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INTEGRATING ARTIFICIAL INTELLIGENCE INTO DIGITAL LITERACY PROGRAMS FOR ACADEMIC LIBRARIES

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Abstract
The influence of artificial intelligence (AI) is increasingly evident across academic disciplines, prompting a growing need for individuals to cultivate AI-related digital literacy. In response to the International Federation of Library Associations and Institutions (IFLA) declaration on libraries and AI, this study explores the development of a structured framework for designing and implementing an AI-focused digital literacy course within academic libraries. A comprehensive literature review using Scopus and Web of Science was conducted to assess existing digital literacy programs, identify gaps, and highlight best practices for AI-specific instruction. Through document and web content analysis, academic libraries with established digital literacy initiatives were examined. The findings emphasize the importance of collaboration among librarians, students, faculty, research offices, university leadership, and ICT departments in crafting effective AI literacy programs. The proposed framework addresses key challenges in course delivery and contributes to the broader conversation on AI education by offering actionable guidance for academic libraries aiming to foster responsible digital engagement and AI awareness.

Keywords: ***Digital literacy instruction, Academic library services, Instructional framework Course design and evaluation, Stakeholder collaboration***

Introduction
The field of information technology continues to advance rapidly, resulting in notable changes across various sectors, including education and research. One of the most significant developments is the growing presence of AI in academic environments (Kong, Cheung and Zhang, 2021). As these technologies become more widespread, there is a need to reconsider how digital literacy is defined and delivered. A focus on technical proficiency alone is no longer sufficient. Learners must also be prepared to understand the broader implications of these tools, including ethical concerns and the potential for bias in automated processes (Yu, 2024). In many universities, digital platforms and tools have become central to teaching, learning, and research activities (Southworth et al., 2023). This shift highlights the importance of preparing students, faculty, and researchers to engage with digital systems in a responsible and informed manner. Academic libraries are well positioned to lead this effort. Their foundational role in promoting lifelong learning makes them suitable for developing and implementing training programmes that support effective use of digital technologies (Alam et al., 2024; Wheatley and Hervieux, 2019). Over time, the scope of library-led literacy initiatives has expanded from information literacy to include media literacy, data literacy, and now digital literacy that incorporates Artificial intelligence (AI). This progression underscores the critical role librarians play in promoting academic integrity and responsible digital engagement (IFLA, 2020; Choice, 2023; Choice, 2023a; Ozor and Toner, 2022). This study proposes a framework for designing a digital literacy course that addresses the use of AI within academic libraries. The framework offers a structured approach to help learners develop the skills and understanding required to use these technologies thoughtfully and ethically. Through targeted training, libraries can continue to serve as essential centres for learning, innovation, and responsible digital practice.

Objectives of the Study

- To identify the major stakeholders involved in designing a digital literacy course in academic institutions
- To describe the challenges encountered in developing such a course within academic libraries
- To present a framework for constructing and delivering a digital literacy course that incorporates AI

Statement of the Problem

The increasing presence of AI in higher education is influencing the conduct of research, teaching, and learning (Bates et al., 2020). As institutions seek to produce graduates who are both technically competent and ethically informed, digital literacy programmes must reflect these dual objectives (Chiu, 2024). Although several studies have examined the role of digital tools in academic libraries and the evolving responsibilities of librarians (Wheatley and Hervieux, 2019; Cox, 2022; Cox and Mazumdar, 2022; Hervieux and Wheatley, 2022; Okunlaya, Syed Abdullah and Alias, 2022; Andersdotter, 2023; Huang, Cox and Cox, 2023; Scott-Branch, Laws and Terzi, 2023; Alam et al., 2024; Akakpo, 2024; Cox, 2024; Lo, 2024), limited research has explored how these developments are being addressed within African academic institutions (Adarkwah et al., 2023). Even fewer contributions have focused on the design and implementation of digital literacy courses that incorporate intelligent technologies in academic library contexts. While these technologies present new opportunities for academic advancement (Dempere et al., 2023; Tayan et al., 2024), their complexity and rapid evolution pose challenges for learners. Many students lack the necessary skills to engage with these tools effectively. Despite their growing relevance, digital literacy programmes in academic libraries often emphasise basic technical skills and overlook broader considerations such as ethical use, fairness, and transparency (Okunlaya, 2022). This gap may hinder learners' ability to critically evaluate and apply these technologies in academic settings. There is a need for a structured and reflective approach to digital literacy instruction that aligns with the realities of contemporary academic environments. A well-designed course should enable learners to understand how these technologies operate, how they influence society, and how to use them responsibly. By promoting critical thinking and ethical awareness, academic libraries can support informed decision-making and responsible research practices. Therefore, addressing this gap is essential for libraries that aim to foster lifelong learning and academic excellence. Through the development and delivery of a comprehensive digital literacy framework, libraries can promote responsible technology use and contribute to a more informed and equitable academic community.

Conceptual Framework

This study was informed by a model of literacy for AI developed by Kong and Zhang (2021) and later expanded by Kong et al. (2023). The framework highlights the importance of designing educational programmes that are inclusive and responsive to learners with varied academic backgrounds. It comprises three interconnected dimensions: cognitive, affective, and socio-cultural. The cognitive dimension focuses on foundational knowledge and essential concepts related to intelligent technologies. It guides the selection of content that academic librarians should prioritise when developing literacy programmes. The affective dimension addresses learner empowerment, encouraging confidence and competence in the use of digital tools. The socio-cultural dimension considers ethical concerns, including fairness, transparency, and responsible use. This final dimension is central to the course's purpose, ensuring that participants are not only informed but also prepared to engage critically with technological systems. Together, these dimensions shaped the structure of the proposed digital literacy course. The framework ensured that the curriculum would support both technical understanding and ethical awareness, equipping learners to interact with AI in a thoughtful and informed manner. The study also drew on the IFLA Statement on Libraries and Artificial Intelligence (IFLA, 2020), which outlines the responsibilities of libraries in promoting responsible engagement with digital technologies. The statement notes that libraries

have successfully delivered training programmes that support vulnerable and underserved populations. These programmes can be adapted to include key elements of literacy for AI.
Two principles from the IFLA statement were particularly relevant to this study:

- Libraries equip users with the skills required to participate meaningfully in technology-driven societies.
- Libraries support ethical scholarship by promoting research practices that prioritise transparency, fairness, and accountability.

These principles reinforce the role of academic libraries in shaping informed and responsible engagement with digital technologies across scholarly communities.

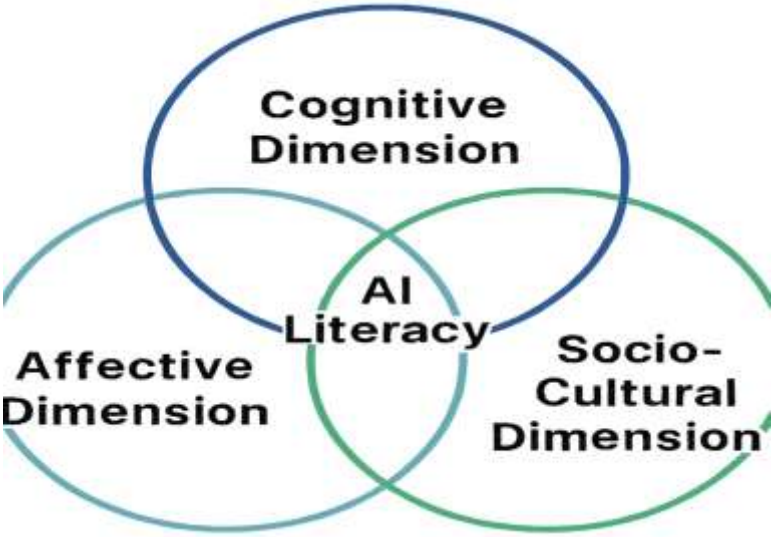


Figure 1: Conceptual Framework for AI Literacy (Kong & Zhang 2021)

Justification for AI Literacy in Academic Libraries

Artificial intelligence refers to the ability of machines to perform tasks that typically require human cognition, such as learning, reasoning, and adjustment based on experience (Joiner, 2018). It encompasses a range of computational techniques, including pattern recognition, language processing, image analysis, robotics, and decision-support systems. These technologies are increasingly applied across multiple sectors, offering improvements in efficiency, productivity, and service delivery. However, their widespread adoption also introduces ethical, social, and economic challenges (Krishna, 2024). In response to these developments, the concept of AI literacy has emerged as a necessary educational priority. AI literacy involves the capacity to understand, evaluate, and engage with AI in a thoughtful and informed manner (Ng et al., 2021). It includes technical knowledge, awareness of ethical implications, understanding of societal impact, and familiarity with practical applications. As the use of these technologies expands, individuals must be equipped with the competencies required to navigate their influence on academic, professional, and civic life. The integration of ethical reasoning into the development and use of digital innovations is essential. This calls for a workforce that is not only technically proficient but also ethically aware and socially responsible. Academic libraries are well positioned to support this goal due to their established role in promoting lifelong learning, equitable access to information, and research support.
Libraries contribute to AI literacy in several ways:

- They assist researchers in understanding and applying AI to enhance the quality and scope of scholarly work (Alam et al., 2024; Lo, 2024).
- They support curriculum development by helping students acquire the skills needed for future employment in technology-rich environments.

- They provide guidance on ethical issues such as fairness, privacy, accountability, and transparency (Cox, 2024).
- They promote inclusion by extending literacy initiatives to underserved and marginalized communities (IFLA, 2020; Okunlaya, 2022).
- They foster collaboration and innovation by serving as interdisciplinary knowledge centers.

Therefore, AI literacy within academic libraries is essential for promoting responsible engagement with digital technologies, advancing research excellence, and supporting inclusive academic development. By prioritizing literacy initiatives, libraries can influence how AI are understood and applied across educational and societal contexts.

METHODOLOGY

This study adopted a pragmatic research paradigm, which supports the use of multiple strategies for acquiring knowledge and addressing complex research questions (Creswell and Creswell, 2018). A qualitative approach was employed to collect and interpret non-numerical data that provided insight into how a digital literacy course focused on intelligent technologies can be developed within academic libraries. The data collection process involved three main strategies. First, a literature review was conducted using the Web of Science and Scopus databases to identify peer-reviewed publications relevant to the study. The search terms included "Artificial intelligence literacy," "Digital literacy course," and "Academic library." Second, the IFLA Statement on Libraries and Artificial Intelligence (IFLA, 2020) was analysed to examine the potential roles of academic libraries in supporting literacy initiatives related to AI. Third, web content analysis was carried out using the McGill University Library website (McGill, 2023), which provided detailed information on how librarians at the institution introduced literacy training focused on intelligent technologies. Through these methods, data were gathered on the stakeholders involved in designing the course and the challenges encountered during its development. The collected data were analysed using thematic content analysis, guided by the objectives of the study. This approach enabled the identification and explanation of key themes related to stakeholder roles and implementation challenges, which are presented in the findings and discussion sections.

Findings and Discussion

The analysis of the collected data revealed that academic libraries play a significant role in educating users and preparing them to function effectively in environments where intelligent technologies are increasingly present. According to Hervieux and Wheatley (2020), individuals do not need to understand the technical complexities of these systems to be considered literate in their use. Instead, literacy involves engaging with the technologies and critically analysing related content. These authors developed a tool known as ROBOT, which stands for Reliability, Objective, Bias, Ownership, and Type. This tool assists users in evaluating the legitimacy of digital applications.

Stakeholders in Developing a Literacy Course

The findings indicated that librarians are central to promoting literacy within the university community. Their responsibilities include ensuring that information generated by AI is credible, reliable, and accessible (Elsevier, 2024). This aligns with their broader role in curating, verifying, and disseminating information (PressReader, 2023; Scott-Branch et al., 2023). At McGill University, librarians were actively involved in designing a literacy course that included a visual representation of the relationships among various digital applications. This was presented as a family tree model (Wheatley and Hervieux, 2020). They also developed a series of workshops titled "Keeping up with Artificial Intelligence," which addressed topics such as literacy principles, ethical concerns, and research applications (Wheatley and Hervieux, 2022). Students and faculty contributed during the needs assessment phase to determine the content of the training sessions. University management and the research office provided policy support, while the ICT department ensured that the infrastructure was suitable for both physical and online delivery. At Pacific University Libraries, Brown

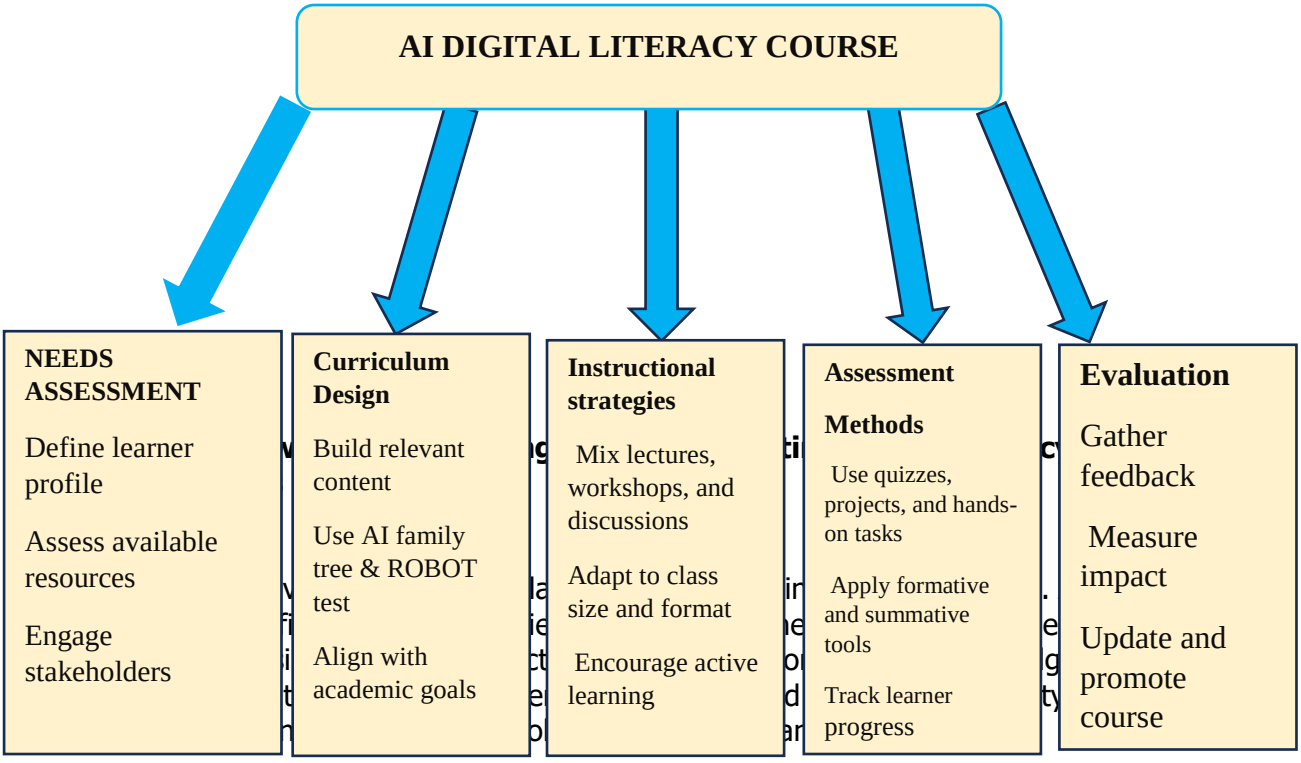
and Lantrip (2023) engaged faculty members to gather input for the development of a curriculum and toolkit, reflecting the importance of collaboration among stakeholders.

Challenges in Developing a Literacy Course

The study identified several challenges in developing a literacy course. One major issue was the limited technical knowledge among librarians regarding AI, along with insufficient funding to support programme implementation (Choice, 2023). At McGill University, the librarians initially lacked expertise in this area but dedicated time over several years to improve their understanding. They enrolled in online courses to enhance their skills before launching the training sessions (Wheatley and Hervieux, 2022). This highlights the importance of continuous professional development. Financial constraints also posed difficulties. The librarians at McGill did not receive a dedicated budget and had to rely on free resources to achieve their objectives. Their experience demonstrates that resourcefulness and commitment can compensate for limited financial support. Another challenge was the diversity of learner backgrounds and the rapid evolution of digital technologies. It is essential for teaching librarians to design courses that accommodate varied learning needs and apply flexible instructional strategies. Ongoing evaluation of the course content is necessary to keep pace with technological changes. Collaboration among all stakeholders within the academic community is also crucial for the success of such initiatives (Akakpo, 2024; Scott-Branch et al., 2023).

Framework for a Digital Literacy Course

This framework adopts a learner-centred approach, drawing from established models of digital education. It integrates instructional methods, interactive learning formats, and curated resources to support learners in developing critical engagement with digital tools and platforms. The framework encourages thoughtful reflection on the use of digital systems in academic contexts and promotes their responsible application in scholarly work. By leveraging institutional infrastructure, fostering collaboration, and applying sound instructional design, academic libraries can serve as key facilitators of digital literacy across the university community.



Curriculum Design
Following the needs assessment, the curriculum should be developed to meet identified learner needs. At McGill University, librarians incorporated knowledge competencies and visual tools to illustrate relationships among digital systems (Wheatley and Hervieux, 2020). They also applied a structured evaluation method known as the ROBOT test (Reliability, Objective, Bias, Ownership, Type) to assess the credibility of digital sources (Hervieux and Wheatley, 2020). Core curriculum elements include foundational concepts, ethical considerations, evaluation of digital outputs, and integration into academic practice.

Instructional Strategies
To accommodate diverse learning styles, librarians may employ a range of instructional methods. These include lectures, guest presentations, case studies, discussions, hands-on workshops, and online platforms. The selected strategies should be appropriate for the class size and aligned with course objectives. At McGill University, both online and in-person sessions were used, supported by interactive formats such as case studies and group discussions.

Assessment Methods
Assessment should be designed to measure progress in relation to course goals. A combination of formative and summative techniques may be used, including practical exercises, quizzes, projects, short assignments, and final examinations. These methods help learners develop problem-solving skills and apply their knowledge effectively.

Evaluation
Continuous evaluation is necessary to refine the course. Feedback from participants and stakeholders provides insight into long-term impact and areas for improvement. At McGill University, evaluations led to adjustments in workshop duration and delivery format. Promotional efforts through social media and student email lists also enhanced visibility and engagement.

Conclusion
Academic librarians are well-positioned to support digital literacy by equipping students, researchers, and faculty members with the necessary skills and resources to engage with emerging technologies in a responsible and ethical manner. To achieve this, librarians should collaborate with key stakeholders, including students, researchers, the information and communication technology office, the research office, and university management. Such collaboration ensures institutional support and helps address potential challenges in course development and delivery.
Establishing a multidisciplinary approach that includes faculty participation, student engagement, local industry professionals, and research organisations can foster trust and accountability in the broader digital ecosystem. This requires librarians to pursue ongoing professional development, including upskilling and reskilling, to effectively integrate digital literacy concepts into traditional instructional formats. Importantly, delivering such training does not require advanced technical expertise, but rather a pedagogical understanding of digital tools and their academic applications.
Library and information science schools can contribute by offering short courses and revising their curricula to include digital literacy components. This will enable academic librarians to design and deliver training sessions that are relevant and beneficial to the academic community. The proposed framework provides a practical guide for librarians seeking to implement a structured digital literacy course that meets institutional and learner needs.

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