

The AI Literacy Programmes in Higher Education: Trends and Emerging Practices

Peter Neri^{a*} and I. Behl^a

^aUCL Institute of Education, University College London, London, UK

*peterneri11@gmail.com

The AI Literacy Programmes in Higher Education: Trends and Emerging Practices

Abstract

This study investigates the integration of Artificial Intelligence Literacy (AIL) programmes in higher education, adapting the five dimensions defined by Pretorius and Cahusac de Caux (2024): foundational, conceptual, ethical, social, and emotional. Recognizing the complexities of institutional culture, the research examines how a multi-level approach can facilitate effective AIL implementation. An exploratory web-based comparative analysis was conducted on 15 universities' AIL programmes and resources for teaching and learning, revealing that while most institutions prioritize foundational and conceptual dimensions — providing technical knowledge and application skills — the sociocultural and emotional dimensions are significantly underrepresented. Ethical considerations are increasingly acknowledged, yet few programmes engage learners in collaborative AIL activities and reflection activities on their emotional responses to AI. The study highlights the necessity of strategies operating both institution-wide and at departmental levels, employing diverse educational methods to enhance engagement across disciplines. By embracing a comprehensive approach that encompasses all five AIL dimensions, higher education institutions can better prepare students and faculty to navigate an AI-driven world with critical thinking, ethical reasoning, and emotional intelligence.

Keywords: ai literacy; higher education; artificial intelligence education; ethical ai practices; literacy framework

Introduction

Defining AI Literacy in Higher Education

Artificial Intelligence Literacy (AIL) represents a set of competencies that empower individuals to understand, engage with, and critically evaluate AI technologies. In higher education, this necessitates a comprehensive framework that integrates technical proficiency, ethical reasoning, collaborative skills, emotional intelligence, and sociocultural awareness. By integrating AIL taxonomies presented in recent educational research reviews (Rizvi et al., 2023; Shiri, 2024), the AIL framework proposed by Pretorius and Cahusac de Caux (2024), can be expanded to include seven domains: foundational, conceptual, ethical, social, affective, sociocultural, and pedagogical (*figure 1 below*).

The *foundational domain* provides technical knowledge of AI systems, including their capabilities, limitations, and underlying mechanisms. It forms the basis for engaging with AI technologies effectively, mirroring the importance of foundational knowledge highlighted in digital literacy frameworks (Shiri, 2024).

Building on this, the *conceptual domain* emphasizes critical evaluation and the ability to apply AI concepts effectively within diverse academic and professional contexts. Together, these dimensions ensure that learners acquire both the technical and cognitive foundations required to navigate the complexities of AI. (Ng et al., 2021).

The ethical domain focuses on principles such as bias, fairness, accountability, inclusivity, privacy in AI use (Kharkova & Holmes, 2022). This domain aligns with the call for ethical and responsible AI practices in emerging AI literacy research (Long & Magerko, 2020; Rizvi et al., 2023).

Complementing this is the *social domain*, which focuses on collaboration and human-AI interactions. This dimension equips learners to work effectively individually or within interdisciplinary teams and to utilize AI as a tool for enhancing collective problem-solving and innovation.

The affective domain introduces an essential element of emotional engagement, recognizing that learners' attitudes toward AI significantly influence their openness to AI technology adoption and critical reflection. By supporting resilience, adaptability, and positive emotional responses, AIL programmes sustain learners to navigate the layered challenges posed by the use of AI technologies (Gillespie et al., 2023).

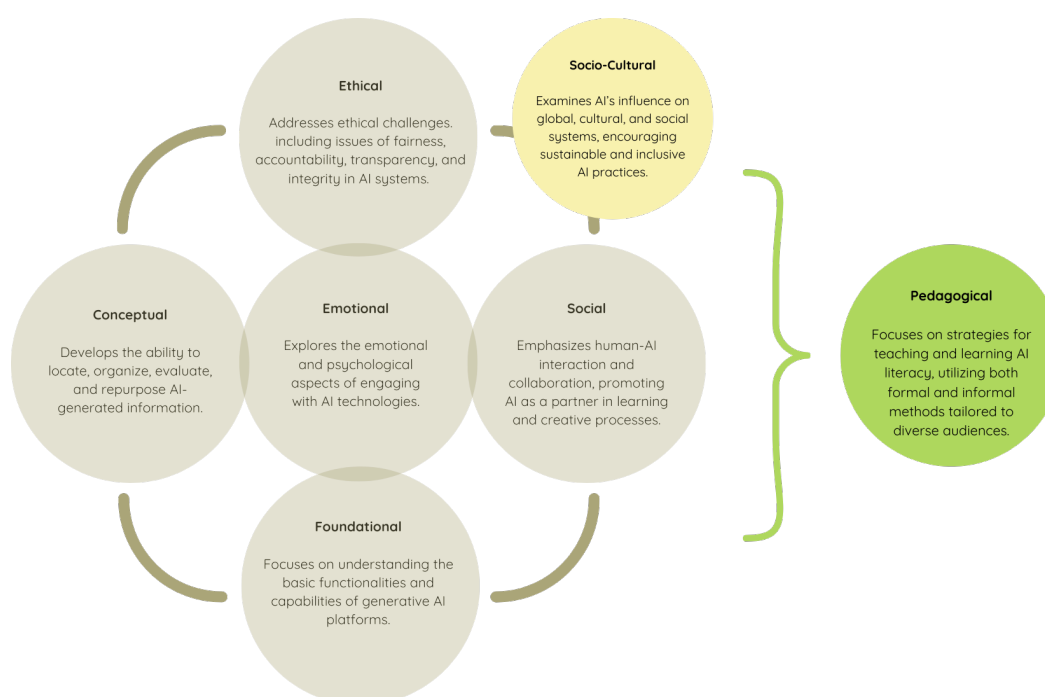
Expanding on the above five core AIL domains proposed by Pretorius and Cahusac de Caux (2024), two additional domains are proposed:

The *sociocultural domain* addresses the broader societal, cultural, and global contexts in which AI operates. Drawing from digital literacies and multiliteracies theories (Bawden, 2008; Cazden et al, 1996), this dimension emphasizes the importance of ethical and sustainable AI practices that align with global challenges such as climate change and equity. It also highlights the role of AI in shaping cultural norms and governance structures, advocating for inclusivity in AI design and deployment (Holmes, 2023). By encouraging learners to critically evaluate AI's societal impact, the sociocultural dimension prepares them for the future of work and to engage with AI in ways that promote social justice.

The *pedagogical domain* focuses on empowering educators with strategies to effectively facilitate AI literacy teaching and learning activities and adopt AI use in educational contexts (Kong et al., 2023; Shiri, 2024). It emphasizes educator training and interdisciplinary integration, promoting teaching strategies that adapt to diverse learning

contexts (Laupichler et al., 2022). Drawing upon approaches to digital literacy education (Meyers et al., 2013), it encompasses both formal and informal learning strategies. Furthermore, it supports professional development for educators, equipping them with the tools and resources needed for AIL curriculum integration.

Figure 1: Revised Framework for AIL, adapted from the original 5-domain framework of Pretorius and Cahusac de Caux (2024), with the addition of the Socio-Cultural and Pedagogical domains.



This expanded AIL framework is intended to also reflect the participatory and adaptive ethos of digital literacies (Meyers et al., 2013), emphasizing critical engagement, contextual application, and cultural inclusivity; in particular, AIL programmes should promote:

- **Reflexivity**: Encouraging learners to critically assess their relationship with AI technologies and their societal roles.
- **Adaptability**: Recognizing the need to review conceptual understanding and approaches in response to the rapid evolution of AI technologies and their applications.

By synthesizing the range of AIL taxonomies presented in the literature and incorporating the pedagogical dimension, the expanded AIL framework provides an analytical tool to evaluate current AIL initiatives in higher education for the scope of this comparative study.

Cultural Change in Universities

Achieving high levels of multi-domain AIL across a higher education institution requires a profound cultural shift among students and faculty. Universities are complex organizations with ingrained traditions, values, and practices. The widespread introduction of AI technologies challenges existing pedagogical approaches and necessitates adaptation to new ways of teaching, learning, and researching. Cultural archetypes within institutions influence how change is perceived and enacted, suggesting that a one-size-fits-all approach is ineffective. Hargreaves et al. (1998) highlight that successful innovation depends on acknowledging the multifaceted nature of educational institutions. Factors such as organizational innovations, managed or planned educational change, and mandated reforms play critical roles in how higher education adapts to new technologies.

Kezar and Eckel (2000) emphasize the significant impact of institutional culture on change strategies, underscoring the need to understand unique institutional cultures when implementing comprehensive changes. The integration of AI technologies requires universities to address not only pedagogical adjustments but also the broader implications for the future of work and discipline-specific applications of AI. Faculty and students must engage with the socio-cultural dimension of AI not just as a tool but as a transformative force that influences all aspects of academia and society.

A Multi-Level Approach to AI Literacy

Addressing the challenges of integrating AIL programmes requires a multi-level approach operating both institution-wide and at the departmental level. Institution-wide initiatives have the potential to foster an AI-aware culture that embraces innovation and ethical considerations, involving shared AI guidelines for educators and students, promoting informal learning opportunities, and encouraging cross-disciplinary collaboration. At the departmental level, curriculum integration contextualizes AI within specific disciplines, tailoring AIL content to allow students to gain relevant and practical competencies.

AIL initiatives for students and educators are being extensively implemented by universities at the institution-wide level to address the new educational landscape, particularly following the widespread adoption of generative AI technologies; on the other hand, department-level initiatives for curriculum integration are not as common outside of STEM departments (Southworth et al., 2023).

Formal learning strategies such as microlearning modules, credentialing programmes, and project-based learning provide foundational knowledge, enhance engagement and deepen conceptual, social and ethical understanding of AI. Informal opportunities, such as engagement with hands-

on workshops, debates, public scholarship and media initiatives, address the social and affective dimensions by fostering a community of practice and encouraging reflective dialogue (Lee et al., 2024; Ng, 2021).

Methodology

An exploratory web-based comparative analysis was used to investigate how universities are implementing AI literacy programmes with a particular focus on the domains described in the expanded AIL framework (Figure 1).

Building upon insights from the literature review, a web-based search identified 15 higher education AI literacy programmes for analysis. The selected programmes are detailed in the annexed Table 1. The selection criteria included:

- Diversity of institutions: Programmes from universities across different regions and with varied institutional profiles.
- Availability of information: Programmes with accessible online information regarding curriculum, educational strategies, and implementation approaches.
- Relevance to AIL dimensions: Programmes explicitly described as advancing AI Literacy and addressing one or more of the AI literacy dimensions.

Information was extracted from university websites and programme descriptions and coded according to the seven AI literacy dimensions.

The approach combined content analysis and comparative education research related to educational practices across different contexts to identify patterns, similarities, and differences (Bray et al., 2014). By adopting this approach, the study aims to understand the diverse strategies universities employ in integrating AIL programmes and how these strategies address the various dimensions of AI literacy. The comparative design allows for an analysis of multiple cases, providing insights that might not be apparent when examining AIL programmes in isolation.

Limitations

The study is exploratory and based on secondary research from publicly available web-based sources, which may not fully represent the scope of each programme due to limited depth of analysis for each individual case.

Moreover, variations in institutional culture and regional educational policies may affect the generalizability of findings.

Future research could include direct engagement with programme administrators, faculty and students, through qualitative methods to evaluate in depth the content, approach and context of each programme.

Ethical Considerations

The study adhered to ethical research practices by:

- Using public data: Only publicly accessible information was used, respecting institutional privacy.
- Accurate representation: Efforts were made to accurately represent each institution's AIL programme without bias.
- Acknowledging Sources: proper citations were provided for all referenced materials and shared in the annexes.

Cross-Case Analysis

Emphasis on AI Literacy Dimensions

Most of the AIL programmes analyzed prioritize the *foundational* and *conceptual* dimensions, ensuring students gain essential technical knowledge about AI technologies and their applications. *Ethical* considerations are acknowledged to varying degrees, with the majority highlighting responsible AI use and providing guidelines to promote ethical practices. AI teaching guidance documents and resources published by universities tend to address best practices related to the *social* dimension of student-AI interaction and collaboration, as well as provide practical cases of classroom use of AI for teaching and learning activities.

However, a significant gap can be inferred in the limited references to the sociocultural and emotional dimensions in the AIL programme content and teaching guidance. Few programmes explicitly engage with learners' emotional responses to AI or promote activities that foster emotional intelligence and critical reflection on AI's societal impact.

Educational Strategies Adopted

The AIL programmes analyzed employ diverse strategies:

- Practical guidance and resource provision: There is widespread use of guides and strategies to assist in integrating AI tools into teaching, learning, and assessment practices.

- Online learning and microlearning: Self-paced courses and microlearning modules provide flexibility and cater to diverse learning needs were among the most common modes of instruction.
- Project-based learning: This approach was limited to few ALL programmes, which engage students in hands-on projects that allow them to apply their knowledge in practical contexts.
- Curriculum integration: Some institutions make AI education mandatory for all students, emphasizing interdisciplinary application. Others incentivize completion of online or on-campus courses through micro-credentialing programmes and certificate programmes.
- Educator professional development: Asynchronous training and resources are also commonly adopted to support educators in effectively teaching AI literacy and integrate it into existing courses.

Emerging Themes, Trends and Gaps

Key themes include a strong focus on technical skills, acknowledgment of ethical implications, limited attention to social and affective dimensions, diverse educational strategies, and challenges in making AI literacy relevant to non-technical fields. While there is an effort to embed AI literacy across disciplines, bridging theoretical concepts with practical applications remains limited.

Trends include institution-wide AI literacy initiatives and resource provision for educators. Offering micro-credentials recognizes and incentivizes student engagement in AI literacy. However, gaps remain in addressing the affective dimension and ensuring engagement in non-technical disciplines.

Discussion

While institutions recognize the importance of integrating AI literacy, they tend to focus predominantly on the foundational, conceptual and social dimensions. This emphasis equips students with essential technical competencies but may not fully prepare them to understand AI's broader societal implications and personal emotional responses. On the other hand, the complex array of ethical challenges posed by AI use in educational contexts requires in depth support for educators and students alike, integrating theoretical understanding with practical learning activities (Holmes, 2023).

Limited focus on socio-cultural and affective dimensions is a significant gap. The affective domain influences how individuals perceive and interact with AI, affecting openness to adopting new technologies and critical engagement with AI-generated content (Faruqe et al., 2022; Long & Magerko, 2020).

Neglecting this may hinder students' ability to navigate AI complexities in real-world contexts.

Further Developments for AI Literacy Programmes

Successful AIL integration requires addressing the complex cultural dynamics within universities (Kezar & Eckel, 2000). Engaging with unique departmental cultures enhances effectiveness and mitigates resistance (Hargreaves et al., 1998). Without considering these nuances, efforts may fail to achieve meaningful change.

A multi-level strategy enhances engagement and caters to diverse needs among students and faculty. Flexible learning options, such as microlearning modules and self-paced courses, provide accessibility, but cohesion is necessary to prevent fragmented learning experiences. Tailoring content to align with the interests of non-technical disciplines can enhance relevance and engagement.

Institutions should integrate activities that prompt reflection on personal attitudes toward AI, discuss emotional reactions to AI interactions, and explore societal impacts. Collaborative learning, discussions, and case studies can enrich the learning experience. Fostering a culture change toward awareness of AI uses and implications through shared guidelines, community engagement, and interdisciplinary collaboration embeds AI literacy within the institutional fabric of a university (Jin et al., 2024).

Proposal for a University-Wide AIL Multilevel Initiative

Within the context of the UCL IOE Assessment Challenge, an AI literacy programme framework was developed to tailor to the needs of higher education students and educators. The project aimed to address the critical gaps in existing AI literacy programme while providing a roadmap for enabling students to navigate the challenges and opportunities of AI. The educational programme proposal aims to balance socio-cultural and cognitive goals to achieve two primary objectives: fostering a shared culture of AI awareness across the institution and enhancing AI-related competencies, specifically at a department-level. At the institution-wide level, informal learning initiatives such as multi-channel awareness campaigns, microlearning modules, and community-based activities (e.g., hackathons, AI competitions, and workshops) are proposed to build a community of practice and cultivate engagement. At the department-level, subject-specific strategies like curriculum integration, hands-on workshops, and personalized mentorship are recommended to focus on skill development and domain-specific applications.

This dual-level framework reflects a commitment to creating an interdisciplinary, adaptable, and sustainable AI literacy programme. By integrating findings from the assessment challenge, the proposed design ensures a student-centered approach that balances AI awareness with practical application, preparing learners to thrive in an AI-driven future. To operationalize the proposed AI literacy framework, we have designed a range of teaching and learning activities tailored to address the dimensions of AI literacy in line with the proposed framework. Additional details regarding the sample AIL programme framework proposal and sample activities are provided in the annexure (figures 2.1, 2.2, 2.3, 2.4), providing practical guidance for integrating AI literacy into the teaching and learning process.

Conclusion

Integrating AI literacy programmes in higher education is essential for preparing individuals to navigate an AI-driven world. Enhancing focus on the ethical, sociocultural and affective domains is necessary for a comprehensive understanding of AI's impact on individuals and society.

By acknowledging the complexities of institutional culture change and adopting a multi-level approach, higher education institutions can develop effective AI literacy programmes that equip learners with technical skills and foster critical thinking and ethical reasoning.

Recommendations for Future Research and Implementations

Future research should explore in-depth programme evaluations, longitudinal studies on AI literacy impact, development of assessment tools for social and affective competencies, and investigation of institutional culture's influence on AIL initiatives.

References

- Bawden, D. (2008). Origins and concepts of digital literacy. In C. Lankshear & M. Knobel (Eds.), *Digital literacies: Concepts, policies and practices* (pp. 16–32). Peter Lang.
- Bray, M., Adamson, B., & Mason, M. (Eds.). (2014). *Comparative education research: Approaches and methods* (2nd ed.). Springer. <https://doi.org/10.1007/978-3-319-05594-7>
- Cazden, C., Cope, B., Fairclough, N., Gee, J., Kalantzis, M., Kress, G., ... Nakata, M. (1996). *A pedagogy of multiliteracies: Designing social futures*. Harvard Educational Review, 66(1), 60–92. <https://doi.org/10.17763/haer.66.1.17370n67v22j160u>

- Faruqe, F., Watkins, R., & Medsker, L. R. (2022). Competency model approach to AI literacy: Research-based path from initial framework to model. *Advances in Artificial Intelligence and Machine Learning*, 2(4), 580–587. <https://dx.doi.org/10.54364/AAIML.2022.1140>
- Gillespie, N., Lockey, S., Curtis, C., Pool, J., & Akbari, A. (2023). Trust in Artificial Intelligence: A Global Study. The University of Queensland and KPMG Australia. <https://doi.org/10.14264/00d3c94>
- Hargreaves, A., Lieberman, A., Fullan, M., & Hopkins, D. (Eds.). (1998). *International handbook of educational change* (ISBN 0-7923-3534-1). Springer.
- Holmes, W. (2023). The unintended consequences of artificial intelligence and education (ISBN 978-92-95120-98-3). Education International.
- Jin, Y., Yan, L., Echeverria, V., Gašević, D., & Martinez-Maldonado, R. (2025). Generative AI in higher education: A global perspective of institutional adoption policies and guidelines. *Computers and Education: Artificial Intelligence*, 8, 100348. <https://doi.org/10.1016/j.caeai.2024.100348>
- Kezar, A., & Eckel, P. D. (2000). The effect of institutional culture on change strategies in higher education. *Journal of Higher Education*, 71(1), 1–25. <https://doi.org/10.1353/jhe.2002.0038>
- Kharkova, I., & Holmes, W. (2022). The challenge of artificial intelligence. In M. Yülek & J. G. Wissema (Eds.), *Towards third generation learning and teaching: Contours of the new learning* (pp. 165–180). Anthem Press.
- Kong, S. C., Zhang, G., & Cheung, W. M. Y. (2023). Evaluating an artificial intelligence literacy programme for developing university students' conceptual understanding, literacy, empowerment, and ethical awareness. *Educational Technology & Society*, 26(1), 16–30. [https://doi.org/10.30191/ETS.202301_26\(1\).0002](https://doi.org/10.30191/ETS.202301_26(1).0002)
- Laupichler, M. C., Aster, A., Schirch, J., & Raupach, T. (2022). Artificial intelligence literacy in higher and adult education: A scoping literature review. *Computers and Education: Artificial Intelligence*, 3, 100101. <https://doi.org/10.1016/j.caeai.2022.100101>
- Lee, K., Mills, K., Ruiz, P., Coenraad, M., Fusco, J., Roschelle, J., & Weisgrau, J. (2024). AI literacy: A framework to understand, evaluate, and use emerging technology. Digital Promise. <https://digitalpromise.org/2024/06/18/ai-literacy-a-framework-to-understand-evaluate-and-use-emerging-technology/>
- Long, D., & Magerko, B. (2020). What is AI literacy? Competencies and design considerations. In *CHI '20: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1–16). <https://doi.org/10.1145/3313831.3376727>
- Meyers, E.M., Erickson, I. & Small, R.V. (2013). Digital literacy and informal learning environments: An introduction. *Learning, Media and Technology*, 38(4), pp. 355–367. <https://doi.org/10.1080/17439884.2013.783597>
- Ng, D.T.K., Leung, J.K.L., Chu, S.K.W. and Qiao, M.S. (2021). Conceptualizing AI literacy: an exploratory review. *Computers and Education: Artificial Intelligence*, Vol. 2, p. 100041. <https://doi.org/10.1016/j.caeai.2021.100041>
- Pretorius, L., & Cahusac de Caux, B. (2025). The AI literacy framework for higher education: A grounded theory exploration of the foundational, social,

- conceptual, ethical, and affective domains of AI literacy. In J. D. DeHart, S. Abas, R. A. Mora, & D. Gibbons Pyles (Eds.), *Reimagining literacy in the age of AI: Theory and practice*. Chapman and Hall/CRC.
<https://doi.org/10.1201/9781003510635>
- Rizvi, S., Waite, J., & Sentance, S. (2023). Artificial intelligence teaching and learning in K-12 from 2019 to 2022: A systematic literature review. *Computers and Education: Artificial Intelligence*, 4, 100145.
<https://doi.org/10.1016/j.caeai.2023.100145>
- Shiri, A. (2024). Artificial intelligence literacy: A proposed faceted taxonomy. *Digital Library Perspectives*, 40(4), 681–699. <https://doi.org/10.1108/DLP-04-2024-0067>
- Southworth, J., Migliaccio, K., Glover, J., Glover, J., Reed, D., McCarty, C., Brendemuhl, J., & Thomas, A. (2023). Developing a model for AI across the curriculum: Transforming the higher education landscape via innovation in AI literacy. *Computers and Education: Artificial Intelligence*, 4, 100127.
<https://doi.org/10.1016/j.caeai.2023.100127>