

Dirassat & Abhath
The Arabic Journal of Human
and Social Sciences



مجلة دراسات وأبحاث
المجلة العربية في العلوم الإنسانية
والاجتماعية

EISSN: 2253-0363
ISSN : 1112-9751

Generation Z, Artificial Intelligence, and Library 4.0: New Conceptions and Viabilization in Academic Libraries

الجيل Z، والذكاء الاصطناعي، والمكتبات 4.0: مفاهيم جديدة واستدامة في المكتبات
الأكاديمية

Dr. Imad MENAI

Associet Professor, Institute of Library science and Documentation, University of Constantine 2,
Algeria, Lab. NTIRDN,
imad.menai@univ-constantine2.dz

د. عماد مناعي

أستاذ محاضر صنف "ب"، معهد علم المكتبات والتوثيق، جامعة قسنطينة 2، الجزائر، مخبر تكنولوجيا المعلومات
الجديدة ودورها في التنمية الوطنية

imad.menai@univ-constantine2.dz

تاريخ النشر: 2026/10/15

تاريخ القبول : 2026/09/18

تاريخ الاستلام: 2026/06/20

Abstract:

The fast-paced development of digital technologies continues to transform the academic library landscape, and the digitally native Generation Z becomes the lead user group. Immediacy, interactivity, and personalization are their expectations, and this converges perfectly with the transformable power of Artificial Intelligence (AI) and the Library 4.0 principles. In this paper, the intersection of these three entities becomes the focus, highlighting the potential of AI-powered tools like intelligent search, recommendation. The paper also examines the Library 4.0 conceptual framework facilitating co-creation of knowledge, seamless infusion of digital resources, and interactive learning spaces designed to meet Gen Z's academic habits. The proposes, the Viabilization of Library 4.0 involves not just the uptake of technology, but also organizational flexibility, digital literacy actions, and the ethics of AI deployment. The aim of this research topic is the identification of the academic libraries as centers of innovation capable of developing a new ecosystem of access to information and knowledge dissemination for Generation Z.

Keywords: Generation Z; Artificial Intelligence; Library 4.0; Academic Libraries; Digital Transformation

المخلص:

يواصل التطور المتسارع للتقنيات الرقمية إعادة تشكيل مشهد المكتبات الأكاديمية، بروز جيل (Z) بصفته مجموعة المستخدمين الأساسية، بوصفه جيلاً رقمياً أصيلاً. تتمثل توقعات هذا الجيل في الفورية والتفاعلية والتخصيص، وهي خصائص تتلاقى بشكل كامل مع القدرات التحويلية للذكاء الاصطناعي ومبادئ المكتبة 4.0. تركز هذه الورقة على تقاطع هذه العناصر الثلاثة، مسلطة الضوء على إمكانات الأدوات القائمة على الذكاء الاصطناعي، مثل البحث الذكي، وأنظمة التوصية. كما تدرس الورقة الإطار النظري للمكتبة 4.0، الذي يُسهّل الإنتاج المشترك للمعرفة، والتكامل السلس للموارد الرقمية، وتوفير فضاءات تعلم تفاعلية تصمّم خصيصاً لتناسب مع العادات الأكاديمية لجيل (Z). إن تحقيق أهداف المكتبة 4.0 لا يقتصر على مجرد توظيف التكنولوجيا، بل يتطلب أيضاً المرونة التنظيمية، وبرامج محو الأمية الرقمية، وأخلاقيات نشر تطبيقات الذكاء الاصطناعي. تهدف هذه الورقة إلى تحديد دور المكتبات الأكاديمية باعتبارها مراكز ابتكار قادرة على تطوير نظام بيئي جديد للوصول إلى المعلومات ونشر المعرفة يتناسب مع خصائص جيل (Z).
الكلمات المفتاحية: الجيل Z؛ الذكاء الاصطناعي؛ المكتبة 4.0؛ المكتبات الأكاديمية؛ التحول الرقمي.

1. INTRODUCTION

Academic libraries are undergoing a profound transformation, driven by the relentless pace of technological advancement and the evolving needs of their user communities. The digital revolution has fundamentally reshaped how information is accessed, consumed, and disseminated, pushing libraries beyond their traditional roles as mere repositories of physical books. To remain relevant and indispensable, these institutions must adapt their services and infrastructure to meet the demands of a digitally fluent populace. This adaptation involves embracing new technologies and reconceptualizing their purpose within the broader educational ecosystem, evolving into

dynamic, digital environments that offer patrons access without physical presence.

1.2- Background:

This paper focuses on three interconnected forces shaping the future of academic libraries: Generation Z, Artificial Intelligence, and the emerging concept of Library 4.0.

A) Generation Z (Gen Z):

Generally defined as individuals born between the mid-1990s and early 2010s, represents the first true cohort of "digital natives". They have matured in an environment saturated with digital commerce, social media, and ubiquitous internet connectivity, leading to distinct digital habits and information-seeking

behaviors. Their proficiency with electronic devices, the internet, and software is a defining characteristic, with platforms like TikTok playing a significant role in their daily interactions [1].

B) Artificial Intelligence (AI):

Encompassing machine learning, natural language processing (NLP), expert systems, and advanced analytics, offers transformative potential across various sectors, including information management and library services. AI's capabilities range from automating mundane tasks and enhancing data access to improving user experiences through intelligent systems.

C) Library 4.0:

The concept of Library 4.0 represents an advanced paradigm for libraries, drawing inspiration from the "Point-oh framework" that charts the evolution of industrial and web technologies (e.g., Web 4.0). This model envisions libraries as intelligence-based, massive data-driven, augmented reality-enabled, context-aware, and makerspace-rich environments. It signifies a shift towards dynamic, technology-driven spaces that actively contribute to education and community engagement, moving beyond traditional service models [2].

1.3- Problem Statement:

The Imperative for Academic Libraries to Strategically Integrate AI within the Library 4.0 Framework to Effectively Serve the Unique Needs and Preferences of Generation Z.

A significant challenge for academic libraries is the observed low patronage of traditional services by Gen Z students, who exhibit a strong preference for digital convenience and immediate information access. This demographic's inherent digital fluency and reliance on online platforms necessitate a fundamental modernization of library services to align with their expectations. While AI offers immense potential to address these needs, its effective integration within the Library 4.0 framework requires careful strategic planning, particularly concerning ethical implications and the nuanced requirements of a digitally native generation.

1.4- Purpose:

This paper aims to bridge the gap between Generation Z's digital expectations, the transformative capabilities of Artificial Intelligence, and the visionary framework of Library 4.0. It seeks to explore new conceptual models for academic libraries and propose practical strategies for their viability, ensuring these institutions remain central to the academic success and personal development of Gen Z.

1.5- Significance:

Successful integration of AI within a Library 4.0 paradigm, specifically tailored for Generation Z, can empower academic libraries to become vibrant, personalized hubs of knowledge and discovery. This strategic evolution is crucial for enhancing the relevance of libraries, fostering deeper user engagement, and ultimately improving educational outcomes in the digital era.

2. Generation Z: Characteristics, Information Behavior, and Library Expectations

2.1- Digital Nativity and Habits

Generation Z has grown up immersed in a digital environment, where information is perpetually at their fingertips. This cohort is characterized by its innate technological proficiency, demonstrating comfort and skill in handling electronic devices, navigating the internet, and utilizing various software applications. Their daily digital habits are heavily influenced by social media platforms such as TikTok, Instagram, and YouTube, which serve as primary channels for information seeking, trend adoption, and community engagement. Gen Z exhibits a strong preference for easily consumable content formats, including videos, audiobooks, and podcasts, which align with their fast-paced digital interactions.

2.2- Information Seeking Behaviors

Gen Z's information-seeking behaviors are largely shaped by their digital upbringing. They tend to favor quick, accessible, and visually engaging sources. While adept at rapid information retrieval, there is a recognized challenge in their ability to critically evaluate the vast amount of

information available online. Studies indicate that despite their digital fluency, many Gen Z students struggle with critical evaluation of sources, highlighting a need for enhanced information literacy skills [3].

2.3- Library Patronage and Expectations

Traditional library services often face low patronage from Gen Z, who expect immediate and personalized access to resources. Their expectations align with the convenience of digital platforms, leading to a demand for library services that are integrated with technology and offer seamless digital experiences. Academic libraries must therefore evolve to provide interactive learning spaces and digital resources that cater to these preferences, moving beyond physical collections to become dynamic digital hubs [4].

3.1- Evolution of Library Paradigms

The concept of Library 4.0 signifies a significant evolution in library paradigms, moving beyond traditional models to embrace intelligence-based and data-driven environments. This evolution is inspired by the

evolution of industrial and web technologies, envisioning libraries as dynamic, technology-driven spaces [5].

3.2- Core Principles of Library 4.0

Library 4.0 is characterized by several core principles, including being intelligence-based, massive data-driven, augmented reality-enabled, context-aware, and rich in makerspaces. It emphasizes the co-creation of knowledge, seamless integration of digital resources, and interactive learning environments. This model moves beyond traditional service models to actively contribute to education and community engagement [5]. The infrastructure required for such modern service delivery often involves technologies like Artificial Intelligence (AI), Internet of Things (IoT), and blockchain-powered chatbots, which enhance customer satisfaction and operational efficiency [6].

4. Artificial Intelligence Applications in Academic Libraries

4.1- Integration of AI-Driven Tools

Academic libraries are increasingly integrating AI-driven tools to enhance various services. This includes automating mundane tasks, improving data access, and personalizing user experiences. AI applications can range from intelligent search systems and recommendation engines to automated cataloging and virtual assistants [7].

4.2- Transformation of LIS Services

AI is transforming core Library and Information Science (LIS) functions by offering new ways to manage, organize, and disseminate information. This transformation impacts areas such as information retrieval, user engagement, and resource management, making services more efficient and user-centric [8].

4.3- Benefits and Drawbacks of AI Adoption

The adoption of AI in libraries offers numerous benefits, including improved efficiency, enhanced user experience, and personalized services. However, it also presents potential drawbacks such as ethical concerns, privacy issues, and the need for significant investment in technology and training [9]. Industry perspectives highlight the transformative power of AI in the academic sector, emphasizing its potential to revolutionize how libraries operate and serve their communities [10].

4.4- Case Studies and Examples for Gen Z

Specific case studies and examples of AI implementation in academic libraries targeting Generation Z users demonstrate the practical application of these technologies. These initiatives often focus on creating engaging and interactive experiences that align with Gen Z's digital habits and preferences [11].

5. AI Literacy and Digital Literacy for Gen Z

5.1- The Educational Role of Libraries

Libraries play a crucial educational role in fostering AI literacy and digital literacy among students, particularly Gen Z. This

involves teaching students how to navigate, critically evaluate, and responsibly use AI and digital information [12].

5.2- Implementing AI Literacy Programs

Practical guides for librarians emphasize the importance of implementing AI literacy programs. These programs aim to equip students with the skills to understand AI's capabilities and limitations, identify biases, and use AI tools effectively and ethically [13].

5.3- Digital Literacy via Social Platforms

Social media platforms, which are integral to Gen Z's daily lives, also play a role in enhancing digital literacy. Understanding the psychological and social perspectives of digital literacy through these platforms can help libraries design more effective educational interventions [14].

6.1- Ensuring Equitable and Ethical AI Empowerment

The deployment of AI in libraries necessitates careful consideration of ethical implications, privacy, and accountability. Methodologies for ensuring equitable and ethical AI empowerment are crucial to prevent biases and ensure fair access to information and services [15].

6.2- Ethical Risks of Generative AI

Generative AI, in particular, poses several ethical risks, including concerns about privacy, accountability, integrity, bias, and the impact on human labor. A comprehensive understanding of these risks is essential for responsible AI adoption in academic libraries [16].

8- Results and discussion:

The confluence of Generation Z's digital characteristics, the transformative capabilities of Artificial Intelligence, and the evolving vision of Library 4.0 presents both an imperative and an unprecedented opportunity for academic libraries. Gen Z, as digital natives, demands immediate, personalized, and highly relevant information experiences, often preferring digital platforms and social media for their information needs. Traditional library services, if not modernized, risk diminished

engagement. Library 4.0 provides a conceptual framework for this modernization, envisioning intelligent, data-driven, and co-creative spaces that extend beyond physical boundaries. AI serves as the critical enabler, capable of revolutionizing core library functions from cataloguing and reference services to personalized learning and resource discovery. The synergy between these elements is not merely about technological adoption but about fundamentally redesigning the library's value proposition to align with the behavioral and psychological preferences of its primary future users.

7. Conclusion

Integrating AI within the Library 4.0 framework to serve Generation Z effectively is not merely a technological upgrade but a strategic imperative for academic libraries. By understanding the unique characteristics and information behaviors of Gen Z, embracing the principles of Library 4.0, and judiciously applying AI technologies, libraries can transform into dynamic, personalized hubs of knowledge and discovery. This transformation requires a commitment to fostering AI and digital literacy, alongside a robust ethical framework to ensure responsible and equitable deployment of AI. The future of academic libraries lies in their ability to adapt, innovate, and remain central to the academic success and personal development of the digital native generation.

References

- [1] Melissa De Witte (2022). Know Gen Z. Stanford News. Link
- [2] Younghee, Noh. Imagining Library 4.0: Creating a Model for Future Libraries. ResearchGate. Visited on: (14/6/2025), Available at: https://www.researchgate.net/publication/282427811_Imagining_Library_40_Creating_a_Model_for_Future_Libraries
- [3] Okwu, E., Oyighan, D., & Oladokun, B. (2025). Patronage and Use of Library Resources among Gen Z Undergraduates in Nigerian Universities. Journal of Digital Learning and Education. Visited on: (22/2/2026), Available at: <https://www.researchgate.net/publication/39206>

7264 Patronage and Use of Library Resources among Gen Z Undergraduates in Nigerian Universities/citation/download

[4] Lee, C. S., Tan, L., & Goh, D. (2025). Examining generation Z's use of generative AI from an affordance-based approach. Information Research. Visited on: (23/3/2026), Available at: https://www.researchgate.net/publication/389764872_Examining_generation_Z's_use_of_generative_AI_from_an_affordance-based_approach/citation/download

[5] Younghee, N. (2015). Imagining Library 4.0: Creating a Model for Future Libraries. ResearchGate. Visited on: (17/6/2026), Available at: https://www.researchgate.net/publication/282427811_Imagining_Library_40_Creating_a_Model_for_Future_Libraries

[6] Rane, N., Choudhary, S., & Rane, J. (2024). Artificial Intelligence (AI), Internet of Things (IoT), and blockchain-powered chatbots for improved customer satisfaction... Exploration of the "Intelligent Infrastructure" required for modern service delivery. Visited on: (22/11/2025), Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4847274

[7] Ahammad, A., & Taher Hasan, A. A. (2025). Integration of AI-Driven Tools in Academic Library Services. International Journal For Multidisciplinary Research. Visited on: (22/1/2026), Available at: https://www.researchgate.net/publication/393729824_Integration_of_AI-Driven_Tools_in_Academic_Library_Services/citation/download

[8] Chandrashekara, G. S., & Mulimani, M. (2024). The Impact of Artificial Intelligence on Library and Information Science (LIS) Services. Visited on: (5/4/2025), Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4856459#:~:text=AI%2Ddriven%20tools%20like%20recommendation,of%20knowledge%20and%20information%20access.

[9] Hasan, N., Saifullah, M., & Hashmi, A. H. (2024). Application of Artificial Intelligence in Libraries: Benefits and Drawbacks. Journal of Data Science. Visited on: (9/1/2026), Available at: <https://papers.ssrn.com/sol3/papers.cfm?abstract>

[id=4847274](#)

[10] LibraryTechnology.Guides (2025). Harnessing the power of AI in academic libraries. Clarivate Publishing. Visited on: (23/2/2026), Available at: <https://librarytechnology.org/pr/31209>

[11] Zayed University Library. Are there specific case studies or examples of AI implementation in academic libraries targeting Generation Z users? Visited on: (25/5/2026), Available at: <https://zuscholars.zu.ac.ae/cgi/viewcontent.cgi?article=7386&context=works>

[12] FIU Library (n.d.). AI Literacy. Florida International University Library. Visited on: (), Available at: <https://library.fiu.edu/AI-ACRL/readings>

[13] College & Research Libraries News. AI Literacy: A Guide for Academic Libraries. Visited on: (22/11/2025), Available at: <https://crln.acrl.org/index.php/crlnews/article/view/26704>

[14] Maisuroh, S., Jamil, M., & Manshur, U. (2024). The Role of Social Media in Enhancing Digital Literacy Among Generation Z. Journal of Social Studies and Education. Visited on: (20/12/2025), Available at: https://www.researchgate.net/publication/390753497_The_Role_of_Social_Media_in_Enhancing_Digital_Literacy_Among_Generation_Z_A_Social_and_Psychological_Perspective/citation/download

[15] Wusu, O. (2024). The rise of artificial intelligence in libraries: the ethical and equitable methodologies and prospects.. ResearchGate. Visited on: (25/12/2025), Available at: https://www.researchgate.net/publication/378310823_The_rise_of_artificial_intelligence_in_libraries_the_ethical_and_equitable_methodologies_and_prospects_for_empowering_library_users

[16] LibGuides.usask.ca. What are the ethical considerations of Generative AI, including privacy, accountability, integrity, bias, and human labor?. Visited on: (2/6/2026), Available at: https://libguides.usask.ca/gen_ai/ethical