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AI literacy of library and information science students: A study of Bangladesh, India and Pakistan

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Abstract

This study adopted an exploratory approach to investigate the nuances of AI literacy among Library and Information Science (LIS) students in South Asia namely Bangladesh, India and Pakistan. A total of 632 respondents from these countries participated in an online survey that explored their level of AI literacy and familiarity with AI tools and technologies, purposes of using AI tools, ethical perceptions and how AI-related contents were covered in LIS courses and programmes. The study results indicate that students are moderately familiar with AI tools, but the degree of their self-rated AI literacy ranges from basic to advanced. Students reported using AI tools for academic purposes, including information searching, summarising articles, generating ideas and writing academic papers. However, participant LIS students expressed concerns about the ethical usage of AI and Generative AI tools, particularly academic integrity and plagiarism in academic writing. The results underscore the need for more robust AI literacy education in South Asian LIS education programmes – and potentially globally – to deepen students' understanding and critical engagement with AI tools and technologies. This would better equip them for emerging roles in AI-integrated library services, highlighting a key direction for curriculum development, training methodologies and policy initiatives within LIS education and library and information management profession.

Keywords

AI in libraries, AI literacy, ethical AI use, academic libraries, gender differences in AI literacy, library and information science (LIS), university students, higher education.

Introduction

We live in an era where artificial intelligence (AI) is becoming more prevalent in everyday activities, including education. The emergence of ChatGPT has sparked renewed contemplation about Generative Artificial Intelligence (GenAI), prompting a profound reassessment of its conceptual framework and consequential implications across educational and professional domains, including the esteemed arena of complex text-based inquiries, scholarly publishing and librarianship (Lund and Naheem, 2024; Lund et al., 2023).

According to UNESCO (2022), AI needs to be directed towards the common good by equipping all citizens with the necessary skills, knowledge, understanding and value, collectively termed 'AI literacy'. Hossain defined AI literacy as 'the ability to identify, understand, develop ideas, and critically evaluate AI technologies, their applications, and ethical implications' (2023: 1). AI literacy extends beyond understanding AI technologies, it includes using AI applications as tools, viewing them critically, understanding their context and embedded principles, and questioning their design and implementation (Voulgari et al., 2022). At its core, as Crabtree (2023) states, AI literacy means effectively using AI technologies and applications.

As AI advances, there is a growing interest in exploring, developing and implementing AI, specifically GenAI

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tools and applications to enhance productivity. This trend is evident across various public domains, including libraries (Hossain et al., 2024; Lund et al., 2020). Several studies have explored the potential applications of AI in librarianship, particularly in transforming library operations and enhancing technical capacity, user services and experiences, as well as information retrieval, research, scholarship, service innovation, usability and retrieval (Ali et al., 2021; Cox and Mazumder, 2024; Hossain, 2023; Okunlaya et al., 2022).In this context, library and information management (LIM) professionals play a crucial role, using their knowledge of information curation, verification and dissemination to bridge the gap between users and AI-generated content (Cox, 2023a).

Lee et al. (2021) recommended that to keep pace with the rapid expansion of AI across various fields and industries, it is imperative to train the workforce with strong computational skills and the specific knowledge and capacity to work with AI. Similarly, Cox (2023a) predicted that to gain employment, students need to have AI literacy regardless of the discipline they are studying and will be working in. The recommendations made by Lee et al. (2021) and Cox (2023a) are equally relevant to LIS education, LIS students and LIM professionals. By addressing these recommendations, this study seeks to explore AI literacy and readiness among LIS students in South Asia, aiming to bridge the research gap and better prepare future LIM professionals for an AI-driven world.

Problem statement

Research by Wood et al. (2021), Karaca et al. (2021) and Markauskaite et al. (2022) emphasise the growing need for 'AI literacy', 'AI readiness', and 'AI capabilities' in students' professional development, advocating for the inclusion of AI literacy education in curricula. Singh et al. (2024) stated that AI literacy is crucial for designing effective learning experiences and nurturing skills like problem-solving and critical thinking. However, a recent study by Hornberger et al. (2023) concludes that AI literacy remains mostly unclear among university students. Studies and reports (Lee et al., 2021; UNESCO, 2022) have raised concerns about how knowledgeable youth are about AI and the significant impact its applications will have on their future careers (Ng et al., 2023). Additionally, research reported that institutions face challenges in effectively incorporating AI literacy – especially regarding GenAI tools – into courses, academic integrity policies and instruction (Hossain, 2023; Johnston et al., 2024; UNESCO, 2023a).

As of yet, only a handful of research projects have explored AI literacy (Hornberger et al., 2023; Mansoor et al., 2024) and most have examined the efficacy of AI literacy courses offered in K-12 (Kong et al., 2023; Lee et al., 2021; Ng et al., 2023) and universities (Kong et al., 2022).

While existing AI literacy assessments often focus on cognitive skills and generic knowledge, there's a need to measure domain-specific AI literacy and ethical understanding (Knoth et al., 2024). In light of this background, our study seeks to fill this gap by exploring university students' AI literacy focusing on LIS students – the future LIM professionals in South Asia. The study also aims to explore LIS students' familiarity with AI tools, purposes of use, and ethical perspectives within academic settings. In addition, this study attempts to understand the extent to which LIS courses/programmes integrate AI into their curricula, how well LIS students are prepared to work with AI tools and technologies, and the AI-related challenges they anticipate in their future LIM careers. The following are the key objectives that guided the study:

- Exploring LIS students' AI literacy, familiarity and AI readiness.
- Investigating purposes for using AI applications
- Understanding ethical perceptions of AI use in academia
- Assessing AI-related content coverage in LIS curricula
- Identifying AI-related challenges anticipated in LIM careers

Literature review

AI in LIS education and the LIM profession

Research on foundational skills among LIS students reveals a need for enhanced computational, information and digital literacy to meet the evolving demands of the LIM profession. Studies by Hossain and Sormunen (2019) in Bangladesh and Irawati (2009) in Indonesia found that LIS students generally perceive their computational and internet skills positively, although skill levels vary by gender and academic year. The Indonesian study further highlighted the challenges students face in applying information literacy, often relying on self-study and guidance from supervisors to overcome limitations in advanced ICT skills and the evaluation of internet resources (Irawati, 2009). These studies underscore the importance of incorporating ICT, copyright literacy and inquiry-based learning into LIS curricula to address knowledge gaps and develop future-ready LIM professionals (Hossain, 2021; Hossain and Sormunen, 2019).

Expanding on the importance of digital literacy, further studies across diverse contexts – such as Iceland (Pálsdóttir, 2019), Norway (Gastinger and Landøy, 2019), Portugal (Terra et al., 2020) and Spain (Arias Coello et al., 2020) – have explored LIS students' familiarity with copyright and intellectual property laws. Findings indicate that while

students generally possess a foundational understanding, curricula could benefit from enhancements to address emerging needs in copyright literacy.

As LIS education adapts to new technological landscapes, AI literacy is becoming increasingly relevant. According to Cox (2023a), LIS students, as future LIM professionals, must acquire AI skills to effectively guide users in the ethical and productive use of AI tools. AI applications have been rapidly integrated into library services, with AI literacy predicted to become essential for professional success across disciplines (Cox, 2023a, 2023b; Jha, 2023). The 'IFLA Statement on Libraries and Artificial Intelligence' (IFLA FAIFE, 2020) further emphasises that AI is reshaping libraries globally, as librarians integrate AI technologies and promote AI literacy among patrons.

Internationally, notable initiatives demonstrate AI's potential in LIS contexts. In Canada, the 'AI for All' project involves a collaboration between Ryerson University Library and Toronto Public Library, aimed at enhancing AI literacy nationwide ("AI for All", 2019). Similar projects, such as Finland's 'Elements of AI' MOOC and Frisco Public Library's AI maker kits in Texas, reveal a trend towards using AI tools for community engagement ("Elements of AI", 2024; Finley, 2019). In Europe, the Association of Public Libraries in Berlin recently launched an AI chatbot to support library searches, a pioneering initiative in Europe (Eblida, 2024).

Within school libraries, AI integration has also gained traction. Hossain (2023), drawing from personal experience in a Swiss international school, describes efforts to teach AI applications in research and information literacy. Such experiences, including prompt engineering and ethical AI usage, highlight how librarians can actively participate in AI-driven educational efforts. Oddone et al. (2023) similarly identified AI as an opportunity for school librarians in Australia to lead in ethical AI literacy, despite challenges related to funding, technical skills and strategic alignment.

Despite these advancements, AI adoption in library services remains in its early stages, with significant obstacles, particularly in terms of workforce skills (Hervieux and Wheatley, 2021). Huang (2022) noted that while librarians recognise the inevitability of AI, limited expertise hinders effective implementation. Consequently, developing AI literacy among LIS students is crucial for empowering LIM professionals to navigate the complexities of AI technologies and fulfil their roles responsibly (Cox, 2023a).

AI literacy, coupled with a concept known as 'AI citizenship' (Hossain, 2024), equips LIS professionals to make informed decisions, enhance productivity and responsibly leverage AI to improve information access. By engaging with AI tools, LIS students can contribute to broader goals, such as the UN's Sustainable Development Goal 4, which advocates for 'Quality Education' and promotes equitable access to AI resources (Hossain, 2023). Initiatives like UNESCO's '2019 Beijing Consensus on Artificial Intelligence and Education' underscore the critical role of AI in achieving the UN's Education 2030 Agenda.

From the literature, it is clear that LIS students, as future LIM professionals, need comprehensive competencies (AI Citizenship) to effectively and ethically engage with AI tools in diverse contexts, whether personal, educational, or professional. While there has been substantial discussion about AI's impact on education, more research is needed to fully understand how AI tools can advance the mission of libraries and LIM professionals. This study, therefore, aims to explore the AI literacy of LIS students, examining their familiarity with AI, how they use AI tools for academic and future professional purposes, and their ethical considerations regarding AI in the LIM field.

AI literacy assessment

The recent studies on AI literacy in the higher education spectrum emphasise the assessment of AI literacy (Hornberger et al., 2023; Montag et al., 2024) and AI education courses (Kong et al., 2022; Lin et al., 2021a). Mansoor et al. (2024) advocate for assessing AI literacy levels across different societal segments and developing the appropriate measurements. As a way forward, Montag et al. (2024) proposed that AI attitudes and literacy/competence need to be investigated in large representative samples throughout the world. A study by Laupichler et al. (2024) investigates medical students' AI literacy and attitudes towards AI using two validated self-assessment scales, revealing a discrepancy in skills and a correlation between AI literacy and attitudes. The study further reported that medical students rated their technical understanding of AI significantly lower than their ability to appraise critically or practically using AI, and female medical students rated their overall AI literacy substantially lower than male medical students. The study conducted by Mansoor et al. (2024) examines AI literacy among university students from four Asian and African nations, revealing significant disparities in AI literacy levels based on nationality, scientific specialisation and academic degrees.

According to Laupichler et al. 'Prior AI education and interest in AI is positively correlated with AI literacy' (2024: 1). In addition to technical competence, this literacy includes ethical considerations, critical thinking and socioemotional skills, reflecting the complex relationship between AI technologies and societal norms (Biagini, 2024). However, valid tools for assessing the AI literacy of students from developing countries are still lacking (Ma and Chen, 2024). The findings of the study may contribute to filling these gaps and enriching the discourse around AI-powered LIS education and LIM services in South Asia and beyond. It is also expected that this study will facilitate

Table 1. AI capacity of Bangladesh, India and Pakistan in the *Global AI Index 2024 ($n = 83$ countries).

Country	Overall rank	Talent	Infrastr-ucture	Operating environment	Research	Development	Govt. strategy	Commercial
Bangladesh	75	73	75	70	68	61	58	78
India	10	2	68	3	14	13	11	13
Pakistan	76	57	78	68	58	64	63	75

Data retrieved and adapted from Cesareo and White (2024).

Table 2. Components of AI literacy with descriptors.

AI components	Descriptors
Familiarity	AI awareness, recognition and usage experience
Knowledge & application	Conceptual and technical AI knowledge and understanding
Ethical perceptions	AI impact on academic integrity and related realms

the development of AI literacy courses in higher education institutions offering LIS education across South Asia and in other regions.

Methodology

As part of a larger collaborative project, this quantitative study adopted an exploratory approach to investigate the nuances of AI literacy among undergraduate and postgraduate LIS students in South Asia, specifically Bangladesh, India and Pakistan. An exploratory approach was chosen for this study due to the limited prior research on AI literacy among LIS students in South Asia, as well as a general lack of data on AI readiness and competencies within this demographic. According to Stebbins (2001), exploratory design is well-suited for topics with sparse foundational data, allowing for initial insights and broader understanding.

The rationale behind choosing these countries is that these countries have similar educational structures but dissimilar levels of technological advancement (see Table 1 for details). India has a highly developed ICT infrastructure and diverse higher education systems. As part of its AI development initiatives, the Indian government has launched the National AI Strategy, the National AI Portal and the Responsible AI for Social Empowerment (RAISE) initiative (Gautam, 2024). Bangladesh is actively developing what insofar as ICTs for eGovernment and working towards AI integration under the slogan 'AI for Innovative Bangladesh' (ICT Division, Government of Bangladesh, 2020). In addition, Bangladesh developed a 'National Strategies for Artificial Intelligence' in 2020 and plans to integrate AI into secondary and higher secondary school curriculums. In Pakistan, the Presidential Initiative for Artificial Intelligence and Computing (PIAIC) was launched in 2018 to promote education, research and business opportunities in AI, blockchain, the Internet of Things (IoT) and Cloud Native Computing (Munir, 2018).

As a means of clarifying to survey participants what we meant by AI literacy, we used the definition of Hossain (2023: 1) *"AI literacy is the ability to identify, understand, develop ideas, and critically evaluate AI technologies, their applications, and ethical implications"*. It was also explained to the survey participants that 'AI familiarity is about knowing what AI is and what AI tools are, while AI literacy involves a more comprehensive understanding and ability to engage with AI/AI tools meaningfully' (OpenAI, 2024). Moreover, to explore the multifaceted dimensions of AI literacy, we used the following detailed breakdown of AI components, as shown in Table 2.

As a first step, the questions were drafted in Google Forms by the first author, and then feedback from co-authors was sought, and minor updates were made before finalising the questionnaire. Various question formats, including checkboxes, Likert scales, multiple-choice and statement-type questions were employed to capture nuanced responses from participants. The survey questionnaire was divided into five distinct sections: Demographic Information, AI Literacy and Familiarity, Purposes of using AI Tools, Ethical Concerns about using AI Tools and AI Literacy Covered in LIS Education, including students' perceptions of their future AI-driven careers. Adherence to ethical guidelines maintained and ensured participant anonymity, confidentiality and voluntary participation, all underscored by informed consent.

Purposive sampling was employed to recruit a diverse cohort of respondents from LIS programmes across various academic institutions in Bangladesh, India and Pakistan. To reach a representative sample, LIS faculty members in each country distributed the survey via institutional channels, including student email lists and departmental social media platforms (Facebook Pages/Groups and WhatsApp Groups). Additionally, the survey was circulated to other institutions offering LIS education in these countries through personal and professional networks, expanding the reach beyond the primary

institutions. Between January and April 2024, 632 responses were received, with 266 from Bangladesh, 220 from India and 146 from Pakistan. The respondents came from both public and private universities with various levels of LIS education, which also confirms the rigour of the sample. A detailed demographic breakdown is provided in Table 3.

While the purposive sampling approach does not ensure random selection, it was deemed suitable for targeting a specific population – LIS students in these countries – to explore their AI literacy. Despite India's larger population, recruitment in India was affected by logistical issues, including limited access to certain institutions and lower response rates. Additionally, a personal emergency involving one of our Indian collaborators further impacted our outreach efforts. Notwithstanding this, we believe the findings remain generalisable, as similar trends were observed across all three countries, supporting the study's regional insights.

Findings of the study

Demographic information

Regarding respondents, Bangladesh topped the list (42%), followed by India (35%) and Pakistan (23%). The survey respondents included both males and females studying at public and private universities in their respective countries as undergraduates and postgraduates. Table 3 details the survey participants' locations, gender, education, types of participating universities (e.g. public or private) and self-reported English proficiency levels. The survey participants' English proficiency levels were taken into consideration because the majority AI tools use English as their operational language. Therefore, English proficiency is essential to understanding how the desired AI tools work, engaging in self-learning via online courses and engineering better prompts (questions/queries). Most students (44.1%) self-rated their English language competency as 'Intermediate (B1)' followed by beginners and upper intermediate, as depicted in Table 3.

LIS students' self-rated 'AI literacy'

The study sought to explore LIS students' overall 'AI Literacy' asking students to self-rate their level of AI literacy from 'No AI Literacy to AI Expert'. Survey participants self-rated their AI literacy along the 'Basic to Advanced' continuum. Not only Pakistan's mean score is lower than other participating countries, a significant number (17.8%) of Pakistani LIS students claim to have 'no AI literacy'. In contrast, just over one in four (28.6%) Bangladeshi LIS students claimed to possess 'Expert' level AI literacy, as shown in Figure 1.

A further analysis of the data revealed that male students scored higher across the 'Basic to Expert' continuum

Table 3. Academic and demographic profile of the respondents (*n* = 632).

Status	*n*	%
Country		
Bangladesh	266	42.1
India	220	34.8
Pakistan	146	23.1
University type		
Public	583	92.2
Private	49	7.8
Gender identity		
Male	343	54.3
Female	285	45.1
Non-binary	2	0.3
Prefer not to say	2	0.3
Current study level		
Bachelor student	211	33.4
Post Graduate Diploma (PGD)	53	8.4
Graduate student (Master's or equivalent)	298	47.2
Graduate student (PhD or equivalent)	70	11.1
English proficiency level		
Beginner (A1-A2)	182	28.8
Intermediate (B1)	266	42.1
Upper intermediate (B2)	125	19.8
Advanced (C1-C2)	44	7.0
Near-native	15	2.4

of AI literacy than female students. In contrast, females have a higher percentage of 'No AI Experience' than males, as shown in Table 4. Overall, male students have better AI literacy than their female counterparts.

To demonstrate their AI literacy and readiness, LIS students also self-rated their technical skills with AI tools/applications, their understanding of Machine Learning Models (MLMs) behind AI text generation tools and their ability to identify whether a tool or software used AI technology. As illustrated in Figure 2 respondents' level of understanding was scattered across the 'Poor to Excellent' continuum.

LIS students' self-rated 'AI familiarity'

As for the 'AI Familiarity Scale' (Likert Scale 1 to 5, 'Not Familiar to Very Familiar'), the majority rated themselves between 'Slightly familiar to Moderately familiar' continuum details are presented in Figure 3. In terms of AI/Gen AI tools familiarity, Bangladesh outperforms India and Pakistan.

In order to assess participants' familiarity with the existing and well-known AI tools and applications, we asked them about their favourite AI tools and applications. Figure 4 shows that ChatGPT (71.3%) was the most popular AI tool among LIS students, followed by Google's Gemini and Quillbot. Participant LIS students also tend to use Elicit and Perplexity AI, which is noteworthy.
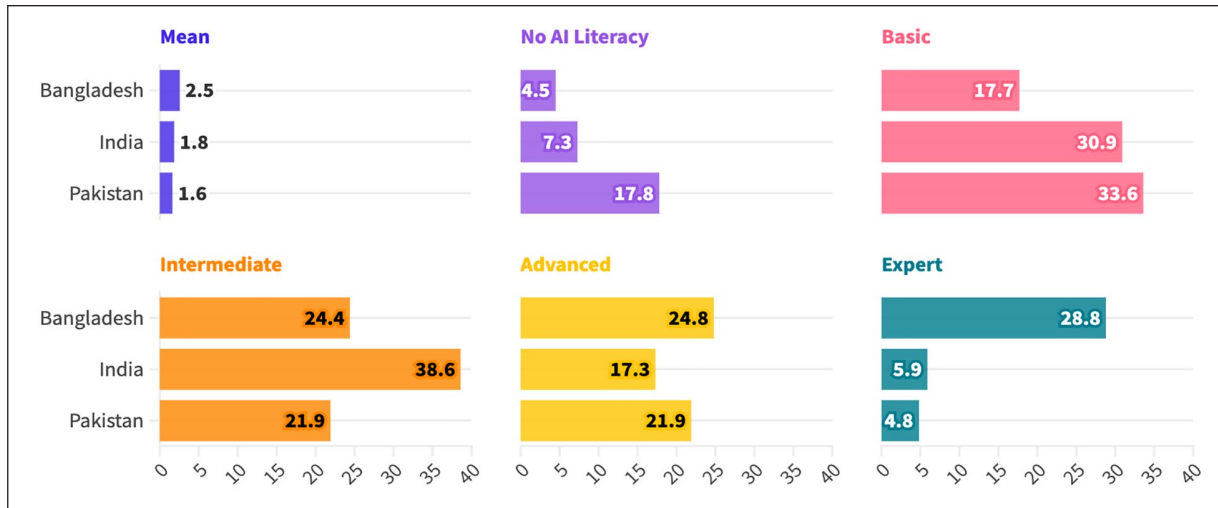
Figure 1. South Asian LIS students' self-rated AI literacy (*n* = 632).

Table 4. AI literacy by gender.

Gender (*n* = 632)	No AI literacy	Basic	Intermediate	Advanced	Expert	Total (%)
Male	3.96	14.56	16.46	11.23	8.07	343 (54.27)
Female	4.59	11.08	12.34	10.13	6.96	285 (45.09)
Non-binary	–	0.16	–	–	0.16	2 (0.32)
Prefer not to say	–	0.16	–	0.16	–	2 (0.32)
Total (%)	8.54	25.95	28.80	21.52	15.19	632 (100)
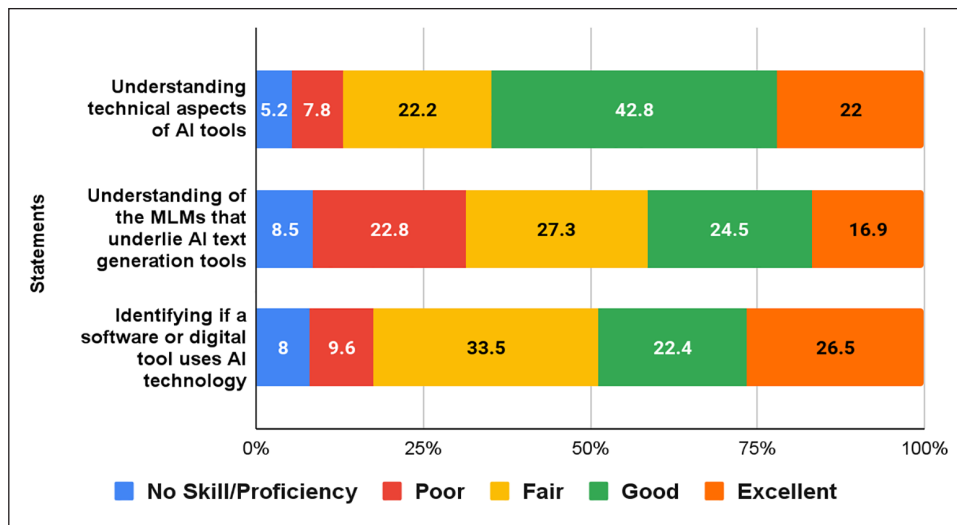
Figure 2. LIS students' technical skills, knowledge and understanding of AI tools (*n* = 632).

LIS students purposes and frequency of using AI tools/applications

One of the primary objectives of this study was to investigate LIS students' purposes for using AI tools/applications. Results show that most students use AI tools for understanding concepts, answering questions, information searches, finding related resources and summarising articles, among other things. As illustrated in Figure 5, the data also indicated that LIS students use AI tools to generate research ideas or improve research effectiveness and productivity.
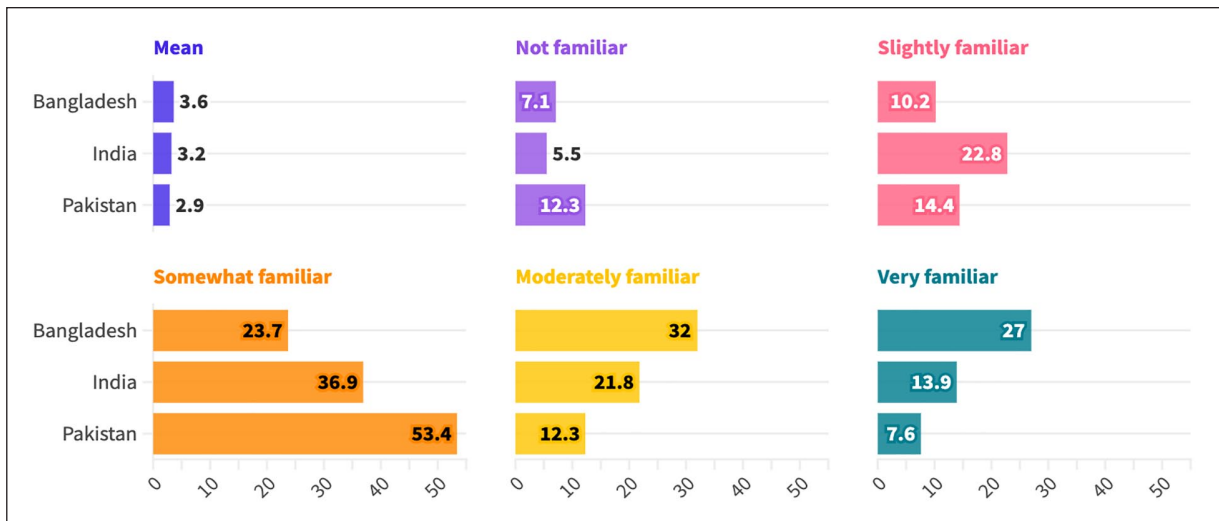
Figure 3. LIS students' familiarity with AI/AI tools in South Asia (*n* = 632, multiple responses were allowed).
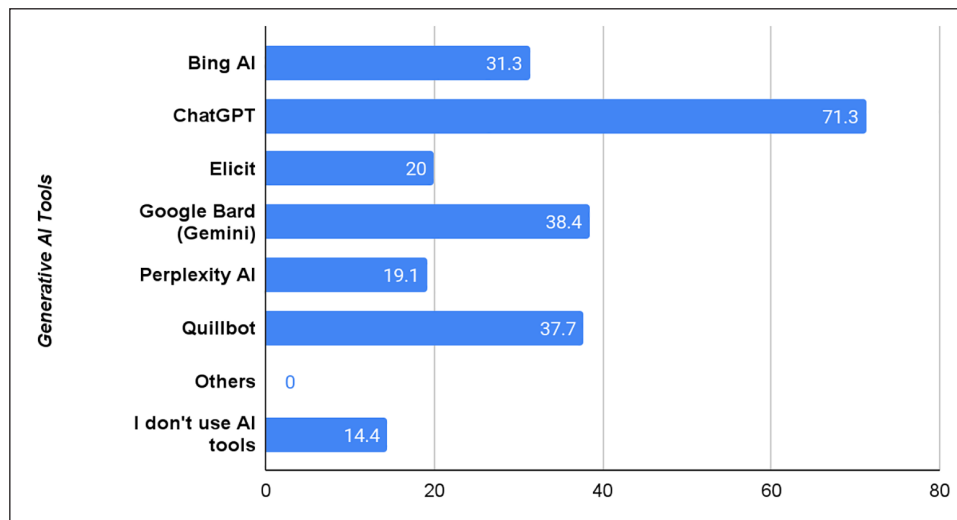

Figure 4. LIS students favourite AI tools/applications (*n* = 632, multiple responses were allowed).

LIS students' ethical perceptions of using AI tools

To better understand students' perceptions of ethical issues associated with using AI tools, we included five (5) statements in our survey as shown in Table 5. According to the results, 54.4% of LIS students were concerned about AI/GenAI tools conflicting with academic and research integrity principles. Nearly 70% of the LIS students believed 'Agree or Strongly Agree' that AI tools could compromise academic integrity if misused in academic writing. However, participants' data indicates that receiving AI tool assistance with academic writing assignments is ethical as long as the user critically engages with and revises the generated contentises the generated content. Almost two out of three students considered it appropriate to acknowledge the use of AI-based tools when submitting papers or assignments that incorporated such technology. Additionally, more than two-thirds (75.8%) of respondents believe it is fair and ethical for non-native English-speaking students to use AI-powered translation and writing tools to improve the quality of their academic papers.

Additionally, LIS students expressed concerns about plagiarism when using AI tools for academic writing. More than half (55.7%) of the survey participants felt 'Very concerned' or 'Extremely concerned' about plagiarism when using GenAI tools for academic writing, as illustrated in Figure 6.

To justify students' ethical concerns about AI-powered LIM services, students were asked a follow-up question 'To what extent do you think incorporating AI into information services and library management poses ethical concerns?' According to student responses, AI integration into LIM services poses moderate ethical concerns. Among
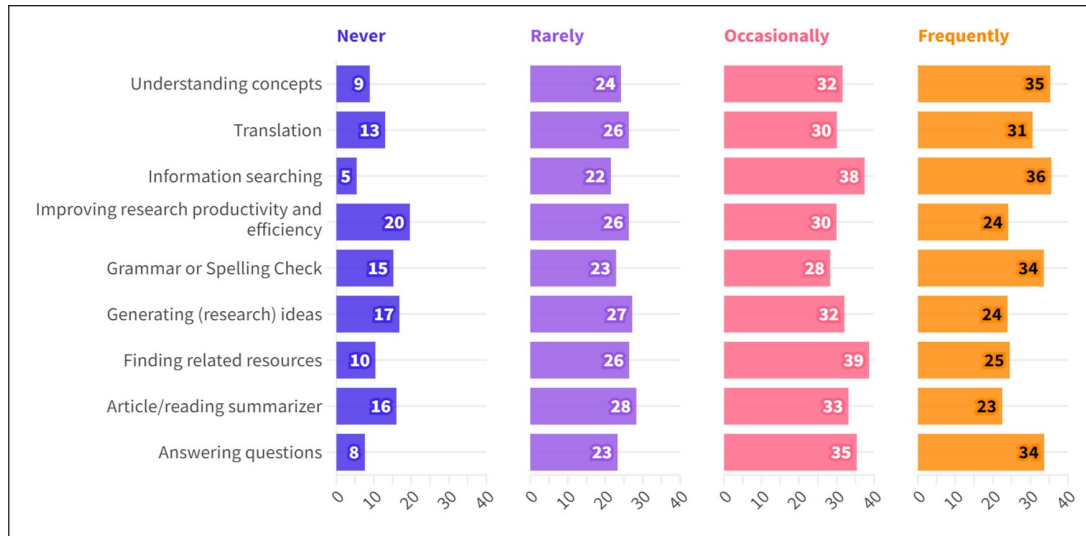
Figure 5. LIS students' purposes and frequency of using AI tools (*n* = 632).

Table 5. LIS students' ethical perceptions of using AI tools in academia (*n* = 632).

Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
'The use of generative AI tools conflicts with academic and research integrity principles'.	54.4	–	32.3	13.3	–
'Academic integrity could be compromised by the misuse of AI in academic writing'.	26.3	39.6	25.9	6.6	1.6
'Using AI to assist with writing assignments is ethical as long as the student critically engages with and revises the AI-generated content'.	24.2	43.2	27.8	4.1	0.7
'Students should acknowledge the use of AI-based tools when submitting papers or assignments that have utilised such technology for content creation or editing'.	26.3	47.8	21	4.3	0.6
'It is fair and ethical for non-native English-speaking students to use AI translation and writing enhancement tools to improve the language quality of their academic work'.	25.5	50.3	21.4	2.4	0.4

their primary ethical concerns were the privacy of patron data (66%), security risks associated with AI implementation in library systems (54%), and bias and fairness in AI algorithms for retrieval of information (53%).

Integration status of AI-related modules or topics in LIS courses/programmes

The question 'Are AI-related modules or topics covered in your LIS courses?' aimed to assess if AI-related modules or topics were integrated in LIS courses/programmes students participated in, and if so, to what extent. According to the survey, 37.7% of students indicated that their LIS courses or programmes included AI-related topics or modules 'to some extent' while 27.8% indicated they were integrated 'Extensively'. About a quarter of students reported their LIS courses/programmes did not include any AI-related modules. Details are presented in Table 6.

To ascertain students' overall AI-readiness for their future AI-driven LIM careers, we prompted the question

'Is your understanding of AI tools and applications sufficient to prepare you for the future of library and information services?' Responses are spread across the spectrum, from 'Not at all sufficient' to 'Completely sufficient', with a majority of the students being positive about their AI-related preparation details depicted in Figure 7.

Although AI/GenAI tools present opportunities for the LIM profession, the challenges to adopt AI technologies in the profession is not unique and every sector has to go through such evolutions. In light of this, we asked students what challenges they anticipate when it comes to incorporating AI tools into their future careers in LIM profession. The primary challenges LIS students anticipated facing in their future careers include poor infrastructure (59.18%), a lack of AI literacy (52.53%), a lack of clarity regarding AI's role in library services (51.74%), financial constraints (43.04%), concerns about job displacement or changes as a result of AI integration (41.61%) and resistance to change from traditional practices (44.46%). The AI revolution has led nearly half of the students to believe that library and
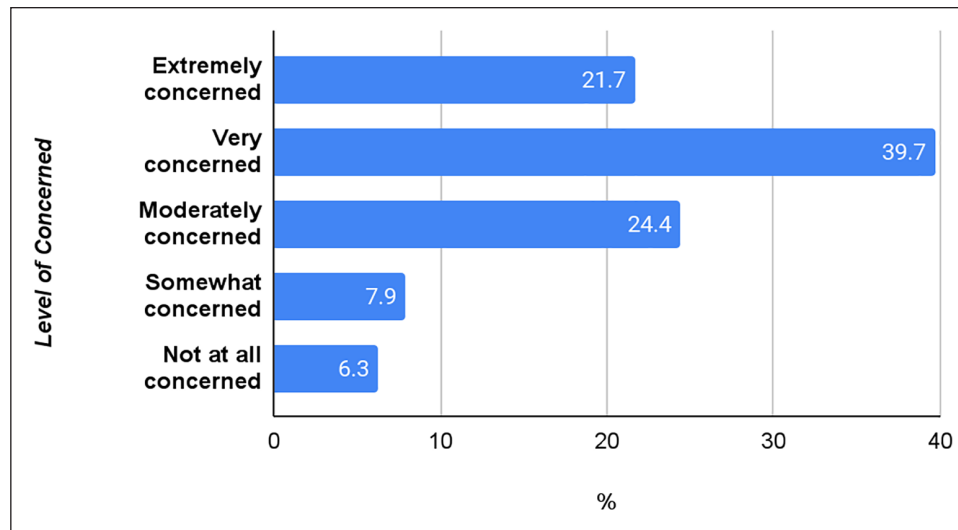
Figure 6. LIS students' level of concern about plagiarism when using AI/GenAI tools (*n* = 632).

Discussion and analysis

The current study aimed to explore the AI literacy of South Asian students enrolled in LIS courses/programmes in Bangladesh, India and Pakistan. Within the context of AI literacy, we specifically explored their AI familiarity, purposes of using AI tools and applications in academic contexts and associated ethical concerns, as well as how much their institutions cover AI-related topics in their curricula and what impact AI may have on their future LIM career. Our study found that LIS students in South Asia are moderately familiar with various aspects of AI tools and applications, and their self-rated AI literacy ranged from basic to advanced. As per students' moderate level of familiarity, AI is a novel and emerging technology in South Asia and either partially included or yet to be integrated into LIS curriculum.

Pertaining to gender, male students indicated a higher level of AI literacy than their female counterparts (see Table 4). In the convenient sampling technique, the proportionality of a small number of answers provided by female students does not necessarily indicate that male students are more AI literate than female students. Research also indicates that male students often self-report higher proficiency in IT-related skills compared to female students, which may influence perceived levels of AI literacy (Cooper and Weaver, 2003; Lin et al., 2021a; Ziegler et al., 2014).Therefore, the reported gender differences in AI literacy should be interpreted cautiously, as they reflect self-perceptions rather than objectively measured competencies. An important point to note is that a significant gender difference in motivation was reported by Lin et al. (2021b) study, with girls perceived to be less motivated to learn AI literacy than boys. Nevertheless,

8.3% of students across both genders self-reported having no experience with AI tools, indicating limited 'AI Familiarity' and 'AI Literacy'. Perhaps LIS students' AI familiarity has a trickle-down effect on their AI literacy.

According to the collected data, the AI literacy level of Indian and Pakistani LIS students was classified on a continuum between 'Basic' and 'Advanced' levels, whereas their Bangladeshi counterparts were generally categorised between 'Intermediate' and 'Expert' levels. The surprising finding of the study was that a high proportion (17.8%) of Pakistani LIS students claimed to have 'No AI Literacy'. In contrast, just over one in four (28.6%) Bangladeshi LIS students claimed to possess 'Expert' level AI literacy. Is it possible that Bangladeshi LIS students overrate themselves or are too confident of their ability to utilise AI tools and technologies? Or perhaps they receive better AI literacy education than their counterparts in India and Pakistan?

Based on further data analysis, we found that more than half (51.8%) of Bangladeshi LIS students had 'self-taught' (Self-taught myself online) themselves about AI tools in contrast to 28.1% and 26% of Indian and Pakistani LIS students, respectively. In addition, 64.2% of Bangladeshi LIS students reported that their universities or departments offered AI-related modules or courses, as compared to 13.6% of Indian and 21.9% of Pakistani students. In the Pakistani context, the literature indicates that despite financial and technical challenges the applications of AI are slowly making room in the affairs of academic libraries (Ali et al., 2022) and LIS programmes (Asim et al., 2023). These factors may give Bangladeshi and Indian students an edge over Pakistani students.

Although students reported that AI-related modules were included in their academic courses or programmes curricula, some students (26.2%) reported they were hardly enough to provide adequate insight into the AI tools and applications useful in their anticipated AI-powered LIM careers readiness. All these factors had an impact on the AI

Table 6. AI-related modules or topics integrated in LIS courses and programmes (*n* = 632).

Country	Yes, extensively (%)	Yes, to some extent (%)	Not sure (%)	Not at all (%)	Total (%)
Bangladesh	21.5	13.3	2.8	4.4	42.1
India	2.8	16.3	6.3	9.3	34.8
Pakistan	3.5	8.1	1.4	10.1	23.1
Total	27.8	37.7	10.6	23.9	100
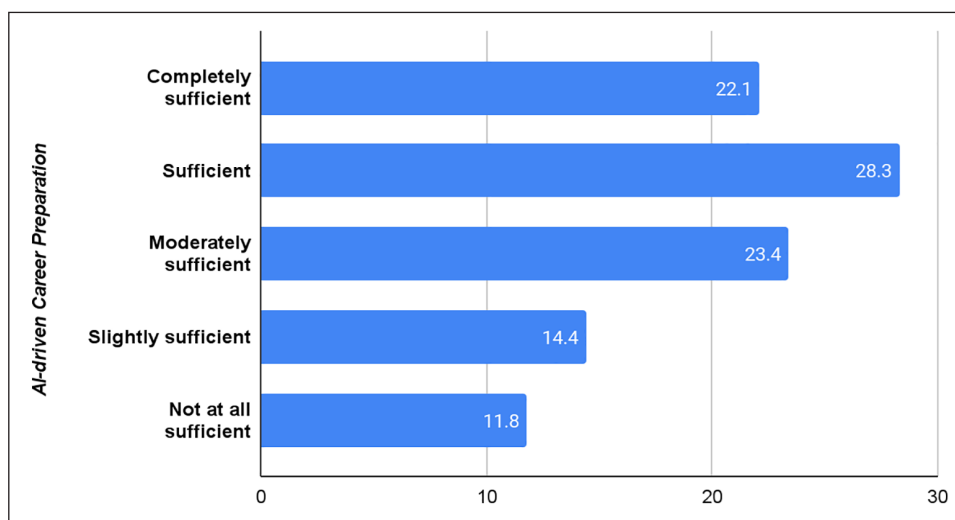
Figure 7. LIS students' self-rated readiness for AI-driven career (*n* = 632).

familiarity and AI literacy of LIS students in South Asia. Perhaps these could be attributed to the limited curriculum coverage of AI-related topics in South Asian LIS courses/ programmes. Thus, the need to include AI components in academic curricula should be recognised by South Asian LIS schools. They need to redesign/revamp ICT-related courses or modules to provide additional educational opportunities for AI/GenAI use in academia, especially in areas such as understanding GenAI tools, prompt engineering and critical evaluation and identification of AI-generated information. In addition, faculty may consider embedding AI tools into course assignments and assessments as a natural way to ensure students learn about these tools.

There is a significant percentage (81.8%) of students who believe that using AI for academic purposes improves their academic performance, specifically academic writing. In addition to traditional means of conducting information searches, translation, or proofreading, LIS students are making use of a variety of AI tools and applications to generate ideas, understand concepts, summarise articles and improve research project productivity which requires critical AI literacy. The study also revealed that students rely heavily on text-generating tools, primarily ChatGPT. Although the study was not focused on ChatGPT specifically, students were asked about their use of it. This study endeavoured to lighten up the broad uses of AI-powered technologies to understand better how students use these tools, which tools they use and what their ethical perspec-

tives are on the use of AI-powered tools for academic purposes, as well as where ChatGPT fits into all these factors.

Despite utilising AI/GenAI tools for a wide range of academic purposes, students have a limited understanding of the MLMs behind the artificial text generation tools used in academic writing, indicating that they need to become more familiar with the basic technical aspects of AI technologies. It makes the researchers wonder if this will decrease the effectiveness of AI usage by LIS students or students in other non-technical fields. In this regard, Kong et al. (2021) argue that prior programming knowledge is not required for AI concept development, and the flipped classroom enables the participants to learn at their own pace. That said, students would have been able to understand the technical aspects of AI and GenAI tools if AI-related modules/courses had been included in their curriculum. However, Hornberger et al. (2023) and Laupichler et al. (2024) studies claim that students with prior experience in computer science or AI, whether through university courses or informal learning, exhibit higher levels of AI literacy. Additionally, students from STEM backgrounds demonstrate greater AI literacy than those from social science disciplines.

The participants of this study were not native English speakers, and many of them self-rated themselves as being 'Beginners (A1-A2) to Intermediate (B2)' (90.7%) proficient in English. The lack of educational resources in the local languages (mother tongue) they can access may be

affecting their ability to understand and learn technical aspects of AI technologies from the freely available courses and educational materials online. While LIS students use AI tools for a variety of academic purposes, a considerable number of students (65.9%) believe that the use of GenAI tools conflicts with academic and research integrity principles. They seemed more concerned about plagiarism when using AI tools for academic writing. However, participating LIS students believed that it is fair and ethical for non-native English-speaking students to use AI tools to improve the quality of their academic papers. Accordingly, we encourage students to critically analyse, revise and acknowledge the AI-generated content regardless of their language proficiency in a given language and acknowledge that AI-assisted to the creation of content.

As Gen AI tools has created limitless possibilities, it also presents hurdles to individuals and organisations looking to adopt AI. As reported by the study, South Asian LIS students are generally interested in adopting and using AI-powered services in their future LIM careers. However, they cited several challenges related to AI integration in the LIM profession, including technical, managerial and ethical. In terms of technical constraints, there are, for example, issues related to understanding technical concepts of AI algorithms, security risks associated with AI implementation in library systems, analysing usage data for insights and improvements, as well as limited AI resources. The managerial and ethical issues cited included resistance to changing from traditional practices and concerns about job displacements or changes in job roles due to the wide adoption of AI tools and applications. Huang's (2022) study with Taiwanese academic librarians and Jha's (2023) 'content analysis' study both found similar key factors (e.g. funding and costs, technological problems, privacy and ethics) that hampered the implementation of AI in the LIM sector. In addition, Cox and Mazumder (2024) noted that there is a recurrent concern that AI may replace librarians' work and that may negatively impact equality, diversity and inclusion. In the literature (American Library Association, 2019; Huang, 2022), it is also argued that with AI, libraries' functions will become more complex, therefore, future library professionals will have to think critically, creatively and innovatively, as well as emotionally. The current study reported that South Asian LIS students are conscious of these facts and optimistic about adopting and using AI-powered services in their future LIM careers.

Significance and implications of the study

Theoretical implications

This study contributes significantly to the theoretical understanding of AI literacy within the field of LIS, particularly in the context of South Asia, revealing the varying levels of self-reported AI literacy among students from Bangladesh, India and Pakistan. By highlighting these regional differences, this study adds a nuanced layer to existing theories of AI literacy, underscoring the role of socioeconomic factors in shaping students' experiences and competencies in AI (Luckin et al., 2022; Mansoor et al., 2024).

Additionally, this study's findings align with the concept of parasocial relationships in educational contexts. Parasocial relationships describe how individuals interact with AI as though it were a collaborative partner or pseudo-social bonds with AI or robots (Edwards et al., 2019; Glikson and Woolley, 2020; Markauskaite et al., 2022). The integration of AI literacy within parasocial contexts – where students interact with AI-based tools for academic purposes or as educational and professional partners – adds depth to parasocial relationship theories (Glikson and Woolley, 2020), illustrating how students build trust or scepticism towards AI through usage and ethical reflection (Lund and Naheem, 2024). It also suggests a need for further exploration of how these relationships impact both academic integrity and knowledge acquisition.

Finally, this study suggests that self-assessment of AI skills, which varied significantly between genders, offers insights into gender-based confidence in technical skills. Research on self-reported IT skills often shows that male students tend to rate themselves higher in technical skills (Laupichler et al., 2024; Ziegler et al., 2014), a pattern observed here and worth further theoretical exploration in the context of AI literacy.

Practical implications

Specifically, the findings of this study offer the following practical insights for LIS programmes in South Asia and other regions aiming to develop and integrate AI literacy into their curricula effectively:

Integrate AI Literacy into LIS Curricula: Given the gap between current AI literacy levels and the demands of future AI-driven careers, integrating AI literacy modules in LIS courses and programmes is essential. This could include foundational machine learning knowledge, AI concepts, prompt engineering, ethical considerations, and hands-on AI tool training, allowing students to apply AI responsibly in library services (Cox, 2023a). Courses/modules could prioritise hands-on learning with AI tools such as ChatGPT to cultivate students' ethical judgement and practical capabilities, supporting UNESCO's recommendation on ethical AI education (UNESCO, 2023b). In designing AI courses, educators should also consider the variance of students' prior knowledge (Hornberger et al., 2023). Additionally, considering the language barrier faced by many non-native English speakers, AI literacy training should be tailored to improve students' understanding and

use of AI in multilingual/translingual settings. This could involve offering resources or AI modules in local languages to increase accessibility and comprehension (COHERE, 2024; Voulgari et al., 2022). For effective implementation, faculty development programmes in AI literacy could be introduced (Hossain, 2023) to ensure educators are well-equipped to teach these topics.

Address Ethical Concerns: With a high percentage of students expressing concerns about plagiarism and academic integrity, LIS curricula should include specific modules on ethical AI use, focusing on proper citation of AI-generated content, understanding the risks of AI misuse and maintaining academic honesty (Johnston et al., 2024) and research integrity. To further address ethical concerns, curriculum should incorporate discussions around academic and research integrity, particularly concerning AI's role in information generation.

Gender-Specific Support for AI Literacy: The self-reported data indicating gender differences in AI competency suggests a need for targeted educational interventions to support female students in gaining confidence and proficiency in AI technologies. This might include female-led workshops, mentorship programmes, or accessible self-paced learning modules (Lin et al., 2021b; UNESCO, 2022).

Institutional Policy Development: Universities should establish clear policies for AI use in academic work, covering guidelines on ethical use, acknowledgement requirements and criteria for permissible AI-assisted academic activities. Embedding these guidelines into course assessments and projects can reinforce responsible AI usage practices (Lund and Naheem, 2024).

Conclusion

This study advances the understanding of AI literacy and readiness among Library and Information Science (LIS) students in South Asia, focusing specifically on Bangladesh, India and Pakistan. It offers insights into the current state of AI literacy within the context of LIS education, revealing trends that underscore a critical gap between students' AI competencies and the demands of AI-driven careers in the Library and Information Management (LIM) profession and services.

Findings show that, while many LIS students in South Asia are moderately familiar with AI technologies, their self-rated AI literacy levels vary widely. The study highlights students' notable reliance on AI tools for academic purposes, including information searching, summarising, idea generation, translation and academic writing. However, ethical concerns related to AI use – particularly around academic integrity and plagiarism – suggest that students require structured training in ethical AI use and to critically engage with AI-generated content. Additionally, the research reveals that despite some AI-related content in LIS curricula, students report that these modules often lack

depth, particularly in practical AI applications in LIM profession and services. Technical, managerial and ethical challenges further complicate this landscape, including issues related to understanding AI algorithms, data privacy and limited institutional resources.

The implications of these findings are twofold. First, they emphasise the necessity of integrating robust AI literacy programmes within LIS education that cover technical skills, ethical guidelines and critical AI use. Second, they suggest practical steps for policy and curriculum reform, including the establishment of faculty development programmes to ensure instructors are well-equipped to teach AI topics. Professional development workshops, partnerships with institutions that have advanced AI curricula, and exchange programmes can support educators and students alike in bridging current knowledge gaps.

Our findings highlight, like several other studies, the growing importance of AI literacy among students. This aligns with existing literature emphasising the importance of AI skills in a fast-evolving digital landscape. The authors believe that the adoption of GenAI has the potential to revolutionise higher education, particularly in developing countries where English is not the dominant language or the language of instruction. For example, it can enhance students' concept-building and writing skills by suggesting improvements in vocabulary, sentence structure and coherence. Among the managerial challenges are ensuring the data privacy and security of library users, assessing the impact of AI on the user experience in library settings and understanding user emotion, acceptance and trust. Understanding the ethical implications of AI in library and information services and managing AI-related ethical dilemmas in library settings is top of mind for students and comes with a variety of concerns, including, for example, plagiarism and academic integrity.

This study also deepens the theoretical understanding of AI literacy in LIS by examining regional and socioeconomic differences in self-reported AI literacy among students in Bangladesh, India and Pakistan. Additionally, gender differences in self-assessed AI skills highlight patterns of confidence that warrant further exploration in AI literacy research. The study's findings offer valuable insights for policymakers and curriculum developers in the educational sector, highlighting the need for targeted educational curricula and methodologies to enhance AI literacy among university students.

Future research should expand on these findings by exploring the longitudinal impacts of AI literacy interventions in LIS education and examining similar trends in other regions to understand global AI literacy patterns. By addressing these recommendations, LIS programmes in South Asia and beyond can better prepare students for AI-driven careers, positioning them as knowledgeable and ethical leaders in the evolving field of LIM profession and services.

Abbreviations

Artificial intelligence (AI)
Artificial Intelligence in Education (AIEd)
Generative Artificial intelligence (GenAI)
Library and Information Management (LIM)
Library and Information Science (LIS)
Large Language Models (LLM)
Machine Learning Models (MLM)

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Ethical approval and informed consent statements

"The survey is conducted on an anonymous and voluntary basis. The information you provide for this survey will be treated confidentially and analysed at an aggregated level, collected data will be kept in a secured file (and maybe deleted after the intended purposes are achieved) by the researchers involved in. Personally identifiable information (if any) will not be shared."

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Data availability statement

Data is available upon request. The authors are considering releasing the data in a suitable open-access repository.

References

AI for All (2019) AI for All program. Available at: https://aiforall.ca/ (accessed 19 November 2024).

Ali MY, Naeem SB and Bhatti R (2021) Artificial Intelligence (AI) in Pakistani university library services. *Library Hi Tech News* 38(8): 12–15.

Ali MY, Naeem SB, Bhatti R, et al. (2022) Artificial intelligence application in university libraries of Pakistan: SWOT analysis and implications. *Global Knowledge, Memory and Communication* 73(1/2): 219–234.

American Library Association (2019) Artificial intelligence. Available at: https://www.ala.org/tools/future/trends/artificialintelligence (accessed 2 November 2024).

Arias Coello A, Simón Martín J, Sulé A, et al. (2020) Copyright literacy in Spanish library and information sciences (LIS) students. *Revista Espanola de Documentacion Cientifica* 43(3): e269. Available at: http://hdl.handle.net/2445/177837 (accessed 19 November 2024).

Asim M, Arif M, Rafiq M, et al. (2023) Investigating applications of Artificial Intelligence in university libraries of Pakistan: An empirical study. *The Journal of Academic Librarianship* 49(6): 102803.

Biagini G (2024) Assessing the assessments: Toward a multidimensional approach to AI literacy. *Media Education* 15(1): 91–101.

Cesareo S and White J (2024) The global AI index (data). *Tortoise Media*. Available at: https://www.tortoisemedia.com/intelligence/global-ai/#data (accessed 17 November 2024).

COHERE (2024) The leading AI platform for enterprise. *Cohere*. Available at: https://cohere.com/ (accessed 15 November 2024).

Cooper J and Weaver KD (2003) *Gender and Computers: Understanding the Digital Divide*. New York, NY: Psychology Press.

Cox A (2023a) Developing a library strategic response to Artificial Intelligence. *IFLA*. Available at: https://www.ifla.org/g/ai/developing-a-library-strategic-response-to-artificial-intelligenc https://www.ifla.org/g/ai/developing-a-library-strategic-response-to-artificial-intelligence/(accessed 23 December 2024).

Cox A (2023b) How artificial intelligence might change academic library work: Applying the competencies literature and the theory of the professions. *Journal of the Association for Information Science and Technology* 74(3): 367–380.

Cox AM and Mazumdar S (2024) Defining artificial intelligence for librarians. *Journal of Librarianship and Information Science* 56(2): 330–340.

Crabtree M (2023) What is AI literacy? A comprehensive guide for beginners. *DataCamp*. Available at: https://www.datacamp.com/blog/what-is-ai-literacy-a-comprehensive-guide-for-beginners (accessed 15 December 2024).

EBLIDA (2024) Webinars: AI-Chatbot in public libraries. Available at: https://eblida.org/event/webinars-ai-chatbot-in-public-libraries-2/ (accessed 22 December 2024).

Edwards C, Edwards A, Stoll B, et al. (2019) Evaluations of an artificial intelligence instructor's voice: Social Identity Theory in human-robot interactions. *Computers in Human Behavior* 90: 357–362.

Elements of AI (2024) Global. Available at: https://www.elementsofai.com/ (accessed 15 December 2024).

Finley T (2019) Breaking open artificial intelligence for the masses. *Urban Libraries Council*. Available at: https://

www.urbanlibraries.org/blog/breaking-open-artificial-intelligence-for-the-masses (accessed 19 December 2024).

Gastinger A and Landøy A (2019) Copyright literacy skills of LIS students in Norway. In: *Information literacy in everyday life: 6th European conference, ECIL 2018, Oulu, Finland, 24–27 September 2018, Revised Selected Papers 6*, pp.578–584. Cham: Springer International Publishing.

Gautam A (2024) Artificial intelligence in India: India and artificial intelligence (AI) technology? *LinkedIn post*. Available at: https://www.linkedin.com/pulse/artificial-intelligence-india-ai-technology-r35df/ (accessed 11 November 2024).

Glikson E and Woolley AW (2020) Human trust in artificial intelligence: Review of empirical research. *Academy of Management Annals* 14(2): 627–660.

Hervieux S and Wheatley A (2021) Perceptions of artificial intelligence: A survey of academic librarians in Canada and the United States. *The Journal of Academic Librarianship* 47(1): 1–11.

Hornberger M, Bewersdorff A and Nerdel C (2023) What do university students know about Artificial Intelligence? Development and validation of an AI literacy test. *Computers and Education: Artificial Intelligence* 5: 100165.

Hossain MA and Sormunen E (2019) ICT skills of library and information science (LIS) students in Bangladesh. *International Information & Library Review* 51(4): 285–299.

Hossain Z (2021) Copyright literacy of library and information science professionals in Bangladesh. *IFLA Journal* 47(1): 78–90.

Hossain Z (2023) Unlocking tomorrow's potential by integrating AI literacy into school curriculum: ICS initiatives and future directions. *Connections-The ICS School Magazine* 2(33): 16–19. Available at: https://issuu.com/inter-community-school-zurich/docs/ics_autumn_connections_2023/1 (accessed 19 November 2024).

Hossain Z (2024) School librarians developing AI literacy for an AI-driven future: Leveraging the AI Citizenship Framework with scope and sequence. *Library Hi Tech News*. Epub ahead-of-print 29 November 2024. DOI: 10.1108/LHTN-10-2024-0186.

Hossain Z, Çelik Ö and Hertel C (2024) Academic integrity and copyright literacy policy and instruction in K-12 schools: A global study from the perspective of school library professionals. *International Journal for Educational Integrity* 20(1): 4.

Huang YH (2022) Exploring the implementation of artificial intelligence applications among academic libraries in Taiwan. *Library Hi Tech* 42(3): 885–905.

ICT Division, Government of Bangladesh (2020) National strategy for artificial intelligence: Bangladesh. Available at: https://ictd.portal.gov.bd/sites/default/files/files/ictd.portal.gov.bd/legislative_information/c2fafbbe_599c_48e2_bae7_bfa15e0d745d/National%20Strategy%20for%20Artificial%20Intellgence%20-%20Bangladesh%20.pdf (accessed 21 December 2024).

IFLA FAIFE (2020) IFLA statement on libraries and artificial intelligence. Ifla.org. Available at: https://repository.ifla.org/handle/123456789/1646 (accessed 24 December 2024).

Irawati I (2009) Information literacy competency of library and information science students at the Faculty of Humanities University of Indonesia. In: *A-LIEP 2009 (Poster Session)*, pp.483–493. Available at: https://cir.nii.ac.jp/crid/1050001202653193216 (accessed 21 November 2024).

Jha SK (2023) Application of artificial intelligence in libraries and information centers services: Prospects and challenges. *Library Hi Tech News* 40(7): 1–5.

Johnston H, Wells RF, Shanks EM, et al. (2024) Student perspectives on the use of generative artificial intelligence technologies in higher education. *International Journal for Educational Integrity* 20(1): 2.

Karaca O, Çalışkan SA and Demir K (2021) Medical artificial intelligence readiness scale for medical students (MAIRS-MS)–Development, validity and reliability study. *BMC Medical Education* 21: 1–9.

Knoth N, Decker M, Laupichler MC, et al. (2024) Developing a holistic AI literacy assessment matrix–Bridging generic, domain-specific, and ethical competencies. *Computers and Education Open* 6: 100177.

Kong SC, Cheung WMY and Zhang G (2021) Evaluation of an artificial intelligence literacy course for university students with diverse study backgrounds. *Computers and Education: Artificial Intelligence* 2: 100026.

Kong SC, Cheung WMY and Zhang G (2022) Evaluating artificial intelligence literacy courses for fostering conceptual learning, literacy and empowerment in university students: Refocusing to conceptual building. *Computers in Human Behavior Reports* 7: 100223.

Kong SC, Cheung WMY and Zhang G (2023) Evaluating an artificial intelligence literacy programme for developing university students' conceptual understanding, literacy, empowerment and ethical awareness. *Educational Technology & Society* 26(1): 16–30.

Laupichler MC, Aster A, Meyerheim M, et al. (2024) Medical students' AI literacy and attitudes towards AI: A cross-sectional two-center study using pre-validated assessment instruments. *BMC Medical Education* 24(1): 401.

Lee I, Ali S, Zhang H, et al. (2021) Developing middle school students' AI literacy. In: *Proceedings of the 52nd ACM technical symposium on computer science education*, March 2021, pp.191–197. New York, NY: Association for Computing Machinery.

Lin CH, Yu CC, Shih PK, et al. (2021a) STEM based artificial intelligence learning in general education for non-engineering undergraduate students. *Educational Technology & Society* 24(3): 224–237.

Lin PY, Chai CS, Jong MSY, et al. (2021b) Modeling the structural relationship among primary students' motivation to learn artificial intelligence. *Computers and Education: Artificial Intelligence* 2: 100006.

Luckin R, Cukurova M, Kent C, et al. (2022) Empowering educators to be AI-ready. *Computers and Education: Artificial Intelligence* 3: 100076.

Lund BD and Naheem KT (2024) Can ChatGPT be an author? A study of artificial intelligence authorship policies in top academic journals. *Learned Publishing* 37(1): 13–21.

Lund BD, Omame I, Tijani S, et al. (2020) Perceptions toward artificial intelligence among academic library employees and alignment with the diffusion of innovations' adopter categories. *College & Research Libraries* 81(5): 865.

Lund BD, Wang T, Mannuru NR, et al. (2023) ChatGPT and a new academic reality: Artificial Intelligence-written

research papers and the ethics of the large language models in scholarly publishing. *Journal of the Association for Information Science and Technology* 74(5): 570–581.

Ma S and Chen Z (2024) The development and validation of the Artificial Intelligence Literacy Scale for Chinese College Students (AILS-CCS). *IEEE Access* 12: 146419–146429.

Markauskaite L, Marrone R, Poquet O, et al. (2022) Rethinking the entwinement between artificial intelligence and human learning: What capabilities do learners need for a world with AI? *Computers and Education: Artificial Intelligence* 3: 100056.

Mansoor HM, Bawazir A, Alsabri MA, et al. (2024) Artificial intelligence literacy among university students—A comparative transnational survey. *Frontiers in Communication* 9: 1478476.

Montag C, Nakov P and Ali R (2024) On the need to develop nuanced measures assessing attitudes towards AI and AI literacy in representative large-scale samples. *AI & Society* 1–2.

Munir S (2018) A digital beginning! President Arif Alvi launches PIAIC with a click of a mouse. *Techjuice*. Available at: https://www.techjuice.pk/president-launches-initiative-to-promote-artificial-intelligence-blockchain-and-cloud-education/ (accessed 21 November 2024).

Ng DTK, Su J, Leung JKL, et al. (2023) Artificial intelligence (AI) literacy education in secondary schools: A review. *Interactive Learning Environments* 1–21. https://www.tandfonline.com/doi/abs/10.1080/10494820.2023.2255228

Oddone K, Garrison K and Gagen-Spriggs K (2023) Navigating Generative AI: The teacher librarian's role in cultivating ethical and critical practices. *Journal of the Australian Library and Information Association* 73(1): 3–26.

Okunlaya RO, Abdullah NS and Alias RA (2022) Artificial intelligence (AI) library services innovative conceptual framework for the digital transformation of university education. *Library Hi Tech* 40(6): 1869–1892.

OpenAI (2024) *ChatGPT* [Large language model]. Available at: https://chatgpt.com/c/67278d4f-d844-800a-b4ce-d1aa32a93271 (accessed 19 July 2024).

Pálsdóttir Á (2019) Copyright literacy among students of Information Science at the University of Iceland. In: Information literacy in everyday life: 6th European Conference, ECIL 2018, Oulu, Finland, 24–27 September 2018, Revised Selected Papers 6, pp.569–577. Cham: Springer International Publishing.

Singh E, Vasishta P and Singla A (2024) AI-enhanced education: Exploring the impact of AI literacy on generation Z's academic performance in Northern India. *Quality Assurance in Education*.

Stebbins RA (2001) *Exploratory Research in the Social Sciences*. Thousand Oaks, CA: Sage.

Terra AL, Martins F and Pinto M (2020) Copyright literacy of LIS students in Portugal: Some results from a case study. *Qualitative and Quantitative Methods in Libraries* 9(3): 499–510. Available at: https://qqml-journal.net/index.php/qqml/article/view/659/594 (accessed 19 July 2024).

UNESCO. (2022). *International Forum on AI and Education: Ensuring AI as a Common Good to Transform Education, 7-8 December 2021; synthesis report*. UNESDOC Digital Library. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000381226

UNESCO (2023a) Education in the age of artificial intelligence. The UNESCO Courier. Available at: https://courier.unesco.org/en/articles/education-age-artificial-intelligence (accessed 21 November 2024).

UNESCO (2023b) International forum on AI and education: Steering AI to empower teachers and transform teaching. UNESCO Digital Library. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000386162 (accessed 21 November 2024).

Voulgari I, Stouraitis E, Camilleri V, et al. (2022) Artificial intelligence and machine learning education and literacy: Teacher training for primary and secondary education teachers. In: Xefteris S (ed.) *Handbook of Research on Integrating ICTs in STEAM Education*. IGI Global, pp.1–21. Available at: https://www.igi-global.com/chapter/artificial-intelligence-and-machine-learning-education-and-literacy/304839

Wood EA, Ange BL and Miller DD (2021) Are we ready to integrate artificial intelligence literacy into medical school curriculum: Students and faculty survey. *Journal of Medical Education and Curricular Development* 8: 23821205211024078.

Ziegler A, Stoeger H, Harder B, et al. (2014) Gender differences in mathematics and science: The role of the actiotope in determining individuals' achievements and confidence in their own abilities. *High Ability Studies* 25(1): 35–51.

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