OPEN ACCESS

ISSN: 3066-0807

Macpherson RJS (2025): 1532
Int J Teach Learn Sci, 2025(11):1863.142
DOI: 10.71010/3066-0807/ijtls-e142

Research Article

International Journal of Teaching and Learning Sciences

Philosophical Challenges of AI, Blockchain, and Cybersecurity to Educative Leadership in Knowledge Organisations

Reynold J. S. Macpherson*

***Corresponding author:** Reynold J. S. Macpherson, 484 Pukehangi Road, Rotorua 3015, New Zealand. Home +64 7 346 8553; Mobile +64 21 725 708; Email: reynold@reynoldmacpherson.ac.nz

Citation: Macpherson RJS (2025) Philosophical Challenges of AI, Blockchain, and Cybersecurity to Educative Leadership in Knowledge Organisations. *Int J Teach Learn Sci*-IJTLS: e142.

Received Date: 07 November, 2025; **Accepted Date:** 26 November, 2025; **Published Date:** 02 December, 2025

Abstract

This article explores how artificial intelligence (AI), blockchain, and cybersecurity are transforming the moral and epistemic foundations of educative leadership across knowledge organisations—schools, school systems, universities, libraries, archives, museums, research institutes, media organisations, and government agencies and technology firms. Drawing on John Dewey's pragmatism, Colin Evers and Gabrielle Lakomski's non-foundational epistemology and pragmatic holism, and Reynold Macpherson's conception of educative leadership as moral praxis, it argues that digital technologies are not neutral tools but socio-technical environments that redefine truth, trust, and responsibility. The analysis situates contemporary developments—risk-based AI regulation, verifiable credentials, content provenance, and cybersecurity frameworks—within a philosophical framework that interprets technological change as a moral field of practice. The paper concludes that educative leadership must evolve as moral craftsmanship: an art of aligning technological systems with human flourishing through reflective judgment, dialogical reasoning, and public accountability.

Keywords*: educative leadership; pragmatic holism; non-foundational epistemology; moral craftsmanship; artificial intelligence; blockchain; cybersecurity; knowledge organisations; public ethics.*

Introduction: Knowledge Organisations in a New Moral Terrain

Knowledge organisations are institutions whose primary purpose is to create, store, share, and apply knowledge to achieve their goals. Examples include schools, universities, research institutes, government agencies, and technology firms—all of which transform information into understanding, innovation, or policy (Peters et al., 2024). They rely on information, learning, and expertise as key resources rather than physical assets.

Such organisations act as stewards of humanity's epistemic and cultural inheritance. Their social licence depends on two intertwined conditions: epistemic integrity—the capacity to produce and preserve trustworthy knowledge—and public trust—the belief that they serve the collective good. The rise of digital infrastructures built on AI, blockchain, and cybersecurity has unsettled both (Peters et al., 2024; IBM, 2024). Algorithms now mediate decisions once governed by professional judgment; distributed ledgers claim to guarantee authenticity without human institutions; and breaches of cybersecurity can destroy reputations in minutes.

A recent insider account of global technology governance reinforces this philosophical urgency. Wynn-Williams' memoir *Careless People: A Cautionary Tale of Power, Greed, and Lost Idealism* (2025), based on her tenure as Director of Global Public Policy at Meta, chronicles how lofty visions of global connection and empowerment masked a culture of strategic opacity, commercial ambition, and ethical neglect. She depicts senior leadership—including Mark Zuckerberg and Sheryl Sandberg—as prioritising market expansion and personal influence over civic responsibility, often concealing controversial initiatives such as negotiations on censorship tools for access to the Chinese market. Through this lens, Meta's internal decision-making becomes emblematic of a broader moral drift: the detachment of technological progress from ethical reflection and public accountability.

Her reflections also illuminate the personal and institutional moral challenges inherent in knowledge organisations that wield global influence. Wynn-Williams describes how her initial idealism—believing technology could democratise information—collapsed under the weight of harassment, misogyny, and managerial indifference to harms like disinformation and hate speech. Meta's subsequent attempt to silence her memoir through emergency arbitration only reinforced the themes of secrecy and moral failure she exposed. *Careless People* thus serves as a cautionary tale: when technological institutions equate success with dominance rather than stewardship, they erode the very trust and integrity upon which their legitimacy depends.

For leaders who understand education and information management as moral and intellectual vocations, these transformations are profoundly philosophical. They raise questions about what counts as knowledge, how truth is warranted, who is accountable when algorithmic systems err, and how institutional authority can be sustained when decision-making is distributed across code.

Three philosophical lineages offer guidance. Dewey's (1938) pragmatism conceives inquiry as cooperative problem-solving oriented toward growth. Evers and Lakomski's non-foundational epistemology and pragmatic holism (Evers & Lakomski, 2012; Lakomski & Evers, 2022) conceive knowledge as coherent yet fallible, produced within systems of practice. Macpherson's (2025a, 2025b) theory of educative leadership conceives leadership as moral reasoning in action, joining learning with ethical responsibility. Taken together, these

frameworks yield a vision of moral craftsmanship—a capacity for reflective, context-sensitive, dialogical action that integrates technical competence with moral imagination.

Artificial Intelligence in Knowledge Organisations

AI has become an infrastructural presence in virtually every knowledge domain. In schools, predictive analytics monitor attendance and progress; large language models assist with assessment and reporting; and adaptive tutors personalise learning. Universities employ AI for grading support, plagiarism detection, and research discovery. Libraries automate metadata creation and translation; museums use computer vision to classify and restore artefacts; governments deploy chatbots, translation engines, and policy-simulation models (Peters et al., 2024).

Since 2024, the governance landscape has changed markedly. The European Union's Artificial Intelligence Act (Future of Life Institute, 2024) introduced a risk-based framework banning "unacceptable-risk" systems such as social scoring, imposing strict obligations for high-risk uses—including education, employment, and law enforcement—and requiring transparency for limited-risk systems like chatbots. Governments, school systems, and public agencies worldwide have begun to adopt this model, creating registries of AI systems, human-oversight protocols, and appeal procedures.

From a pragmatic perspective, these developments show that AI is not simply an efficiency tool but a moral experiment. Dewey's (1929) instrumentalism asks that we judge tools by their consequences for human growth, inclusion, and participation. The educative leader's task is therefore to ensure that AI expands, rather than diminishes, agency. In schools this means designing processes where teachers and students interrogate model outputs; in governments it means maintaining transparency about algorithmic decisions and providing citizens with recourse.

Blockchain, Verifiable Credentials, and the New Trust Stack

Blockchain and allied distributed-ledger technologies are building a new trust architecture for credentials, records, and provenance. The World Wide Web Consortium's (W3C, 2025) *Verifiable Credentials 2.0* standard enables interoperable digital claims—such as school diplomas, teacher licences, or government IDs—secured by cryptographic signatures and privacy-preserving selective disclosure. The Content Authenticity Initiative and the C2PA specification (C2PA, 2022) allow cameras and editing software to embed tamper-evident histories into images, documents, and videos.

Educational systems and governments alike are experimenting with these technologies. Universities issue blockchain-anchored degrees; vocational schools use verifiable credentials for micro-certifications; local councils test ledgers for grant distribution; and national agencies explore digital-identity frameworks linking education, employment, and civic participation.

While such systems promise authenticity, non-foundational epistemology reminds us that truth cannot be guaranteed by code alone (Evers & Lakomski, 2012). Ledgers instantiate trust by protocol but still rely on social interpretation and procedural fairness. Pragmatic holism (Macpherson, 2025c) therefore evaluates technology by its coherence with broader institutional purposes—equity, inclusion, and accountability—rather than by technical perfection.

Cybersecurity and Institutional Integrity

Cybersecurity has shifted from a specialist concern to a public moral issue. The NIST Cybersecurity Framework 2.0 (2024) broadened its scope to all sectors and added a *Govern* function emphasising leadership accountability, risk appetite, and cultural maturity. For schools, breaches endanger children's privacy and safety; for universities and governments, they threaten intellectual property, records, and public confidence.

As digital infrastructures have become essential to organisational functioning, cybersecurity now stands at the intersection of technology, ethics, and governance. The rise in ransomware, data theft, and misinformation has shown that technical safeguards alone are insufficient; institutional cultures must also evolve. Effective protection depends on shared norms of responsibility and trust, extending from IT specialists to educators, administrators, and policy leaders. This ethical dimension reframes cybersecurity not only as risk management but as a collective moral discipline that underpins the credibility of knowledge organisations.

Dewey's (1929) moral naturalism situates ethics within habitual conduct. Secure institutions cultivate ethical reliability through practices of care: regular updates, transparent communication, backup resilience, and shared responsibility. In this view, cybersecurity becomes a moral pedagogy—teaching communities to value honesty, vigilance, and mutual protection.

From Pragmatic Holism to Educative Leadership

Pragmatic holism, developed through the later work of Evers and Lakomski (2017; 2020; 2022), posits that knowledge and value emerge through coordinated activity rather than immutable foundations. Applied to digital transformation, it advises leaders to seek coherence rather than certainty. The practical commitments are purposive alignment (technologies must serve educative and civic aims), contextual justification (decisions explained relative to use), sensitivity to consequences, and fallibilism.

In practice, pragmatic holism transforms abstract epistemology into a leadership ethic attuned to complexity. It encourages leaders to view digital transformation not as a technical sequence of upgrades, but as an evolving conversation among people, purposes, and technologies. By foregrounding relationships and consequences over rigid procedures, it reframes the work of governance as a continual search for coherence across moral, technical, and institutional domains.
This orientation is invaluable for school systems and governments managing overlapping reforms in AI ethics, data protection, and digital inclusion. Pragmatic holism allows them to balance innovation with care, integrating technical systems into a coherent moral narrative about learning, trust, and the public good.

Non-Foundational Epistemology and Digital Judgment

Non-foundational epistemology regards knowledge not as a fixed body of truth but as a dynamic network of warranted beliefs open to revision. It recognises that what we call knowledge emerges through inquiry, justification, and consensus within communities of practice rather than from immutable foundations. This philosophical stance is particularly

relevant in the digital age, where data-driven models, machine learning systems, and cryptographic protocols often present outputs with an aura of certainty that can obscure their contingent nature.

In the context of artificial intelligence and blockchain, non-foundational epistemology cautions against confusing statistical probability or cryptographic verification with epistemic truth. AI-generated predictions and automated decisions are probabilistic, dependent on training data and embedded assumptions; likewise, verifiable credentials can confirm authenticity without guaranteeing fairness or accuracy. For leaders in education, government, and knowledge organisations, this understanding calls for epistemic humility—the recognition that digital systems extend but never replace human reasoning and moral judgment.

Practically, this philosophy translates into deliberative oversight and procedural safeguards. Teachers moderate AI-assisted assessments through professional dialogue to ensure contextual fairness; school boards establish appeal mechanisms for disputed algorithmic outcomes; and ministries conduct impact assessments and publish risk registers to sustain public accountability. Each of these practices accepts that technological outputs are claims to be justified within human reasoning rather than accepted as fact. In this way, non-foundationalism evolves from a theory of knowledge into a moral stance that protects autonomy, fairness, and justice in an increasingly automated world.

Educative Leadership as Moral Craftsmanship

Educative leadership, as proposed by Duignan and Macpherson (1992) and extended by me (Macpherson, 2014, 2025d), conceives leadership as an educative act that fuses moral reasoning with collective learning. It emphasises that leadership is not merely the exercise of authority or the coordination of resources, but a reflective practice through which values, knowledge, and human relationships are continually reinterpreted in pursuit of the public good. In the digital era, this conception becomes even more vital as leaders face an unprecedented convergence of technical systems and ethical dilemmas. Artificial intelligence, blockchain, and cybersecurity demand leaders who can bridge technological proficiency with human judgment, transforming ethical complexity into learning opportunities for both institutions and communities.

Moral craftsmanship represents the cultivated ability to integrate technical knowledge, reflective inquiry, and public-facing ethical communication into coherent moral action. It is the craft of governing through wisdom rather than control—an artistry that combines precision, reflection, and care. This form of leadership is grounded in the recognition that every technological decision embodies moral choices about who benefits, who bears risks, and what values are reinforced. Consequently, moral craftsmanship transforms leadership into an educative process in itself, where reasoning is shared, dialogue is encouraged, and outcomes are open to scrutiny and revision. It demands that leaders develop both moral imagination—the capacity to foresee ethical consequences—and institutional courage—the willingness to uphold integrity even when expedience or political pressure suggest otherwise.

In practice, moral craftsmanship unfolds through several interrelated competencies. Diagnostic wisdom involves perceiving the underlying patterns and moral tensions in complex socio-technical situations before acting. Design literacy requires embedding ethical values into the architectures of policy, software, and governance, ensuring that fairness, transparency, and inclusivity are not afterthoughts but structural features. Dialogical authority is achieved through reason-giving, participation, and openness, cultivating legitimacy through communication rather than coercion. Pedagogical leadership reframes technological disruption as an opportunity for shared learning, encouraging teachers, civil servants, and citizens to develop digital and ethical fluency together. Finally, courageous fallibilism expresses the humility to revise, retract, or reform policies and systems when harm becomes evident affirming that responsible leadership is inseparable from continuous ethical growth.

The following cases from schools, school systems, and governments illustrate moral craftsmanship in practice and demonstrate how educative leaders transform ethical uncertainty into opportunities for institutional and civic learning.

Moral Craftsmanship in Practice: Schools and School Systems

A large urban secondary school implemented an AI writing assistant to support formative evaluation including feedback in senior classes. Students drafted essays, reviewed AI suggestions, and discussed them with teachers before submitting reflective memoranda explaining their reasoning (Gómez, 2024). The school publicly released documentation on model provenance and bias testing, and teachers collaboratively moderated samples to maintain fairness. Appeals were available for contested evaluations. Through these measures, the school operationalised transparency, autonomy, accountability, and growth.

In a primary school that suffered a ransomware attack, prior preparation—continuity plans, offline resources, and community communication drills—allowed learning to continue (WithSecure, 2023; NCSC, 2021). The principal issued clear, honest updates through verified channels using content-provenance tags, modelling integrity under pressure.

Vocational education and training institutions in Europe are piloting verifiable credentials where learners hold digital credentials for trade-skills, can share them with employers, and oversight mechanisms monitor fairness, while traditional paper credentials remain available (European Commission, 2024).

The state-wide adoption of an AI-enhanced teacher-support platform by a U.S. state education department demonstrated how leadership layered professional development, student voice, algorithmic transparency, and opt-out mechanisms to turn a potentially opaque system into a learning-oriented infrastructure (Arizona Department of Education, 2024; New Hampshire Department of Education, 2024).

Moral Craftsmanship in Practice: National and Local Governments

At the national level, a ministry of education in a European state piloted an AI-based admissions recommender classified as a high-risk system under the AI Act. It incorporated human review for contested cases, public impact assessments, and regional consultations (upReach, 2020; Hern, 2020).

Local governments have adopted provenance technologies for record-keeping and emergency communication. City and national communication services have published alerts and bylaws with embedded provenance data and explanatory guides clarifying the limits of such assurances (NSA et al., 2025; UK Government Communication Service, 2024).

National digital-identity programmes applying *Verifiable Credentials 2.0* combine convenience with privacy through selective disclosure and unlinkability (W3C, 2025; EUDI Wallet Dev Hub, 2025; Service NSW, 2025). Independent audits and appeals offices ensure accountability. Here, moral craftsmanship resides in balancing efficiency, security, and human dignity through participatory oversight.

Across these cases, the unifying pattern is reflective integration of values into design. Moral craftsmanship transforms governance and schooling alike into educative enterprises oriented toward trust and justice.

Cross-Sector Design Patterns for Knowledge Organisations

The identification of cross-sector design patterns derives from comparative and preliminary analyses of policies, frameworks, and empirical cases drawn from education, government, and cultural institutions. This interpretive methodology applies the principles of pragmatic holism—seeking coherence between purpose, context, and consequence—to distil common practices that align technology with moral intent. Rather than prescribing fixed rules, the approach emphasises iterative reasoning, where leaders examine how particular mechanisms such as disclosure tools, provenance systems, or cybersecurity protocols contribute to institutional learning and ethical reliability. Each pattern, therefore, functions as a heuristic for integrating technical design with educative purpose.

The first four patterns—maintaining model inventories and context registers; treating disclosure and consent as pedagogical tools; embedding recourse within system design; and combining provenance with explanation—reflect a process of organisational reflexivity. Maintaining inventories and context registers ensures that decision-makers can trace how digital systems evolve and interact, establishing conditions for transparency and accountability. Treating disclosure and consent as pedagogical rather than bureaucratic practices reframes compliance as an opportunity for ethical learning among staff, students, and citizens. Embedding recourse within design acknowledges that mistakes are inevitable in complex systems and that justice depends on timely, accessible redress. Provenance paired with explanation closes the epistemic loop, connecting technical verification with narrative understanding.

The fifth pattern—elevating cybersecurity governance to the strategic level—extends moral craftsmanship from operational management to institutional vision. It recognises that security cannot remain the responsibility of technicians alone but must become an ethical culture woven into governance structures. When board discussions of digital strategy include moral reasoning about trust, privacy, and community welfare, cybersecurity evolves from a defensive posture into a formative aspect of institutional identity. Together these five patterns exemplify pragmatic holism in action: they align ethical purpose, technical design, and organisational learning to sustain integrity across diverse knowledge environments.

Policy, Ethics, and the Public Good

International regulatory and ethical frameworks such as the European Union's *Artificial Intelligence Act* (2024), UNESCO's *Recommendation on the Ethics of Artificial Intelligence* (2021), the *NIST Cybersecurity Framework 2.0* (2024), the *W3C Verifiable Credentials 2.0* standard (2025), and the *C2PA content provenance specification* (2022) collectively establish a global scaffolding for responsible digital practice. They provide definitions, risk categories, technical standards, and governance expectations that help align institutional actions with international norms. Yet, by design, these frameworks stop short of prescribing the moral reasoning needed to balance competing values such as innovation, inclusion, and privacy. They offer the architecture of compliance but not the conscience of ethical discernment.

Educative leadership fills this gap by interpreting and applying such frameworks through reflective moral inquiry. It requires leaders to reason publicly about the ethical implications of adopting or rejecting technologies and to ensure that regulatory compliance does not replace moral accountability. Within schools, universities, and governments, leaders must deliberate on the purposes that technology serves—whether it amplifies learning, enhances participation, or inadvertently entrenches bias and exclusion. This interpretive task transforms the leader's role from that of a policy implementer into a moral agent who mediates between legal requirements, professional values, and community expectations.

Ultimately, the challenge for all knowledge organisations is to convert standards into practices that sustain the public good. This entails fostering public dialogue about what responsible technology means in local contexts, encouraging informed consent, transparency, and shared responsibility. The ethical question, therefore, is not whether to adopt new digital tools, but how to use them to enlarge the sphere of informed and caring agency. When international frameworks are enlivened by moral craftsmanship, they cease to be mere instruments of governance and become vehicles for democratic learning, civic trust, and human flourishing.

Research, Practice, and a Programme for Moral Craftsmanship

Future inquiry into educative leadership in the digital age must first confront the problem of epistemic justice—the equitable distribution of power to know, interpret, and act within algorithmic systems. Research should examine how AI-mediated learning environments shape whose voices are amplified or silenced, whose data are valued, and how algorithmic transparency can be improved through participatory design. Comparative studies of classroom practice, curriculum policy, and data governance could investigate how students, teachers, and citizens understand the epistemic status of algorithmic judgments. A central question is how educative leaders can ensure that digital infrastructures serve as instruments of learning and inclusion rather than as systems of epistemic exclusion or control.

A second line of inquiry concerns community understanding of provenance and authenticity tools. As blockchain, digital credentials, and content provenance technologies become embedded in education and governance, research is needed into how diverse publics perceive and trust such mechanisms. Ethnographic and survey studies could assess whether these tools genuinely enhance confidence in public information, or

whether their technical opacity fosters new forms of alienation. Design-based research could explore how provenance features—metadata, cryptographic signatures, and explanatory labels—might be used pedagogically to strengthen critical digital literacy. Here, moral craftsmanship would be tested through leaders' capacity to translate technical assurance into meaningful social trust.

A third avenue involves studying institutional learning loops that operationalise fallibilism—the capacity to recognise, correct, and learn from moral and technical errors. Mixed-methods evaluations could map how feedback and audit systems in schools, universities, or government agencies enable continuous ethical adaptation in AI use, cybersecurity, and data sharing. Case studies might identify how dialogue between technical experts, educators, and citizens produces organisational resilience and moral growth. This research could develop new indicators of institutional maturity based on reflexivity, transparency, and the willingness to revise.

Finally, leadership development and moral formation in digitally saturated contexts require sustained theoretical and empirical attention. Programmes integrating ethical reasoning with digital fluency could be studied across jurisdictions to determine how leaders cultivate diagnostic wisdom, design literacy, and dialogical authority. Action research might explore professional-learning communities that treat ethical dilemmas in AI and data governance as opportunities for collective inquiry. Future work could also examine the cultural adaptability of moral craftsmanship—how its principles translate across differing moral traditions, policy regimes, and socio-technical infrastructures. Together, these research directions would form a comprehensive programme for understanding and advancing educative leadership as moral craftsmanship in the emerging knowledge society.

Conclusion: Implications for Educative Leadership of Knowledge Organisations

Artificial intelligence, blockchain, and cybersecurity are reshaping how knowledge organisations create, authenticate, and protect information. These technologies penetrate every layer of practice—from classroom assessment to national governance—redefining how authority, trust, and responsibility are exercised. For schools and school systems, the central implications involve pedagogy, equity, and digital citizenship: ensuring that AI-mediated formative evaluation remains dialogical, that digital credentialing supports inclusive recognition of learning, and that cybersecurity education fosters communal care rather than fear. For universities and research institutes, the challenge is to reconcile technological innovation with scholarly integrity through transparent algorithmic governance, open research data, and equitable partnerships with private-sector developers. For libraries, archives, and museums, the ethical mandate is to pair authenticity with cultural sensitivity and community participation. In governments, digital systems increasingly redefine the social contract, demanding participatory oversight, ethical data stewardship, and clear moral communication with citizens.

Within this shifting landscape, pragmatic holism offers a philosophical compass. It calls for coherence between technical systems, ethical purposes, and institutional contexts, guiding leaders to align innovation with moral and civic ends. Instead of seeking certainty or control, pragmatic holism invites a flexible integration of knowledge, value, and practice, grounded in continual reflection on consequences. This means that digital transformation should not be treated as a technical project alone, but as a living inquiry into what it means to act wisely and well within complex systems. For educative leaders, coherence becomes a moral achievement—a disciplined capacity to coordinate ethical, epistemic, and organisational learning in pursuit of the public good.

Equally important is the contribution of non-foundational epistemology, which instils humility in digital governance. It reminds leaders that knowledge and policy decisions are always provisional, shaped by interpretation, dialogue, and evolving evidence. In practice, this epistemic humility translates into deliberative oversight of algorithmic systems, transparent recourse mechanisms, and inclusive public consultation. By acknowledging uncertainty as an ethical condition rather than a flaw, non-foundationalism enables more democratic and adaptive forms of leadership. It reframes authority as an open process of justification and learning, rather than a claim to infallibility—a vital orientation for navigating the probabilistic nature of AI and the distributed accountability of blockchain infrastructures.

Finally, moral craftsmanship unites these philosophical commitments into an actionable form of leadership practice. It is through moral craftsmanship that pragmatic holism and non-foundational epistemology find expression in concrete acts of judgment, dialogue, and design. The educative leader becomes both artisan and moral philosopher, crafting institutions that humanise technology through fairness, openness, and care. The essential task is not technological perfection but humanisation—ensuring that systems serve human flourishing rather than subordinating it. Educative leadership thus emerges as the connective moral intelligence of the digital age, transforming technological disruption into a shared practice of ethical inquiry, institutional trust, and collective learning. By cultivating such craftsmanship, knowledge organisations can renew their legitimacy as moral communities devoted not merely to efficiency, but to the continuous education of humanity itself.

References

1. Arizona Department of Education. (2024, May 1). *Superintendent Horne announces the opportunity to provide AI tutors statewide through Khan Academy.* https://www.azed.gov/
2. C2PA. (2022). *C2PA releases specification of world's first industry standard for content provenance.* https://contentcredentials.org/c2pa-releases-specification-of-worlds-first-industry-standard-for-content-provenance/
3. Dewey, J. (1929). *The quest for certainty: A study of the relation of knowledge and action.* Minton, Balch.
4. Dewey, J. (1938). *Logic: The theory of inquiry.* Henry Holt.
5. Duignan, P. A., & Macpherson, R. J. S. (Eds.). (1992). *Educative leadership: A practical theory for new administrators and managers.* Falmer Press.
6. EUDI Wallet Dev Hub. (2025). *Architecture and reference framework (v2.2).* https://eu-digital-identity-wallet.github.io/
7. European Commission. (2024). *EBSI Verifiable Credentials – Vocational Education and Training (VET) use-case.* European Commission. https://ec.europa.eu/digital-building-blocks/sites/spaces/EBSI/pages/600343491/EBSI%2BVeriﬁable%2BCredentials

8. European Union. (2024). Regulation (EU) 2024/1689 of the European Parliament and of the Council of 13 June 2024 laying down harmonised rules on artificial intelligence (Artificial Intelligence Act). *Official Journal of the European Union.*
9. Evers, C. W. (2016). *Realist inquiry in social science.* SAGE.
10. Evers, C. W. (2019). Decision-making and the school organization. In A. J. Daly (Ed.), *The SAGE handbook of school organization* (pp. 430–446). SAGE.
11. Evers, C. W., & Lakomski, G. (1991). *Knowing educational administration.* Pergamon.
12. Evers, C. W., & Lakomski, G. (2012). Science, systems, and theoretical alternatives in educational administration: The road less travelled. *Journal of Educational Administration, 50*(1), 57–75. https://doi.org/10.1108/09578231211196069
13. Evers, C. W., & Lakomski, G. (2020). Theories of educational leadership. In *Oxford Research Encyclopedia of Education.* Oxford University Press. https://doi.org/10.1093/acrefore/9780190264093.013.603
14. Future of Life Institute. (2024). *High-level summary of the AI Act.* https://artificialintelligenceact.eu/high-level-summary/
15. Gómez, J. (2024, May 13). *Newark Public Schools considers new AI tutor chatbot for districtwide use after pilot testing. Chalkbeat Newark.* https://www.chalkbeat.org/newark/2024/05/13/artificial-intelligence-khanmigo-chatbot-tutor-pilot-testing-districtwide-expansion/
16. Hern, A. (2020, August 20). *Everything that went wrong with the botched A-levels algorithm. WIRED.* https://www.wired.com/story/alevel-exam-algorithm/
17. Lakomski, G., & Evers, C. W. (2022). The importance of context for leadership in education. *Educational Management Administration and Leadership, 50*(2), 269–284. https://doi.org/10.1177/17411432211051850
18. Macpherson, R. J. S. (2014). *Political philosophy, educational administration and educative leadership.* Routledge.
19. Macpherson, R. J. S. (2025a). Bridging moral philosophies and metaphysical paradigms: Rethinking educative leadership for diverse organizational contexts. *Ethics and Education, 20*(2–3), 319–342. https://doi.org/10.1080/17449642.2025.2495508
20. Macpherson, R. J. S. (2025b). Building educative leadership theories: A non-foundational and culturally specific approach. *Educational Philosophy and Theory, 57*(11), 1003–1013. https://doi.org/10.1080/00131857.2025.2468429
21. Macpherson, R. J. S. (2025c). Ethical and educative leadership to improve the quality of learning: Revising a pioneering theory using pragmatic holism. *International Journal for Leadership Learning, 25*(1), 1–41. https://doi.org/10.29173/ijll52
22. Macpherson, R. J. S. (2025d). Educative leadership in multicultural contexts: Refining policies, practices and theory building. *Multicultural Education Review, 17*(4).
23. National Cyber Security Centre (UK). (2021, March 19). *Further targeted ransomware attacks on the UK education sector by cyber criminals.* https://www.ncsc.gov.uk/
24. National Institute of Standards and Technology. (2024). *The NIST Cybersecurity Framework (CSF) 2.0 (NIST CSWP 29).* https://doi.org/10.6028/NIST.CSWP.29
25. New Hampshire Department of Education. (2024, April 9). *NHED to provide Khanmigo AI education for free to all NH students, parents and teachers.* https://www.education.nh.gov/
26. NSA; Australian Cyber Security Centre; Canadian Centre for Cyber Security; UK National Cyber Security Centre; New Zealand National Cyber Security Centre; National Cyber Security Centre – Netherlands. (2025, January 23). *Enhancing media literacy and cybersecurity resilience against foreign malign influence (joint guidance).* https://www.cyber.gov.au/
27. Peters, M. A., Jackson, L., Papastephanou, M., Jandrić, P., Lazaroiu, G., Evers, C. W., Cope, B., Kalantzis, M., Araya, D., Tesar, M., Mika, C., Chen, L., Wang, C., Sturm, S., Rider, S., & Fuller, S. (2024). AI and the future of humanity: ChatGPT-4, philosophy and education – Critical responses. *Educational Philosophy and Theory, 56*(9), 828–862. https://doi.org/10.1080/00131857.2023.2213437
28. Reimagining Education With AI: Ethics, Equity, and Transformation. (2024, May). *TIE Online.* https://www.tieonline.com/article/7701/reimagining-education-with-ai-ethics-equity-and-transformation
29. Service NSW. (2025, July 2). *Upgraded NSW digital photo card trial – Terms and conditions (Verifiable Credential pilot).* https://www.service.nsw.gov.au/terms-and-conditions/nsw-photo-card-verifiable-credential-trial
30. UK Government Communication Service. (2024, November 15). *How to prepare for the use of AI in government communications.* https://gcs.civilservice.gov.uk/
31. upReach. (2020, August 17). *Ofqual grades algorithm: A recipe for unfairness (Briefing).* https://cms.upreach.org.uk/uploads/up_Reach_Ofqual_Algorithm_Research_17th_August_2020.pdf
32. W3C. (2025, May 15). *Verifiable Credentials Data Model v2.0 (W3C Recommendation).* https://www.w3.org/TR/vc-data-model-2.0/
33. WithSecure. (2023). *Case study: Harris Federation – Protecting 40,000 students and 5,000 staff from cyber-attacks.* https://www.withsecure.com/
34. Wynn-Williams, S. (2025). *Careless People: A cautionary tale of power, greed, and lost idealism*. Flatiron Books.