Winter 11-10-2023

THE POWER OF EMERGING TECHNOLOGIES ON ACADEMIC LIBRARIES

Samson Adesina Akinola
Joseph Ayo Babalola University, Nigeria, saakinola@jabu.edu.ng

THE POWER OF EMERGING TECHNOLOGIES ON ACADEMIC LIBRARIES

Samson Adesina Akinola
Joseph Ayo Babalola University
Ikeji – Arakeji, Nigeria
saakinola@jabu.edu.ng
ORCID ID: 0000-0002-6010-5571

Abstract

The importance of technology in academic institutions is growing, and it is essential for libraries and information professionals to familiarize themselves with these technologies. Digital literacy development is now a crucial part of educational curriculums, and new library technologies such as bibliographic reference management software, learning systems design software, electronic copyrights management software, artificial intelligence software and more are becoming integral to academic environments. Classroom management software and automated libraries also play a role in the evolving landscape of academic libraries. Additionally, integrated discovery software has greatly influenced academic libraries, and they are increasingly venturing into digital content creation. This paper provides an overview of the emerging trends in library technology, specifically focusing on academic libraries and urged librarians to embrace these advancements to meet the evolving needs of library users.

Keywords: Academic librarians, Library technology, Emerging technology

Introduction

In order to effectively carry out their roles, academic librarians must stay up to date with technological advancements and develop the necessary technical skills. This is crucial due to the rapid evolution of library tasks and tools. Adapting to technology allows librarians to utilize it effectively within their institutions. Specifically, academic librarians heavily rely on web-based research tools like academic databases, international resources and electronic resources in their work. However, it is important to note that technology serves as a gateway to interact with information, and other skills such as information processing, problem solving and critical thinking are equally significant. Therefore for university librarians to be successful in their positions, they must possess knowledge of technological developments and utilize them effectively. Modern academic libraries are shifting their focus towards digital content creation, curation, and preservation using metadata. This involves creating, organizing, and preserving content through metadata management. By doing so, academic libraries aim to make their special collections more accessible. To achieve this, libraries should familiarize themselves with

various techniques and technologies including bibliographic reference management software, electronic rights management systems, classroom management systems, and electronic resource management software. It is crucial for academic libraries to keep up with technological innovations in higher education and be at the forefront of utilizing these technologies.

Bibliographic citation management software

Bibliographic citation management software is widely used by academics and provides various benefits. The software helps in organizing references by allowing users to collect and manage groups of citations, create subject-based groups, and organise references efficiently. Unlike standard databases like Access or FileMaker Pro, bibliographic citation management software is specifically designed to accommodate the fields associated with bibliographic information. This software also allows users to select specific references to be cited in an article. Additionally, it can generate a bibliography, footnotes, and support different citation styles such as APA, Turabian, and Chicago. These software packages are compatible with popular word processing programmes such as Microsoft Word. Bibliographic citation management software simplifies the management and formatting of references for academic writing, making it a valuable tool for researchers and students. The Z39.50 protocol used by the search engine in bibliographic software limits access to databases that use this protocol. Librarians should educate researchers about appropriate citation tools to improve their research process. However, a study by Fry et al.(2019) indicates that non-professionals and students are not interested in bibliographic training, as they believe librarians focus more on answering reference questions rather than teaching the process of searching, retrieving, and evaluating information. This has resulted in a decline in the use of bibliographic citation management software. To tackle this issue, academic libraries should establish training programmes conducted by librarians with experience in educational services. These librarians should also be trained in effective methods for helping researchers use citation tools and manage bibliographic citations.

Electronic Resource Management Software

The increasing prevalence of electronic resources in academic libraries, it is necessary for the Technical Services Department to reassess their methods and policies. The amount of time spent managing electronic resources has surpassed that of traditional print resources, prompting the need for new positions such as an electronic resources librarian (Collins, 2005). Furthermore, there is a growing demand for electronic resource management software (ERMS) to aid in the management of databases, electronic journals, and electronic books. The responsibilities of managing electronic resources encompass various tasks, processes, and procedures pertaining to the efficient selection, evaluation, acquisition, and upkeep of such resources. Additionally, workflows that facilitate information management are included. As the environment continues to evolve, academic libraries are adapting to

ensure the effective and efficient management of electronic resources. Electronic resource management systems (ERMS) have numerous advantages for libraries, staff, and customers. These advantages include improving workflow efficiency, saving staff time, reducing customer confusion, eliminating duplicate packages, handling the growing complexity of electronic resources, and providing usage statistics for collection decision-making. ERMS also simplify installation and maintenance through content access services (CASE). However, several factors need to be considered before implementing ERMS in academic libraries. Limited budgets, lack of technical skills, expertise, and unstable network connectivity can hinder the implementation process. Moreover, using a stand-alone ERMS may not be suitable for libraries that already have an integrated system. It is worth noting that these disadvantages may differ among libraries and may not apply universally.

Classroom management software

Classroom management software helps streamline administrative tasks and improves communication and engagement in the education process. It is a comprehensive and modular data management solution that is used to manage various aspects of education, such as admissions, enrollment, student demographics, attendance, grades, discipline, and more (Riley et al., 2004). It also includes features like parent portal, student portal, standards-based assessments, and special reports. Classroom management tools include ExamView, Classcraft, Classter, iTunesU, ProClass, PlanbookEdu, ClassDojo, GoGuardian, LanSchool, eduphoria, , itslearning, eduCATE, ClassLink, TutorTrac, Showbie, and Alma and others. These tools enable educational institutions to effectively manage and deliver content in an online environment. They offer various options for content delivery, with integrated cloud-based technology to enhance teaching and learning. These tools provide solution to positive classroom tradition where students can get credit for their contribution in classroom activities. The software also supports lesson creation, homework assignments, and provides tools for content sharing, real-time feedback, and classroom interaction. Additionally, these platforms facilitate online and distance learning, making it easier for students to access educational resources remotely. School management is also simplified with these software platforms, allowing for the efficient management of textbooks, attendance, curriculum integration, lesson planning, and other aspects of school governance. However, it is important to note that there are limitations to classroom management software in an academic setting, as highlighted by Feshchenko et al. (2015).

Artificial intelligence (AI)

The rapid development of artificial intelligence (AI) technologies, particularly machine learning, has led to the widespread use of these technologies in academic libraries. One area where AI is being applied is machine translation, which involves using information technology to translate one language into another. In today's digital age, machine translation has become an important tool in multilingual

environments, serving various purposes such as personal communication, office work, and business translation. As academic libraries strive to be more accessible and available globally, it is likely that new advancements in machine translation will be integrated into library systems to facilitate the dissemination of information worldwide. Although current machine translation tools are not perfect, they do provide a starting point for improving human translation. Interestingly, the text does not mention the most powerful free machine translation software available currently. The speech recognition technology, also known as speech-to-text technology, allows for the conversion of human speech signals into written text through human-computer interaction. This technology finds applications in academic libraries, specifically in the area of data entry. While wired keyboards are currently the primary means of data entry, speech recognition technology offers a wireless alternative, transforming the way users interact with computers. With voice recognition software, users can input documents and request audio/video files from digital libraries. Furthermore, this technology enhances the accessibility of academic libraries by enabling users with disabilities to access and search electronic collections. Ultimately, speech recognition technology provides a range of powerful tools and opportunities to enhance interaction and accessibility within academic library environments.

Instructional System Design Software

Instructional Systems Design (ISD) is a methodical approach to designing educational systems and delivering educational products and services that promote effective and engaging learning experiences. It involves understanding the learner's situation and needs, establishing learning objectives, and creating interventions to facilitate learning (Wagner, 2011). The various instructional design models, including the popular ADDIE model comprising analysis, design, development, implementation, and evaluation stages, are used to guide the process. The primary goal of instructional design is to ensure that specific learning outcomes are achieved and to optimize the educational value for the learner, particularly in terms of time. ISD software is instrumental in producing high-quality e-learning content and is employed for tasks like creating instructional materials, developing multimedia presentations, and assessing the efficacy of training programs. By employing instructional design principles and leveraging appropriate software, educators can enhance the overall learning experience for students. The technology is less adaptable compared to a human teacher, which means that once an integration plan is in place, it is less likely to change based on student reactions. This integration of pedagogy and technology is crucial in designing the curriculum and bridging the gap between teaching methods and technology. Instructional design plays a crucial role in helping educators make better use of technology, ensuring its successful

integration into instruction. It enables different teachers or designers to create different curricula, while also ensuring consistency between different lessons created by different teachers. Additionally, the software focuses on presenting content in the most effective way and is learner-centered, catering to the needs and preferences of individual learners. It provides standardized content and assessment processes. The implementation of EMIS software on campus comes with various costs and constraints. The costs involved include design, development, implementation, and staff training. However, there are several constraints that hinder the implementation process. These constraints include inadequate budgets, technical issues, security concerns, lack of curriculum development skills, lack of control over content, and lack of long-term commitment from academic institutions. The adoption of ISU software by universities is hindered by various constraints, which include insufficient budget, technical and security problems, lack of course development skills, lack of content control, and lack of long-term commitment from academic institutions. To address these issues and ensure the successful implementation of ISU software, it is important to involve a curriculum developer who can provide expertise in content creation. The involvement of a curriculum developer is crucial as their knowledge of curriculum development methods is essential for organizing knowledge effectively and maintaining pedagogical integrity in the final product. By including a curriculum developer in the process, universities can overcome these constraints and optimize the use of ISU software for educational purposes.

Integrated Search Software

Integrated search software is a system that automates web searches by retrieving information from different sources to find specific information based on a search query. It streamlines the search process and brings together results from multiple databases. It is designed to perform web searches by systematically searching for information from various sources such as CRM, ERP, HRM, or SCP software packages. This software aims to find specific information based on a text search query online. Instead of manually searching each database based on individual search criteria, integrated search software automates the search process and integrates search results from multiple databases. This allows users to securely enter and retrieve information from organizational databases and intranets. By streamlining the search process, integrated search software helps users efficiently access information from different sources, enhancing productivity and eliminating the need for separate searches on each database (Ghafari et al., 2012). These tools provide a centralized and efficient means of retrieving and utilizing scattered information. Integrated search tools play a valuable role in information retrieval by facilitating centralized search models. Examples of commonly used integrated search tools include Algolia Site Search, Swiftype, iManage, Elasticsearch, AddSearch Site Search, IBM Watson Explorer, and VuFind,

among others. Chickering and Yang (2014) emphasize the importance of these tools in organizing and structuring data spread across various repositories, thus making information retrieval more efficient. They further outline the benefits of integrated search tools, which include data cleaning and structuring to enhance retrieval, freeing up database capacity by focusing on discoverable information, and creating a secure environment for information retrieval, annotation, archiving, sharing, and searching by media size and type. Additionally, integrated search tools enable simultaneous searching of multiple sources, leading to more efficient data and information retrieval and saving human resources. Kumar et al. (2008) highlighted some limitations of integrated search software that make them unsuitable for academic use. The first limitation is that the sorting of search results by relevance is restricted by the quality of metadata, as metadata often lacks summary or full-text information. Secondly, federated search systems are resource-intensive and cannot match the search accuracy and precision of local interfaces. Additionally, due to the absence of a common authentication standard, federated search systems do not provide access to certain databases. Some databases may not function properly in federated search systems, especially those that require input. Furthermore, certain databases are associated with specific types of search systems, causing compatibility issues within federated search systems. Some databases may be compatible with one federated search product but not with another, while some databases may not work with any federated search system at all. These limitations hinder the practical use of integrated/combined search software in academic environments.

Library Automation Software

Library automation software enhances the efficiency and effectiveness of library operations, benefiting both library staff and users alike. It is designed to improve the management and circulation of books and members in libraries and institutions. With advancements in technology, automation has become a necessity in libraries. This software is comprehensive and helps librarians efficiently perform their tasks. It can be useful for both librarians and users. Library automation software comes in various forms, such as software for small libraries and cloud-based library management software. It can be platform-specific or multi-platform, and can be library-based or multi-vendor. The software can be either static, requiring manual updates by the administrator, or dynamic with automatic updates provided by the SAM solution provider. Additionally, the authentication process can range from simple to complex, depending on factors like fingerprints, meta applications, registry entries, SWID data, package management data, or product-specific data. Library automation software plays a crucial role in library management, with various types available such as Koha ILS, OPALS, Liberty, and Genesis G4. Academic libraries commonly utilize open source software like Koha, NewGenLib, Evergreen, and OpenBiblio. These systems provide

benefits to both patrons and librarians. Patrons appreciate the convenience and improved service provided by automated environments. For librarians, automation enables easy item creation, space saving, workload reduction, improved information services, and efficient query handling. The advantages of library automation software are significant and can be seen in areas such as cataloging, circulation, patron management, reporting, and online access to resources. Library automation software offers several benefits for libraries. Firstly, it helps in making informed decisions about materials to be added or kept, ultimately improving the collection. Secondly, it reduces operating costs and requires minimal maintenance. The software streamlines the work for librarians and allows for easy sharing of tasks among staff members. Cloud-based software eliminates the need for hardware or software upgrades. Furthermore, it enables librarians to focus on current information and does not require IT support if staff members are well trained. Additionally, some software allows for data sharing, promoting effective communication between users and library staff. However, there are some limitations to consider. Data security can be a concern due to virus attacks, and configuring the software to the library's needs may present challenges. Lastly, users may face difficulties in verifying the source of information in e-books. Library automation software helps with decision-making, reduces operating costs, streamlines work, and allows for easy data sharing. However, there are concerns about data security, configuring the software to library needs, and unknown sources of information in e-books.

Cloud computing technology

Cloud computing is a technology that enables the sharing of resources and services over the internet, eliminating the need for physical infrastructure. It includes virtual servers, networks, applications, and resources, all housed in the "cloud" rather than on-site. This lack of physical location makes it difficult for users to pinpoint where their data is stored or managed. The key feature of cloud computing is on-demand access to computing resources such as networks, servers, storage, applications, and services, which can be easily distributed with minimal intervention from the service provider. It is a widely accessible model that allows anyone with an internet connection to quickly access and share computing resources. Cloud computing allows users to access applications and resources without owning or managing them, as data is stored remotely and accessible anytime, anywhere. Through an internet connection, users can work on personal and business files on any computer without the need for local installations. Cloud computing is considered a service that provides scalable and flexible computing capabilities to customers through internet technology.

Maintaining leadership position in information delivery business

In order that the library sector continues to maintain its leading position and remain relevant as primary information provider in today's rapidly evolving technological landscape, it is crucial for librarians to keep up with the latest advancements. Exclusive of a plan to address these changes, libraries risk becoming obsolete and irrelevant. To effectively manage technological change, librarians should adopt a proactive approach and be prepared to respond to new tools and challenges presented by their customers. To stay updated, librarians can pursue continuous professional development opportunities, such as attending conferences, workshops, and webinars. They can also join professional organizations and networks that focus on technology in libraries. Additionally, engaging in online learning, reading professional literature, and keeping in touch with colleagues can help librarians stay abreast of the latest technological developments. By incorporating these strategies, librarians can adapt to the changing needs of their users and ensure the long-term relevance of libraries

Conclusion

This paper has underlined the importance of libraries and librarians in today's technological world. Despite advancements in technology and growing user expectations, libraries and librarians continue to have a significant role to play. To effectively serve their purpose, libraries need to incorporate new technologies such as bibliographic reference management software, instructional design software, electronic rights management systems, classroom management software, library automation software, electronic resource management software, and integrated search software. In order to remain relevant and keep up with the rapidly evolving technological landscape, librarians need to be adaptable and stay abreast of the latest developments. This entails staying up to date with advancements to effectively cater to users' changing needs. The review suggests that libraries and librarians can thrive in this digital age by embracing technology and leveraging these tools to enhance services and meet the information needs of their users.

References

Anderson, E. (2015). Electronic resource management systems and related products. *Library Technology Reports , 50* (3), 30–42.

Capterra. (2023). Best Classroom Management Software. 2023 reviews of the most popular tools & systems. Retrieved from https://www.capterra.com/classroom-management-software. .

Choi, Y. and Rasmussen, E. (2009). What qualifications and skills are important for digital librarian positions in academic libraries? A job advertisement analysis. *The Journal of Academic Librarianship, 35(5): 457–467.* .

Collins, M. (2005). Electronic resource management systems: Understanding the players and how to make the right choice for your library. *Serials Review, , 31*, 125–140.

Davis, S. (2005). Electronic resources management from the field. *Serials Review, , 31*, 171– 177.

East, J. (2003). Z39. 50 and personal bibliographic software. *Library hi tech, , 21* (2), 1-16.

Egunjobi, R.A.and Awoyemi, R.A. (2012). Library automation with Koha. *Library Hi Tech News, , 29* (3), 208-212.

Feshchenko, A. V., Mozhaeva, G. V., Kulikov, I. A., & Zilberman, N. N. (2015). Prospects for the development of e-learning technologies. *Proceedings of the 7th International Conference on Computer Supported Education, CSEDU May 2015-). https://doi.org/10.5220/0005410102080212*, (pp. 208–212).

Francese, E. (2013). Usage of reference management software at the University of Torino. Italian. *Journal of Library, Archives and Information Science. Rivista italiana di biblioteconomia, archivistica e scienza dell'informazione , 4* (2), 145-174.

Fry, K., Malone, B. and Rose K. (2019). Bibliographic instruction: Overview and issues. A web presentation. Retrieved from http://jan.ucc.nau.edu/~kjr/bikatheewebpage.html#_BIBLIO GRAPHIC_INSTRUCTION_(BI): .

George, C. (2006). *Copyright management systems. In The Information Society: Emerging Landscapes.* Boston, MA.: Springer.

Ghafari, M., Saleh, M. and Ebrahimi, T. (2012). A federated search approach to facilitate systematic literature review in software engineering. International. *Journal of Software Engineering & Applications , 3* (2), 13-21.

Harischandra, P., Shylesh, S. & Aithal, P.S. (2016). Information Technology Innovations in Library Management: A Case of SIMS. *International Journal of Current Research and Modern Education (IJCRME), , 1* (1), 657-676.

Isaias, P. (2020). ECMS: Electronic Copyright Management Systems. Ariadne-Web Magazine for Information Professionals, Issue 2. *Retrieved from http://www.ariadne.ac.uk/issue/20/ecms/ .*

Katz, I.R. and Macklin, A.S. (2007). Information and Communication Technology (ICT) Literacy: Integration and Assessment in Higher Education. *Systemics, Cybernetics and Informatics, , 5* (4), 50-55.

King, D. (2018). How to stay on top of emerging technology trends for libraries. *Library Technology Reports , 54* (2), 1-35.

King, R., Barbara, H. and Wendy, W. (2011). Using bibliographic software to appraise and code data in educational systematic review research. *Medical teacher, , 33* (9), 719- 723 .

Kumar, S., Sanaman, G. and Rai, N. (2008). Federated Search: New option for libraries in the digital era. . *6th International CALIBER-2008, University of Allahabad, Allahabad, February 28-March1. INFLIBNET centre, Ahmedabad.*, (pp. 267-285).

Kumar, S., Sanaman, G. and Rai, N. (2008). Federated Search: New option for libraries in the digital era. *6th International CALIBER-2008, University of Allahabad, Allahabad, February 28-March1. INFLIBNET centre, AhmedabadRetrieved from http://ir.inflibnet.ac.in:8080/ir/bitstream/1944/1233/1/27.pdf*, (pp. 267-285)).

Maideen, S. and Oke, O.C. (2019). A Study on emerging technology trends in academic libraries: An overview. Reshaping of Librarianship, . *Innovations and Transformation e-Proceedings* , 163-168. .

Moruf, H.A., Sani, S. & Abu, Z.I. (2020). Open source automation software: Stirring automated to integrated library system. *Journal of Applied Sciences & Environmental Management , 24* (7), 1273-1278.

Naik, R., & Naik, K. . (2016). Electronic resource management system in libraries- challenges and prospects. *International Journal of Library and Information Studies, 6(3). Retrieved from http://ijlis.org/img/2016_Vol_6_Issue_3/127-134.pdf* .

Sellers, C. (2003). Digital rights management systems: Recent European Issues. *Ent. L.R., 14(1): 5-9.* .

Wyburn, M., & MacPhall, J. (2005). The intersection of copyright and plagiarism and the monitoring of student work by educational institutions. *Austl. & New Zealand Journal of Law & Educ., 11(2) 73-92.*