



Cultivating university data culture in the age of artificial intelligence: a conceptual framework and critical reflections

Yunjie Tang

DOI: <https://doi.org/10.47989/ir30iConf47293>

Abstract

Introduction. This paper examines the transformation of university data culture in the age of AI. AI and big data are reshaping how universities manage data, make decisions, and interact with stakeholders, raising both opportunities and challenges.

Method. The study explores the concept of university data culture, proposing a four-layer conceptual framework: the data layer, user layer, organizational layer, and societal layer.

Analysis. The four-layer framework captures the lifecycle of data, stakeholder behaviours and competencies, institutional policies, and societal influences. It emphasizes how AI transforms data usage and governance within universities, as well as the ethical and social considerations that arise.

Results. AI is driving a shift from traditional data management to structured data governance, fostering greater data-informed decision-making, and encouraging bottom-up participation among faculty and students. However, challenges related to ethics, privacy, and inequality persist.

Conclusion. The transformation of university data culture is not just technological but cultural, requiring universities to address ethical and social issues. Ensuring inclusivity, fairness, and responsibility in data practices is critical for fostering a balanced and sustainable data culture in higher education.

Introduction

Mayer-Schönberger (2013) describes the big data era as ‘a radical revolution in how we live, work, and think’, with big data and artificial intelligence (AI) increasingly becoming fundamental to human civilization and shaping a new cultural paradigm (Shi & Feng, 2017). As key drivers of knowledge production and dissemination, universities are now entering a data-driven era, harnessing these technologies to improve teaching, research, and administrative processes. This shift has given rise to a new data culture within higher education, which is transforming management practices, pedagogical approaches, and research methodologies. Universities are not only recognizing the practical uses of data but also its potential to fundamentally reshape organizational structures and decision-making processes. However, the integration of AI presents both opportunities and challenges, as it redefines how data is understood, analyzed, and applied.

This paper uses content analysis to investigate the evolution of university data culture in the AI era, focusing on the core components of this cultural shift and AI’s role in fostering it. Further, it draws on Bourdieu’s concept of cultural capital to critically examine the ethical, privacy, and social responsibility issues that arise, offering strategies to address these challenges.

From data culture to university data culture

As a relatively new and evolving concept, data culture lacks a clear consensus across academic and industrial communities. Different interpretations arise based on varying research objectives and contexts. Broadly, data culture can be seen through several lenses: as part of societal culture focused on data-driven (Zhang & Lu, 2020), logical decision-making (cultural subordination); as a key component of data competency (Kee-Luen et al., 2018), emphasizing evidence-based decision-making for value creation (data competency); and as a set of organizational practices and values related to data use, sharing, and management (Integration) (Liu & Tu, 2023; Oliver et al., 2023; Oliver et al., 2024). Oliver et al. (2024) proposed five core aspects of data culture: data-related skills and attitudes (such as literacy and fluency), data sharing behaviours, data reuse, data ethics and governance, and localized perspectives like data sovereignty. These components reflect the multifaceted nature of data culture, which operates across various societal, technical, and organizational levels.

Data culture in higher education has been defined in various ways. The Institute of Education Sciences views it as an institutional environment shaped by attitudes, values, and practices around data use, reflecting leadership’s vision (Hamilton et al., 2009). Powers and Henderson (2018) describe it as a collective consciousness that emphasizes consistency and reciprocity in data practices, aiming to democratize data for actionable insights that support the university’s mission. Similarly, Raffaghelli et al. (2020) highlight the contextual nature of data culture, shaped by institutional traditions and roles, and emphasize that it can be transformed by stakeholders to promote equity.

Drawing from these perspectives, university data culture can be defined as a collective awareness and institutional framework governing how data is processed, used, and managed. It encompasses the values, policies, and behaviors of administrators, faculty, and students, driving data-informed decision-making. University data culture emphasizes data democratization, ensuring broad access and transparency, and transforming data into actionable insights that support teaching, research, and administration. This shift is not only technological but cultural, fostering shared data practices across institutional roles.

Furthermore, university data culture is shaped by each institution’s socio-historical context. It requires critical reflection on ethical and social implications, such as privacy and fairness. By addressing these concerns, universities can reshape data practices to create more inclusive environments. Ultimately, university data culture drives intelligent transformation, enabling

universities to leverage AI and big data to enhance learning, research, and decision-making while adapting to evolving societal needs.

Proposed conceptual framework of university data culture

Powers and Henderson (2018) identify four core characteristics of university data culture: sharing data, valuing data, trusting data, and using data. These features provide a foundational framework for understanding the role of data in universities. However, university data culture extends beyond these traits, involving deeper institutional arrangements, technological infrastructure, and ethical considerations. To offer a more comprehensive analysis, this study builds upon the three-tier information culture framework proposed by Oliver and Foscarini (2021) and, in conjunction with the data culture dimensions identified by Oliver et al. (2024), develops an initial four-layer conceptual framework, as shown in Figure 1. The focus of each layer is briefly outlined as follows:

- **Data layer:** Emphasises the flow of information, including how data is created, preserved, and managed. This layer focuses on the technical and procedural aspects of data handling, ensuring that data lifecycle processes are efficient and effective.
- **User layer:** Concentrates on users' data literacy and behavioural norms, focusing on individuals' various behaviours in data practices. This includes enhancing data competencies among faculty, students, and administrators to foster a data-informed community.
- **Organizational layer:** Focuses on elements that are less apparent yet still identifiable, involving data-related regulations, policies, systems, and infrastructures. This layer addresses the formal structures and guidelines that govern data management and governance within the university.
- **Societal layer:** Addresses more macro and the most elusive aspects, rooted in the cultural beliefs embedded in the collective and individual subconscious. This is the deepest and most subtly perceived cultural level, encompassing personal and collective unconscious beliefs, attitudes, and ideologies about information, as well as data governance philosophies. It includes the ethical frameworks and societal norms that influence how data is perceived and utilised within the institution.

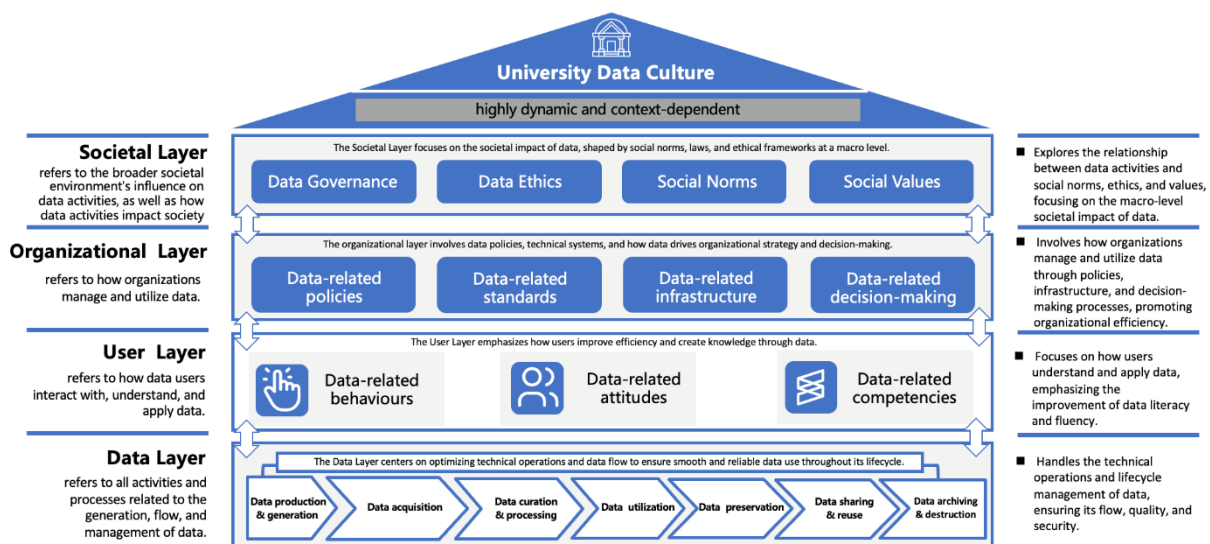


Figure 1. The proposes a four-layer conceptual framework

The data layer centers on the lifecycle of data within universities, encompassing its creation, collection, processing, management, sharing, and reuse. In higher education, data has emerged as a critical asset, with universities generating vast amounts of information from student learning behaviors, research activities, and administrative operations. To manage this data, many institutions have developed data management platforms and 'data lakes' that facilitate the storage and analysis of diverse data sources (Villegas-Ch et al., 2018). For example, student performance data can be consolidated to build early warning systems, allowing administrators to identify at-risk students and offer personalized academic support. This layer emphasizes optimizing data flow and ensuring its effective integration across various functions to enhance institutional performance.

The user layer focuses on the behaviours, attitudes, and competencies of key stakeholders, including faculty, students, and administrators in relation to data. Central to this layer are data literacy and fluency, which refer to users' ability to comprehend and effectively apply data in their teaching, research, and decision-making processes. Advanced users leverage data-sharing platforms and analytical tools to foster interdisciplinary research, driving innovation and promoting transparency across academic fields. This layer highlights the agency of users in shaping data usage within the university, as their familiarity with and engagement in data practices directly influence the institution's overall data culture.

The organizational layer addresses the role of universities as institutions, focusing on the policies, standards, infrastructure, and leadership that govern data usage. The development of a robust data culture within universities relies on clear policies that regulate the collection, storage, and use of data. For example, many universities implement stringent privacy protocols for learning management systems while simultaneously encouraging data sharing in research to promote collaboration. Leadership is a vital component of this layer; when university leaders advocate for data-driven decision-making and foster a supportive environment for data use, they significantly strengthen the institution's data culture (Powers & Henderson, 2018). This layer underscores the importance of organizational structure and governance in managing data effectively and ethically.

The societal layer considers broader societal factors, including data ethics, governance, and the influence of local and global contexts on university data culture (Deja, 2024). In the era of global data flows, universities must navigate complex issues such as data sovereignty (Lilley et al., 2024), privacy protection, and compliance with both local and international legal frameworks. For example, institutions engaged in cross-border research collaborations face challenges related to data sharing while adhering to national security concerns and privacy laws (Tang, 2024). This layer emphasizes the need to balance global data collaboration with respect for local legal, cultural, and ethical standards, ensuring that universities remain accountable to both societal and institutional norms.

Notably, university data culture is highly dynamic and context-dependent. Its form and function evolve with technological advancements, societal demands, and institutional developments. Different universities face unique challenges in constructing their data cultures: while technologically advanced institutions may more easily build comprehensive data cultures, those with limited resources may encounter greater technical and financial barriers. Therefore, building a data culture must account for specific contextual needs and constraints.

Transformation of university data culture in the AI era

The rise of AI is driving a transformation in university data culture that goes far beyond technical upgrades—it signals a fundamental shift in mindset. Universities are being called to undergo comprehensive, multidimensional changes to cultivate a data culture that aligns with their long-term goals. This transformation is not just about implementing new technologies; it requires creating an integrated environment rooted in collaboration and shared practices while also

reshaping organizational structures, management approaches, and cultural attitudes (Gagliardi et al., 2018).

One of the key shifts involves moving from '*data management*' to '*data governance*'. Traditional data management focuses primarily on storage and basic planning, but data governance requires a more structured approach that emphasizes role clarity, accountability, and institutionalized workflows. A shared governance system that involves all stakeholders is essential. For instance, universities have begun forming governance committees that integrate research and IT departments to oversee data sharing and ensure security and effective resource use.

Equally important is the transition from a '*reporting culture*' to a '*data-informed culture*'. In many institutions, data is still passively collected for performance reports, offering little value beyond compliance. A true data culture, however, sees faculty and administrators actively using data to drive decision-making and continuous improvement. A notable example is Georgia State University, which uses data analytics to identify academic risks and provide personalized support, significantly improving graduation rates.

Moreover, universities need to shift from a '*top-down*' to a '*bottom-up approach*'. While leadership support remains critical, broad participation by faculty and students is equally important to deeply embed a data-driven culture. One way to encourage this is by providing open-access data platforms and labs where faculty and students can engage in data analysis, fostering a grassroots data culture. This grassroots involvement can be a powerful catalyst for change (Zimpher, 2014).

The transition from '*single-driven*' to '*multi-stakeholder collaboration*' is crucial. Building a robust data culture requires partnerships not only within the institution but also with government, industry, and other external entities (Zhou, 2024). European universities, for example, have collaborated with tech companies to develop data tools that accelerate digital transformation and foster deeper integration with societal needs.

Furthermore, the focus should shift from simply building '*data infrastructure*' to creating a '*data ecosystem*'. While past efforts have centered on building data centers and servers, the rise of AI and big data calls for an ecosystem that facilitates data sharing and interdisciplinary collaboration (Vicente-Saez et al., 2020).

Finally, universities must evolve from '*traditional hierarchies*' to '*modern mechanisms*.' Bureaucratic structures are often too rigid to keep pace with the fast-evolving digital landscape. To adapt, universities should consider adopting flatter, more agile organizational models, such as establishing digital transformation offices or appointing chief digital officers (Davison et al., 2023).

Reflection: Data as a '*double-edged sword*' of new cultural capital

University data culture has undoubtedly fueled advancements in technology, management, and institutional practices. However, alongside this progress come ethical dilemmas, privacy concerns, and questions of social responsibility. Through the lens of Bourdieu's cultural capital theory, we see that when data transforms into a new form of capital, it deepens issues of inequality, power dynamics, and social reproduction (Grenfell, 2014; Ignatow & Robinson, 2017).

In Bourdieu's framework, cultural capital is a key determinant of power, and data, as a modern embodiment of this capital (Paino & Renzulli, 2013), plays a pivotal role in shaping who holds influence within universities. Those with the tools and expertise to manage and analyze data—administrators, researchers, and data scientists—naturally accumulate more capital, gaining leverage over decision-making processes. This shift in power risks exacerbating inequalities, as those without the requisite data skills become increasingly marginalized.

Moreover, Bourdieu emphasizes how cultural capital is reproduced within educational systems (Bourdieu, 1977). In today's data-driven environment, proficiency with data analysis becomes a gateway to accumulating this capital. Mastery of data analysis has become a key factor in gaining influence, with individuals and groups proficient in these skills often occupying leadership roles. Meanwhile, those lacking these competencies may find themselves marginalized. This imbalance not only affects university governance but also impacts students' learning opportunities and career prospects. The 'data divide' between well-funded and under-resourced institutions further amplifies these discrepancies, limiting equitable access to advanced technologies.

The question of who controls data also reflects Bourdieu's ideas about power and ownership. In the realm of data culture, privacy concerns intensify as vast amounts of personal data, including student performance, research findings, and health metrics, are collected and analysed. Those who manage this data hold significant power, influencing behaviour through surveillance and evaluation. If left unchecked, biased algorithms used in processes such as admissions or resource allocation could perpetuate existing inequalities, further reinforcing the power structures they are intended to address.

Bourdieu's work also reminds us that universities, beyond being centres of knowledge production, are instrumental in the reproduction of social structures. In this context, the growing reliance on data culture, with its focus on quantifiable metrics, risks overshadowing more humanistic values. As institutions increasingly prioritize data-driven decision-making, emphasizing research outputs and student performance scores, there is a real danger that critical thinking, empathy, and moral responsibility may be neglected, ultimately undermining the broader mission of education to cultivate responsible global citizens.

To address these challenges, universities must adopt strategies that align with Bourdieu's warnings about the unequal distribution of capital. Enhancing data literacy is crucial to ensure that students and staff can equitably access and utilize data, while also understanding its ethical implications. Strengthening data ethics education is equally important, ensuring that individuals reflect on the power dynamics and privacy concerns inherent in data usage. Furthermore, promoting fair data usage through transparent policies will help democratize data access and reduce power imbalances. Finally, universities should adopt a diversified evaluation system that values ethical awareness, social responsibility, and critical thinking, alongside quantitative metrics.

Conclusion

The transformation of university data culture in the age of AI brings forward a conceptual framework that identifies the critical layers of data culture: data, user behaviour, organizational structures, and societal influences. AI plays a pivotal role in reshaping each of these components, fundamentally altering how universities manage data, make decisions, and engage with stakeholders. This shift is more than just a technological upgrade; it represents a deep cultural transformation within higher education. However, alongside these advancements come significant ethical, social, and operational challenges. Addressing these issues is essential to ensure that the evolving data culture within universities fosters inclusivity, fairness, and responsibility in its practices.

Given that this study is in its preliminary stages, the current framework was developed through a manual review of selected key literature related to data culture and information culture. This approach provided an initial foundation for understanding the multifaceted nature of university data culture. Moving forward, the research will adopt a more rigorous content analysis methodology, utilising qualitative analysis software such as NVivo, and will involve systematic, multi-level coding of relevant literature to enhance the scientific robustness and validity of the conceptual framework. Future research will ensure a comprehensive and empirically grounded exploration of the layers that constitute university data culture in the era of artificial intelligence.

About the author

Yunjie Tang is a Ph.D. candidate in the Department of Information Management at Peking University. An educational foundation has been established with a master's degree in Information Science and a bachelor's degree in Archival Science from Shanghai University. Current research is focused on data culture, governance, and privacy protection within a data-driven society. Publications have been featured in journals, including LISR, LIBRI, serials review, and library and information service. An upcoming book titled 'mechanisms for open sharing of scientific data' is set to be published. Correspondence may be directed to yunjietang@stu.pku.edu.cn.

References

- Bourdieu, P. (1977). *Outline of a theory of practice*. Cambridge University Press.
- Davison, R. M., Wong, L. H. M., & Peng, J. H. (2023). The art of digital transformation as crafted by a chief digital officer. *International Journal of Information Management*, 69, Article 102617. <https://doi.org/10.1016/j.ijinfomgt.2022.102617>
- Deja, M. (2024). Information culture of university administration: making personnel bureaucracy a professional bureaucracy. *Journal of Librarianship and Information Science*, 56(2), 379-396. <https://doi.org/10.1177/09610006221145931>
- Gagliardi, J., Parnell, A., & Carpenter-Hubin, J. (2018). The analytics revolution in higher education. *Change: The Magazine of Higher Learning*, 50(2), 22-29. <https://doi.org/10.1080/00091383.2018.1483174>
- Grenfell, M. (2014). *Pierre Bourdieu: key concepts*. Routledge.
- Hamilton, L., Halverson, R., Jackson, S. S., Mandinach, E., Supovitz, J. A., Wayman, J. C., Pickens, C., Martin, E., & Steele, J. L. (2009). Using student achievement data to support instructional decision making. https://ies.ed.gov/ncee/wwc/Docs/PracticeGuide/dddm_pg_092909.pdf
- Ignatow, G., & Robinson, L. (2017). Pierre Bourdieu: theorizing the digital. *Information, Communication & Society*, 20(7), 950-966. <https://doi.org/10.1080/1369118X.2017.1301519>
- Kee-Luen, W., Hong-Leong, J. T., Shwu-Shing, N., & Min-Hooi, C. (2018). Insights from the CGMA Data Competencies Model: the role of data culture to the value creation process. *Journal of Telecommunication, Electronic and Computer Engineering*, 10(2-4), 187-192. <https://jtec.utem.edu.my/jtec/article/view/4404>
- Lilley, S., Oliver, G., Cranefield, J., & Lewellen, M. (2024). Māori data sovereignty: contributions to data cultures in the government sector in New Zealand. *Information, Communication & Society*, 1-16. <https://doi.org/10.1080/1369118X.2024.2302987>
- Liu, X., & Tu, Z. (2023). Thinking and exploring of data culture in the academic library. *Journal of Academic Libraries*, 41(6), 19-25. <https://doi.org/10.16603/j.issn1002-1027.2023.06.003>.
- Mayer-Schönberger, V. (2013). *Big data: a revolution that will transform how we live, work, and think*. Houghton Mifflin Harcourt.
- Oliver, G., Cranefield, J., Lilley, S., & Lewellen, M. (2023). Data cultures: a scoping literature review. *Information Research an international electronic journal*, 28(1), 3-29. <https://doi.org/10.47989/irpaper950>
- Oliver, G., Cranefield, J., Lilley, S., & Lewellen, M. J. (2024). Understanding data culture/s: influences, activities, and initiatives: an annual review of information science and technology

(ARIST) paper. *Journal of the Association for Information Science and Technology*, 75(3), 201-214.
<https://doi.org/10.1002/asi.24737>

Oliver, G., & Foscarini, F. (2021). *Recordkeeping cultures*. Facet.

Paino, M., & Renzulli, L. A. (2013). Digital dimension of cultural capital: the (in) visible advantages for students who exhibit computer skills. *Sociology of education*, 86(2), 124-138.
<https://doi.org/10.1177/003804071245655>

Powers, K., & Henderson, A. E. (2018). *Cultivating a data culture in higher education*. Routledge New York.

Raffaghelli, J. E., Manca, S., Stewart, B., Prinsloo, P., & Sangrà, A. (2020). Supporting the development of critical data literacies in higher education: building blocks for fair data cultures in society. *International Journal of Educational Technology in Higher Education*, 17, 1-22.
<https://doi.org/10.1186/s41239-020-00235-w>

Shi, C., & Feng, X. (2017). From data to insights: cultural innovation and data science – a summary of the international academic conference on the national forum on cultural innovation and data science. *Journalism Research*, 33(5), 137-144.

Tang, Y. (2024). Privacy protection framework for open data: constructing and assessing an effective approach. *Library & Information Science Research*, 46(3), 101312.
<https://doi.org/10.1016/j.lisr.2024.101312>

Vicente-Saez, R., Gustafsson, R., & Van den Brande, L. (2020). The dawn of an open exploration era: emergent principles and practices of open science and innovation of university research teams in a digital world. *Technological Forecasting and Social Change*, 156, Article 120037.
<https://doi.org/10.1016/j.techfore.2020.120037>

Villegas-Ch, W., Luján-Mora, S., Buenaño-Fernandez, D., & Palacios-Pacheco, X. (2018). Big data, the next step in the evolution of educational data analysis. In *Proceedings of the International Conference on Information Technology & Systems (ICITS 2018)* (pp. 138-147). Springer International Publishing. https://doi.org/10.1007/978-3-319-73450-7_14

Zhang, J., & Lu, M. (2020). The status quo and cultivation of data culture in colleges and universities of China: on the role of institutional research. *Journal of Higher Education*, 41(12), 40-47.
[https://doi.org/1000-4203\(2020\)12-0040-08](https://doi.org/1000-4203(2020)12-0040-08)

Zhou, J. (2024). On the value, deviation, and orientation of digital transformation in double first-class universities. *Journal of Graduate Education*(3), 27-33.
<https://doi.org/10.19834/j.cnki.yjsjy2011.2024.03.05>

Zimpher, N. L. (2014). *Building a smarter university: big data, innovation, and analytics*. State University of New York Press.

© [CC-BY-NC 4.0](#) The Author(s). For more information, see our [Open Access Policy](#).