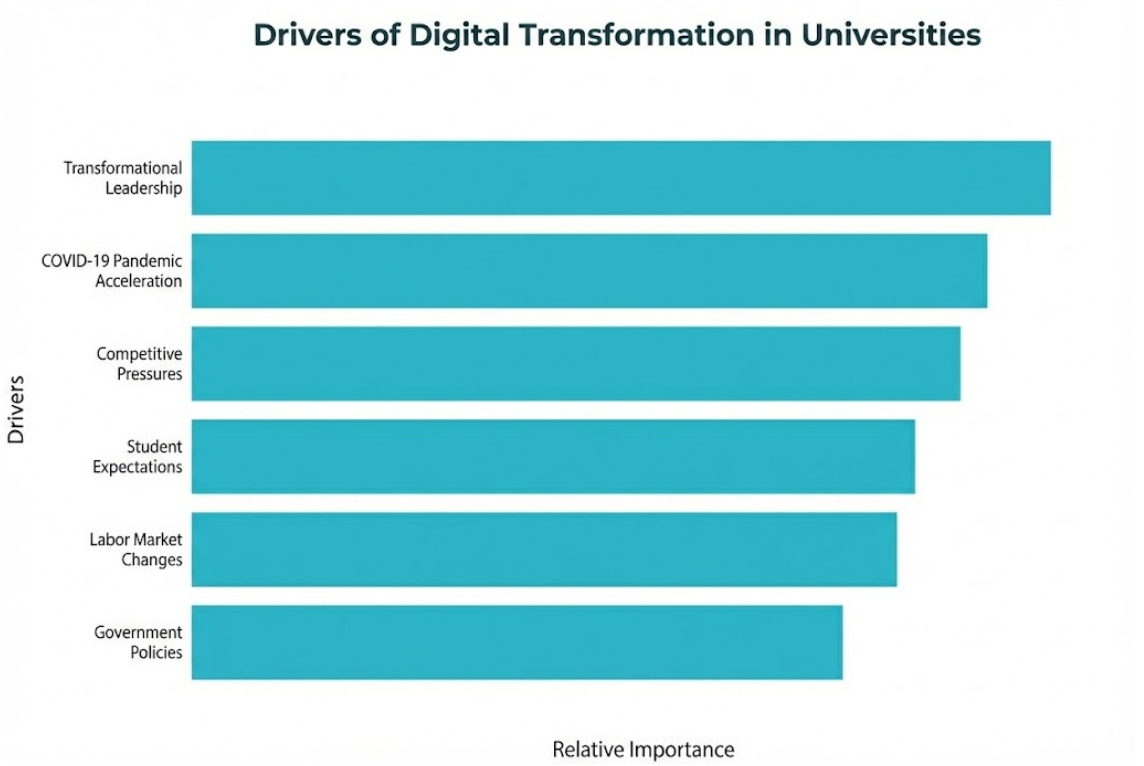
B.1. Digital Transformation: Digital transformation in higher education extends beyond the mere adoption of technological tools. This transformation entails a

fundamental metamorphosis in the methods of teaching, learning, research, and university management. The digital transformation of universities can be categorized into four primary dimensions, each requiring distinct and specialized strategies:

- Technological Dimension: This dimension encompasses the hardware and software infrastructures that enable the provision of digital services. Learning Management Systems (LMS), cloud platforms, high-speed internet networks, online collaboration tools, and cybersecurity infrastructure all fall into this category. Studies indicate that universities that have invested in technological infrastructures have demonstrated greater resilience and capability in facing unforeseen crises (Gkrimpizi, Peristeras, & Magnisalis, 2023).
- Organizational Dimension: Digital transformation necessitates a revision of organizational structures, administrative processes, and governance models. This includes the establishment of specialized information technology units, the formulation of digital policies, the definition of new roles and responsibilities, and the creation of coordination mechanisms among various departments. Without organizational transformation, advanced technologies cannot yield the desired outcomes (Digital Transformation Skills, 2023).
- Educational Dimension: This dimension relates to the manner in which curricula are designed, delivered, and evaluated. Personalized learning, blended learning, Massive Open Online Courses (MOOCs), the use of virtual and augmented reality in education, and continuous assessment through digital tools are key components of this dimension. Research shows that universities utilizing blended learning approaches have reported higher student satisfaction and better learning outcomes (Alagbe, 2022).
- Cultural Dimension: Perhaps the most critical, yet most challenging, dimension is cultural transformation. This dimension involves altering the attitudes, beliefs, values, and behaviors of the members of the academic community. Embracing change, continuous learning, interdisciplinary collaboration, flexibility, and a readiness for trial and error are considered essential characteristics of a digital culture (Robert, 2024).

According to the conducted reviews, the most important factors driving digital transformation in universities, as illustrated in Figure 1 and detailed below, are:

Figure 1. Drivers of digital transformation in universities. Sources: (Gkrimpizi, Peristeras, & Magnisalis, 2023; MacGregor, 2023; Alenezi, 2021).



- Transformational Leadership: Numerous studies have shown that effective leadership is the most critical success factor in digital transformation. Leaders who possess a clear vision, allocate sufficient resources, and promote a culture of innovation can guide their universities toward digital transformation (MacGregor, 2023).
- Competitive Pressures: Global competition to attract students, secure funding, and improve rankings drives universities toward digital innovation. Universities that lag behind in digital transformation run the risk of losing their standing.
- Student Expectations: The new generation of students (Generation Z and Alpha), having grown up with digital technologies, expect universities to utilize these very same technologies. They seek interactive, personalized, and flexible learning experiences (Thornton, 2020).
- Labor Market Changes: The emerging needs of the labor market, which emphasize digital skills, critical thinking, and creative problem-solving, compel universities to transform their curricula and prepare students for a digital future.
- Government Policies: Many governments have formulated national programs for the digital transformation of higher education, driving universities toward digitalization through funding, laws, and regulations (Digital Transformation Skills, 2023).

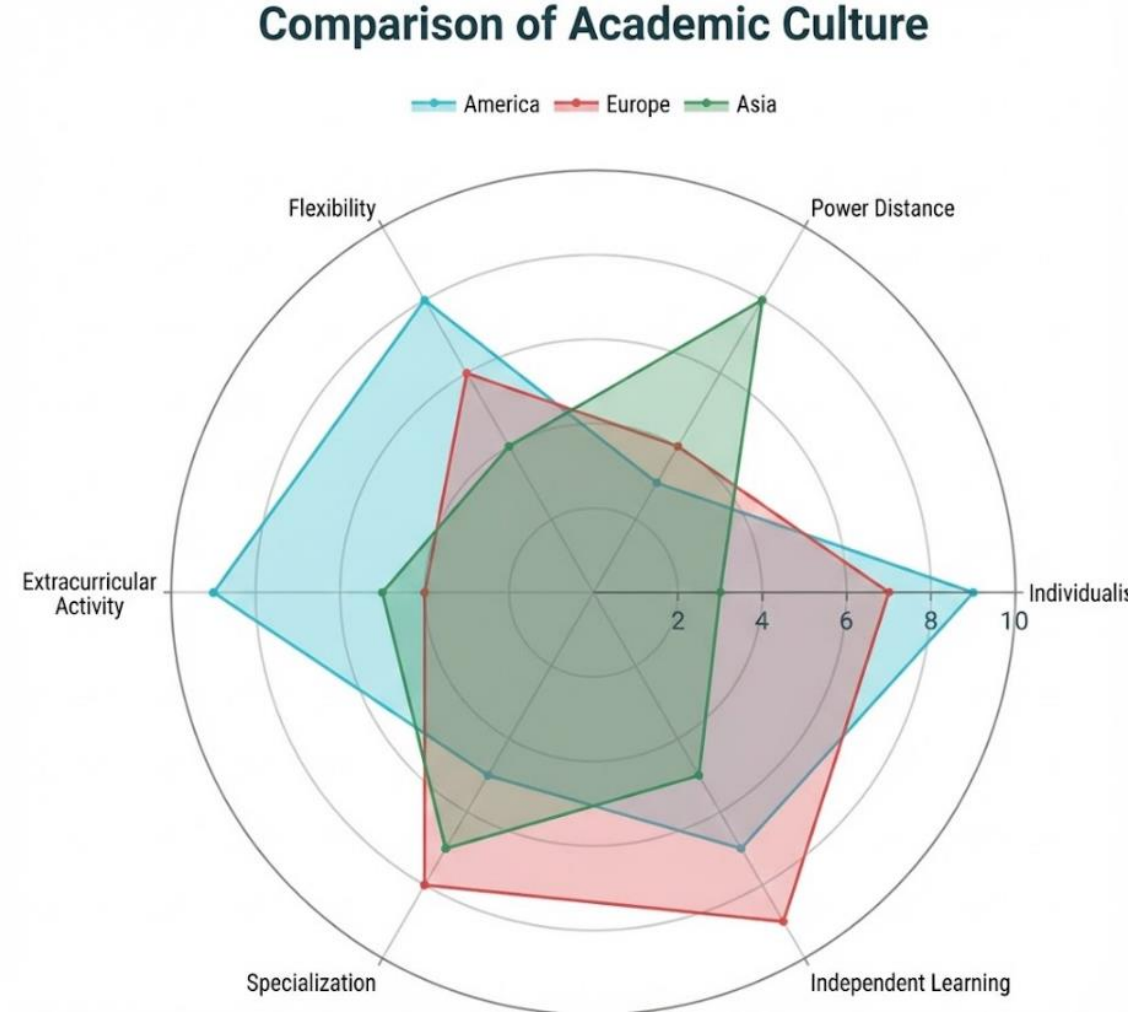
B.2. Academic Culture: Academic culture, as one of the fundamental concepts in

higher education studies, is a complex and multi-layered set of shared norms, values, and beliefs that have formed among the members of the academic community, influencing their ways of thinking, feeling, and acting (Schein, 2010; Trowler, 2008). This concept extends beyond formal and organizational structures, referring to deep patterns that are reproduced over time through the daily interactions of faculty, students, and staff, thereby shaping the collective identity of the university (Marginson, 2016).

Based on a synthesis of numerous definitions, academic culture can be considered a dynamic and historical set of shared patterns of meanings, values, and underlying beliefs that the university and its members produce and reproduce in their daily interactions (Trowler, 2008; Marginson, 2016). These patterns manifest both at the formal level (organizational systems and structures) and the informal level (social norms and implicit assumptions), influencing the behavior, decision-making, and interactions of university members. This culture varies based on the historical tradition and the cultural, political, and economic context of each university; it adapts to the external environment and changes as a result of technological transformations and social tensions (Stensaker, 2015; Readings, 1996). Academic culture is not a static reality but rather a continuous and dynamic process that is constantly taking shape and being redefined through meaningful interactions among various actors (faculty, students, administrative staff, and the external community) (Trowler, 2008).

Accordingly, academic culture varies and is diverse considering the social contexts and backgrounds of each country and geographical region. Refer to Figure 2.

Figure 2. Comparison of academic culture dimensions across three global regions. Sources: (Adapted from Beyond the States, 2025; Loh & Teo, 2017; Tierney, 1988).



As illustrated in Figure 2, the relative weight of the components shaping academic culture—comprising individualism, power distance, independent learning, specialization, cross-sectoral activity, and flexibility—across three regional contexts paves the way for distinct patterns of academic culture.

Considering the points discussed, the dimensions of academic culture in this article correspond to eight domains that are being transformed by artificial intelligence. These domains are examined in the table below.

Table 1. The Impact of AI on Academic Culture

Domain	Description of Impact	Main Challenges
1. Learning and Teaching	Personalization of learning, automated assessment, and content adaptation	Faculty resistance and ethical concerns
2. Research	Big data analysis and automation of experiments	Reduction of the human role and the issue of reproducibility
3. University Management and Administration	Automation of processes and data-driven decision-making	Algorithmic transparency and conflict of interest
4. Student Activities	Identifying student needs and predicting their success and failure	Privacy and data security
5. University-Society Connection	Responding to societal needs and increasing social impact	Local relevance and localization
6. Innovation and Entrepreneurship	Accelerating the development cycle and identifying new opportunities	The issue of intellectual property
7. Ethical and Legal Issues	Defining new standards for the use of algorithms and machine learning	Incompatibility of laws and regulations
8. Staff Professional Development	Training new skills and adapting to market changes	Shortage of educational resources and specialists

Therefore, artificial intelligence is not merely a tool for improving efficiency; rather, it exerts profound impacts on academic culture across all dimensions—from learning to ethics and accountability. This implies that the reconfiguration of academic culture necessitates a systemic and coordinated approach. A study of 250 top universities worldwide revealed that over 78 percent of the universities successful in utilizing AI had initiated cultural transformation prior to their technological investment. This transformation involved fostering a positive attitude toward change, enhancing digital competencies, and establishing transparent data governance (Alenezi, 2021).

In contrast, Iranian universities face numerous structural and cultural challenges. Gaps in access to technological infrastructures between central and peripheral universities, resistance from academic staff toward adopting new tools, and the lack of coherent policies for data governance and the utilization of AI tools are among the most significant barriers. This situation has caused Iranian universities to lag significantly behind their regional counterparts in global AI readiness rankings for the Middle East and Southwest Asia (Asghari, 2021).

4. Research Methodology

This research has a "theoretical-analytical" nature and employs conceptual synthesis to answer the research questions; meaning that, relying on existing scientific literature regarding academic culture and the consequences of artificial intelligence, and by integrating institutionalist perspectives with the theory of technological impetus, the three-stage model of the article is constructed and validated. Accordingly, this study is distinct from a narrative review—which merely describes and summarizes sources—because it utilizes a "conceptual synthesis" approach to construct a novel model. In conceptual synthesis, the components of various theories (institutionalism and technological impetus) are detached from their original contexts and combined into a new arrangement to elucidate an emergent phenomenon (AI culture).

The data corpus of the research consists of secondary sources, including:

A. Scientific texts and authoritative reports in the field of academic culture and artificial intelligence, the working definition of academic culture provided in this article, and interpretive evidence from the experiences of universities and professional institutions.

B. The literature review was conducted purposively, focusing on the domains formulated in the text of the article as the primary arenas of academic culture (including learning and teaching, research and innovation, management, ethics, etc.). For each domain, the reports and practical examples mentioned in the text were evaluated as secondary evidence.

The process of analyzing the collected data in this article was carried out according to the table and figure presented below:

Table 2. Research Data Analysis Process

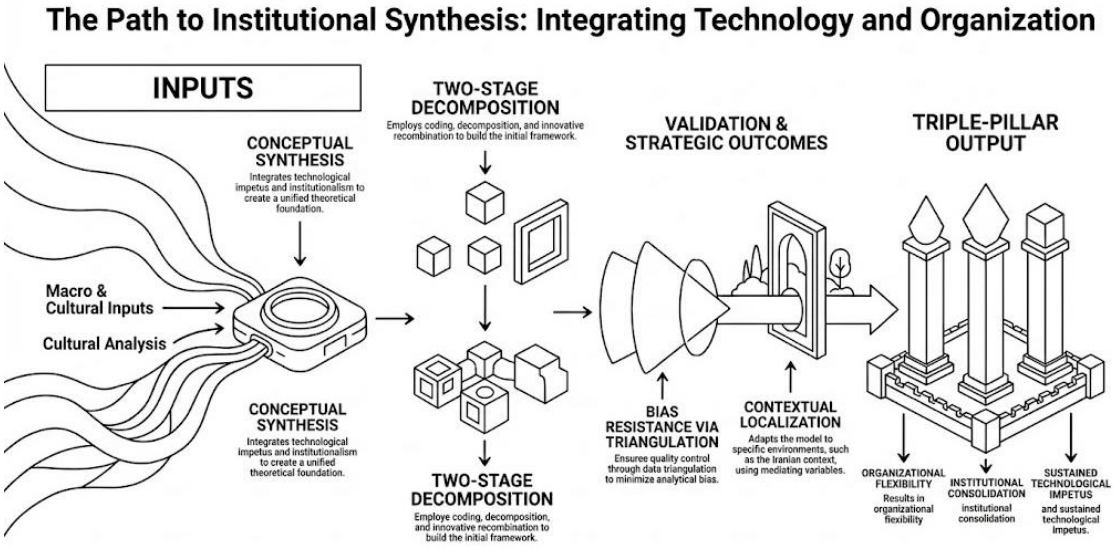
Stage	Description of Operational Actions	Research Outcome
1. Purposive Data Collection	Searching for and selecting scientific sources (2020-2025) and reports from reference institutions (such as EDUCAUSE, EUA), focusing on the eight domains of academic culture.	Formation of the research data corpus (secondary sources).
2. Thematic Analysis	Extracting initial codes and categorizing concepts such as "data governance," "digital competence," and "access equity," and linking them to the three layers of culture.	Identifying policy components and drivers of transformation.
3. Conceptual Synthesis	Integrating institutionalist perspectives with the theory of technological impetus to elucidate the transition from "instrumental change" to "cultural transformation."	Designing the three-stage model (flexibility, consolidation, impetus).
4. Validation	Utilizing the triangulation technique through the cross-referencing of theoretical literature, policy documents, and field case studies.	Enhancing validity and ensuring the convergence of evidence.

To enhance validity, triangulation was utilized: cross-referencing scientific literature, policy documents, and case studies reported in the text. This procedure makes the arguments more resilient against source bias and provides greater assurance regarding the convergence of evidence.

Although quantitative tools for measuring culture (such as questionnaire-based tools and culture structure assessments) are introduced in related scientific literature, this research, dictated by its theoretical objective, relies on documentary analysis and conceptual synthesis, utilizing quantitative tools merely as reference sources.

In a broader view, the process by which this article leverages the theoretical foundations of the research methodology is represented in the figure below:

Figure 3. The process of utilizing theoretical foundations and research methodology.



5. Findings

A. Reconfiguring Academic Culture for the Responsible Adoption of AI

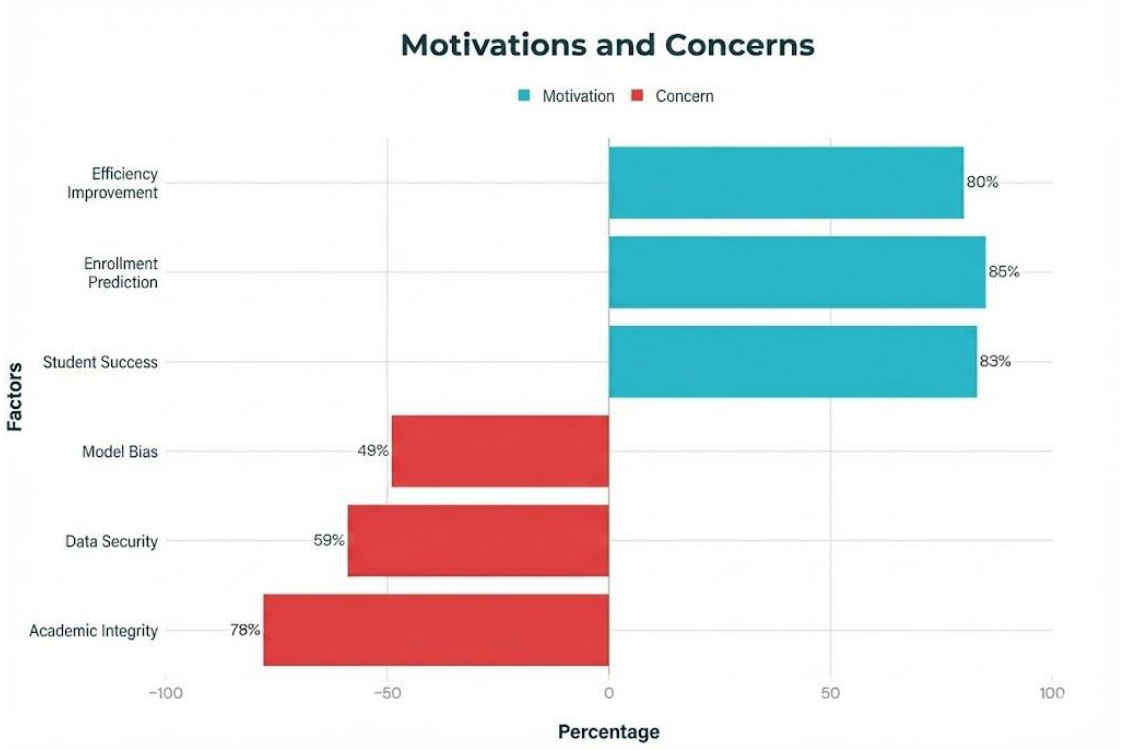
The first finding relates to "governance and accountability": the dispersal of responsibility in the deployment of intelligent systems is palpable and highly risky; where "no one is fully responsible," practically "no one is accountable." Therefore, the reconfiguration of culture must commence with the explicit determination of responsibilities, accountability pathways, and the transparency of decisions (EDUCAUSE, 2025; Akinwumi, 2025).

The second theme concerns learner autonomy, which requires prior notification and the right to appeal: students must know when an intelligent system is making a decision, what criteria it uses, and how that decision can be challenged. This right to awareness and appeal constitutes the pillar of a responsible academic culture (Inspera, 2025).

The third theme concerns equity and the prevention of self-fulfilling discrimination: if unequal historical data is directly transformed into predictive models, the subsequent labeling and reduction of support for certain groups will reproduce inequality.

Reconfiguring the culture requires bias monitoring and consequential compensation mechanisms (DCU, 2025; Indiana Law Journal, 2025).

Figure 4. Motivations and concerns of AI adoption in higher education. Sources: (Ellucian, 2024; HEPI, 2025).



As illustrated in Figure 4, the penetration and expansion of AI in universities simultaneously give rise to motivations—such as improving efficiency, predicting outcomes, and student success—and concerns—such as model bias, data security, and academic integrity.

The fourth theme emphasizes the simultaneous attention to the culture of adoption, the definition of fundamental values, and the development of human capacity in the expansion of AI within universities. The culture of "acceptance," guiding values (transparency, equity, ethics), and the empowerment of all actors (including faculty, students, and staff) must advance concurrently so that the change transcends the mere level of tools.

Three continuous policy drivers (transparent data governance, digital competence, and access equity) act as a gateway: on the one hand, clear criteria for data collection and application build trust and transparency; on the other hand, digital literacy and skills elevate the capacity for interpretation and meaningful use; and ultimately, equitable access prevents overreliance on data-driven indicators from turning into symbolic inequality.

The data-driven cultural transition is accompanied by a "power shift"; meaning that

as decisions become more reliant on data, the pattern of governance and the influence of groups change; those possessing data literacy gain more power. If this transformation is not accompanied by transparency and accountability, it will lead to a new cultural gap (Liaison Education, 2025; Watermark, 2025; EDUCAUSE, 2024).

Proactive investment in digital competence and literacy is a prerequisite for effective policymaking on AI development in universities: the evidence reviewed indicates that most of the success in deploying and using intelligent systems depends on human and cultural readiness, not merely on infrastructure (Alenezi, 2021).

A participatory field example (an air pollution monitoring project) demonstrates that with community involvement, the role of the university shifts from "building for the community" to "building with the community"; this shift signifies the democratization of knowledge and the deepening of cultural layers (NCBI, 2022).

Comparative policy inputs also corroborate this trajectory: the diversity of university policies and the demand for a national strategy for literacy and equity in the deployment of intelligent systems signify the necessity of multi-level (national-university) coordination (Policy Options, 2025; European Journal of Education, 2025).

Considering the points discussed, the reconfiguration of academic culture becomes sustainable only when accountability and transparency, the stakeholders' right to awareness and appeal, bias monitoring, the meaningful participation of actors, investment in digital competence and literacy, and the guarantee of equal access advance simultaneously and in conjunction with one another. In the following section, the findings related to "operational strategies and policies" are reported.

B. Strategies and Operational Policies for Facilitating Cultural Transformation

Various universities worldwide, considering their specific conditions, have chosen different paths for implementing artificial intelligence. North American universities have predominantly focused on market-driven innovation and collaboration with the private sector. European universities pay greater attention to ethical issues, privacy, and social justice. Asian universities, meanwhile, are focused on the rapid development of infrastructure and mass education (European University Association, 2023; Zwetsloot et al., 2019).

This diversity of approaches indicates that there is no single, universal model for implementing AI in higher education. Rather, each university and country must design a unique path tailored to its own resources, priorities, and values. Simultaneously, however, there are fundamental principles common to all successful endeavors: transparency in decision-making, broad participation of actors, investment in human development, and a commitment to ethical values (Pisica et al., 2023).

Considering this crucial point, strategies and operational policies for achieving cultural readiness in the university have been formulated in three continuous steps to enable the transition from the "tool level" to "sustainable cultural transformation." Findings demonstrated that if "tool deployment" proceeds in isolation—without

transparent data governance, the enhancement of digital competence, and the guarantee of access equity—it remains at the level of "artifacts" and fails to achieve the transformation of cultural values and assumptions. Therefore, the three aforementioned drivers must be implemented simultaneously and in conjunction with one another to propel academic culture toward the responsible adoption of AI (EDUCAUSE, 2025; Pisica et al., 2023; Zeide, 2019).

Furthermore, the data-driven transition entails a shift in organizational power; groups possessing data literacy gain greater influence, and if transparency and accountability are not reinforced, a new cultural gap will emerge (Liaison Edu, 2025; Watermark, 2025).

Ultimately, the right to awareness and the right to appeal regarding the decisions of intelligent systems, acting as the "procedural rights" of stakeholders, constitute the pillar of public trust and the prerequisite for the cultural legitimacy of this transition (Inspera, 2025).

Based on the research findings, policy implications can be presented at three levels, including:

A) National Policy Level

Formulating reference frameworks for data governance, transparency, and accountability, alongside a targeted support program for underprivileged universities (infrastructure, equipment, workforce training) in order to reduce the access gap. This action is a prerequisite for equal opportunities in the responsible adoption of AI (Pisica et al., 2023; Policy Options/NAICU, 2025; European Journal of Education, 2025).

B) University Level

Establishing a data governance and ethics committee, launching a "registry of intelligent applications," determining accountability pathways, and publishing regular reports on impacts and risks; as well as anticipating appeal mechanisms and independent reviews for sensitive decisions. This institutional package provides the foundation for trust and transparency (Inspera, 2025).

Deploying a bias auditing process and periodic reporting, coupled with compensatory tools to mitigate consequential discrimination in learning and assessment systems (Indiana Law Journal, 2025; DCU, 2025).

Continuous professional development programs for faculty and staff focusing on course design, evaluation, and data-driven research, as well as strengthening university-community participation in technological decision-making (EDUCAUSE, 2025).

C) Actor Level (Faculty, Students, Staff)

Providing basic and advanced digital literacy training in a phased and comprehensive manner, with periodic assessment of competencies; evidence shows that proactive investment in human empowerment is the primary factor in the successful deployment

of intelligent systems (Digital Transformation Skills, 2023; Alenezi, 2021).

Ensuring equitable access for all students and professors to the necessary tools and support so that data-centrism does not result in symbolic inequality (Pisica et al., 2023).

6. Conclusion

This study shows that the intelligent adoption of technology in universities, if confined to the deployment of tools, remains at the level of artifacts and does not transform the fundamental values and assumptions of academic culture. A sustainable cultural transition occurs only when three key drivers—transparent data governance, enhanced digital competence, and equitable access—advance simultaneously and synergistically (Pisica et al., 2023; EDUCAUSE, 2025).

The theoretical contribution of the article is the formulation of a three-stage model for cultural transformation: the organizational flexibility stage, the institutional consolidation stage, and the technological impetus stage. This model, derived from a conceptual synthesis of the literature and secondary evidence, indicates that moving from superficial change to cultural transformation requires step-by-step planning and institutional support (Gkrimpizi, Peristeras, & Magnisalis, 2023).

From a governance perspective, the results underscore that the right to awareness and the right to appeal regarding decisions made by intelligent systems must be institutionalized in university policies. Transparency in decision-making pathways and the possibility of independent review form the foundation of public trust and the cultural legitimacy of this transition (Inspera, 2025; Zeide, 2019). At the same time, the data-driven transition can shift organizational power: groups with stronger data literacy gain greater influence, and in the absence of robust accountability mechanisms, a new cultural gap may emerge. Regular reporting, bias auditing, and the clear designation of responsibilities should therefore be integral components of every university's policy package (Liaison Education, 2025; Watermark Insights, 2025).

At the national level, aligning macro-policies with university programs to reduce inequalities in access is a prerequisite for cultural equity in technology adoption. The experiences and policy documents surveyed in this article highlight the need for reference frameworks and targeted support for under-resourced universities (European Journal of Education, 2025; Policy Options, 2025; NAICU, 2024). In terms of human capacity, the evidence suggests that proactive and continuous investment in the digital competence of professors, students, and staff is more decisive for the successful deployment of intelligent systems than any other factor (Digital Transformation Skills, 2023).

Taken together, these analyses suggest that a three-part package of transparent data governance, digital competence, and equitable access, when implemented simultaneously across the national, organizational, and individual levels, can move universities from the mere deployment of tools to sustainable cultural transformation; otherwise, the risk of eroding trust and reproducing inequalities remains high (Forbes,

2025; Watermark, 2025).

7. Suggestions and Recommendations

To transition from mere "tool deployment" to "sustainable cultural transformation," the following recommendations have been formulated across three time horizons, as detailed below:

Table 3. Recommendations

Relationship to Finding / Model Stage	Operational Recommendation	Time Horizon
Response to the finding of "dispersal of responsibility" (Section 5-A)	Establishing an ethics working group and a registry system for monitoring and evaluating platforms	**Short-term**
Prerequisite for the "organizational flexibility" stage (Model)	Basic digital literacy training	**Short-term**
Primary tool for the "institutional consolidation" stage (Model)	Formulating a comprehensive data governance framework	**Medium-term**
Solution to the "equity and discrimination" challenge (Section 5-A)	Algorithmic bias monitoring system	**Medium-term**
Stabilization of the "technological impetus" stage (Model)	Alignment with transnational standards	**Long-term**

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Resources

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