Expanding the Role of Information Literacy in the Age of Artificial Intelligence

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Abstract

The use of artificial intelligence has become increasingly common in higher education. While artificial intelligence has significant benefits for the educational sphere, academic librarians worry about its use. These concerns do not justify banning the technology altogether, but they must be addressed. As more students gravitate toward this technology, institutions must facilitate proper, responsible use. Improper use of artificial intelligence in academia can create academic integrity issues – including plagiarism and information misuse. However, librarians can minimize this problem by introducing ethical use of artificial intelligence into information literacy training. Librarians may reduce unethical AI use by teaching students how to authenticate sources, analyse data, and identify bias and misinformation. By focusing on information literacy, university libraries can help students stay abreast with the changing technological landscape while preserving academic integrity. This research sets out to investigate major roles librarians can play to support the use of artificial intelligence in a higher education setting. A content analysis of academic literature supports this qualitative study. The thematic analysis shows that artificial intelligence has greatly impacted academia, particularly information access, suggesting that librarians should help students develop the skills needed to navigate this new era. Technology has changed education, prompting a critical review of information literacy in the digital age. Universities cannot hope to prevent its use altogether but must focus on utilizing skilled librarians to improve information literacy and boost student outcomes.

Keywords: Artificial intelligence, information literacy, higher education, academic librarian

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Introduction

As artificial intelligence (AI) advances, its integration into the education system has become inevitable. Increasingly, diverse forms of AI are effortlessly infiltrating our lives. Considering basic applications like predictive text, we can observe the continual and often subtle incorporation of AI into daily routines. Though AI can influence students' learning experiences, it also highlights the significance of librarians' expertise in assessing and contextualizing material within the digital deluge. In this regard, information literacy (IL), delivered with intention and mindfulness of current circumstances, remains essential across all educational levels to equip students for a future in which AI will be integral to their personal and professional lives.

In order for students to take advantage of the significant opportunity for success that exists with AI, librarians must assume a pivotal role. Librarians have consistently served as a conduit for researchers and students, providing researchers with the resources necessary for information literacy, which plays a vital role in academic integrity. Librarians ought to enhance information literacy sessions by incorporating AI literacy training. Expanding IL to include AI literacy may serve as a strategy to prevent violations of academic integrity. Academic librarians can develop modules to instruct students on the proficient utilization of AI technologies by categorizing the various types of AI, analyzing the characteristics of paid versus free AI tools, and elucidating the proper citation of AI materials, among other topics (Artificial Intelligence (AI) in Education Policy, UG, 2023, p. 19).

AI literacy is a contemporary notion that transcends traditional digital and media literacy, born of the necessity for the academic community's evolution to keep up with AI technologies. AI literacy fundamentally encompasses the skills and abilities necessary for the effective and efficient utilization of AI technology and applications in many contexts. AI literacy should be seen not

merely as an additional subject, but a component of a comprehensive education in the 21st century. AI literacy should serve to help students with the knowledge and skills they need to navigate an increasingly AI-driven society. It fosters critical thinking, problem-solving, and digital literacy skills, and is a lifelong learning skill. AI literacy can extend to educate users to view these AI technologies such as ChatGPT critically, to understand their context, and to question their design and implementation. Users of such technologies must be able to discern the benefits and challenges of AI while making informed decisions about its use in academia to avoid any form of academic misconduct.

Statement of the Problem

Although AI has emerged as the foremost technical innovation in the global information landscape, it is now being approached with caution by librarians in Guyana. Being insiders, the researchers who have worked in an academic library setting for over two decades felt that their current information literacy programme was insufficient to help learners navigate among artificial intelligence. It is the view of the researchers that Guyanese librarians must urgently assume a role in the implementation and integration of artificial intelligence within the higher education sector. According to Ali et al., (2020) the role of librarians becomes increasingly relevant due to AI. This research aims to examine the significant responsibilities librarians can assume to facilitate the utilization of AI. The findings may interest academic librarians and provide a framework and strategy for local librarians to establish a forward trajectory.

Objectives

The objectives of this study are to:

- Ascertain whether the scope of IL covers the emerging age of AI
- Ascertain the potential roles that IL training can play in mitigating the challenges raised by the use of AI for academic student work.

Literature Review

Theoretical Underpinning

Information literacy is the capacity to identify information deficiencies and to address them through assessment. The Association of College and Research Libraries (ACRL) offers a framework including various competences essential for information literacy. Additionally, a pertinent theory to support this research is the Information Search Process (ISP) established by Carol Kuhlthau (2004). The ISP theory provides a detailed understanding of how individuals seek

information and the stages they go through during this process. Kuhlthau's model comprises six stages: initiation, selection, exploration, formulation, collection and presentation.
Further, the ISP model emphasizes the cognitive dimensions of information seeking. This model places emphasis on the importance of supporting users through each stage to enhance information literacy skills. As it relates to AI in academia, the ISP model is relevant to addressing the emotional and cognitive challenges users face when interacting with AI tools and technologies. It supports the use of IL training sessions for students to easily navigate and break down any cultural resistance barrier that they may face.

AI in Academia

In recent years AI has become a crucial driver in transforming the educational landscape. AI has impacted all sectors of higher education bringing about significant changes in how education is delivered, accessed, and personalised (Reiss, 2021). The academic library is not exempt from the integration of AI. Folorunso and Momoh (2020) predicted that AI would become an important tool for libraries. Cox (2022) gave reference to the growth of AI in academic libraries and stressed the need for librarians to be prepared for the changes. With the extensive use of AI, universities created policies to address the abuse of the tool in academia. For example, the University of Guyana's AI policy emphasises responsible and ethical use of AI, which aligns with the University's strategic goals outlined in the Blueprint 2040. The policy covers ethical and societal concerns; promotes responsible use of AI in teaching, learning and administrative processes; supports the use of technology and online resources responsibly; and commits to provide students and lecturers with the opportunity to learn more about the use of AI tools.

AI offers numerous benefits in higher education, such as automated grading systems, adaptive assessments, curriculum planning, and gamification. Automated grading helps in providing quick and impartial assessments (Kim & Araujo, 2021). AI-driven adaptive assessments personalise learning experiences, making education more effective (Swiecki et al., 2022). Curriculum planning and gamification engage students and enhance their learning experiences (Murillo-Zamorano et al., 2021).

Despite its benefits, AI poses significant challenges, particularly concerning academic integrity. The irresponsible use of AI can lead to plagiarism and the misuse of information. Robinson (2020) as cited in Ng et al (2021) emphasizes the need for students to differentiate between ethical and unethical AI use, while Steinbauer et al. (2021) underscore the importance of equipping students with the skills to navigate an AI-driven environment responsibly. Tiernan et al. (2023) highlighted that AI use posed significant challenges for learners in information seeking that only IL strategies could solve. Additionally, there are concerns that over-reliance on AI might reduce students' critical thinking and problem–solving skills, as they might depend too much on AI for answers, potentially diminishing their self-reliance and creativity (Holmes et al., 2019). It is important that AI tools are leveraged effectively to advance scholarship and learning within the institution (Tomar

& Verma., 2021). To ensure its effective use, it is important that AI instruction become an important, if not, mandatory part of the higher education curriculum (Southworth et al., 2023) possibly through information literacy training.

Interplay between AI and Information Literacy

Generative AI tools can be inherently biased and if students rely too heavily on AI without critical evaluation, this reliance can compromise the quality of their work and lead to the dissemination of misinformation (Zhai et al., 2024). The relationship between IL and AI is becoming more significant as more learners rely on AI; therefore, there is a need for them to develop abilities to identify, evaluate and responsibly use information. Lung & Wang (2023) posits that librarians' role become prominent in developing AI literacy as part of broader IL training sessions. By adapting to the current technological advancements, librarians can assist students to use AI tools responsibly.

With the changes and challenges faced by students, Ng et al. (2021) suggests that enforcing an understanding of AI in academia, including their ethical use, is crucial to enhance the knowledge of students and faculties on AI literacies which can be achieved by expanding information literacy instruction. "Information literacy is the set of integrated abilities encompassing the reflective discovery of information, the understanding of how information is produced and valued, and the use of information in creating new knowledge and participating ethically in communities of learning" (ACRL, 2016, p. 8). Including AI ethics in the teaching of information literacy will enhance students' critical thinking skills. They will learn to evaluate AI-generated content for accuracy, reliability, and ethical implications which empowers them to be discerning consumers and creators of information.

According to Teaching and Learning Resource Center (n.d.), IL training provides the necessary tools and equipment needed to teach students how to utilize information responsibly and without any difficulties. With the advancement of technologies and the introduction of AI tools, IL training must adapt and include how to effectively use AI in research. Such training must aim to prevent any misconceptions of the use of AI as a student. Expanding IL to include AI literacy can help mitigate ethical concerns associated with AI use. Librarians can provide professional development through interactive sessions and create modules or crash courses on the use and abuse of AI tools. Librarians need to establish an effective curriculum for IL with the inclusion of AI literacy. This helps to sensitize the students on the current policies related to the use of AI at the library and ensures that students use AI and cite correctly (Cox & Tzoc, 2023). According to Lo (2023) there is a need for new methods of information literacy (IL) instruction which will consequently lead to AI literacy. James and Filgo (2023) posit the Framework for Information Literacy for Higher Education as a useful framework to expand IL instruction to cater for the emergence of AI tools in the use of information gathering and utilisation. It is the highest used information literacy framework in the field of academic librarianship (Hsieh et al., 2021).

Methodology

This study adopts a qualitative approach. Qualitative research is well-suited to exploring complex concepts like these, as it allows for an in-depth examination of meanings, experiences, and perspectives through the collection of non-numerical data (Creswell, 2013). The content analysis technique was used to explore the intersection of information literacy (IL) and artificial intelligence (AI) in academia. According to Krippendorff (2004), content analysis is "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use" (p. 18). Content analysis is a research method used to systematically examine and evaluate documents to draw conclusions.

The data collection process involved searching the library databases and Google Scholar for relevant articles by using the following keywords: "information literacy and higher education", "artificial intelligence use in academia", "frameworks for teaching information literacy", and "information literacy training". The initial search which was conducted during the period September to October 2023 yielded 570 results across various sources, which were filtered based on relevance, peer-review status, and the publication during the years 2020 to 2024. To ensure the quality and relevance of the selected articles, inclusion criteria required that the articles: focused specifically on either information literacy or AI in educational settings, were peer-reviewed and published in scholarly journals, and provided full access to the text. Abstract-only works and non-scholarly publications were excluded from the content analysis. Following this process, 18 articles were selected for detailed content analysis based on their alignment with the study's objectives (Table 1).

The content analysis research method allows for themes to be used for the interpretation of the data as well as other aspects of the research topic (Braun & Clarke, 2006). This study utilized a thematic analysis which allowed for identification of key patterns and themes within the selected literature. This method provided insight into the overarching trends in the intersection of IL and AI, supporting the study's goals of identifying how IL frameworks can incorporate AI literacy for the benefit of both students and librarians.

Table 1
Summary of Search Results and Article Selection

Keywords	Source	Results (# of Articles)	Articles Selected	Inclusion Criteria
Information literacy and higher education	Google Scholar	150	5	Scholarly articles, peer reviewed and available in full-text
Artificial intelligence use in academia	Library Database	200	7	
Frameworks for teaching information literacy	Google Scholar	100	3	
Information literacy training	University Library DB	120	3	

Findings and Discussion

Eighteen scholarly articles were included in content analysis of this qualitative research. The findings of this study revealed three overarching themes: **AI has infiltrated academia**; **there is a relationship between IL and AI**; and **there is scope for IL to aid in AI literacy**.

Several authors have concluded that **AI has infiltrated academia** (Cox, 2002; Ng et al., 2021; Reiss, 2021; Tomar & Verma, 2021; Southworth et al., 2023). The educational landscape has changed and so too are the related services and experiences (Folorunso & Momoh, 2020). The use of AI in academia derives both benefits and challenges. AI enhances educational accessibility and efficiency while supporting adaptive learning platforms that cater to diverse student needs. The many significant benefits of AI have the propensity to revolutionize the educational experience particularly through personalization and data-driven insights (Kim & Araujo, 2021; Murillo-Zamorano et al., 2021). The adoption of AI in academia does not come without its challenges. Despite the exceptional opportunities that can be derived from the application of AI in academia, there are some significant implications and ethical concerns that must be addressed (Holmes et al., 2019; Ng et al, 2021; Steinbauer et al., 2021). Artificial intelligence tools have impacted the information landscape which has a direct connection to the academic library, and librarians should not be apprehensive in embracing its use. Reference services, circulation processes, cataloguing processes, as well as dissemination of information have all been impacted by AI.

The relationship between information literacy (IL) and artificial intelligence (AI) lies in the fact that currently, AI plays a significant role in the shaping and processing of information. Students' information seeking behaviour is affected now more than ever because of AI. Information is no longer generated and provided only by humans. Machines using large generative language models such as ChatGPT are generating text that flows naturally and resembles human language. There is a significant relationship between IL and AI whereas AI technologies improve the search process by making data gathering faster and probably making more information available, IL provides the skills to evaluate and use the information. Tiernan (2023) posited that IL tools and frameworks could help students develop competencies to deal with AI in the information context. As such, there is a need for IL modules or curriculum that links IL and AI literacy for students.

There is scope for IL to aid in AI literacy. The rapid advancement of AI has introduced new challenges and opportunities in the realm of information literacy, particularly in understanding the ethics of using AI-generated text. As AI-generated content becomes more prevalent, university students must develop the skills to critically evaluate and use information generated by AI systems responsibly. The academic library can be leveraged to support students in using AI tools in such a way as to avoid negative consequences by expanding IL instruction to include ethics related to AI-generated text. The Framework for Information Literacy for Higher Education (ACRL, 2016) can be useful for repurposing information literacy instruction to incorporate AI literacy instruction (James & Filgo, 2023). The ACRL Framework is based on the following six tenets or frames which help students to use information responsibly: "Authority is constructed and contextual; Information creation as a process; Information has value; Research as inquiry; Scholarship as conversation; and Searching as strategic exploration" (ACRL, 2016, p. 2). According to Hsieh et al. (2021) the Framework does not have to be used in its entirety to remodel information literacy teaching. Of the six frames, four can be utilized to repurpose IL instruction to bring awareness to the fact that AI produces biases in information; it hallucinates; and to ensure that the academic voice should not give way to AI.

'Authority is Constructed and Contextual' is a frame that encourages learners to delve deeply into the construction of authority and its connection to truth and expertise (Rose-Wiles, 2024). Such a frame can be customized to teach learners the importance of critical thinking and evaluation of generative AI so as to be able to identify biases and gaps in the information. The 'Information has Value' frame aims to get students to think about the origin and value of information (Gross, et al., 2022) and as such can be used to teach learners the importance of citing sources as well as verification of accuracy of citations to help negate inaccuracies in citations that may be generated from AI tools. This frame can also be used to provide guidance on how to properly cite AI-generated text in academic and professional contexts. The 'Scholarship as Conversation' frame explains that "research in scholarly and professional fields is a discursive practice in which ideas are formulated, debated, and weighed against one another over extended periods of time" (ACRL,

2016, p. 8). This frame is therefore applicable to build a module to help learners realise that AI tools should not be used to replace their ability to contribute to scholarship through their academic voices. According to ACRL (2016) flexibility enhances the search process making it more effective. Librarians can therefore conduct training to provide search strategies and evaluation techniques for students to use as a guide along with ChatGPT using the 'Searching as Strategic Exploration' frame.

The three themes above have been able to respond positively to the objectives of this study as follows:

- **To ascertain whether the scope of IL covers the emerging age of AI.** In the dynamic landscape of information literacy, the traditional scope of IL has the capacity to navigate the complexities of the introduction of AI in higher education. As AI grows and can be applied to all aspects of life, so too can IL be expanded to cover AI literacy in its teachings. Librarians, as stewards of information dissemination and education, should play a vital role in bridging the gap by incorporating AI literacy into existing IL frameworks.

- **To ascertain the role that IL training can play in mitigating the challenges raised using AI for academic student work**. Integrating IL training to mitigate the challenges raised by using AI for academic student work would be beneficial for librarians, lecturers and students. AI tools like ChatGPT offer benefits such as enhanced learning and assisting with grammatical errors. However, the tool can also provide incorrect information and if used incorrectly, students can plagiarize by not citing correctly. This research highlights the role that AI training can play to mitigate these challenges.

The ISP model theorizes that information seeking is a process of construction (Kuhlthau, 2004). The findings of this study proves that AI can contribute and enhance that process as it can potentially offer personalised search results and make it easier for relevant and precise information to be found.

The implications of this study affect practice and further research. The implication for practice that has emanated from this study is the need for training. Librarians' training in AI and machine learning education is very important. It equips them with the knowledge and skills needed to integrate AI literacy into their IL teaching. To effectively teach AI literacy, librarians and educators need to become AI literate. Further research on AI and IL is crucial in today's digital age, where the proliferation of information and the sophistication of AI systems are rapidly increasing. Such research can possibly focus on best practices for educating learners on AI literacy.

The main limitation of this research was the methodological weakness of content analysis which was applied in the study. While useful for systematically analysing communication, the researchers

relied on subjective interpretation in selection of the materials to be included in the study. Additionally, the small sample of scholarly communication which was examined may affect the generalizability of the findings.

Conclusions

Undoubtedly, AI technology has made its impact on the education sector, especially in higher education. Its integration offers benefits and opportunities as well as challenges that require the application of caution. Librarians have always embraced technological advancements in the field, such as automation and digitization. Similarly, there is also a place for the involvement of library professionals in artificial intelligence. Incorporating insights from the findings and discussion, it is evident that librarians play a pivotal role in enhancing AI literacy through information literacy training for the development of critical thinking skills. Although libraries may not serve as the primary locus of AI development, librarians possess adept skills to educate patrons on emerging technologies and their ramifications concerning information retrieval, ethical considerations, and the potential biases inherent in search results. As librarians, our niche in the learning process is the shaping of responsible practices for students through our information literacy instruction. Librarians must endeavour to help students to navigate the challenges of AI generated content. It is absolutely necessary that learners become information and AI literate enough to navigate the information landscape. AI literacy is more than gaining professional competencies, it is about critical thinking and understanding the world around us which is technologically driven. In this new era, it is important that librarians continue to help learners to develop abilities that will help them to make informed decisions about the information they consume, cite, and share. The importance of ethical responsibility in the use of information must remain a main area of focus. Understanding the ethics of AI-generated text is essential to avoid issues related to plagiarism, misinformation, and bias. Students should be aware of the ethical considerations surrounding the use of AI tools for content creation and dissemination.

Academic libraries and suitably trained librarians can support the development of these competencies by virtue of their specialty and involvement in information literacy. Information literacy can be complementary to AI literacy. Teaching information literacy and ethics in the context of AI-generated text is essential for university students in today's digital age. By equipping students with the knowledge and skills to critically evaluate and responsibly use AI-generated content, educators can empower them to navigate the evolving information landscape with integrity and discernment. Therefore, by expanding IL to include AI literacy, students will be taught how to develop a strong understanding of evaluating information and to make calculated decisions based on the facts presented before them. Having these necessary skills are critical to functioning in an information ecosystem that continues to see an increase in advanced internet technology including large language models. Through a combination of theoretical understanding,

practical exercises, and ethical discussions, students can become informed, ethical users of AI-generated text, contributing to a more responsible and informed digital society. Higher education institutions must be open to embrace and provide the necessary infrastructure to support IL and AI instruction.

Recommendations

Building on the existing literature and the findings of this study, the authors recommend firstly, that a critical avenue for exploration lies in understanding the impact of AI technologies on information-seeking behaviours and cognitive processes within academic settings. Investigating how students interact with AI tools in libraries, especially concerning ethics and responsible use, can provide valuable insights for developing comprehensive IL training programmes. Furthermore, research should delve into the integration of AI literacy into existing IL curricula, assessing the effectiveness of educational modules in enhancing students' digital competencies and critical thinking skills. Additionally, studying the role of librarians as facilitators of AI literacy and ethical AI use in educational environments can shed light on best practices and interventions to promote responsible information. By delving into these realms, future studies can not only enrich the discourse on IL in the context of AI but also offer practical recommendations to enhance information literacy training programmes in higher education institutions, ensuring students are well-equipped to navigate the complex information landscape effectively.

Secondly, it is recommended that expanded IL which includes AI literacy should inculcate practical and interactive methods to avoid passivity in the instruction. This method should allow for hands-on activities that include the use of AI tools and technologies in undertaking research assignments. Some strategies that may prove effective for this type of instruction are as follows:

i. *Hands-On Exercises*: Engage students in practical exercises where they interact with AI-generated text. Have them evaluate AI-generated articles, create content with AI assistance, and cite AI-generated content correctly.
ii. *Case Studies*: Present real-world case studies that highlight ethical dilemmas related to AI-generated text. Encourage students to analyse these cases, discuss the ethical considerations, and propose solutions
iii. *Debates and Discussions*: Organize debates and discussions on topics related to AI ethics and information literacy. This strategy encourages critical thinking and allows students to explore different perspectives on AI-generated text.
iv. *Continuous Learning*: Information literacy and AI ethics are evolving fields. Encourage students to stay informed about developments in AI and related ethical considerations throughout their academic and professional careers.

Thirdly, measurement and evaluation in higher education are crucial for ensuring the quality and effectiveness of the teaching and learning processes. To examine the effectiveness of the use of IL to promote AI literacy in the academic library there must be periodic evaluation to ensure that objectives are being met particularly as it relates to equipping students with the necessary skills to navigate AI-driven environments responsibly. Robust metrics play an intricate role in assessing students' competency in navigating in the digital world. It gives an insight into how much students face challenges and need assistance from librarians. The implementation of comprehensive assessment tools like the use of surveys before and after AI literacy instruction sessions will help determine how much a student learnt from the session. It will also speak to the effectiveness of providing the training sessions and address ways to better the services of the academic library. Metrics should encompass a diverse range of criteria, including the ability to critically analyse sources, synthesize information, and apply findings to real-world scenarios. Further, institutions can tailor assessment criteria to address ethical considerations and ensure students grasp the nuances of utilizing AI tools responsibly.

In examining the long-term effects of information literacy education, it is crucial to consider the lasting impact on students' academic and professional endeavours. The proverb by the Chinese Philosopher Lao Tzu said, "Give a man a fish and you feed him for a day. Teach him how to fish and you feed him for a lifetime." This proverb helps the researchers to understand the importance that proper training in information literacy and the use of AI not only enhances students' ability to access, evaluate and utilize the information correctly and effectively, but also fosters a lifelong learning mindset. The student will be able to apply the knowledge in his/her studies and everyday interactions with the internet (if need arises). Integrating AI literacy into information literacy training can empower learners to ethically engage with AI tools; thereby, instilling a sense of responsibility and critical thinking.

This study presents an urgent call to action for expanding information literacy in the age of artificial intelligence. As AI tools become more prevalent in higher education, it is imperative for librarians to incorporate AI literacy within their information literacy training sessions. By equipping students with the skills to critically evaluate and ethically use AI technologies, academic institutions can mitigate risks associated with academic misconduct, such as plagiarism. Librarians play a vital role in fostering AI literacy among students, enabling them to harness the benefits of AI for enhanced learning experiences while addressing ethical considerations. The integration of AI literacy in information literacy training represents a crucial step towards preparing students to effectively engage with AI tools in academia and beyond.

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