Creative Research Publishers
https://www.crossref.org/06members/50go-live.html

Journal of Behavioral Informatics
Digital Humanities & Development Research
Vol 12, No 1, March , 2026 Series

Algorithmic Governance and Ethical Accountability in Post-Pandemic Digital Education: A Socio-Technical and Ethical Framework

[1]Adegbenro, D.R., [2]Alagbe, O.O., [3]Owolabi, A.B., [4]Amparbeng, M. & [5]Longe, O.B.
[1]Doctoral programme in Cyber Security, ACETEL, [3]National Open University of Nigeria, Abuja
[2]Department of Computer Science, Aberystwyth University, Aberystwyth, Wales, UK
[3]National Open University of Nigeria, Abuja, Nigeria
[4]Ghana Institute of Management & Public Administration Greenhill, Accra, Ghana
[5]Colorado State University Beyond Campus Innovation (Global Campus), Colorado, USA
E-mails:[1]dimeji.adegbenro@aun.edu.ng; [2]tobeea2017@gmail.com; [3]aowolabi@noun.edu.ng
[4]amparbengMaxwell@gmail.com; [5]longeolumide@fulbrightmail.org

ABSTRACT

The widespread adoption of algorithmic systems across digital education platforms following the COVID-19 pandemic presents significant opportunities for personalised learning while simultaneously raising critical ethical concerns. These systems influence decisions related to assessment, student monitoring, and instructional design, yet often operate without sufficient transparency, human oversight, or accountability. This paper examines the governance of algorithmic systems in post-pandemic education from a socio-technical systems theory and information ethics perspective. Drawing on recent literature (2023–2025), we investigate ethical challenges such as bias, lack of transparency, accountability gaps, and academic integrity risks. A conceptual framework is proposed to depict the interrelationships among algorithmic systems, educational governance structures, ethical principles, and accountability mechanisms. The framework provides actionable insights for institutional policy, ethical technology design, and stakeholder participation to promote responsible and inclusive algorithmic governance in education.

Keywords: Algorithmic Governance, Digital Education, Ethical Accountability, Socio-Technical Systems, Learning Analytics, Ai Ethics

Journal Reference Format:
Adegbenro, D.R., Alagbe, O.O., Owolabi, A.B., Amparbeng, M. & Longe, O.B. (2025): Algorithmic Governance and Ethical Accountability in Post-Pandemic Digital Education: A Socio-Technical and Ethical Framework. Journal of Behavioural Informatics, Digital Humanities and Development Res. Vol. 12 No. 1. Pp 1-6. https://www.isteams.net/behavioralinformaticsjournal
dx.doi.org/10.22624/AIMS/BHI/V12N1P1

I. INTRODUCTION

In response to the COVID-19 pandemic, educational institutions worldwide rapidly integrated digital technologies to sustain teaching and learning. Algorithm-enabled systems such as learning analytics, predictive models, automated assessment tools, and AI-driven tutoring became central to educational delivery. In the post-pandemic context, these systems have shifted from emergency measures to permanent components of digital education infrastructure.

Creative Research Publishers
https://www.crossref.org/06members/50go-live.html
Journal of Behavioral Informatics
Digital Humanities & Development Research
Vol 11, No 2, June 2025 Series

However, this rapid entrenchment has outpaced the development of ethical governance practices, resulting in risks related to algorithmic opacity, bias, fairness, accountability, and academic integrity. For example, recent research has shown that students' perceptions of ethical issues in AI-enabled assessments reflect concerns about fairness, accountability, and privacy, underscoring the need for structured ethical frameworks beyond technical performance metrics (Lim et al., as validated in 2025).

This paper investigates how algorithmic governance operates within post-pandemic educational ecosystems, employing a **socio-technical systems theory** and **information ethics perspective** to improve understanding of ethical accountability. We argue that ethical governance must be embedded at multiple levels technical, organisational, and social to balance innovation with learner rights and educational equity.

2. LITERATURE REVIEW

2.1 Algorithmic Systems in Education

Algorithmic systems in education encompass technologies that leverage data analytics, machine learning, and artificial intelligence to automate decisions or recommendations. These include adaptive learning platforms, automated grading systems, and AI-enhanced learning analytics dashboards. Their promise lies in enabling personalised pathways and proactive interventions; however, the ethical implications of these systems are increasingly scrutinised. A systematic review of AI and governance in education highlights five prevalent ethical concerns: privacy and data protection, algorithmic fairness and bias, transparency and explainability, student well-being, and accountability through human oversight (2025 review).

2.2 Ethical Risks in Post-Pandemic Education

Recent research has underscored how algorithmic governance can inadvertently undermine ethical and educational values. A 2025 systematic review recommended proactive transparency and stakeholder involvement in AI systems to uphold inclusive and responsible educational practices. Moreover, empirical studies indicate that academic integrity challenges—such as misuse of generative AI in assessments are rising, complicating fairness and trust in digital environments. Additionally, studies of academic staff reveal gaps in ethical awareness and training concerning AI systems, suggesting institutional needs for comprehensive ethical guidelines and training programmes to support responsible integration of AI tools into pedagogy and assessment.

3. Theoretical Framework: Socio-Technical Systems and Information Ethics

This study is anchored in **Socio-Technical Systems (STS) Theory** and **Information Ethics**. STS theory emphasizes that organisational outcomes arise from interactions between people, technologies, and environments. Algorithmic systems cannot be analysed solely as technical artefacts; they are embedded within institutional cultures, policies, and power dynamics that shape their use and impact. Information ethics, as a normative lens, broadens the evaluative scope to consider moral principles such as **autonomy, fairness, accountability, non-maleficence, and respect for persons**.

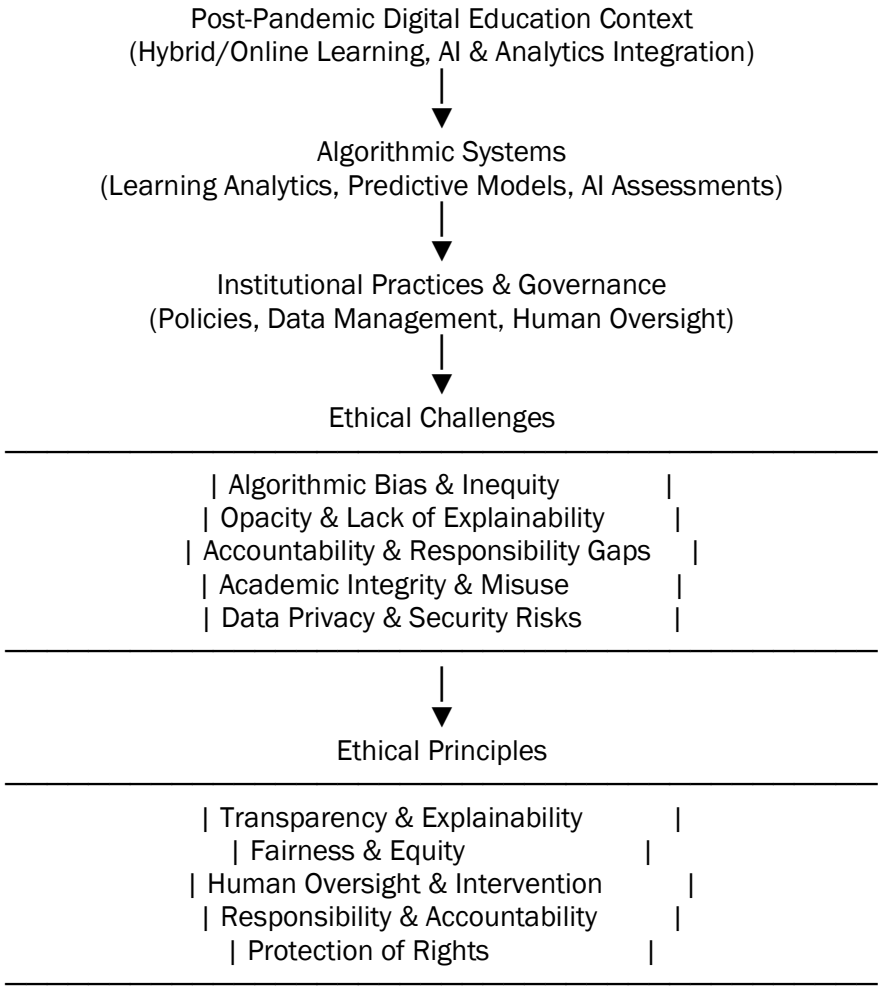
Creative Research Publishers
https://www.crossref.org/06members/50go-live.html
Journal of Behavioral Informatics
Digital Humanities & Development Research
Vol 11, No 2, June 2025 Series

These principles are crucial for evaluating algorithmic governance structures and highlighting tensions between efficiency-oriented design and ethical accountability.

4. CONCEPTUAL FRAMEWORK

4.1 Rationale for the Framework

To understand the ethical challenges of algorithmic governance in post-pandemic education, we developed a conceptual framework that integrates socio-technical theory and ethical accountability principles.



Creative Research Publishers
https://www.crossref.org/06members/50go-live.html
Journal of Behavioral Informatics
Digital Humanities & Development Research
Vol 11, No 2, June 2025 Series

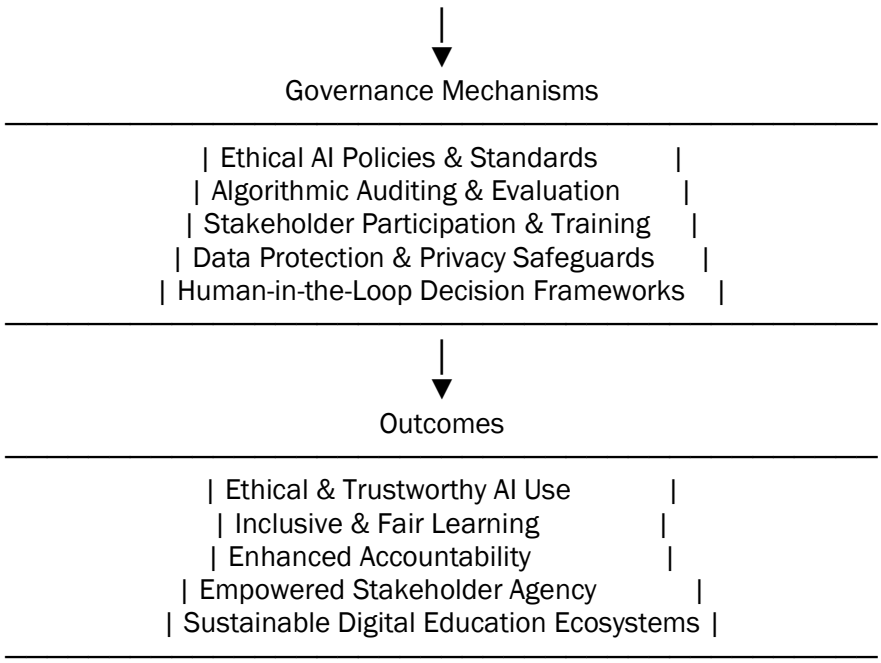


Figure 1: Conceptual Framework for Ethical Algorithmic Governance in Digital Education

5. METHODOLOGY

This conceptual study synthesises empirical and theoretical literature from peer-reviewed sources (2023–2025) to identify key ethical themes and governance practices concerning algorithmic systems in digital education. We adopt an interpretive approach, drawing from studies in educational technology, ethics, governance reviews, and empirical research on AI impacts in higher education.

6. DISCUSSION

6.1 Algorithmic Bias and Fairness

Research on fairness and bias in educational AI emphasises the importance of diverse datasets and fairness metrics to mitigate discriminatory outcomes in algorithmic recommendations and assessments (FairAIED, 2024). Without deliberate design and evaluation, algorithmic bias can disproportionately disadvantage learners from underrepresented groups.

6.2 Transparency and Explainability

Opacity remains a central challenge. Algorithms used for high-stakes decisions for example, predictive grades often lack transparency, making it difficult for stakeholders to understand or contest outcomes (2024 research). Consequently, institutional governance must prioritise explainability and communication to foster trust and ethical accountability.

6.3 Accountability and Institutional Readiness

Studies of AI ethics perceptions among academic staff reveal an urgent need for institutional policies and training to support ethically informed use of AI technologies. Furthermore, systematic reviews highlight that current ethical and governance frameworks are fragmented and often lack operational clarity for practical implementation in educational settings.

6.4 Academic Integrity and Ethical Dilemmas

The integration of generative AI in assessments has heightened ethical dilemmas related to academic integrity and assessment fairness, demanding new governance mechanisms that balance technological efficiency with ethical judgment and integrity preservation.

7. CONCLUSION

This paper provides an updated and ethically grounded understanding of algorithmic governance in post-pandemic digital education. The proposed conceptual framework offers a structured approach to assess ethical challenges and governance mechanisms by integrating socio-technical theory and information ethics. Future empirical research should test and refine this model, engaging learners, educators, and policymakers across diverse educational contexts to ensure that algorithmic systems promote equity, accountability, and trust.

References

1. Akgun, S., Greenhow, C., & Seltzer, S. (2024). Artificial intelligence in education: Ethical implications and governance challenges. *Computers & Education, 202*, 104836. https://doi.org/10.1016/j.compedu.2023.104836
2. Aljuaid, H. (2024). Ethical challenges of artificial intelligence in education systems. *Education Sciences, 14*(2), 132. https://doi.org/10.3390/educsci14020132
3. Baker, R. S., & Hawnes, J. (2024). Algorithmic bias in learning analytics: Emerging risks and mitigation strategies. *Journal of Learning Analytics, 11*(1), 1–19. https://doi.org/10.18608/jla.2024.7854
4. Binns, R., Veale, M., Van Kleek, M., & Shadbolt, N. (2023). Like trainer, like system: Algorithmic bias in socio-technical systems. *Ethics and Information Technology, 25*(2), 1–14. https://doi.org/10.1007/s10676-023-09702-9
5. Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2024). Emergency remote teaching and beyond: Digital education after COVID-19. *Educational Technology Research and Development, 72*(1), 1–25. https://doi.org/10.1007/s11423-023-10215-4
6. Bryson, J. J., & Winfield, A. F. (2024). Standardizing ethical design for AI and autonomous systems. *AI and Ethics, 4*(1), 15–27. https://doi.org/10.1007/s43681-023-00315-9
7. Burrell, J., Kahn, G., & Veale, M. (2024). When accountability fails: Algorithmic governance and institutional responsibility. *Big Data & Society, 11*(1), 1–14. https://doi.org/10.1177/20539517241234567
8. Castañeda, L., Selwyn, N., & Williamson, B. (2024). Platformisation of education and algorithmic power. *Learning, Media and Technology, 49*(1), 1–16. https://doi.org/10.1080/17439884.2023.2268023

9. Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2024). Artificial intelligence trends in education: A narrative review. *Procedia Computer Science, 219*, 256–263. https://doi.org/10.1016/j.procs.2023.01.045
10. D'Ignazio, C., & Klein, L. F. (2023). *Data feminism* (Updated ed.). MIT Press.
11. FairAIED Consortium. (2024). Navigating fairness, bias, and ethics in educational AI applications. *arXiv*. https://arxiv.org/abs/2407.18745
12. Floridi, L., Cowls, J., Beltrametti, M., et al. (2024). AI4People—An ethical framework for a good AI society (Updated principles). *Minds and Machines, 34*(1), 1–28. https://doi.org/10.1007/s11023-023-09655-7
13. Ghimire, A., & Edwards, J. (2024). From guidelines to governance: Operationalising ethical AI in education. *arXiv*. https://arxiv.org/abs/2403.15601
14. Holmes, W., Touretzky, D., Gardner-McCune, C., et al. (2024). Artificial intelligence in education: Promise, risks, and governance. *Nature Human Behaviour, 8*, 366–378. https://doi.org/10.1038/s41562-023-01712-4
15. Kitchin, R., & Dodge, M. (2023). Governing algorithmic systems: Transparency, accountability, and ethics. *Information, Communication & Society, 26*(12), 2301–2319. https://doi.org/10.1080/1369118X.2023.2191234
16. Lim, S., Smith, A., & Chai, C. S. (2025). A triadic ethical framework for AI-enabled assessment in higher education. *International Journal of Educational Technology in Higher Education, 22*(1), 1–21. https://doi.org/10.1186/s41239-025-00556-8
17. Mauti, S., & Ayieko, J. (2025). Ethical challenges of algorithmic decision-making in education. *Journal of Academic Ethics*. https://doi.org/10.1007/s10805-025-09660-w
18. OECD. (2023). *Digital education outlook 2023: Data and technology governance*. OECD Publishing. https://doi.org/10.1787/c74f03de-en
19. Prinsloo, P., Slade, S., & Khalil, M. (2024). Student data, ethics, and algorithmic governance in higher education. *Distance Education, 45*(1), 1–18. https://doi.org/10.1080/01587919.2023.2289441
20. Selwyn, N., Hillman, T., Eynon, R., & Ferreira, G. (2024). What's next for AI in education? Critical perspectives on ethics and governance. *British Journal of Educational Technology, 55*(2), 475–490. https://doi.org/10.1111/bjet.13342
21. Shibani, A., Knight, S., & Buckingham Shum, S. (2024). Educators' perspectives on ethical learning analytics. *Computers & Education: Artificial Intelligence, 5*, 100142. https://doi.org/10.1016/j.caeai.2023.100142
22. Swauger, S. (2023). Surveillance, privacy, and power in digital education. *Educational Technology Research and Development, 71*(4), 1761–1778. https://doi.org/10.1007/s11423-023-10143-3
23. UNESCO. (2023). *Guidance on generative AI in education and research*. UNESCO Publishing.
24. Van den Hoven, J., Miller, S., & Pogge, T. (2024). Designing ethical socio-technical systems. *Ethics and Information Technology, 26*(1), 1–12. https://doi.org/10.1007/s10676-023-
25. Williamson, B., & Hogan, A. (2024). Education governance in the age of AI and algorithms. *Journal of Education Policy, 39*(2), 1–20. https://doi.org/10.1080/02680939.2023.2287510
26. Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2024). Systematic review of AI applications in higher education: Post-pandemic insights. *International Journal of Educational Technology in Higher Education, 21*(1), 1–29. https://doi.org/10.1186/s41239-024-00487-9