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Trends in Library Services and the Competencies of the Librarian

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[See table of contents](#)

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Article abstract

This study sought to discuss the perspective of services for libraries and to indicate the competences of professionals to act in face of this scenario. Regarding the nature of the research, it is characterized as basic research, using an exploratory approach and bibliographic and documental characteristics. The searches were carried out in the following databases: Web of Science, Scopus (Elsevier), SciELO. The 2,030 documents were retrieved; these were explored by reading the titles, the keywords, and the abstract. In this way, we evaluated which of the articles answered the research question. Among the documents checked, 55 documents were selected. The results identified services in the technological sphere: Artificial Intelligence (AI), the Internet of Things, Drones, Virtual Assistants, and Blockchain. In the society, sphere Co-working. In the Education category, Badging, and in the Environment category, Resilience. Given what was proposed, the librarian's perception of these changes becomes essential as actors and providers of these services.

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Trends in Library Services and the Competencies of the Librarian

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This study sought to discuss the perspective of services for libraries and to indicate the competencies of professionals to act in the face of this scenario. Regarding the nature of the research, it is characterized as basic research, using an exploratory approach and bibliographic and documental characteristics. The searches were carried out in the following databases: Web of Science, Scopus (Elsevier), SciELO. The 2,030 documents were retrieved; these were explored by reading the titles, the keywords, and the abstract. In this way, we evaluated which of the articles answered the research question. Among the documents checked, 55 documents were selected. The results identified services in the technological sphere: Artificial Intelligence (AI), the Internet of Things, Drones, Virtual Assistants, and Blockchain. In the society, sphere Co-working. In the Education category, Badging, and in the Environment category, Resilience. Given what was proposed, the librarian's perception of these changes becomes essential as actors and providers of these services.

Keywords: Libraries of the future, Professional Competencies, Library Services Trends

Introduction

The technologies developed worldwide add to the work of professionals in administrative organizations in general and in libraries. The library is an institution that was proposed as a guardian of books. This environment was kept sacred and frequented by people with specific profiles. (Martins, 2002). The space gained another bias and started not only to store the books but to play an essential role in society. It became a place for interaction, debates, cultural and artistic manifestations, and, above all, for democratizing literate culture. (Ferraz, 2014). Technological revolutions are considered essential for the development of society. It is noticed that society is in industry 4.0, which provides the omnipresence of digital technologies in everyday life and combines the physical, biological, and digital worlds. (Sierra-Castañer & Aller, 2021). It presents technologies such as artificial intelligence, Big Data, genetic engineering, among others.

When changes occur in the world, libraries, documentation, and information centers must also go through these changes. At the end of the 1970s, advanced library management technologies and software emerged as tools that responded to the general needs of libraries. (Rodrigues & Prudêncio, 2009).

The discussion on service trends for libraries was the subject of the publication entitled: “8 Tendências para Bibliotecas no Futuro [8 Trends for Libraries in the Future, freely translated],” addressed by the Federal Council of Librarianship on the official website and social media such as LinkedIn. The publication discussed eight types of technologies that will be used by libraries by 2029, namely: Artificial Intelligence (AI), Drones, Virtual Assistants, Blockchain, Coworking, Privacy, New Business Models, and Flipped Learning.

Depending on the proposed context, this study discusses the trend of services for libraries. It indicates the skills of professionals to act in this scenario and bring reflections for the future of librarian activities.

The American Library Association published a report called Library of the Future, which addresses trends for the libraries of the future. Shows the documents listing axes: society, technology, education, environment, politics, government, economy, and demography. The society category presents 11 trends. Co-working stands out and aims to promote a structure with adequate resources for users who wish to attend the library to carry out professional work. An example is shown at the Richland Library Co-Working. (Lima, 2020; CFB, 2022).

The Technology category shows 13 trends, of which Artificial Intelligence (AI), the Internet of Things, Drones, Virtual Assistants, and Blockchain stand out. Artificial intelligence has the potential to produce machines that think through natural language applications and deep processing; that is, the machine makes decisions according to past experiences, so

functions and services in a library can be used to organize and improve access to information, content indexing, document matching, content mapping in article citations, as well as AI tools can perform content summarization as it is capable of summarizing a document. (Yoon, Andrews & Ward, 2021; Oyelude, 2021). There are activities with Artificial Intelligence in libraries through Talk to Books, which was developed by Google to locate excerpts of books through AI. Semantic Scholar is an example of a scientific journal search engine that uses AI. (ALA, 2019b).

As society develops in terms of digital technologies, it reflects on the future of libraries. Given this, the following research question arises: what service perspectives can the library add?

Methods

The characterization of this research is classified according to its nature in basic research because it aims to generate new knowledge and perceive events, reporting to expand the base of scientific knowledge, and paying attention to the development and expansion of studies on innovation in library services. The objective is characterized as an exploratory approach because it explores the reality in search of knowledge and the bibliographic characteristics since the elaboration was carried out through the bibliographic search. Searches were carried out in the following databases: Web of Science, Scopus (Elsevier), and SciELO. The searches were carried out from 05-25-2022 to 07-25-2022. In this way, we used the following: Future, library service, and Intelligent Library; the keywords were determined according to the purpose of the research. Exclusion criteria were opinion articles, congress presentations, repeated publications, books, book chapters, and articles that did not answer the research question. The database filters were applied to delimit the language, with English and Spanish chosen for their international scope and Portuguese aiming to include national or Luso-Brazilian literature. The temporal cut, to recover recent documents from the year 2017 to 2022, came from the idea of looking for what was published on the subject in the last 5 years; the year 2017 entered the count because it was thought to complement since the year 2022 had not yet ended in the research development period. The field of knowledge to retrieve documents within the scope of Information Science, as well as the typology of the document, is limited to articles, conference papers, or book chapters.

Results

As the searches were carried out, it was observed that the Web of Science database retrieved 1,049 documents. Scopus presented the results of 611 studies, and the SciELO database retrieved one survey.

After identifying the 2,032 documents, it was found that three were duplicates, so they were removed. After carrying

out the previous analysis of the studies, the need to establish specific exclusion criteria was verified to achieve a satisfactory result. In this way, the following criteria were defined: a) Studies that did not contemplate technology contexts; b) Studies that did not mention librarianship or library activities; and c) Did not present an abstract/summary/text.

The 1,977 articles eliminated did not contain content on applying technologies in libraries and information units. They were articles dealing with Artificial Intelligence and the Internet of Things (IoT), but not their application in informational environments, but in the programming area.

The studies addressed technology-oriented service offerings, but some investigations dealt with environments reserved exclusively for connected learning.

The development of Information and Communications Technology (ICT) and the Internet have entered libraries. They have changed the services they offer and the work of the professionals who develop activities there.

Kubat (2017) presents a study of national literature on university libraries accessible via smartphones in Turkey. The study reports the recurrent use of smartphones worldwide, notably due to the use of the Internet; the study also mentions computers losing space for this type of mobile technology. The survey was carried out in 30 libraries in seven regions of Turkey. It was identified that these libraries have mobile technology and websites for mobile devices adapted to serve users. Libraries feature mobile library catalogues, short message services, chat rooms, queries via instant messaging tools, mobile device lending services, and augmented reality and QR code applications. Despite offering these services, Turkish libraries still face difficulties with the lack of metadata standards. The study made a valid observation regarding the skills of librarians in this scenario. Coding has become a requirement for these professionals.

Donner, Campbell-Meier, and Seto (2017) verify five projects that are conducted by library associations and organizations, namely: the International Federation of Library Associations and Institutions (IFLA), United States; the Royal Society Canada Project, Canada; the New Zealand Joint Library and Information Association Project, New Zealand; the Australian Library and Information Association; and, the Arts Council of England (ACE) Project, England. The research studies the projects seeking to have a vision of the future of libraries. To study the projects, the authors applied the sensemaking perspective to analyze the results. The study reports that professionals in librarianship go through several changes, and the digital age brought another shift in the doing of librarianship. However, the authors point out that digital evolutions provide the profession with a greater understanding of its role in society.

Thorpe (2017) presents a literature review to identify opportunities and trends for providing engaging and relevant referral services. The author discusses four main themes:

changing community expectations and user behaviour, defining and measuring the impact of modern library and reference services, providing flexibility in spaces and service delivery, and the roles of library staff and future skill sets. The author's review confirmed that libraries, mainly reference and information services, remain uniquely positioned to support the community in learning, work, recreation, creativity, and innovation. Finally, despite the challenges experienced by these libraries in adapting to new technological scenarios, libraries in the 21st century will continue to connect people to information, helping and enabling them to respond to their informational needs. The case study by Wilders (2017), with an example of the Utrecht library, addresses that by the year 2025, library shelves will have a new function due to the advent of digitization. The study points out that there is a high probability that the monographs will be offered in electronic format; with that, users will have easier access, regardless of the location of a shelf. The author considers the new role of shelves, which may not store physical work, but digital support for accessing monographs.

Hoy (2018) presents the idea of a voice assistant. Proportional to technological development, human beings are increasingly preparing to talk to machines; voice assistants are an example of this interaction between humans and machines. The author mentions that with virtual assistants, users can perform music requests, informational questions, and dial numbers through a conversation. According to the author, the wide use of this technology will reach the library since it can potentially be a tool for the delivery of materials and library services. The study explains that virtual assistants use software that perceives the voice and uses keywords to activate it. The author explains that with the popularization of the computer, it became cheaper, and online text reading gained space; these texts were used to train virtual assistants to respond to and analyze user requests.

Cherinet's research (2018) investigates the future roles and skills required of librarians to respond to users' needs. The study analyzed the literature, which identified that some roles are evolutionary and others revolutionary. And the most eloquent is to create an informed society through resocialization and modelling. The study identified that leadership and ICT skills are essential for future generations of librarians. The study highlighted that this last skill becomes essential due to the growth of digital reading.

Fernández (2019) discusses new technologies in the library and mentions the Streaming service as a possible tool to be integrated. The author introduces that changes in technologies and the development of Internet infrastructures, such as the fifth-generation connection (5G), enable the creation of new platforms that will constitute the next generations. Still, the author argues that the evolution of streaming media is in continuous development, and this media provides other scenarios that libraries can use. The study presents the

trajectory of streaming services such as Netflix to reach the debate of this service in the library because this institution is increasingly offering materials in digital formats, such as e-books and videos that are made available for download, which makes editors experience different features and makes changes more manageable. This study comprises two parts, and the first concludes the streaming service integrating the library, mainly academic libraries.

In the second part of the study by Fernández (2019), the author discusses the development of other media, such as YouTube, which presents two faces of access and censorship despite having acted frequently even in teaching. Regarding the resources in the library, it is worth mentioning the counterpoint because some libraries do not have a technological infrastructure or resources. Therefore, the construction of streaming can be a challenge. However, the author noted the use of YouTube as a tool to be explored by the library since this social media can offer opportunities for libraries to work with the free content made available and allows it to create content for the local community.

The study by Salort, Bilhão and Lopes (2019) presents the dissertation research results defended in 2017. The study was conducted through a structured interview that questioned eight librarians working in a university library specialized in health. The research analyzed the perceptions of librarians and found that their perception is still linked to the traditional work of librarianship. The study raised questions related to cyberculture in the library, which resulted in the issue of academic training in Librarianship having privileged technical matters in the face of the technological transformations imposed by cyberculture.

The study by Anglada (2019) addresses changes, certainties, and uncertainties for libraries. The research draws attention to professionals adhering to technologies or technological "fads" that will soon be replaced later on because the moment is to adopt and perceive service trends involving technology in the long term. This recommendation envisions librarians and information professionals starting to discuss the changes and then including them in the course curriculum.

Liang (2020) conducted author addresses that the leading service of the library is the mediation of access to information; the Internet of Things (IoT) provides potential for libraries such as consulting, training, tracking service, information sharing, retrieval, and navigation of information in a virtual environment, directory information, access to the traditional and online collection. The author concludes that IoT can fully automate the tracking and sharing of information; libraries can find a way to establish an ecosystem of library work and develop this technology in the library. After reviewing the literature, the author also highlights that IoT has the potential to change library services.

Saavedra-Alamillas et al. (2020) bring an experience report of document delivery during the COVID-19 pandemic

in universities in Mexico. The Document Delivery Service (DDS) was implemented in six university libraries in Mexico. To respond to the student's need for information during the pandemic, the service first opted for collaboration between libraries to exchange information in addition to cooperation. This service consisted of a team prepared to deal with issues of access to information, documentation, and communication in return for the world's contingency. Librarians worked dynamically, exchanging information requested by users. The service was developed via a message application; users who requested documents registered the data on a platform built by the librarians, informing the type of document required. 441 entries were registered; among the requests, 260 were for scientific articles, 42 books, 72 book chapters, and 72 theses. The study ends with the consideration that the developed service demonstrated possibilities in the face of the great health crisis, such as the Covid-19 pandemic. Librarian collaboration was a way to face challenges and positively respond to information needs.

Liang and Chen (2020) argue that although IoT has rapidly adhered to the commercial sector, its development in the library still needs to grow. The authors' study consists of analyzing the state of the art of studies on the application of IoT in libraries. It is known that radiofrequency was adopted by digital libraries. However, the authors explain that the slow implementation in the library is due to privacy, data security, the absence of established standards, financial resources, technological resources, and the organization. The authors portray that IoT presents a series of changes for the library, used to support processes and Back-office services for users. This technology will also make it easier for librarians to carry out their library tasks through comprehensive automation. The literature retrieved and analyzed by the authors also addresses that services such as self-lending and self-return, intelligent inventory, intelligent query, and a combination of books and information systems will be achieved by IoT.

Hussain (2020) addresses the impact of the Industrial Revolution 4.0 on libraries and librarians' work. The author argues that Industry 4.0 integrates technology and human beings. This integration facilitates work activities in all trades, as the pace of production will show more results with the help of machines. The study argues that even though librarianship deals with Industrial Revolution 4.0, resulting in unemployment for librarians, the opposite will occur because the more equipped they are with technology and knowledge about them, the more potential employment will be possible. The reformulation of the librarian's work can guarantee a more lasting work future because this and the successive technological revolutions naturally favor the professional who works with information.

Hapel (2020) discusses the technological changes that have occurred during the last three decades. Technology developments have accelerated scans, and organizations have been

affected. The author's literature study addresses the changing scenario of information technology in the library. It ends by discussing the future of librarianship courses. The author mentions that 5G technology will result in a large proportion of data per second, in addition to enabling other services for libraries. However, the study addresses that not all libraries mentioned in the literature have been optimistic about changes. The author argues that the reason for this posture is linked to learning librarianship. As a consideration, she points out that these changes and how to proceed should be discussed in library and information science education.

Quispe-Farfán (2020) discusses public libraries in the context of technological trends. The desk study develops service trends for libraries and models that are being applied in librarianship. The study indicates that many libraries worldwide are joining new services and products relying on technological tools. The survey mentions reports like ALA for Libraries. The ALA listed library trends within seven categories: society, technology, environment, politics, economics, and demographics. In the technology category, the report mentions tools such as blockchain, connected toys, data collection, drones, facial recognition, robots, virtual reality, and voice control, among other features. The study considers that the context of trends for libraries directly influences developments in librarianship studies. Furthermore, the study mentions that the COVID-19 health crisis accelerated this need for virtualization of library management.

Yu and Huang (2020) carried out a case study that discussed the technological advances and broad services developed due to broadband connections, in addition to the rapid economic development and information networks that resulted in the evolution of the library concept. The authors argue that the most modern technologies have expanded library services and made the community relearn library management. The study also sought to identify the perceived value of intelligent library services. According to the results, users showed ease in using the technological tools proposed by the library. Concerning the added value of the services, users responding to the questionnaire were favourable and reported the ease of using technologies in the library. While some responses were positive, others resulted in recommendations to help intelligent libraries integrate artificial intelligence methods to deliver more prosperous and attractive offerings to users.

Fang Tu et al. (2021) studied the conceptions and perceptions of intelligent libraries. The analysis was conducted through a case study with undergraduate students in Librarianship and Information Science and students who did not attend this course. According to the results, the student's perception of the Librarianship and Information Science of the intelligent library showed robots, interactive book lending with technology tools, intelligent services, location recognition services, and mobile applications. The other students

have the perception of an intelligent library related to reading, not involving technological activities. As the authors consider, intelligent libraries can serve as a space to promote collections and services and publish informative videos, online readings, maker activities, and training programs for digital skills, digital literacy, and innovative tools.

The case study by Huber et al. (2021) presents the Binghamton University libraries that, in 2018, acquired Virtual Reality accessories and made the service available. This new service went beyond libraries; courses such as nursing were able to introduce it into teaching, as well as being included in the Digital Humanities Research Institute. The study mentions that the library also sought resources so that Virtual Reality equipment could be loaned to university students. The challenges encountered were with the team of librarians who needed to be trained to work daily with Virtual Reality equipment. This made it difficult for users to use this equipment; they had to attend only training days to use and learn the equipment. The study considers that libraries still need to present conclusions regarding the demand for services with Virtual Reality. However, libraries seek to adapt these services to offer value to the academic community.

The research by Loh et al. (2021) addresses the revitalization of school library spaces and the support of design thinking for student teaching and how it was used to rethink the role and functions of the school library. The application of this technology in the library supports and expands learning, in addition to encouraging reading, collaboration, and research. The author considers technological resources in school libraries, especially given the broad access to information, a great need.

The study by Hamilton, Stapleton, and Plaisance (2021) presents incorporating resources and hyperlinks of 360 tours as a possible service for users who access information and library services. The study describes an online 360 tour of a university library in the United States. Although 360 hyperlink technology is not current for a library, there are still challenges. The authors portray that this type of technology that favours tourism can also favour a university library. Librarians can combine aspects of virtual tours, showing library environments and information about the library. In addition to serving the user who is enrolled and attends the institution, it favours individuals who wish to study there.

The study by Oyelude (2021) addresses AI taking on forms within the library. The author cites speech and face recognition, virtual assistants, image analysis, and others introduced in the library. Still, the study explains that AI tools can also be used in automatic content summarization; they can summarize documents in a section or a set of documents, making the extraction and abstraction easier. Although AI has benefits, the study reports that it may also have flaws. For this reason, it is recommended that librarians are within the technological field. Just as AI can tag documents or summarize them, it

can also do so using racist terms or not recognizing the traits of a Black person, and this issue must be addressed.

Lee (2021) sought to identify technological innovations in the library through the lifecycle of technologies, which is why he analyzed patent citations. The author argues that several applications of new technologies can be used in the library. An example of this is the storage and analysis of data sets because librarians have the skills and knowledge to use these data. The study also points out that Big Data is a technology that can contribute to the activities of libraries in general, especially in a user study, because it allows them to have information from the minds of users through the use of artificial intelligence applications that provide information to users. To understand user behaviour, the study proposes that adding intelligent dimensions to library applications is useful for understanding and meeting user needs. Blockchain technology was another suggestion of the study because it offers the possibility of building an improved metadata system for libraries to track the rights and ownership of digital sales to provide the connection of networks of libraries and universities or community lending programs and skill sharing.

Garoufallou and Gaitanou (2021) explore how Big Data affects the library and how librarians prepare to deal with data accumulation. In a literature review, the authors portray Big Data acting to help the library support the library, creating technologies to add value to library activities. The study points to the use of Big Data applied to university libraries because they present a history of data collection, analysis, and compilation of statistics to evaluate the library's resources and performance. Concerning the use of Big Data in public libraries, it is summarized in the provision of community service that can help people to know about data generation and have the competence to decide in which data scenario it will be applied and how it works.

Andrews and Ward (2021) sought to understand how Artificial Intelligence and its related technologies are being used in public and academic libraries. In addition, the authors investigated the perception of librarians regarding adopting these technologies in the library. The study was carried out using a questionnaire applied to North American librarians. The results showed that librarians favour training in the use of these technologies since, during training, they had no contact with the subject. The research showed the importance of preparing librarians to work with AI, as it will contribute to the work of librarians.

McMenemy, Robinson, and Ruthven (2022) deal with services developed in a UK library. Due to the COVID-19 pandemic, which caused libraries to close their doors, the library developed innovative alternative services, such as Click and Collect, home delivery, and digital services, such as e-books, online collaborative projects, and the provision of digital services to people who lacked infrastructure. The authors point out that developing services such as access to

research databases, Covid-19 helplines, social media, digital book club, IT support, friendship reading over the phone, school library services, strategic locations for pick up for food, check-in services for shielding, essential PC use and acting as Wi-Fi hotspots. The study concludes that developing these services during the pandemic was challenging for librarians because they had to reinvent themselves.

Gasparini and Kaautonen (2022) explain the use of Artificial Intelligence in libraries. The authors' literature review found that AI develops decision-making activities based on past experiences. Still, the authors seek ways to help libraries in the AI era since librarians will work together. Although the authors' literature review finds studies reporting changes in the library, which becomes using AI technology, the authors mention some literature that discusses the need for more indication of technical skills so that the professional librarian can work together with this technology. The study encourages professional librarians to engage in interdisciplinary collaborations with computer scientists, systems developers, and other researchers to acquire knowledge because companies will require them to have knowledge of different areas. The texts addressed in the review showed possibilities of services being developed in libraries; the professionals need to keep up to date in their concepts within the organization of collections, dissemination of knowledge, and users. Thus, working together with the fundamentals of technology, since the research retrieved in the literature review points to the inclusion of more technologies in the library, such as a virtual assistant such as Alexa, to perform user service.

The study by Aslam (2020) recommends steps for librarians to work in organizations considering the changes that may occur concerning services, namely: a) Create a sense of urgency; b) Establishment of a solid administrative alliance; c) Develop a clear vision; d) Articulate vision; Authorize subordinates to work with vision; e) Strategic planning and development of short-term goals; f) Building and improving for more changes; and g) Infrastructure plus approaches. This view is directly related to the technical dimension. In addition, the author mentioned above describes some of the perceptions regarding the skills that the librarian acquired in the face of changes in this scenario; they are a) Organizational change, b) Effective change, c) Willingness to change, and d) Resistance to change and resilience. These are directly linked to the ethical and political dimensions.

These are the skills that the labour market seeks so that professionals can meet demands that expand with society's development, considering technological aspects.

Conclusion

Given the service trends discussed in the literature review and their possibilities of existence in libraries and information units, librarians can work with these tools and seek technological solutions to improve the processes of library activities,

such as developing platforms, curating content, and generating value for those seeking knowledge.

According to the texts addressed, the library works with Open Access, aiming to collaborate and encourage open research through research and data services. This activity has been developed in many libraries around the world. Librarians had to seek knowledge about the movement to implement policies, support, and incentives for users.

Mentions about the use of equipment such as drones, streaming, or virtual assistants reflect on the dimension of development and how much librarian training curricula have worked on this theme or technological development in the library. The products generate data and information. Although they can be positive for the institution, they create the need to manage this data and information and how they interact with people.

The growing availability of data generated by services such as drones, AI, IoT, Virtual Assistants, and Blockchain and streaming involves applied knowledge in Information Science. It was related to Information Literacy because as the way of doing things in the profession changes, skills are required to be developed.

Because the addressed trends are more present in developed countries, the CFB in 2022 points out that they may be a reality in Brazilian libraries by 2029. This is also reflected in the academic debate about updating curricula to respond to the demands of the labour market.

The competencies approach for professionals develops due to the need for a profile created by the labour market and by companies, institutions, and organizations. The know-how is the technique, empathy, resilience, knowing how to communicate, and attitudes of this professional position. Acting in the labour market involves technical knowledge to meet needs, including skills for professional librarians to develop their activities. Therefore, the present study sought to present trends of technological services that will be part of libraries to show professionals that libraries succeed in receiving influences from societal changes concerning technologies. Therefore, given what was proposed and the literature that points out the trends, the professional librarian's perception of these changes becomes essential as actors and providers of these services.

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