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ARTIFICIAL INTELLIGENCE IN UNIVERSITY LIBRARIES: TECHNICAL, ETHICAL AND EPISTEMOLOGICAL CHALLENGES IN THE CONTEXT OF MOLDOVA

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Abstract: Using artificial intelligence (AI) in university libraries creates new opportunities, but also brings many challenges that must be carefully looked at. This article looks at the technical, ethical and knowledge-related parts of this process, showing both the new possibilities of AI and its limits. When we talk about integrating smart technologies, we need to consider the hardware and software that supports them, how they can work together, and the quality of the information they use.
The article talks about the risks of bias caused by algorithms, how personal data is protected and how information is chosen. These problems need clear rules to make sure users can trust the system. The text looks at how people know things and the challenges they face. AI is changing the way we understand knowledge and information, which means we need to improve our skills in finding and understanding information, and we also need to keep on learning. Librarians help people to use digital tools in the right way. Through hands-on workshops, online tutorials, and training sessions, libraries can support users in understanding the working principles of algorithms and maintaining their intellectual autonomy. The conclusions say that AI should not be seen as a replacement for human judgment. Instead, it should be seen as a useful tool for research and education. But this must be done in a way that follows strong ethical rules and is supported by the right institutions. So, university libraries can turn these problems into chances to make their role in the knowledge society stronger.
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JEL Classification: D83, L86, O33, Z11, Z18

1 Introduction

Digital transformations are no longer just a trend; they have become an essential part of how university libraries are changing, and they are changing the way we access information and organise collections. New technologies have opened up ways to explore different resources, made cataloguing processes much quicker, and made it easier to manage documentary funds. In this context, artificial intelligence (AI) is a promising area of modernisation. It offers tools such as personalised recommendations, intelligent search and automated data processing.

The Republic of Moldova has been interested in information technology since the 1990s. It created a ministry for information technology and telecommunications and has been developing digital infrastructure ever since. The internet was introduced to schools, and electronic services for citizens and institutions were set up. This was the start of the digitisation of administration and education. This way of thinking has become stronger over time. This has happened because of

policies and important documents like the White Paper on Data Governance (White Book, 2024), the Digital Transformation Strategy 2023-2030 (Strategia de Transformare Digitală, 2023), and the Government's Activity Programme for the period 2021–2025 (Programul de activitate al Guvernului, 2025), which contains sections dedicated to digital transformation and harnessing emerging technologies, including artificial intelligence. As stated in the Digital Transformation Strategy 2023–2030, "The digital transformation of the Republic of Moldova is a national priority, aimed at modernizing public services, strengthening digital skills and stimulating innovation."

At the moment, there are only a few discussions about using AI in university libraries in Moldova. This means that we have the chance to explore and understand better how smart technologies can be used. We are just starting to look at the technology, the skills librarians need, and how to use AI. This makes a good time to talk about technical, ethical and knowledge issues.

This article looks at these challenges in a joined-up way. We'll be talking about a bunch of topics, like technical issues with infrastructure, systems, and databases, as well as ethical dilemmas around data protection, responsibility for automated decisions, and the risks of information bias. We'll also be chatting about how AI affects the validation and use of knowledge, the role of the librarian as an information mediator, and the development of users' digital skills.

The article hopes to show what the local situation is now and how AI could be used in Moldovan university libraries in the future in a responsible and efficient way. This would help staff who specialise in this area and the people who work in universities.

2 Technical challenges

The introduction of AI in university libraries is difficult, even more so in the Republic of Moldova, where the digitisation process is still in its early stages. Although we have made notable progress in recent years, such as developing electronic catalogues and making it easier to access information, using AI will create new demands. This requires not only adequate infrastructure and compatibility of existing systems, but also long-term strategic planning, capable of ensuring efficient data management and optimal operation of intelligent platforms.

A first aspect of the technical challenges relates to **the hardware and software infrastructure**. AI algorithms need high-performance servers, generous storage space, and stable networks to be able to process data in real time. Currently, existing facilities mainly support the management of digital resources and electronic catalogs, but are not yet adapted for the complex requirements of machine learning. However, this already created foundation provides a solid starting point for gradual upgrades and incremental adaptations.

Equally important is **the integration of databases and ensuring interoperability**. For AI to work effectively, information needs to be well-structured and standardized. Existing digitized resources can be seen as a promising foundation, but the unification of metadata and the interconnection of systems would pave the way for more precise recommendations, automatic classifications and much more efficient searches. This would improve both the user experience and the way collections are managed.

Another aspect of the technical challenges is **the human resource**. Librarians in the Republic of Moldova already have solid experience in the use of digital technologies, such as database management, the implementation of electronic cataloguing and the provision of online information services. However, their direct contact with artificial intelligence tools is lacking, and specialized training in this field is not yet available. At the same time, there is also a lack of specialists dedicated to AI in libraries, as in Moldova there are only two master's programs that include artificial intelligence courses, but they address the subject at a general level and are not oriented exclusively towards practical applications in libraries or information sciences (Cojocaru, 2021). This situation highlights the need for dedicated training programmes and closer collaboration between academia, IT and the library system.

Last but not least, the issue **of financial resources** is to be taken into account. Implementing AI involves significant costs for software, equipment, and staff training, and institutions' budgets are often limited. However, opportunities for international collaboration or access to external funding programmes can support this transition. Phased planning, making the best use of existing resources, could reduce financial pressure and ensure sustainable development.

In addition to investments and training, **the maintenance and constant updating of the systems** will be indispensable. Algorithms need to be regularly recalibrated and data constantly updated to maintain the accuracy and relevance of the results. The experience already gained in the administration of digital platforms could be gradually extended to the management of more complex systems, but this also requires the proper training of specialists in charge of the maintenance and operation of AI platforms.

Overcoming technical challenges is not only a necessity, but also an opportunity to build a solid foundation for smart university libraries. In our opinion, this stage paves the way for the responsible integration of artificial intelligence, influencing how ethical and epistemological challenges will be addressed.

3 Ethical challenges

The adoption of artificial intelligence in university libraries brings not only opportunities but also significant ethical responsibilities. In the Republic of Moldova, the local context offers the chance to outline correct standards and practices from the beginning, so that the implementation of smart technologies is perceived as safe, transparent and beneficial for the entire academic community. Reflecting on the moral and social aspects of AI thus becomes an integral part of the modernization process, strengthening user trust and the reputation of institutions.

Data privacy remains one of the most sensitive aspects. Digital platforms inevitably collect information about how users search for and use resources, and the integration of AI amplifies this trend through a more detailed analysis of these behaviors. In this context, students and researchers might feel that their academic intimacy is exposed. Therefore, transparency and the existence of clear protection policies are not only technical requirements, but guarantees of trust in the relationship between the library and its community (Shang et al., 2025).

Another challenge is related to algorithmic bias and lack of transparency. If recommendation or search systems do not make their selection criteria visible, there is a risk that international resources, written in widely circulated languages or published in high-impact journals, will always be put in the foreground, while local works remain in the shadows. In this way, local research becomes less visible, and students or professors' risk being deprived of perspectives relevant to the regional context. Moreover, the lack of clarity of the algorithms makes it difficult to verify the correctness of the displayed results. An ethical approach would imply that the user can understand and even adjust these criteria, choosing, for example, to give priority to publications in Romanian or to authors in the region.

Information security is equally important. Any smart system can become the target of cyberattacks or unauthorized access. Such incidents not only jeopardize the library's technical or administrative data, but can also compromise the trust of users, who may be afraid to leave their personal data registered. For this reason, libraries will need to strengthen their security policies and implement prevention mechanisms, including constant monitoring of networks and regular software updates, to protect both institutional and user data.

Another essential element is related to the professional responsibility of librarians. Even if decisions are made by algorithms, the ultimate responsibility must remain with the specialists. Algorithms can make mistakes or generate biased results, and without human oversight the risk of passing on erroneous information would be much higher. That's why librarians have the role of constantly monitoring the functioning of systems, intervening when errors occur, and ensuring that automatically generated recommendations comply with ethical principles and values of education.

So, it's really important to keep training staff so they can understand and use new technologies in the right way.

In general, ethical problems should be seen not just as dangers, but also as opportunities to create strong rules for the future. They give Moldovan libraries the chance to create a culture of transparency, responsibility and respect for users. If we start with these standards in mind, we can make sure that the introduction of artificial intelligence into university services is safer and more balanced. This will be good for everyone in the academic community.

4 Epistemological challenges

AI in university libraries brings technical and ethical challenges. It also changes how users access knowledge and interpret it. We are talking here about challenges to how we know things, i.e., how AI influences the process of creating, validating and using information. These aspects are very important because they affect the quality of learning and research, and help students, researchers and librarians to think critically and use information skills.

The first challenge is to understand how knowledge is produced and checked. AI algorithms can quickly analyse large amounts of data and generate automated recommendations or summaries, but the way they choose and prioritise sources affects how relevant and credible the information seems to users. So, if people can't access all the information online, or if they can only access some of it, smart systems can show more or less of certain sources, languages or types of publications. This means that people still have to check, complete and explain the information. Thus, librarians and researchers remain key actors in ensuring the quality and diversity of knowledge (Shang et al., 2025).

Another epistemological challenge lies in the **over-reliance on automatic recommendations**. Students and researchers may end up relying too heavily on the suggestions provided by AI, which can diminish their ability to critically evaluate information or choose the most appropriate sources. Even if the level of information literacy is solid, it is important that users are trained on how algorithms work, the criteria for selecting sources and the limitations of intelligent systems. In addition, constantly comparing digital information with traditional materials and independently verifying sources helps develop critical thinking and ensures that AI remains a support for research, not a substitute for human judgment.

The limitations of AI in assessing the quality of information are obvious. Although artificial intelligence systems can quickly identify popular or frequently cited sources, they are not able to assess the real quality of information. AI cannot assess whether the methodology used in a study is correct, whether the data is properly interpreted, or whether the paper makes a valuable contribution to the field. For this reason, human intervention remains indispensable: libraries must offer bibliographic guides, tutorials and training sessions that help users understand how to check sources, critically analyze information and compare data obtained from various resources. In this way, AI works as an effective support tool, without replacing people's ability to evaluate and judge.

The impact on information education is significant, as the use of AI changes the way students and researchers search, select, and interpret information. The introduction of these technologies does not only mean having faster access to resources, but also developing critical thinking, digital literacy and the ability to formulate pertinent questions to correctly assess the results generated by algorithms. For example, a recommendation system may suggest articles or books based on previous preferences, but students must learn to identify whether these suggestions are truly relevant or whether they ignore important sources. Activities such as hands-on workshops, online tutorials, or how-to materials allow users to understand the principles of algorithms, how information is filtered, and the limits of automated recommendations. Thus, information education becomes an active process: students not only receive information, but learn to verify it, compare it with other sources and interpret it critically, strengthening their independent research skills.

The socio-cultural and professional impact is directly felt in the relationship between the librarian and the user. If in the past the librarian mainly offered support in finding a book or in orienting through catalogs, with the integration of AI his role becomes more complex: he becomes an epistemological mediator. This means that it not only facilitates access to information, but also helps users understand why an algorithm recommends certain resources, how search criteria can be adjusted, and what risks exist in passively accepting results. At the same time, librarians must be able to monitor and correct the functioning of systems so that recommendations remain relevant and balanced. This new responsibility involves continuous training and the development of skills that combine technical, ethical and pedagogical knowledge.

Institutional policies and good practices these become indispensable. Libraries must establish clear rules on data privacy, transparency of algorithms, and applicable regulations. Human oversight and adherence to an ethical framework are essential to prevent errors and reduce the risk of information bias. In addition, by promoting critical thinking, facilitating access to verified sources and developing responsible digital skills, libraries support users to understand and evaluate the recommendations of intelligent systems. Thus, the academic community is protected against information manipulation and a healthy balance between technology and human values is maintained.

Epistemological challenges can be managed so that AI becomes a valuable support for critical thinking and informed access to knowledge, complementing users' judgment and discernment.

5 Conclusions

For AI to become a valuable and responsible tool in Moldovan university libraries, a gradual and well-planned approach is essential. First of all, the modernization of the digital infrastructure is a fundamental step. This requires high-performance equipment, servers capable of handling large volumes of data, stable networks and adequate storage capacities, so that AI systems work efficiently and without interruptions. Pilot deployment of AI modules can be a useful first test to assess performance and identify necessary adjustments before scale-up.

Database integration and standardization is another crucial element. Well-structured and interoperable data enables intelligent systems to generate accurate recommendations and optimize searches, thus supporting users in identifying relevant resources. At the same time, the development of clear policies and good ethical practices becomes indispensable. Libraries must ensure data privacy, transparency of algorithms and accountability of staff by transparently communicating with users how they operate and the purpose of collecting information.

The continuous training of librarians is another essential pillar. Staff must be trained not only in the use of digital platforms, but also in overseeing algorithms, identifying biases, and adjusting automated recommendations, ensuring a balance between technology and human discernment. At the same time, training users – students and researchers – in terms of how algorithms work, verifying sources and critically evaluating information contributes to transforming AI into a real support, not a substitute for independent thinking.

On the other hand, the piloting and progressive evaluation of AI systems helps to identify problems, adjust processes and optimize the performance of algorithms. Creating a framework for continuous monitoring and updating is equally important, in order to maintain the accuracy of recommendations, prevent errors and biases, and protect institutional and personal data. Finally, promoting an organizational culture open to innovation facilitates the acceptance of smart technologies, turning the implementation of AI into an opportunity to improve services and strengthen access to knowledge.

By combining these strategies – adequate infrastructure, interoperable databases, clear policies, training and digital literacy – Moldovan university libraries can integrate AI responsibly

and efficiently, supporting both the academic community and the development of information services.

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