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Looking Ahead: Incorporating AI in MLIS Competencies

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Abstract

Libraries have long been essential for democratizing knowledge and providing reliable information, extending their services to meet diverse community needs, including educational programs and internet access (Pawley, 2022; Freudenberger, 2022). Librarians, as custodians of information and culture, possess core competencies in information organization, digital literacy, and research skills. The San José State University (SJSU) School of Information (iSchool) aims to educate professionals who significantly impact global communities through high-quality education, research, and technology innovation. This article examines the Master of Library and Information Science (MLIS) program at SJSU iSchool, focusing on the evolution of its 14 core competencies to incorporate advancements in artificial intelligence (AI). As AI transforms educational curricula and administrative processes, updates are needed to include digital literacy, AI ethics, and data privacy, ensuring MLIS graduates are equipped to lead in an AI-integrated future. By aligning these competencies with the iSchool's strategic vision, the article provides suggestions for integrating AI into existing competencies and identifies potential new competencies to address emerging workplace needs effectively.

Keywords

Incorporating AI, MLIS competencies, Libraries, information access, democratizing knowledge, reliable information, community needs, educational programs, internet access, lifelong learning, community building, librarians, custodians of information, digital literacy, research skills, information organization, SJSU iSchool, education, research, technology innovation, information professions, MLIS program, core competencies, artificial intelligence, AI revolution, AI integration, digital literacy, AI ethics, data privacy, AI education, AI technologies, strategic vision, competency definitions, workplace needs

About Author

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Looking Ahead: Incorporating AI in MLIS Competencies

Libraries have long served as vital hubs for information access, democratizing knowledge and acting as gatekeepers of reliable, relevant information (Pawley, 2022). Libraries not only provide access to books, but they also cater to a wide range of community needs, from educational programs to internet access. Libraries are often community centers where individuals can engage in lifelong learning (Freudenberger, 2022), access otherwise inaccessible resources, and contribute to community building. The whole patron experience is directed by the librarians, who are custodians of information and culture, a role that encompasses a diverse set of skills and responsibilities. Their core competencies include information organization, digital literacy, and research skills, allowing librarians to manage collections and guide patrons in their information-seeking endeavors.

The SJSU iSchool is "a global leader in high quality education, research, technology innovation, and advocacy in the information professions" (SJSU School of Information, 2023), and one of its primary goals is to educate "professionals who impact the well-being of our global communities and expands the knowledge base of the information professions through research, innovation, and service." (SJSU School of Information, 2023).

The MLIS program has 14 competencies, each addressing a crucial skill required by the library and information science professionals to manage the complex world of information and its interplay with individuals or communities. In this article, we look at several of these core competencies taught in the Master of Library and Information Science (MLIS) program at San José State University (SJSU) School of Information (iSchool) and how these competencies need to adapt to and incorporate the rapid developments in artificial intelligence (AI). As we enter the era of the AI revolution, these competencies require thoughtful adaptation to remain relevant and effective. The integration of AI technologies into educational curricula and administrative processes presents new opportunities and challenges, necessitating updates to include digital literacy, AI ethics, and data privacy considerations.

In this report, we look at how the existing competencies align with the iSchool's strategic vision. We also look at how AI is and can be incorporated into these competencies, thus preparing MLIS graduates to lead in an AI-integrated future, enhancing their capability to serve diverse and evolving community needs. In the following sections, we analyze the current competency definitions and offer suggestions on how the existing competencies could incorporate aspects of AI education and use, and if new competencies are required to further address the workplace needs.

Competency A

Demonstrate awareness of the ethics, values, and foundational principles of one of the information professions, and discuss the importance of those principles within that profession.

Current offerings in the iSchool around ethics focus heavily on the values of service, privacy, and intellectual freedom. Understanding that the goals of librarianship involve the expansion of access to information, while protecting users' rights to their own information remaining private and confidential, and upholding ideals of service both to the user and the industry through the continual growth of our own knowledge, is so fundamental to the profession that it is built into the earliest required courses for the program. The application of the values and principles of the information professions is a nuanced area of study that requires a deep commitment to the ethical responsibilities of the profession.

Incorporating AI

As more LIS professionals will be using AI for decision-making, they need an education in data privacy, algorithmic bias, and ethical data usage. AI technologies relevant to this competency include:

- Explainable AI (XAI): As AI systems are employed for tasks such as user data analysis and personalized content delivery, XAI can be incorporated to make AI decisions transparent and understandable to users and professionals alike (Gunning et al., 2019).
- Bias Detection Algorithms: Training on how to use and implement algorithms that can detect and mitigate biases in AI applications is crucial. This includes understanding different types of biases (e.g., selection bias, algorithmic bias) and the techniques for reducing their impact in AI systems used in libraries, including fairness-aware programming and diverse data training sets (Bellamy et al., 2018).

As AI technologies advance, the competency should cover ethical considerations in using AI (data collection, processing, and sharing) and policy development for AI governance. This might involve setting up guidelines for data privacy, AI interaction protocols, and regular audits of AI systems to ensure they comply with ethical standards (Jobin et al., 2019).

Competency B

Describe and compare different organizational settings in which information professionals practice.

The broad variety of information settings in which information professionals practice is often surprising to those outside the industry: from public and academic settings, to medical and legal libraries, to corporate libraries, to the vast array of archives and record-keeping institutions, and now data science, there is no shortage of options for students to explore. That students are able to specialize as much or as little as they would like during their time in the iSchool is one of the greatest strengths of the program and allows the student to gain a broad perspective on the policies, practices, and structure of information organizations.

Incorporating AI

To integrate AI into this competency effectively, students should learn about AI solutions customized to and implemented across the specific needs and characteristics of different organizational settings. For instance, AI-driven chatbots could be deployed in academic libraries to assist with research inquiries, while in public libraries, they might focus more on community events and book recommendations (Kamble, 2020). Natural language processing (NLP) and machine learning (ML) can automate routine tasks such as data entry, cataloging, and user query handling, allowing staff to focus on more complex service areas. AI could also be employed to optimize resource allocation within various settings. For example, predictive analytics could forecast user demand and help libraries adjust their staffing levels, open hours, and resource purchases accordingly.

Competency C

Articulate the importance of designing programs and services supportive of diversity,

inclusion, and equity for clientele and employees.

Addressing systemic injustices and individual biases in order to support marginalized and underserved populations with information services is a cornerstone of the information professions, so much so that it is now written into the code of ethics for most of the major professional associations that support the field. Understanding service communities and co-creating programming that is culturally competent, accessible, and inclusive forms the basis of many of the courses in LIS education, even those which, at first glance, seem to be about another topic entirely, because as service areas continue to diversify, so too does the need for such training.

Incorporating AI

LIS Professionals need training on AI technologies that improve accessibility, such as text-to-speech systems, language translation services, and visual recognition technologies that can help visually impaired users navigate digital and physical library spaces (Hersh & Johnson, 2018). While machine learning (ML) models can analyze user interaction data to identify patterns of exclusion or bias, prompting corrective actions to ensure equity, such ML models could be biased themselves (Friedman & Nissenbaum, 1996). LIS education should equip professionals with the skills to monitor and report biases in library services or resources, such as knowledge of the ML algorithms and training data, and bias detection approaches (Bellamy et al., 2018).

Competency D

Apply the fundamental principles of planning, management, marketing, and advocacy.

An understanding of the needs of both internal and external stakeholders in an information environment to utilize the available tools through effective management of resources, staff, budget, and marketing in order to strategically attract users and funding and lead in an effective way is built upon the basic competencies of professional, ethical values and collaboration. Coursework for LIS Professionals in these areas currently stresses the importance of strategic development for policy and planning, while ensuring inclusive and ethical results.

Incorporating AI

LIS education should focus on how AI can enhance planning, management, marketing, and advocacy efforts in libraries. Predictive analytics can help in strategic planning, from daily operations to long-term planning. This can help in planning new services, forecasting library usage and user needs trends, adjusting resource allocations, and even in strategic expansions or contractions of service areas. LIS Professionals also need to learn how to implement tools that automate and personalize marketing efforts. For instance, machine learning algorithms can analyze user behavior and preferences to craft personalized email marketing campaigns or social media content, thus enhancing user engagement (Ngai et al., 2009).

Competency E

Design, query, and evaluate information retrieval systems.

LIS students currently learn to use a variety of Information Retrieval systems (IRs), from search engines to full-text databases, while engaging in their LIS education, but generally learn to do so in the context of becoming the professional intermediary between the user and the information. Many current IRs still come with a steep learning curve for many users, and are often designed with fullness of information, rather than user experience, in mind, leading to results that can be difficult to parse for even experienced users. Building their own broad understanding of these systems, from designing to evaluating IRs, allows information professionals to stand in that research gap for their user bases.

Incorporating AI

Students should learn to use machine learning for search. Techniques like supervised and unsupervised learning can be applied to refine search results based on user behavior and feedback, enhancing the relevancy and precision of search outputs (Manning et al., 2008). Retrieval Augmented Generation (RAG) augments user prompts with relevant documents retrieved from a database (Lewis et al., 2020). Conversational AI uses natural language processing (NLP) to develop systems that understand and process user queries in natural language. This includes the development of chatbots and virtual assistants that can handle complex queries, provide recommendations, and assist in navigation through large databases or digital collections. Such search agents could also be personalized to adapt to user preferences and historical interactions (McTear et al., 2016).

Competency F

Use the basic concepts and principles related to the selection, evaluation, organization, and preservation of physical and digital information items.

LIS education around collection management stresses the importance of understanding the user base and effectively evaluating their needs as criteria for selecting or deselecting items for an institution's collection. These principles of collection management, while in the infancy of automation, are still largely practiced manually via the creation of policies, selection criteria, and the painstaking checklisting of materials in the auditing process, including in archives where the preservation of materials relies on the careful monitoring of environmental factors for both physical and digital information.

Incorporating AI

One of the greatest advantages of using AI or ML systems is their ability to find underlying patterns in large volumes of data, with or without human supervision. AI can be used for collection management by analyzing usage data and user feedback to assist in selecting and evaluating both physical and digital collections. AI can also identify trends in resource usage and suggest additions or decommissions to optimize the collection. For digital assets, we can use AI to predict and mitigate data degradation and automate the migration of physical to digital formats. AI-powered climate control systems could monitor environmental conditions in real-time and adjust climate controls automatically to optimize preservation conditions (Shao et al., 2023).

Competency G

Demonstrate understanding of basic principles and standards involved in organizing information such as classification and controlled vocabulary systems, cataloging systems, metadata schemas or other systems for making information accessible to a particular clientele.

The organization and accessibility of the items in our collections are equally important to what items we choose to offer in our collection, as if the user is unable to locate the materials, those materials will be of little to no use. Accurate and controlled application of systems and schema according to consistent standards for maintaining an organized information structure is the gateway to providing comprehensive user access in the information environment, and everything from the most basic of cataloging courses to those on the intricacies of classification systems prepare LIS professionals for this process.

Incorporating AI

AI technologies can facilitate how information is organized within libraries. Supervised, unsupervised, and self-supervised machine learning algorithms can be used to automatically classify and catalog new acquisitions, thereby reducing manual workload, though maybe at the cost of some accuracy. However, it could act as an essential triaging step for human inspection. On the other hand, natural language processing techniques can extract key information from texts or images (Chowdhury, 2020) to provide descriptive metadata for digital materials.

Competency H

Demonstrate proficiency in identifying, using, and evaluating current and emerging information and communication technologies.

Libraries have typically been slow to adapt to new technological developments, though that has generally been due to issues of budget and bureaucracy, as information professionals are often early adopters of new technologies. This is hardly surprising in a field defined in part by curiosity about information and organization. In the rapidly evolving landscape of information and communication technologies (ICT), so too is the landscape of LIS education rapidly evolving to make room for coursework to assist upcoming information professionals in their proficiency around these technologies.

Incorporating AI

For libraries, staying abreast of technological advancements is critical to adapting services and improving access to information. The future of this competency should focus on the deeper integration of AI into library ICT systems and the adaptation to new technological trends. For example, conversational chatbots and virtual assistants can be integrated into libraries and library websites to interact with users in real time, providing assistance, answering user queries, and guiding users through digital resources (Rubin et al., 2010). Other applications could include integration of the Internet of Things (IoT) with AI in libraries, where sensors and smart devices collect data that AI systems will analyze to improve library management, security, and user services. Similarly, blockchains can be combined with AI to enhance the security and integrity of

digital transactions and records within libraries (Omame & Alex-Nmecha, 2021). This could be particularly useful in managing copyrights, access rights, and digital archives.

Competency J

Describe the fundamental concepts of information-seeking behaviors and how they should be considered when connecting individuals or groups with accurate, relevant and appropriate information.

LIS professionals assess the information-seeking behavior of groups and individuals as they search for relevant and meaningful information in their environment, and education around these topics centers on the importance of being sensitive to the ongoing needs and behaviors of these individuals and groups as they present in order to connect them with appropriate and accessible results. Understanding user groups, their motivations, and their patterns of behavior allows information professionals to design appropriate programs and services and make informed collection decisions for their service areas.

Incorporating AI

As the nature and source of information have changed, we have to revisit and reimagine the fundamental theories about information-seeking and information-using behaviors. AI can help with analyzing user behaviors and adapting and improving services based on such analysis. Machine learning models can process large datasets (borrowing history, services used, search queries, past interests) to identify patterns, preferences, and pain points of users. As a result, libraries can make better data-driven decisions, more customized recommendations, and show a better understanding of user intent (Case & Given, 2016).

Competency K

Design collaborative/individual learning experiences based on learning principles and theories.

Even in collaborative learning experiences, learning and engaging with the learners can often be a deeply individual experience due to the unique and intersectional accessibility needs of the students involved. In order to design accessible and transparent instructional content for the information environment, flexibility and an understanding of user group needs that is built into LIS core curricula is required, alongside the in-depth practical assessment of the theories and practices of instructional design so as to effectively engage with learners of all ability levels.

Incorporating AI

Similar to its impact on other domains, AI has transformed the way we design and deliver education. Searching as learning has previously looked into how search leads to the acquisition and modification of knowledge structures, as is observed during formal learning environments (Ghosh et al., 2018). Learners often have different learning styles and needs, which traditional learning approaches seldom consider. By using AI to adjust the content, pace, and complexity based on the learner's progress and performance, we can provide personalized learning paths, making educational offerings more flexible and engaging. Similarly, AI can be used to analyze

learning outcomes and behaviors and identify strengths, weaknesses, threats, and opportunities for learners (Ghosh et al., 2023). This can help in understanding the effectiveness of different educational programs and in optimizing them based on data-driven insights. The next step would be to integrate AI with VR and AR to create immersive learning experiences. We could also explore learning assistants who interactively converse with learners, answer questions, guide research, and provide feedback, much like a tutor (Woolf, 2010).

Competency L

Demonstrate understanding of quantitative and qualitative research methods, the ability to design a research project, and the ability to evaluate and synthesize research literature.

LIS professionals regularly conduct research in the course of their duties, and designing research for meaningful results can be a challenging prospect. Deciding among qualitative, quantitative, or mixed methodologies for the study design can add to that challenge, particularly when the information professions tend to easily straddle the line between the need for numerical data and the social sciences' need for more experiential data. Preparing for this process through learning to evaluate research literature and structures guides the information professional not just in the performance of original research, but in the assessment of research for reference programs, and in the evaluation of programs, services, and materials collections in their organization.

Incorporating AI

Research methods are crucial across all scientific disciplines, allowing researchers to systematically collect, analyze, and interpret data to understand, explain, and predict phenomena. When discussing research methods, we predominantly discuss quantitative, qualitative, and mixed methods. Until now, computational methods like machine learning, natural language processing, and artificial intelligence have been clubbed under quantitative methods because of the prevalence of mathematics and statistics in AI-based approaches. However, as AI is applied across diverse fields, we need to reevaluate the importance of establishing AI or applied AI as a method itself. LIS professionals can use AI to collect data from their clients using web, android, or iOS applications. AI techniques like zero- and few-shot learning make it easy to annotate, process, and analyze the data without minimal training data (Brown et al., 2020). With recent developments, generative AI can speed up the research process – particularly literature review and proofreading – by recommending articles, summarizing texts, and correcting grammatical errors. In the near future, AI could act as reliable research assistants who can streamline research by designing research projects, identifying research gaps, and suggesting methodologies. Machine learning can also help analyze large datasets, helping researchers, practitioners, and professionals uncover insights about clients, products, and services. Overall, AI as a research method will automate the steps of research and enhance research capabilities and productivity.

Competency M

Demonstrate professional leadership and communication skills

Professional leadership encompasses a range of skills, including the basic values of respect and collaboration with a team, as well as a drive to educate with compassion and build trust within

the organization. These skills are broadly transferable to any environment, and are specifically important to the information profession, where diversity is key, and privacy and ethics are of utmost importance because of the sensitive nature of the information we are often exposed to. An ethical, collaborative leader paves the way for an ethical, collaborative organization.

Incorporating AI

Good leaders make great decisions! AI can be used by leadership to set up decision-support systems. Such systems use massive data for analysis and decision, which is beyond the capabilities of the human brain. LIS professionals should be educated on AI-driven analytics tools that can analyze user data, service usage, and employee performance to help leaders make informed decisions[1](Davenport, 2018). Similarly, AI tools can enhance communication, through automated translation services that help communicate with non-English speaking users, multimodal assistants that could make communication more accessible, and customized, sentiment-aware agents who could make client or user interactions more in line with human principles (Ghosh, 2023). AI could also help in tailoring messages from the library to fit the context and interests of each segment of the community, enhancing engagement and response rates.

Competency N

Evaluate programs and services using measurable criteria

The ability to effectively evaluate a program requires evaluating not just its impact on the service community, but on organizational factors such as budget, staff outlook, and overall usability to determine the feasibility and growth potential for the program and organization. Understanding the user groups in the service area and being able to balance their needs against the operational outlook of the organization is a vital part of successfully managing an information organization, and LIS education on programming and services guides this understanding with discussions of measures and metrics and how they can guide these decisions.

Incorporating AI

The applications of AI do not end with application development and predictive analytics. They can significantly enhance the evaluation of library programs and services by providing sophisticated tools for data collection, analysis, and performance measurement. Machine learning algorithms can analyze user feedback, service usage patterns, and other evaluation metrics. Using natural language processing and adaptive machine learning with limited training data, it is also possible to process user interview transcripts and essays for subjective evaluation metrics following the mission, vision, and policies of organizations (Hirschberg & Manning, 2015). For example, such techniques can help interpret open-ended survey responses, categorize feedback, and even measure sentiment, providing insights into user satisfaction and grievances. By using AI-based evaluation methods, information professionals can anticipate the needs of their clients quicker and adapt services proactively, ensuring that libraries continue to meet the evolving needs of the communities.

[1] It should be noted that current automated systems are often biased, and therefore, knowledge and awareness of AI ethics are crucial when using AI-supported decision-making.

Competency O

Understand global perspectives on effective information practices that are supportive of cultural, economic, educational, or social well-being.

The interconnectedness of information communities is currently expanding at a greater rate than ever before with social media and expanded ICT. Large numbers of people migrating both by choice and not to new homes in new parts of the world means that significant numbers of people are having to maintain connections across continental and cultural boundaries. Understanding the societal and personal impacts of changes in global communities on information communities allows information professionals to better serve not just those in their direct service areas, but also to render appropriate web-based service across great distances.

Incorporating AI

AI tools have the potential to positively impact information practices globally. LIS professionals need to be aware of the AI systems that allow for language translation, language generation, automated captioning, and visual question answering (answering questions on images). With developments in generative AI, it is also important to know how prompts can be designed to generate videos, images, audio, dialogues, and even computer codes. Awareness of such tools and technologies will allow LIS professionals to offer materials and communication in multiple languages, which is essential to ensuring accessibility and serving diverse audiences more inclusively. Using the multimodal and multilingual capabilities of AI, it is also possible to analyze global data sets to identify cultural trends and preferences, and then develop culturally relevant services and collections. AI tools can also help in processing global news, adding context for audiences, and aggregating them from multiple sources to ensure reliability (Hovy & Spruit, 2016).

Future Directions

Finally, it is not sufficient to look at how the existing competencies could benefit from AI integration. As this is the case, we will also recommend new competencies that could tackle some of the challenges emerging from a highly digitized and AI-driven world. Table 1 elaborates on the new competencies and how they address the latest developments in AI.

New Competency Area	Description
Understanding and Implementing Privacy and Data Protection	Privacy and data protection are fundamental concerns for libraries, which are trusted by the public to handle personal and sensitive information responsibly. This competency should involve understanding the legal and ethical implications of data handling (with and without AI), implementing strong data protection measures, and educating users about their privacy rights. It will also include looking into privacy-enhancing technologies (PETs) that use AI to minimize the exposure of personal data while working with

	sensitive data. This approach can involve techniques like differential privacy, which adds randomness to datasets to prevent identification of individuals while preserving the usefulness of the data for analysis (Dwork & Roth, 2014). Mastering this competency will be critical to maintaining user trust and compliance with various data protection laws.
Digital Literacy and Technology Integration	As digital tools and resources become increasingly integral to library services, librarians must be proficient not just in using technology, but in integrating digital tools into library operations. Awareness of this competency will include the ability to evaluate and adopt new technologies that enhance user engagement, library operations, and service delivery. Teaching digital literacy skills to library users will empower users to navigate and utilize digital resources safely and effectively.
Responsible Data Science and Analytics	Students will need to apply data science to analyze library data, helping to inform decision-making and service improvements. They should also demonstrate proficiency in using data visualization tools to effectively communicate data insights to various stakeholders. With new AI developments, students will need to compare and contrast different AI models, and evaluate them critically, assessing their ethical implications and suitability for addressing specific library challenges. Students should possess an understanding of privacy concerns, bias mitigation, and transparency in AI applications (D'Ignazio & Klein, 2020).
Sustainability Practices	AI technologies, especially those involving large data centers and complex algorithms like deep learning, require significant computational power. This can lead to high energy consumption, which is problematic if the energy is sourced from non-renewable resources. The operation of these technologies at scale contributes to carbon emissions and has a substantial environmental footprint. Mastering this competency will require students to demonstrate knowledge and implementation of sustainable practices within the library, aiming to minimize environmental impact while maintaining service quality. They can use AI to analyze energy and resource usage patterns in the library. For example, smart systems can automatically adjust lighting and climate controls based on real-time occupancy and environmental data. However, considering the threat AI poses to sustainability, LIS professionals should learn about the energy demands of large-scale AI systems and the environmental cost of training

	complex models. They should also learn about 'green' and open-source AI models that are more energy and resource-efficient and require less computational power (Strubell et al., 2019). Open-source models reduce the need for redundant model training.
Crisis Management and Resilience Planning	As libraries and their communities face increasing risks from natural disasters, cyber threats, and other emergencies, the need for effective crisis management and resilience planning becomes paramount. This competency will involve preparing libraries to respond to crises, ensuring the continuity of essential services, and recovering from disruptions with minimal impact. AI should be incorporated into this competency to allow for risk assessment and response planning. For example, AI could identify potential threats specific to their locations and operations, such as natural disasters, pandemics, or technological failures. AI technologies can also improve early warning systems (crisis prevention) and initiate emergency protocols automatically, such as data backups or communication with authorities (Gupta et al., 2022).

Table 1. Competency Areas and AI Integration

Conclusion

Many of the current strengths of the iSchool lie in its flexible programming and ability to pivot with ongoing changes in the information industry. Strategic goals around continued growth for both students and staff, as well as a commitment to preparing "students for fulfilling, impactful, and successful careers" with "an interdisciplinary, competency-based curriculum offering programs that foster critical thinking, the development of core professional skills, and cross-domain knowledge" provide a framework upon which to build and rebuild the competencies and curricula according to rapidly-changing, AI-integrated technological landscape of the information profession (SJSU School of Information, 2023). While LIS professionals may have their personal feelings about the use of AI, they will also have a professional responsibility to understand the ethical implications around its use, as well as be required to make informed decisions around its increasing use in professional settings, both as an information management tool and as generative AI is used with more frequency. The iSchool can and should take this opportunity to incorporate the fundamentals of AI into their teaching of the fundamentals of the information profession in order to strategically position the next generation of information professionals as fully informed AI decision-makers.

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