A proposed framework for a digital literacy course for artificial intelligence in academic libraries

Josiline Chigwada[1]
josyphiri@gmail.com ORCID: 0000-0000-0964-3582

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The impact of artificial intelligence (AI) has been felt across all academic areas, and individuals must develop AI literacy skills. The declaration on libraries and AI issued by the International Federation of Library Associations and Institutions (IFLA) urged that libraries play a role in AI usage. A study was conducted to develop a framework for creating and delivering an AI digital literacy course in an academic library. A literature review was done using Scopus and Web of Science, to provide an awareness of current digital literacy courses and to identify gaps and best practices in establishing AI-specific courses. Through document and web content analysis academic libraries that have established digital literacy courses were identified. It was noted that academic librarians should work with students, faculty, the research office, university management and the ICT personnel to develop an AI literacy course. A framework was proposed to address the constraints of delivering an AI digital literacy course. The study contributes to the broader field of AI education by providing practical advice for academic libraries interested in promoting digital literacy and safe AI usage.

Keywords: AI literacy, generative artificial intelligence, AI ethics, research integrity, digital literacy, information literacy, AI technologies

1 Introduction

In the rapidly evolving landscape of information technology, artificial intelligence (AI) stands as a transformative force, permeating various facets of modern society, including academia (Kong, Cheung & Zhang 2021). The proliferation of AI applications across disciplines necessitates a nuanced approach to digital literacy education, one that transcends mere technical proficiency to cultivate a deeper appreciation of AI's societal implications, ethical considerations, and algorithmic biases (Yu 2024). As AI becomes increasingly integrated into academic research, teaching, and learning (Southworth et al. 2023), the imperative for fostering digital literacy in this domain becomes ever more pronounced. Alam et al. (2024) state that academic libraries are uniquely positioned to spearhead initiatives aimed at equipping students, faculty, and researchers with the requisite skills to navigate the intricacies of AI. Furthermore, the role of academic libraries as facilitators of lifelong learning (Wheatley & Hervieux 2019) underscores the importance of ensuring the sustainability and scalability of the proposed digital literacy course. There was a move from information literacy, digital literacy, media literacy and data literacy, and now AI literacy also comes into play (IFLA 2020; Choice 2023), which shows that academic librarians have been instrumental in skills development for patrons on academic integrity. They have taken up the challenge of teaching and supporting skills in these areas at varying degrees (Choice 2023a; Ozor & Toner 2022).

This research endeavoured to propose a comprehensive framework for the development of a digital literacy course tailored specifically for AI within the context of academic libraries. This study contributes to the burgeoning discourse on digital literacy in the age of AI, offering an ethical framework that empowers learners to navigate the complexities of AI with confidence, competence, and conscientiousness. By equipping individuals with the requisite skills and knowledge to harness the transformative potential of AI responsibly, academic libraries can fulfil their mandates as indispensable hubs of learning, inquiry, and innovation in the digital age. It is against this background that the study sought to meet the following objectives:

- Identify stakeholders in developing an AI digital literacy course in academic institutions.
- Document the challenges in developing an AI digital literacy course in academic libraries.
- Develop a framework for developing an AI digital literacy course.

1. Josiline Ghigwada is Post Doctoral Research Fellow in the School of Interdisciplinary Research and Graduate Studies at the University of South Africa

2 Statement of the problem

AI has the potential to transform higher education research, teaching, and learning (Bates et al. 2020), and higher education should produce ethical citizens and professionals globally (Chiu 2024). Much has been written on how AI can be used in academic libraries and AI literacy among academic librarians (Wheatley & Hervieux 2019; Cox 2022; Cox & Mazumdar 2022; Hervieux & Wheatley 2022; Okunlaya, Syed Abdullah & Alias 2022; Andersdotter 2023; Huang, Cox & Cox 2023; Scott-Branch, Laws & Terzi 2023; Alam et al. 2024; Akakpo 2024; Cox 2024; Lo 2024), but there is scanty literature on the use of generative AI in African universities (Adarkwak et al. 2023), and even less on the development of an AI literacy courses in academic libraries. While AI technologies offer unprecedented opportunities in academic institutions (Dempere et al. 2023; Tayan et al. 2024), the complex and rapidly evolving nature of AI presents unique challenges for learners seeking to develop the requisite skills and knowledge to navigate this domain effectively. Despite the pervasive influence of AI in academia, there exists a notable gap in digital literacy tailored specifically to AI within academic libraries (Okunlaya 2022).

Traditional approaches to digital literacy often overlook the nuances of AI, focusing primarily on technical proficiency without adequately addressing the broader implications and biases inherent in AI systems. Consequently, learners may lack the critical understanding and discernment necessary to engage meaningfully with AI technologies, potentially hindering the ability to leverage AI for scholarly inquiry. Therefore, there is an urgent need for a systematic and principled framework for developing a digital literacy course specifically tailored to AI in academic libraries. Such a framework would not only equip learners with the skills needed to navigate AI technologies, but also foster a deeper understanding of AI's societal implications. By providing library patrons with the tools and knowledge to engage critically with AI, academic libraries can empower them to harness AI's transformative potential responsibly, thereby advancing scholarship, innovation and social good. Addressing this gap in digital literacy education for AI represents a pressing imperative for academic libraries seeking to fulfil their mission as facilitators of lifelong learning and scholarly inquiry. Through the development and implementation of a comprehensive framework for AI literacy, academic libraries can play a pivotal role in fostering a culture of AI literacy within the academic community and beyond, thereby shaping a more informed, ethical, and equitable future for AI in academia.

3 Conceptual framework

The study used the conceptual framework of AI literacy by Kong and Zhang (2021), which was buttressed by Kong et al. (2023), and emphasised the importance of meeting the needs of learners and citizens with diverse academic backgrounds. The framework comprises three dimensions, which include the cognitive dimension, the affective dimension, and the socio-cultural dimension, as shown in figure 1.

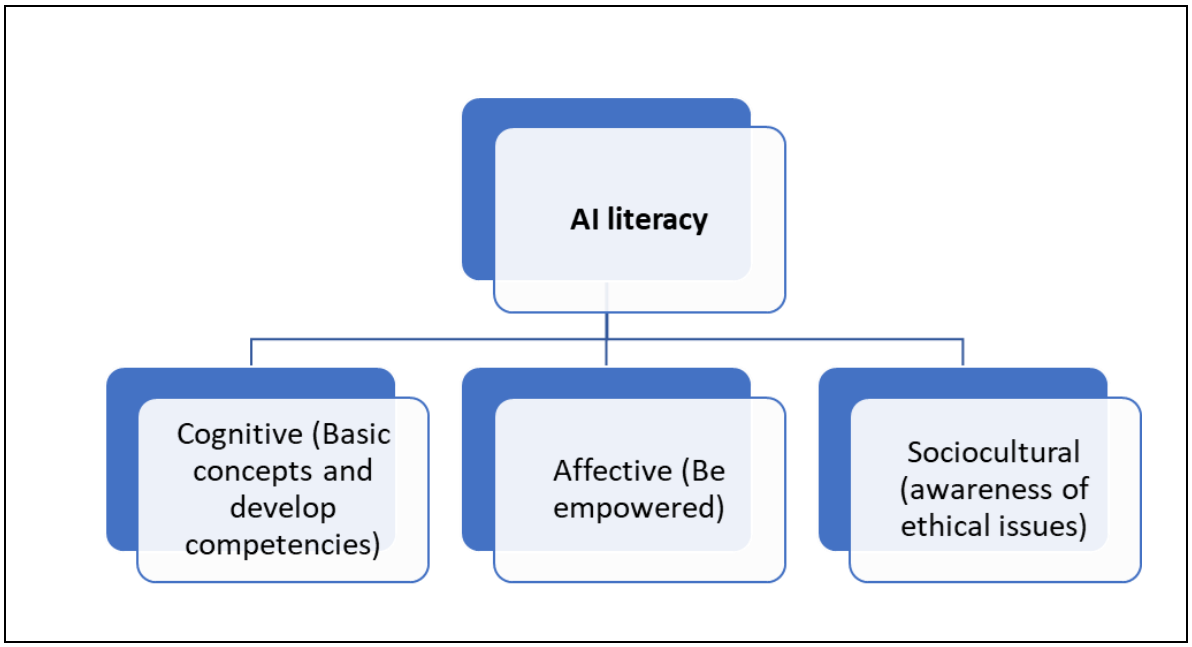

Figure 1: Conceptual Framework for AI Literacy (Kong & Zhang 2021)

The cognitive dimension deals with the teaching of major fundamental AI concepts that guide what academic librarians should teach in the AI literacy course. The affective dimension looks at empowering the learners to be competent in dealing with AI tools and applications. The socio-cultural dimension concerns the ethical use of AI, which is the major aim of

developing the AI literacy course. Therefore, the conceptual framework provided a guide for this study to ensure that the course addresses AI concepts and that literacy empowers participants after completing it and creates awareness of the ethical use of AI tools and applications.

The IFLA Statement on Libraries and Artificial Intelligence (IFLA 2020) also guided this study, as it points out the roles that libraries should take on concerning the responsible use of AI technologies. It was stated that libraries have been training participants through a demonstrated training delivery model that has been beneficial to the vulnerable, disadvantaged or marginalised groups, and, therefore, can extend the model for the key elements of AI literacy. The following points were taken from the statement to guide this study:

- Libraries can educate users about AI and help them thrive in a society that uses AI more extensively.
- Libraries can support high-quality, ethical AI research.

4 Why AI literacy

Artificial intelligence refers to the simulation of human intelligence processes by machines, including learning, reasoning, and self-correction (Joiner 2018). It encompasses various techniques and approaches, including machine learning, natural language processing, computer vision, robotics, and expert systems. Therefore, AI applications are diverse and span numerous industries and domains. While AI has the potential to revolutionise many aspects of society and improve efficiency, productivity, and quality of life, it also raises ethical, social, and economic concerns (Krishna 2024). This gives rise to the need for AI literacy, which refers to the ability to understand, critically evaluate and effectively engage with AI technologies and concepts (Ng et al. 2021). It encompasses a range of knowledge and skills necessary to navigate the increasingly AI-driven world, including technical understanding, ethical considerations, societal implications, and practical applications. As society's interest and involvement in AI technologies continues to grow, the importance for individuals to be AI literate has never been higher. Competencies are needed in a world that is enhanced with AI technologies and there is a need to integrate ethics when developing and using innovations, leading to the need to develop a digitally literate workforce with AI readiness, knowledge, and skills to meet 21st-century challenges. People should have a better understanding of its broad applications, usefulness, limitations, and biases.

AI literacy in academic libraries is crucial for several reasons, including research support, teaching and learning, ethical considerations, information access, equity, innovation, and collaboration (Alam et al. 2024; Lo 2024). As AI technologies increasingly permeate academic research across various disciplines, researchers require support in understanding and using AI tools and methods effectively. Academic libraries can serve as hubs for providing access to AI resources, expertise, and guidance, enhancing the quality and depth of research outcomes (IFLA 2020). Moreover, integrating AI literacy into academic curricula is essential to prepare students for the workforce of the future. Therefore, by offering digital literacy courses tailored to AI, academic libraries can help students develop the skills and knowledge necessary to thrive in a world increasingly shaped by AI technologies. Furthermore, AI raises complex ethical questions regarding bias, privacy, accountability, and transparency (Cox 2024). Academic libraries have a responsibility to educate students, faculty and researchers about these ethical considerations and empower them to navigate AI technologies responsibly. Overall, AI literacy in academic libraries is essential for promoting responsible AI use, advancing research and innovation, and fostering an inclusive and equitable academic community (IFLA 2020; Okunlaya 2022). By prioritising AI literacy initiatives, academic libraries can play a vital role in determining the use of AI in the academic world and society at large.

5 Methodology

The study used pragmatism which provides for a qualitative research approach that used a variety of knowledge acquisition strategies to provide answers to the research problem (Creswell & Creswell 2018). The qualitative approach gathered and used non-numerical data to understand the concepts and views of how to develop an AI literacy course within academic libraries. A literature review was done using the Web of Science and Scopus databases to retrieve high-quality peer-reviewed publications. The search terms that were used include "Artificial intelligence literacy", "Digital literacy course" and "Academic library." The IFLA Statement on Libraries and Artificial Intelligence (IFLA 2020) was analysed to unpack how academic libraries can come into play.

Finally, web content analysis was done by looking at the McGill University Library website (McGill 2023), which provides a detailed explanation of how the academic librarians introduced the AI literacy training at their institution. From the literature review, document analysis and web content analysis, data about the stakeholders involved in developing an AI literacy course and the challenges encountered were collected. The collected data were analysed using thematic content analysis guided by the objectives of the study whereby the stakeholders and challenges were pointed out and explained in the findings and discussion section.

6 Findings and discussion

The findings from the analysed data showed that academic libraries can educate users about AI and help them thrive in a society that uses AI more extensively. Hervieux and Wheatley (2020) point out that there is no need to know the advanced mechanics of AI to be regarded as AI literate. They add that one would be learning about AI technologies and having a critical analysis of any texts that concern AI. These two librarians created a tool that can be used when reading AI applications to consider the legitimacy of the technology, which they termed the ROBOT (Reliability, Objective, Bias, Ownership, Type).

6.1 Stakeholders in developing an AI literacy course

It was noted that librarians have an active role to play in ensuring that the university community is AI literate, and that AI-generated information is abundant, credible, reliable, and accessible to all (Elsevier 2024). This is in line with the role of librarians as experts in information curation, verification, and dissemination (PressReader 2023; Scott-Branch et al. 2023). At McGill University, the librarians were instrumental in developing the AI literacy course which incorporated an AI family tree that represents the relationships between different applications and AI (Wheatley and Hervieux 2020). These librarians created a series of three workshops termed “Keeping up with Artificial Intelligence”, which cover different aspects of AI literacy, AI ethics and bias, and AI in research (Wheatley & Hervieux 2022).

The students and the faculty are instrumental during the needs assessment stage to understand what should be covered during the training sessions. The university management and the research office are the policymakers who provide the necessary support to ensure that policies are in place for the smooth running of the programme. The ICT office ensures that the infrastructure is conducive to offering the course, whether physical or online. At the Pacific University Libraries, Brown and Lantrip (2023) solicited faculty input on the development of an AI literacy library instruction curriculum and toolkit to gain input from other stakeholders within the academic community.

6.2 Challenges in developing an AI literacy course

The findings from the study indicated that the major challenges that can be faced when developing an AI literacy course are a lack of computational knowledge regarding AI and a lack of funds to support the programme (Choice 2023). It was noted that the two librarians at McGill University did not have extensive computational knowledge of AI before the development of the project, but they committed time over some years to strengthen their understanding of AI tools and applications before developing and offering the AI literacy course (Wheatley & Hervieux 2022). They participated in the elements of AI online learning course to increase their knowledge of AI. This shows the importance of reskilling and upskilling to be able to develop and offer an AI literacy course. Limited resources can be a hindrance in developing an AI course and the librarians at McGill University did not have a budget to provide funds, as they needed to achieve the project outcome with little to no capital spent (Wheatley & Hervieux 2022).

To deal with this challenge, the two librarians attended free courses to develop their skills and build upon the available resources to offer the training sessions. Therefore, librarians should study AI tools and applications so that they can propose guidelines on the ethical use rather than institutions forbidding the use of these tools within their academic communities (Akakpo 2024). Another challenge was the diverse learner backgrounds and evolving AI technologies. There is a need to ensure that the teaching librarians develop a course that meets the diverse learning needs of learners and incorporates various instructional strategies to meet most of the needs of learners. Evaluating the course continuously would enable the teaching librarians to deal with the ever-changing AI technologies. There is also a need to collaborate with all the stakeholders within the academic community to make the AI literacy course a success (Akakpo 2024; Scott-Branch et al. 2023).

7 Framework for AI digital literacy course

The proposed framework focuses on a user perspective as adapted from the conceptual framework of AI literacy by Kong and Zhang (2021). Through a combination of instructional strategies, interactive learning experiences and curated resources, the proposed framework aims to empower learners to engage critically with AI technologies, interrogate their underlying assumptions and harness their potential for scholarly inquiry and innovation. By leveraging existing infrastructure, collaborative partnerships and innovative instructional design methodologies, academic libraries can serve as catalysts for fostering a culture of AI literacy within the academic community and beyond, as shown in figure 2.

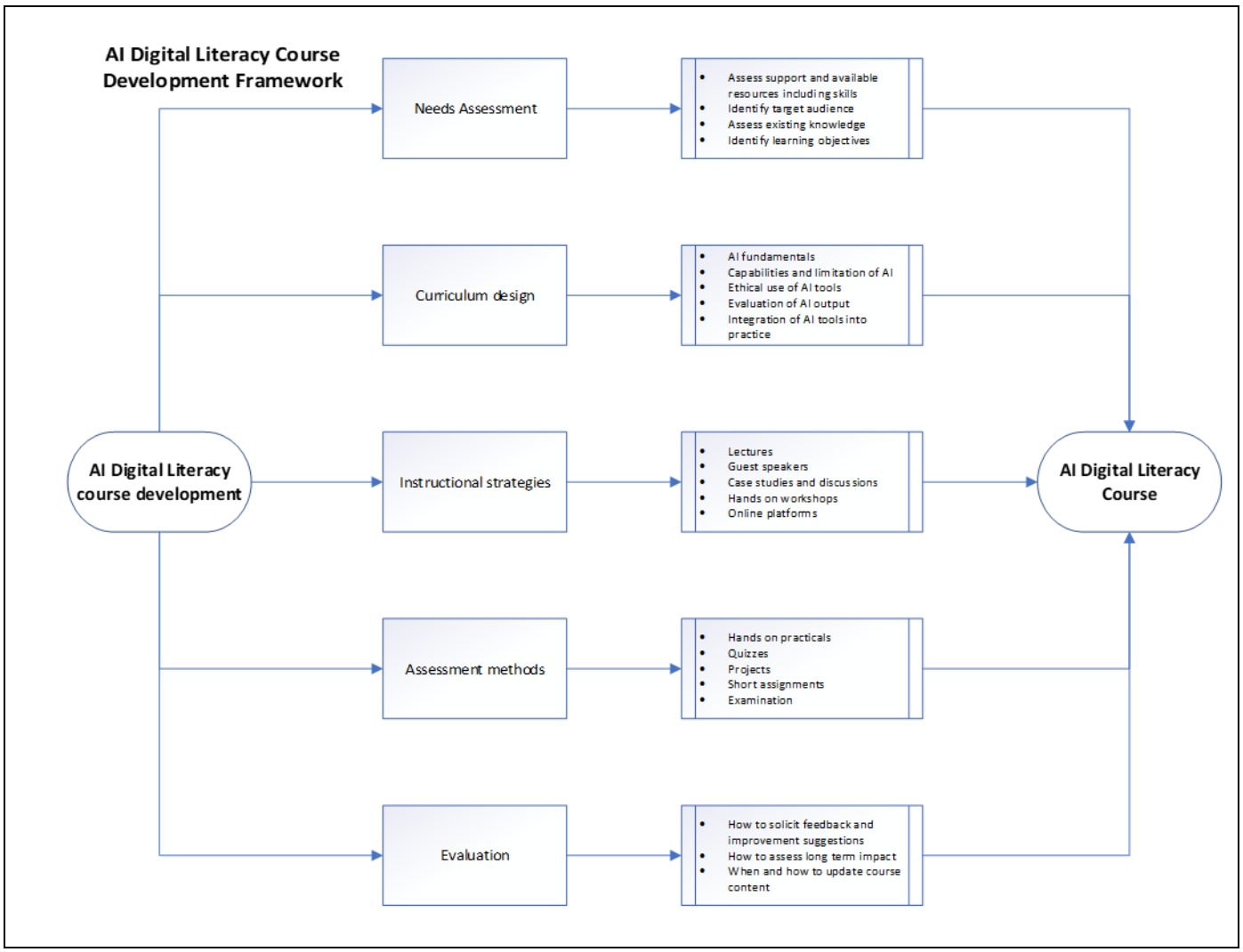

Figure 2: AI Digital literacy course development framework

7.1 Needs assessment

When developing the AI digital literacy course, the librarians should do a needs assessment to assess the support and resources available to deliver the course. The needs assessment phase assists in identifying the target audience and doing a learner-centred course design through an analysis of the learners, their needs, characteristics, expectations, and prior knowledge, as well as the constraints of learning. This assessment would help to identify the learning objectives so that the course would be beneficial to the learners. The needs assessment can be done by collaborating with all the stakeholders to find out what was done by the Pacific University Libraries (Brown & Lantrip 2023).

7.2 Curriculum design

There is a need to develop a curriculum that fits the needs of users, as identified during the needs assessment phase. The two librarians looked into AI technologies and knowledge competencies and considered the AI family tree, which is a graphic of the relationships between AI and other technologies (Wheatley & Hervieux 2020), and the ROBOT test components as criteria to evaluate sources on AI (Hervieux & Wheatley 2020). Borrowing from the AI workshops that were held at McGill University, it is important to look at AI fundamentals, capabilities and limitations, ethical use of AI tools, evaluation of AI output and integration of AI tools into practice.

7.3 Instructional strategies

Academic librarians can offer the AI literacy course using various instructional strategies to engage students with the materials and enable them to meet the objectives. Various ways of instruction such as lectures, guest speakers, case studies and discussions, hands-on workshops and the use of online platforms can be used to meet the various learning needs of learners. It is important to ensure that the instructional strategy is appropriate for the size of the class and consistent with the course goals. The librarians at McGill University used online sessions, face-to-face lecture series, case studies and discussions.

7.4 Assessment methods

The teaching librarians should be able to determine how they will evaluate student learning in line with the course goals. If the course is an examinable one, it is important to consider both formative and summative assessment through hands-on practicals, quizzes, projects, short assignments, and end-of-semester examinations. The assessment methods must go hand in hand with course goals and help the learners improve their problem-solving skills when working with AI technologies.

7.5 Evaluation

It was noted that it is important to evaluate the AI literacy training being done, as shown by the changes that were implemented at McGill University after the initial sessions. There is a need to solicit feedback and improvement suggestions from all the stakeholders to assess the long-term impact of the training sessions. This would help to update and improve the course content in the long run. After the first series was deemed as a learning experience, and after evaluation, they increased the duration of the workshops and the way in which they conducted the sessions, including in person and online. They also noticed that it was important to market the programme through social media promotion using the library account and advertising through student email lists. The evaluation exercise would allow for continuous improvement in the AI literacy course and adapting the content to the ever-changing AI information landscape.

8 Conclusion

In conclusion, it can be stated that academic librarians can offer AI literacy by equipping students, researchers and faculty members with the necessary skills and developing training resources that enable individuals to use AI applications ethically. They should work with other stakeholders, including the students, researchers, the ICT office, the research office, and the university management to ensure that they get the necessary support and deal with the various challenges they may encounter. Collaboration and establishing a multidisciplinary approach can lead to trustworthiness and accountability in the AI ecosystem through faculty involvement, student participation, local industry professionals and AI research organisations. This calls for the upskilling and reskilling of academic librarians to be able to offer AI literacy concepts in traditional literacy avenues since there is no need for a computer expert when creating and delivering AI literacy workshops. Library and information science schools can also assist by offering short courses to academic librarians and revising the curriculum to incorporate AI literacy components so that librarians can offer training sessions to library patrons. The proposed framework can be used by academic librarians to develop and offer an AI literacy course that can be beneficial to the academic community.

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