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6 The Implications for Use of Artificial Intelligence in Libraries and Education: An Introductory Overview

Introduction

Artificial Intelligence (AI) is not solely about technologies, standards and practical applications, though these topics are of great interest and rightly make up much of this book. This section explores some of the wider issues that shape library responses to the opportunities created by the current wave of AI. The issues and the influences on them operate at different levels, including national, organisational, institutional and individual levels and relate to policy and strategic areas. There is an overarching concern with AI ethics.

National Policies and Strategies for Artificial Intelligence

Library use of AI occurs in the context of government policy and existing and emerging legal frameworks. Since around 2019, many countries have recognised AI as a strategic priority. National policies are varied, but according to an analysis by Papyshev and Yarime (2023), some strong common themes emerge, including the need to:

- Develop human capital
- Apply AI ethically
- Develop a research base
- Regulate, and
- Develop data infrastructure and policy.

One can immediately understand the importance of information professionals playing some role in realising many of these priorities, such as by educating citizens in the skills for an AI literate society; by advocating for their unique perspective on the ethics of AI; by supporting researchers to develop the research base for AI; and by inputting on the design and use of appropriate data infrastructures. If AI

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is a national priority, it seems that libraries have a significant role to play alongside other actors.

While there are common themes across national policies, the emphasis in individual policies varies. Papyshev and Yarime (2023) suggest that the approaches taken fall into three groups, focusing on:

- Development, where the state steers development of AI towards national goals. This kind of policy is found in China and Japan, and in Russia and some of the former communist bloc in Eastern Europe
- Control, where the focus is on state regulation and protecting society from the risks of AI. It is the approach taken by countries in the European Union (EU), for example and
- Promotion, where the emphasis is on innovation, especially led by the private sector, and the state plays only a facilitating role. Promotion is the emphasis in the United States, United Kingdom, and other countries including Australia, Ireland and India.

The three categories seem to reflect persistent patterns related to the political culture in these different countries and one would expect to see them similarly reflected in the way that libraries approach AI too.

It can be speculated that there has been a shift towards regulation internationally because of the controversy around ChatGPT. Existing legal frameworks are also still relevant, such as that for the protection of intellectual property rights. Generative AI has been pushing the boundaries of intellectual property. There is an emerging appetite for regulation beyond the EU. This could have radical implications for how AI is developed and used in the library sector.

Institutional Strategy

The wider strategies of the institutions in which libraries are embedded, such as academic libraries within universities, are of direct relevance to the implementation of AI in libraries. Several studies seem to show limited mentions of AI in university strategies (Huang, A.M. Cox, and J. Cox 2023; Wheatley and Hervieux 2019), but there may be hooks in institutional strategies that can help libraries proactively sell the benefits of AI to their institutions, for example, around research excellence and student experience (Cox 2023).

But rather than expecting AI to be mentioned specifically in institutional strategies, arguably it could be seen as simply the latest strand in technological triggers

for digital transformation. If so, it would follow that adoption of AI is likely to be linked to the wider commitments around digital transformation.

> Digital transformation is the profound and accelerating transformation of business activities, processes, competencies, and models to fully leverage the changes and opportunities brought by digital technologies and their impact across society in a strategic and prioritized way (Demirkan, Spohrer and Welser 2016, 14).

The proposition here is that social + mobile + analytics + cloud + Internet of Things (SMACIT) technologies initiate and make possible organisational changes in a way quite unlike the IT driven changes within organisations which have been seen in the past. Digital transformation is not solely about implementing a new technology. SMACIT technologies are generative, malleable and with impacts beyond "automation" of existing processes. Integrating SMACIT into organisational life is about reinventing what organisations do. Critically they are being used not just within organisation but have widespread usage in society. This creates the need for more customer driven strategies. Digital transformation potentially creates new business models, and even new industries, and it happens in stages. AI is very much this kind of technology. For Educause, digital transformation is

> ...a series of deep and coordinated culture, workforce, and technology shifts that enable new educational and operating models and transform an institution's business model, strategic directions, and value proposition (Brown, Reinitz, and Wetzel 2020).

From a strategic perspective, it is important to think about how AI technologies and their implementation interact with other technologies such as SMACIT and augmented or virtual reality in reinventing what libraries and the institutions they serve do.

Organisational Capability

Moving from organisational strategy to capacity requires consideration of whether libraries have the ability to develop and implement AI solutions. This is partly about competencies that library staff need to develop and competencies are often the focus. But using AI effectively makes wider demands on libraries' financial and more intangible resources. Collectively these resources could be called AI capability: the ability of an organisation "to select, orchestrate, and leverage its AI-specific resources" (Mikalef and Gupta 2021, 2).

A convincing model of organisational capability for AI has been developed by Mikalef and Gupta (2021). Rooted in the resource-based theory of the firm their

approach differentiates three types of resource that make up AI capability: Tangible resources, human resources and intangible resources (Table 6.1).

Table 6.1: Resources Required for AI Capability (Adapted from Mikalef and Gupta 2021)

Tangible resources
Data
Technology
Basic resources
Human resources
Technical skills
Business skills
Intangible resources
Inter-departmental coordination
Organisational change capacity
Risk proclivity

Tangible resources comprise not only data resources including user data and collection data and a suitable technical infrastructure, but also access to basic resources such as money and time to invest in AI. Many libraries do have data in the form of both collections and user data. They may also have access to the necessary technical infrastructure to support AI. Funding is always a challenge, but the exciting potential of AI may make it possible to construct a business case to obtain funding.

Human resources combine both the technical skills to develop AI applications, and, equally importantly, the business skills to plan and deliver AI projects and implement AI as a service. Libraries may well have significant technical skills in their teams. They are used to delivering on technical projects, which experimenting with AI involves. Given the changing technical landscape of the last few decades, there is a huge amount of experience in libraries in implementing and promoting new systems. It is increasingly recognised that AI should be developed in participatory ways with stakeholders, which is very much in tune with previous developments within libraries.

Mikalef and Gupta's (2021) intangible resources include the ability to coordinate activities between departments, the ability to manage organisational change, and the willingness to take risks, all of which might be regarded as leadership challenges. Delivering them may also imply structural reorganisation. Again, libraries frequently have the capabilities required, especially in terms of coordination. So much organisational change has happened in libraries in the last few years, that the ability to adapt with agility has increased. Risk-taking may require further organisational change.

Mikalef and Gupta's (2021) model can be used as a framework to evaluate whether a library and its host organisation) have the capacity or the readiness to develop and implement AI systems, especially descriptive AI. Readiness is likely to vary across library sectors. A strengths, weaknesses, opportunities and threats (SWOT) analysis for academic libraries can be found in Cox (2023). National libraries, and some research libraries, have a proven track record of development in descriptive AI, as chapters in this book show. Critically they have vast bodies of collection data that need advanced techniques to enable improved access. Given the benefits, libraries may be able to obtain the funds to support such projects. Libraries and librarians can develop technical skills through proof of concept projects and acquire the business skills through turning projects to services.

The case is less clear for smaller, less resourced libraries, particularly if they do not have unique collections requiring special treatment. Smaller libraries are more likely to buy in systems. Licensing systems does not diminish the possibilities of using descriptive AI, but smaller libraries are more likely to make successful implementations of AI through collaboration. There might need to be longer term processes of capacity building through staff training and proof of concept projects. Defining the AI capabilities and competencies needed for the wide range of institutions in the library sector is an important but complex task.

Artificial Intelligence Literacy and Competencies

Returning to the question of technical skills, it may be useful to say something about what knowledge and skills are relevant to applying AI in the library context, from the policy and organisational level to what skills and knowledge are needed at the level of the individual professional.

Given the range of AI applications relevant to libraries, from descriptive AI used to improve access to collections through chatbots to the improvement of backend systems, it may not be possible to come to a general conclusion about what AI competencies are needed. But there is a starting point in definitions of AI literacy, " a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace" (Long and Magerko 2020, 2). The extended definition implies knowing:

– What AI is, the ability to recognise AI when it is encountered and understand distinctions between general and narrow AI

- What AI can do, the skill of differentiating the tasks AI is good at doing from those it is not good at, and imagining future uses, reflecting the evolving nature of AI
- How AI works, including how computers represent the world in models, with an emphasis on data literacy
- How AI should be used, emphasising ethical considerations, and
- How people perceive AI.

Long and Magerko's approach defines general knowledge about AI needed by every citizen and therefore what all librarians involved in AI literacy training need to know, not least if they are seeking to train users in AI literacy. Applying AI to library services requires deeper knowledge. For example, to use AI in describing library collections, the technical requirements would involve knowledge of:

- Collections as data (Padila et al. 2023)
- Relevant algorithms, and
- Ethics and governance.

Lee (2022) summarizes key points to form a generic guideline of key questions that need to be answered to develop an AI project around a collection. Other types of AI application less collection-centric would require a different skill set. There is a need for more work around defining relevant competencies for AI literacy. What does emerge is that since AI today is data driven, high level data skills are necessary, and the pre-existing knowledge and competencies of librarians and information professionals are of immense value, including knowledge of library-specific data for library projects or contributions to data governance and stewardship in wider institutional applications of AI. All of the following aspects of data use and governance might be areas where librarians can contribute:

- Skills in finding data in a complex information landscape
- Advocacy for the value of sharing, openness and interoperability, but along with awareness of the legitimate reasons for protecting confidentiality and privacy
- Knowledge of the copyright and licensing requirements for the appropriate uses of data
- Awareness of the provenance, validity and quality of data relevant to its use
- Knowledge of how to attach descriptions (metadata) to data, and a commitment to metadata standards
- Development of criteria for selection of tools for undertaking data analysis, and
- Approaches to the storage, preservation, or destruction, of data.

Of particular importance are the issues around provenance and validity. Knowing the origins of any data, such as the creator and the purpose, helps understand how it can be used, and the limits on its interpretation. Validity is about whether the data measures what is cared about. It is always a danger that AI is applied to data without understanding the limits of the data available, arising from how it was created. For data-driven AI, the value of the data-related skills of librarians has great importance. Librarians' focus on understanding user needs is another area where the knowledge of information professionals is highly relevant to AI projects.

The Ethics of Artificial Intelligence

AI promises so much and has great potential in many domains. AI can help clinicians identify patients at risk through scanning and analysis of health data; provide people with disabilities with a voice assistant and improve customer service through 24/7 chatbots. It has the ability to automate routine tasks. AI also offers to support the prime objectives of the library profession in supporting the creation of knowledge through new research methods, the promotion of better and more equitable access to knowledge, the improvement of descriptions of different types of material, as well as through techniques such as translation, transcription, summarisation, and recommendation.

The potential benefits of AI are immense. Yet its emergence and adoption are surrounded by considerable controversy, particularly because it is being developed by the dominant powerful Big Tech companies for commercial ends, and with deep societal and geopolitical implications. As already noted, national policies frequently mention ethics and the need for responsible and trustworthy AI.

Thus, one important dimension of AI are issues of ethics, thinking about how to ensure long-term benefits to society and minimise the risks. Long and Magerko list eight ethical issues:

- Privacy
- Employment
- Misinformation
- The singularity
- Ethical decision making
- Diversity
- Bias, and
- Transparency and accountability (Long and Magerko 2020).

The singularity, the idea that at some point AI gets out of control in an irreversible way, is perhaps not of immediate concern; the current era involves narrow AI with systems designed to perform a specific task or a set of closely related tasks. But the other issues listed are all genuine areas of concern and require potential response and action. The issues highlighted are ones where the library world has always had a strong stance, enshrined in ethics and values statements, like those issued by IFLA. The library and information profession has an important role to play in speaking out about the ethical risks of AI, which are often a secondary consideration for Big Tech. Ensuring that the risks and issues are addressed is inherent to any AI project. It is not a separate consideration, but embedded and ongoing from the design of the project through into the future, as AI systems are implemented and maintained.

Promoting AI literacy in society is an important task for libraries including enabling citizens and workers to understand how to protect their privacy, and their employment. Complementing this, there could be a role for information professionals in ensuring that AI is less opaque(Ridley and Pawlick-Potts 2021).

Bias in AI is of particular importance. Algorithms trained on biased data will produce biased outcomes. There are many cases where AI tools have shown gross and discriminatory bias (AIAAIC 2023). For example, a request for generative AI to produce an image of a doctor will probably produce an image of a white man. Of course, library collections themselves are not unbiased. Work over the last few years on the decolonisation of library collections has alerted the profession to such biases in library collections. What the library and information profession has learned about resolving bias in collections can be applied to reducing bias in AI. The impact of bias in AI is critical, especially where AI operates autonomously in decision making. And the issue of bias in AI is not accidental. At the root of the problem are structural issues. The core AI workforce remains predominately white and male (Collett, Neff and Gomes 2022). Barriers for women and people from ethnic minorities or disabilities to enter work in computing and engineering are well known and has been a problem from the early days of computing. Librarianship with its strong value propositions around issues such as bias and a female majority profession may be in a position to help address such structural issues. Experiences in seeking to diversify the library and information profession further may be helpful in developing approaches to equality, diversity and inclusion in AI.

The wider societal impacts of AI are not mentioned directly by Long and Magerko (2020) in their list of ethical issues, but everyone in the profession should be concerned about the impact on social equity of an AI industry driven primarily by commercial motives. Exemplary AI projects led by libraries will not only reap the benefits of implementing AI but also demonstrate that a deep concern for ethics is one-way libraries can promote responsible AI.

Conclusion

This section of the book in exploring the wider issues of AI in libraries opens with a chapter by Fiona Bradley on the policy context. She addresses the issues and concerns in ensuring that AI applications are deployed for successful and safe use by the community and outlines progress in several parts of the world on developing such policies. Josette Riep and Annu Prabhakar report on a pilot study conducted to assess potential bias when leveraging AIML in recruitment and retention of students in higher education in the US. There have been consistent reports on race and equity issues in American education and ongoing persistent and painful gaps in educational outcomes (Collins 2021). Leveraging AIML in higher education opens up great benefits for measuring and impacting equality in education. Raymond Uzwyshyn focuses on building AI skills and infrastructure with particular reference to research data repositories and digital scholarly ecosystems and provides a list of educational resources which can be used to construct expertise for both library staff and researchers within the community. Neli Tshabalala describes a project involving the implementation of a robotic solution at the North-West University in South Africa which reviewed the potential of available AI applications and tracked their progress. Andrew Cox concludes the section with reflections on the value of ethics scenarios in clarifying the myriad of ethical issues faced by library and information professionals in implementing and using AI applications in their libraries and ensuring that users understand the limitations of new services like ChatGPT.

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