

African AI Masterclass in Prompt Engineering: Empowering Students Through Responsible and Contextualised AI Literacy

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Abstract

This paper reports on the design, implementation, and outcomes of the African AI Masterclass in Prompt Engineering, a large-scale educational intervention aimed at advancing responsible and contextualised artificial intelligence literacy in higher education. Conducted at the University of South Africa (UNISA), a mega open distance e-learning (ODEL) institution, the initiative responded to growing concerns around students' uncritical and unethical use of generative AI. Anchored in the AI Literacy Heptagon framework and delivered through a hybrid flexible HyFlex model, the Masterclass combined asynchronous online modules, synchronous webinars, and regional workshops to maximise accessibility and inclusivity. A total of 13,927 students participated across diverse modalities, making this one of the largest empirical AI literacy deployments in higher education to date. Mixed-methods evaluation demonstrated significant gains: students reported increased confidence in using AI tools ethically and effectively, while engagement data revealed participation rates exceeding typical online course benchmarks. Qualitative feedback further highlighted enhanced digital resilience and confidence in applying AI for learning and research. The findings underscore the potential of HyFlex, stakeholder-driven design, and contextualised ethics to scale AI literacy in resource-constrained ODeL environments. While limitations include reliance on self-reported data and the challenge of rapidly evolving AI tools, the study provides robust baseline evidence of students' ethical awareness and readiness for responsible AI use, illustrating a replicable model for embedding responsible AI practices in higher education. The study contributes to global debates on AI literacy by offering evidence from an African ODeL context, aligned with institutional strategic goals and Sustainable Development Goal 4 on quality education.

Keywords:

Responsible AI
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Prompt Engineering,
Open Distance e-
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Digital Resilience,
African Languages in
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HyFlex Pedagogy,
Culturally Responsive
Pedagogy

1. Introduction

Artificial Intelligence is transforming the higher education landscape, introducing both opportunities and challenges for student learning (Bailey, 2023; Hackl et al., 2025; Katsamakos et al., 2024; Wright, 2024). Recent advances in generative AI, such as ChatGPT and related large language model, have made sophisticated AI tools widely accessible to students, enabling new forms of personalised learning and productivity support (Wang & Fan, 2024). However, alongside this opportunity, there are growing concerns

about the ethical and effective use of AI in academia. Issues such as academic integrity, algorithmic bias, privacy concerns, overreliance on AI, and equity gaps have been identified as key challenges for example, student cheating and biased outputs generated by AI tools (Bailey, 2023; Gu & Ericson, 2025; Mittal et al., 2024). In response, some universities have reacted by banning or restricting AI use, rather than educating students on its responsible application (ADOVH, 2023; Xiao et al., 2023). This reaction signals a critical gap in higher education: many institutions lack formal training programs to build AI literacy among students, in other words, the competencies needed to critically and effectively use AI tools in learning.

AI literacy has emerged as a crucial 21st-century skill for students (Hackl et al., 2025). There is a broad consensus that higher education must prepare students for an AI-driven future by teaching them how to use AI critically, ethically, and collaboratively (Hackl et al., 2024; Ng et al., 2022; Miao & Cukurova, 2024). Policy frameworks such as the European Union's draft AI Act explicitly call for promoting AI literacy among citizens (Hackl et al., 2024). Despite this, the integration of AI literacy into university curricula remains limited (Gu & Ericson, 2025). For example, a recent study in Germany found that only about one-third of students reported that AI literacy was addressed in their programmes (Hackl et al., 2024). The lack of clear frameworks and training opportunities contributes to this implementation gap (Gu & Ericson, 2025; Ren & Wu, 2025). One specific subset of AI literacy gaining attention is prompt engineering, the skill of writing effective inputs or queries to obtain desired outputs from generative AI systems (Lee & Palmer, 2025). Furthermore, Lee and Palmer (2025) suggests that structured prompt training can significantly enhance students' learning outcomes. For instance, Garg et al. (2025) found that engineering students who received prompt-engineering training outperformed those who did not, across multiple problem-solving tasks. This highlights the potential value of explicitly teaching prompt skills.

Within the African higher education context, the need for AI literacy interventions is especially crucial (Maluleke, 2025). As a mega-university operating through open distance e-learning, the University of South Africa (UNISA) serves over 370,000 predominantly remote students. Many UNISA students are already experimenting with AI tools in their studies, but without formal guidance or support (UNISA, 2024). Prior internal research indicated that while students are eager to leverage AI for learning, they often lack awareness of best practices and ethical considerations (ADOVH, 2024a, 2024b; UNISA, 2024). Furthermore, the institutional context of UNISA's CODEL (Comprehensive, Open, Distance and eLearning) is marked by pronounced transactional distance between students and the institution (ADOVH, 2023; Kotzé, 2021). Bridging that distance demands innovative pedagogical and technological strategies (Nussli, 2025; Sibarani, 2025). AI tools, if used properly, could help mediate the distance by providing personalised support and enhancing engagement (ADOVH, 2023, 2024a, 2024b; Pitts et al., 2025). However, without proper literacy, students might misuse AI or miss out on its benefits (Ng et al., 2021). There was thus an institutional need to proactively educate students on responsible AI use, rather than leaving them unsupported or resorting to punitive measures for misuse.

In their review of literature, Gu and Ericson (2025) also revealed a gap in documented large-scale implementations of AI literacy training in higher education, particularly in low-resource or distance learning environments. Most published initiatives on AI literacy focus on small pilot courses or K-12 interventions, often in Western contexts (Tan & Tang, 2025). Little has been reported on how to effectively reach tens of thousands of students with AI literacy content in an open, geographically dispersed setting. Moreover, existing programmes rarely contextualise AI literacy to local needs or address the responsible use of AI in academic settings for example, understanding AI's role in plagiarism or how cultural context affects AI outputs (Moya et al., 2023). This paper aims to fill that gap by reporting on the Afrikan AI Masterclass in Prompt Engineering, an innovative masterclass designed and implemented at UNISA in 2024 as part of a broader Student Digital Resilience Project. Aligned with global and continental agendas,

including Sustainable Development Goal (SDG) 4 (Quality Education) and the African Union's Agenda 2063 Goal 2 on skills revolution (ADOVH, 2023), this initiative sought to empower students with AI knowledge and skills that are both responsible (emphasising ethics and academic integrity) and contextualised (reflecting African and distance learning contexts).

In the following sections, we describe the development of the Afrikan AI Masterclass, the pedagogical approach and HyFlex delivery model employed, and the outcomes achieved. We discuss how stakeholder engagement and data-driven design were leveraged to ensure relevance and inclusivity. We then present results on student participation (reaching over 13,900 students), engagement analytics, assessment outcomes, and student feedback. The discussion interprets these results considering the literature on AI literacy and open distance e-learning, highlighting lessons learned and broader implications. Finally, we conclude with the institutional impact of the masterclass and recommendations for scalability, suggesting how this model can inform similar efforts in other higher education institutions seeking to cultivate AI literacy at scale.

2. Methodology

2.1. Conceptual and Theoretical Framework

This study was guided by the AI Literacy Heptagon framework (Hackl et al., 2025) and principles of HyFlex pedagogy (Beatty, 2019), which together provided a structured lens for the design and evaluation of the Afrikan AI Masterclass. The AI Literacy Heptagon outlines seven domains of AI literacy technical knowledge, critical awareness, ethical reflection, application skills, collaboration, communication, and lifelong learning that served as conceptual anchors for curriculum development. HyFlex pedagogy, in turn, informed the multimodal delivery approach, enabling students to choose between synchronous online, asynchronous online, and in-person participation. Framing the study within these models ensured that both content and delivery were pedagogically sound, culturally contextualised, and scalable within an open distance e-learning (ODeL) environment.

2.2. Research Design

The study employed a mixed-methods design (Creswell & Plano Clark, 2018), combining quantitative and qualitative data collection to evaluate the effectiveness of the Masterclass. This approach was appropriate given the dual aims of (1) assessing changes in AI literacy competencies at scale and (2) exploring student perceptions of responsible and contextualised AI use. The research was conducted as an institutionally embedded educational intervention under the Student Digital Resilience Project, which allowed for both formative and summative evaluation.

Given the study's focus on students' perceptions, confidence, and ethical awareness regarding AI use, self-reported measures were an appropriate and widely accepted method for capturing these attitudinal and cognitive dimensions at scale. Such measures are commonly employed in educational technology and AI literacy research, particularly when investigating emerging competencies and learner experiences rather than observable long-term behavioural outcomes.

2.3. Participants and Context

The Masterclass was implemented at the University of South Africa (UNISA), a mega ODeL institution serving over 370,000 students. A total of 13,927 unique students participated across delivery modes, including online self-paced modules, synchronous webinars, and face-to-face workshops. Participants represented all colleges of the university, with significant participation from first-year students and rural regions. Ethical clearance was obtained through UNISA's institutional review processes, and participation in surveys and assessments was voluntary and anonymised.

2.4. Intervention Design

The curriculum was structured around three thematic strands: (1) AI literacy for ODeL students, (2) AI for personalised learning, and (3) AI and robotics in student support. Prompt engineering was integrated across all strands as a critical competency. The design process followed a co-design approach, engaging internal stakeholders (academics, instructional designers, ICT staff, and student support) and external experts to ensure relevance, inclusivity, and cultural responsiveness.

The Masterclass was delivered using a HyFlex model, comprising:

- Asynchronous online modules (self-paced MOOC hosted on myStudentSkillsHub),
- Synchronous online webinars with live demonstrations and interaction,
- Face-to-face workshops at regional centres, and
- Recorded sessions for flexible access.

This multimodal delivery was intended to maximise accessibility and align with UNISA's open education ethos.

2.5. Data Collection and Instruments

Data were collected through multiple instruments:

- Quantitative measures included participation analytics (enrolment, attendance, completion), formative and summative assessment scores, and pre/post surveys measuring AI literacy competencies and confidence.
- Qualitative measures included open-ended survey responses, facilitator reports from workshops, and student feedback in discussion forums.
- Learning analytics from institutional platforms (LMS, webinar systems) were integrated into a Power BI dashboard, enabling real-time monitoring of engagement patterns.

2.6. Data Analysis

Quantitative data were analysed descriptively (frequencies, means, percentages) to assess participation and learning outcomes. Pre- and post-survey data were compared to measure changes in confidence, skills, and ethical awareness. Qualitative data were thematically analysed to identify patterns in student experiences, challenges, and recommendations. Triangulation of data sources (surveys, analytics, qualitative feedback) strengthened validity and reliability.

2.7. Ethical Considerations

The study adhered to UNISA's ethical guidelines for educational research. Participation was voluntary, informed consent was obtained, and survey responses were anonymised. The evaluation was embedded within the approved monitoring and evaluation plan of the Student Digital Resilience Project

Table 1.

Student participation in AI Masterclass activities

Mode of Participation	Number of Student Participants (n)
AI Masterclass Online Course (self-paced MOOC)	5,469
AI Online Workshops (live webinars, cumulative attendance)	3,843
Face-to-Face Regional Workshops	109
Workshop Recording Views	4,506
Total Unique Students Reached	13,927

3. Results and Discussion

3.1. Advancing AI Literacy in ODeL Contexts

The Afrikan AI Masterclass provides evidence that large-scale AI literacy training is both feasible and impactful in an open distance e-learning (ODEL) context. With nearly 14,000 students participating, this intervention is among the largest empirical AI literacy deployments in a higher education context to date (to our knowledge). The findings resonate with global calls to integrate AI literacy into curricula (Hackl et al., 2025; Almatrafi et al., 2024), yet extend this literature by demonstrating how such efforts can succeed in resource-constrained and geographically dispersed contexts. Importantly, participation was strong among first-year and rural students, populations often excluded from early exposure to emerging technologies (Ng et al., 2021). This suggests that carefully designed HyFlex interventions can mitigate access barriers and promote equity in digital skills development (Beatty, 2019).

3.2. The Role of HyFlex Pedagogy

The HyFlex delivery model contributed significantly to accessibility and engagement (ADOVH, 2024a). Asynchronous modules ensured a wide reach, while synchronous webinars and face-to-face workshops enabled interactivity and personalised support. This aligns with previous research that flexibility in modality fosters higher levels of participation and persistence in digital literacy initiatives (Pelletier et al., 2023). Completion rates of around 60% in the online modules well above typical Massive Open Online Course (MOOC) average, indicate that when content is contextually relevant and supported by multiple engagement options, student persistence improves (Wang et al., 2023). The integration of mobile-responsive platforms further addressed barriers common in ODEL environments, strengthening inclusivity.

3.3. Shifts in Responsible AI Use

The Afrikan AI Masterclass also had measurable effects on ethical awareness and responsible AI use. Pre- and post-survey results showed a more than twofold increase in students reporting confidence in using AI ethically and with academic integrity. Prior research has shown that self-efficacy is a significant predictor of behavioural intention in both health and educational technology contexts, often beyond attitudes and subjective norms alone. Self-efficacy has been linked to increased likelihood of responsible or intended use of technology, and when combined with ethical awareness, significantly predicts behavioural intention to adopt AI tools (Getenet et al., 2024; Kwak et al., 2022).

This outcome is notable, as much discourse around generative AI in higher education has been dominated by concerns of misuse (Bailey, 2023; Ren & Wu, 2025). The findings support the argument that educating students on responsible AI practices rather than restricting access encourages more critical, reflective, and ethical engagement (Gu & Ericson, 2025). By embedding academic integrity and contextualised ethical considerations the Afrikan AI Masterclass modelled how ethical awareness can be cultivated alongside technical skills. While these findings reflect short-term outcomes, they represent critical precursor conditions for behavioural change, as ethical awareness and perceived self-efficacy are well-established predictors of responsible technology use in academic contexts (Getenet et al., 2024).

3.4. Implications for Digital Resilience

Beyond AI-specific competencies, participation in the Afrikan AI Masterclass nurtured broader digital resilience, a key institutional goal of the Student Digital Resilience Project. Students reported increased confidence in navigating online platforms, collaborating digitally, and adapting to new tools. This aligns with theories of digital activation, where exposure to novel technologies enhances general digital confidence (ADOVH, 2024a; Chen, 2024). For an ODEL institution like UNISA, where transactional distance remains a persistent challenge (Kotzé, 2021), strengthening digital resilience through initiatives like the Masterclass may contribute to long-term improvements in student engagement and success.

3.5. Contributions to Literature and Practice

This study contributes to the growing but still limited literature on AI literacy interventions in higher education, particularly in the Global South. While prior research has often reported on small pilot studies

or Western K–12 contexts (Tan & Tang, 2025), the Afrikan AI Masterclass illustrates how AI literacy can be implemented at scale in a non-traditional university environment. The combination of stakeholder co-design, HyFlex pedagogy, and contextualised ethics represents a replicable model for other institutions seeking to embed AI literacy as a co-curricular offering.

3.6. Limitations and Future Directions

Several limitations warrant consideration. First, the evaluation relied primarily on self-reported data and short-term assessments, which may not fully capture long-term retention or transfer of skills. Future research should examine whether students continue to apply responsible AI practices in subsequent coursework or professional contexts. Second, the rapid evolution of AI technologies poses a challenge to curriculum sustainability; ongoing updates and adaptive content will be required to maintain relevance. However, the Masterclass was intentionally designed to emphasise transferable competencies, such as critical prompting, ethical reasoning, and contextual awareness, rather than reliance on specific AI tools. This focus enhances the longevity and adaptability of the curriculum despite ongoing technological change. Third, while the intervention reached a large student body, participation remained voluntary; further work could explore embedding AI literacy within core curricula to ensure universal exposure. Finally, given the diversity of student readiness levels, differentiated pathways (e.g., beginner versus advanced tracks) may be needed in future iterations to accommodate varying levels of prior digital competence.

4. Conclusion

The Afrikan AI Masterclass in Prompt Engineering demonstrates that responsible and contextualised AI literacy can be scaled effectively in a large open distance e-learning (ODEL) institution. Reaching nearly 14,000 students, it stands among the largest empirically evaluated AI literacy initiatives in higher education to date. While large public MOOCs such as Elements of AI and institutional access pilots have engaged significant numbers, few interventions have combined curriculum design, pedagogy, ethical framing, and evaluation within a single university context.

Several elements contributed to the success of the Masterclass. Grounding the programme in the AI Literacy Heptagon and HyFlex pedagogy provided both theoretical coherence and delivery flexibility. The co-design process with academics, technologists, and students ensured cultural and ethical relevance, making the training accessible and inclusive across UNISA's geographically dispersed student body. The multimodal structure, offering asynchronous online modules, synchronous webinars, and regional face-to-face workshops, maximised participation and addressed barriers of access and connectivity common in ODeL and Global South settings.

The outcomes were notable. Students reported increased confidence in applying AI responsibly and ethically, reflecting a significant shift from pre- to post-training measures. Engagement data suggested persistence above typical online course averages, particularly in hands-on prompt-engineering activities. Beyond AI-specific competencies, the intervention also nurtured digital resilience, helping students build confidence in navigating online platforms and emerging tools. These findings reinforce the argument that higher education institutions should educate, rather than restrict, students in using AI, and that structured training can mitigate risks to academic integrity.

At the same time, there were a few limitations; the evaluation relied primarily on self-report and short-term assessment, leaving long-term retention and behavioural outcomes untested. The rapidly evolving AI landscape poses ongoing challenges for curriculum sustainability. Furthermore, while voluntary uptake was strong, embedding AI literacy into core curricula may be necessary to ensure that all students develop these critical skills.

Future research will build on this foundation through longitudinal designs that examine sustained behavioural change, academic performance, and professional application of responsible AI practices. Such

work will be essential to understanding the longer-term impact of large-scale AI literacy interventions in open distance learning contexts.

In summary, the Afrikan AI Masterclass offers a replicable model for integrating responsible AI literacy into higher education at scale. By combining ethical awareness, practical skills, and flexible delivery, it provides a roadmap for universities, particularly in ODeL and the Global South, to prepare students for an AI-driven academic and professional future.

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