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The Fourth Revolution and the Necessary Reinvention of Library Science

Marcos Galindo[α] & Arabelly Ascoli[σ]

SUMMARY

Objective: To discuss the reinvention of Librarianship in the context of the fourth revolution.

Method: The study was characterized as descriptive and used as methods the literature review, bibliographic and documental analysis.

Results: It presents an overview of the fourth revolution, promoted by digital technologies, and its impacts on the world of work. It notes that, given the increasing ease of access to the internet, libraries are dividing their space as providers of information sources and verifies the persistence of the librarian's technical profile. Discusses the disconnect between higher education and the current and potential demands of the contemporary librarian job market in Brazil.

Conclusions: It is recommended to rethink undergraduate teaching in Librarianship and to promote continuous learning so that librarians develop and update informational and technological skills.

Keywords: future of the library. tendencies for librarianship. fourth revolution. librarian.

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Conclusions: It is recommended to rethink teaching in undergraduate librarianship and to promote continued learning so that librarians develop and update informational and technological skills.

I. INTRODUCTION

Certainly touched by the *zieidgeist* [1]that dominated the thinking of intellectuals and fiction

[1] The Zeitgeist , a German term whose translation means spirit of the age or sign of the times, or in better form "spirit of the times", means, in short, the set of the intellectual, sociological and cultural climate of a small region to the whole world. at a certain time in history, or the generic characteristics of a certain period of time. Hermann Joseph Hiery : Zur Einleitung : Der Historiker und der Zeitgeist. http://www.uni-bayreuth.de/departments/neueste/ZeitgeistEinleitung.htm

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writers at the end of the 19th century, Octave Uzane [2], defended, in the most famous of his essays, that, by the designation of 'book', considering those countless collections of paper, printed, sewn and bound in a cover announcing the title of the work, he had to say that: " *no I believe, and modern mechanism forbids me to believe, that Gutenberg's invention can present itself in another way, before sooner or later it disappears as a means of current interpretation of our mental products*" . (UZANNE, 1894)

Inspired by the inventions of Thomas Edson " *The Wizard of Menlo Park* " and Nicolas Tesla, Uzane wrote *The End* Essay *of Books* , which circulated in the July-December 1894 issue of Scribner's Magazine, in which he spoke about the technology of his time and the social aspirations that, in many ways, demanded the creation of efficient and more productive systems for the transmission of knowledge . Uzane speculated supported by strong arguments about the use of technologies developed by Edson and Tesla, especially the 1877 phonograph, whose possibilities aroused the interest of the writer. Uzane 's predictions , it seems, only came to make full sense in the early 2000s, when former MTV VJ Adam Curry started transmitting *podcast applications on the web* [3]where audio content was accessible on devices with internet access.

The theme of the permanence or future of books and libraries has been the object of recurrent fervent debates, whether in fictional works or in works of scientific prediction. In October 2013, MG Siegler published the post " *The end of the library* " [4]in which he argued whether "would libraries continue to exist in the future?" The post provoked a strong reaction from librarians in the form of a "storm of emails, messages, tweets and angry comments", as if the idea was so nefarious that it could not be articulated. Regarding the reason for the reaction to the aforementioned post, the author asks himself: if not he who was a librarian, who would have 'permission' to reflect on the phenomenon? This reaction is part of a phenomenon observable in library corporations around the world, which fortunately loses its force in the face of facts.

The fact is, public libraries that have served generations around the world are closing their doors by the thousands, baffling librarians and educators alike. In this article we will explore a little of this phenomenon, trying to trace a historical line to try to understand the roots and their causal elements.

The development of digital technologies and the ease of access to various types of content on the internet seem, in fact, to be weakening the basis of the millennial power of the object book, specifically that material book, a physical industrial product. This phenomenon has had an energetic impact on the depletion of the social function and, consequently, on the closure of libraries reported globally. [5]The librarian's craft, in turn, has been questioned many times throughout its existence. The redesign of its function and the challenge of adaptation that guarantees its permanence in the future of humanity, has never been so necessary as it is today.

It is not the first time that the permanence of the book, in its traditional format, has been called into question . At the end of the 19th century, the French journalist and bibliophile Octave Uzanne – strongly influenced by the French fiction school

[2] UZANNE, Octave "The End of Books", in *Scribner's Magazine* , Vol. 16 (July–December 1894), 221–231. Accessed on: 23.03.2023. Available at https:// publicdomainreview.org/collection/octave-uzannes-the-end-of-books-1894

[3] The term *Podcast* is a portmanteau of iPod (Apple's audio device) and *broadcast* (which is the distribution of radio or TV content).

[4]https://techcrunch.com/2013/10/13/the-end-of-the-library/

[5] Research points to 'massive growth' in the consumption of e-books and audiobooks. PUBLISHNEWS+, LEONARDO NETO, 06/25/2021 'Digital Consumer book Barometer ', carried out by Bookwire and consultant Rüdiger Wischenbart analyzed sales of editorial content in digital formats in German-speaking countries, Italy, Canada, Mexico, Spain and Brazil. Available at: https:// www.publishnews.com.br/materias/2021/06/25/pesquisa-aponta-crescimento-macico-do-consumo-de-e-books-e-audiolivros

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at the end of the century, as well as by the technological advances of his time, especially those carried out by Thomas Edison in the United States – prophesied the disappearance of this support in his visionary work "The end of books" (GALINDO; LIMA, 2018).

More than a century before the invention of digital players and audiobooks, Uzanne wrote a story inspired by advances in phonographic technology, imagining how the printed book could disappear (UZANE: 1897). The technological innovation that would replace the book refers to what is now known as an audiobook, the materialization of one of the author's predictions. Uzanne anticipates in her essay the emergence of 20th century visual culture marked by the evolution of photography, audio, cinema, television and the internet. The reconfiguration of an ambience where hypermedia in its multiple forms start to flood everyday life.

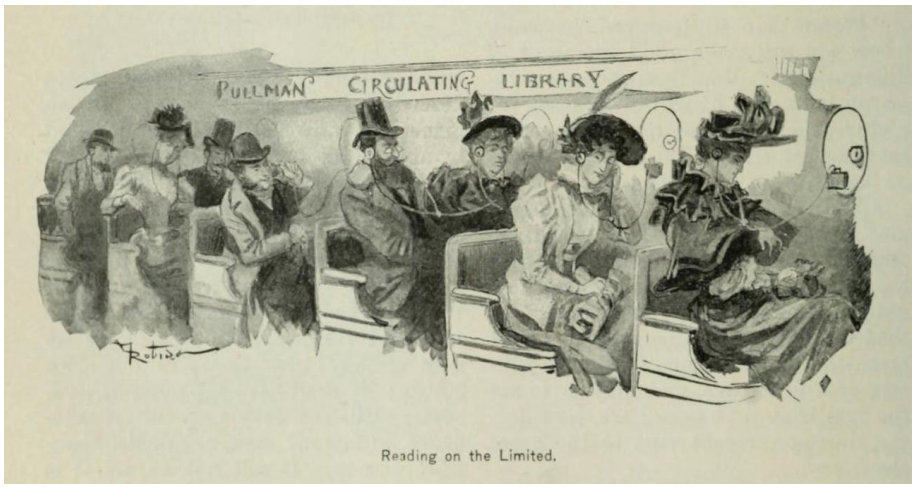


Figure 1: Circulating library of phonographed works. Source: Illustration by Albert Robida for The end of the books. Uzanne (1897).

In *Don't count on the end of the book,* against the grain of history, Umberto Eco bet wrong and fired: *"The book is like the spoon, the hammer, the wheel or the scissors. Once invented, they cannot be improved."* Admittedly in love with the traditional object, printed on paper, they risk guesses about the effects of the technological revolution on literature and the profusion of new supports for the book and reading.

The traditional book format has many advocates. In 2010, Umberto Eco and Jean-Claude Carrière , in "Do not count on the end of the book", defend this artifact by enumerating its benefits, such as not depending on electricity and being portable, and pointing out drawbacks of the digital version, such as technological obsolescence: "We are still able to read a text printed five centuries ago. But we are unable to read, we can no longer see, an electronic cassette or a CD-ROM that is only a few years old". (ECO; CARRIÈRE, 2010, p. 24) The arguments listed by Eco and Carrière are shallow and evidently inspired by a common sense that is not supported by evidence. The text is prejudiced, cortical and flagrantly in contrast to the critical capacity and erudition of the authors. In the text extracted from conversations conducted by the French journalist Jean-Philippe de Tonnac , who chose the easy path of polemics, avoiding the essence of the problem that the theme poses. In this case, contrary to what the text seems to defend, it is not a choice, but an evolutionary process of the instruments for registering and disseminating knowledge.

However, the approach that opposes the forms of technology in a Manichaean confrontation is simplistic, leading to an unproductive discussion. On the other hand, for the evolutionary understanding of the book instrument and libraries as tools for expanding the social intellect, it is interesting to undertake a predictive analysis.

Analysis that must consider the circumstances and conjunctures available and present, among the many possibilities, future paths that lead to the evolution of the book, and, consequently, of libraries.

The fourth revolution, marked by the growing volume of transformations in the ways of producing and accessing information, driven by the development of digital technologies, requires the innovation of orthodox services and products currently offered by the traditional library. According to the bibliographic review undertaken by Jesus and Cunha (2019a), research on the library of the future observed that the transition from physical to digital would be the greatest consequence of technological advancement. However, this transition did not happen at the expected speed and, therefore, has not yet been fully implemented, with library collections currently being much more hybrid than exclusively digital.

Even if at some point the physical collections of libraries are converted into digital ones, if the next generations fully adapt to *e-books* and these replace physical books, how will these huge digital collections be managed? How will publishers' contracts allow or restrict access to readers? These initial questions show that digital technology alone will not solve the limitations of analogue supports and that much still needs to be built to develop solutions to the new problems posed.

Librarians need to be part of the group of professionals who will take the lead in this construction, observing the skills needed for this. In this sense, this article sought to discuss the reinvention of Librarianship in the context of the fourth revolution. The study was characterized as descriptive and used as methods the literature review, bibliographic and documental analysis.

II. THE FOURTH REVOLUTION AND THE FUTURE OF PROFESSIONS

The future has always been a concern for humanity and the subject of studies, books and films constructed with the observation of more or less realistic and/or creative tendencies, depending on the purpose of the creations. One of the authors who inaugurated futurism Alvin Toffler , in his *bestseller "The Third Wave "* , launched in 1980, made a visionary prediction of what would become society in the 21st century, in which information, knowledge and technology would be the essential elements of the economy. Although the work was received by the public as fiction, many of the author's predictions came true (GALINDO; LIMA, 2018).

For Toffler, the first wave of disruptive technology would have been the invention of agriculture, the second, industrialization, and the third, the information wave. (GALINDO; LIMA, 2018), These waves correspond to the Neolithic Revolution and the three Industrial Revolutions – the first marked by the use of water and steam energy to mechanize production, the second by the use of electricity for mass production, the third by the use of electronics and information technology to automate production.

Klaus Schwab, engineer and economist founder of the *World Economic Forum* , considered that his contemporaries were experiencing a fourth industrial revolution: the digital revolution characterized "by a fusion of technologies that is blurring the lines between the physical, digital and biological spheres" (SCHWAB, 2015).

Schwab (2015) argues that the new evolutionary cycle of technology configures a revolution, and not an extension of the previous one, thanks to elements such as the historically unprecedented speed of current discoveries and the breadth and disruptive impact of changes in entire systems of production, management and governance. Schwab highlighted the unlimited possibilities of billions of people connected by mobile devices with high processing power, storage and access to knowledge and reflected on the opportunities and challenges that the revolution was promoting at the time in the personal, social, governmental, economic and commercial spheres (SCHWAB, 2015).

However, a quarter of a century before Schwab , the cognitive scientist and important name of the

Open Access movement, Steven Harnad , already predicted the outbreak of a fourth revolution in the field of scientific communication. For him there would have been three revolutions during the evolution of human communication and cognition – language, writing and printing – and that, in the early 1990s, society was on the threshold of a fourth revolution (HARNAD, 1991). Harnad 's predictions seemed to back up advances made by British physicist, computer scientist Tim Berners-Lee, with the creation of the World Wide Web between 1989 and 1990, and Robert Cailliau who first mediated successful communication between a client HTTP and the server over the internet.

The fact is that, since the beginning of humanity, with the development of language, the emergence of symbolic thinking and speech-mediated communication, *Sapiens Sapiens* became the only species to transmit culture through words, thus managing to conserve stocks from memory. Later, with writing, it became possible to codify the products of the mind with systemic reliability, to preserve and transmit symbolically structured contents in languages of wide diffusion power. Printing made it possible to create and distribute texts widely and quickly. Harnad (1991) explains that he considers only these three advents as revolutionary because he believes that only they had a qualitative effect on the disruption in the ways in which humanity thinks and expresses its senses. The other technological developments would only be a quantitative refinement of writing.

The condition for the emergence of the fourth revolution would be the development of the then recent Internet. Harnad (1990, 1991) visualized the potential of the network to make scientific communication more efficient and interactive, naming this new medium *"scholarly skywriting"* :

> the *skywriting* promises to restore the speed of scholarly communication to a rate much closer to the speed we think it is, while adding a global scope and interactive dimension unprecedented in human communication, all driven through the discipline of the written medium, monitored by peer review and permanently archived for future reference. [...] the possibility of a transition in the evolution of knowledge, in which we will free ourselves from the terrestrial inertia that has burdened human research until now, finally rising to the sky speeds to which our minds were organically destined (HARNAD, 1991)

The author considers that the revolution had not yet occurred at that time due to some obstacles, such as the belief that the internet was not an adequate medium for serious academic communication, the secular habits of the academic community adapted to paper publications, the interests of publishers , the unfriendly interface of computers at the time, an excess of electronic waste and questions about text quality, plagiarism and copyright (HARNAD, 1990, 1991). Some of these obstacles have been overcome and, even if others have not yet been overcome, academic communication has indeed been profoundly modified with the internet and other digital technologies.

At the end of 2019, the world was surprised by the COVID-19 pandemic. Faced with the need for social isolation, adopted in most countries as it proves to be the most effective way to contain the virus, the use of technology has become, more than ever, imperative. Perhaps this pandemic was the main historical marker of the fourth revolution, since, in a short period of time, different types of services had to adapt to the digital context at the risk of perishing - which in fact occurred with many activities that were unable to give the technological leap.

All previous revolutions promoted major transformations in people's way of life, with, naturally, the world of work being one of the most impacted social circuits. Likewise, the fourth revolution has also caused impacts, transforming, extinguishing and creating professions, so the future of professions has been a widely discussed subject.

In 1996, Jeremy Rifkin , describing in *"The end of work "* the effects of the Post-Industrial Era, already predicted that the new economy of the Information Society would impose a decrease in

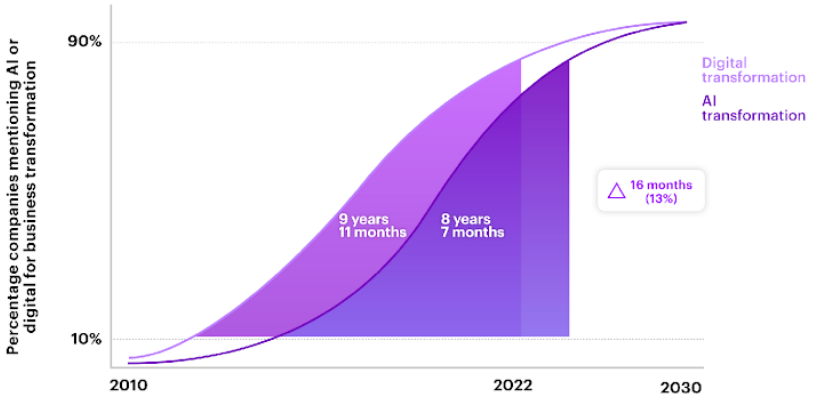
the levels of employment in the industrial activity due to the emergence of the tertiary sector and greater efficiency of the industrial processes that started to use the technology of the information and robotic resources in the production cycle of consumer goods (GALINDO; LIMA, 2018). Rifkin is the author of dozens of books on the impact of scientific and technological change on the economy, workforce, society and environment.

Among the most relevant works on the subject we can mention *"The Future of the professions : How technology will transform the work of human experts"* , by Richard Susskind and Daniel Susskind (2015), who announce in the introduction that the book deals with the systems and people that will replace professions. The *World Economic Forum* (2016), in turn, published an in-depth study on the subject: *"The Future of Jobs: employment , skills and workforce strategy for the Fourth Industrial Revolution"* where advocated that it was mandatory for companies to offer qualifications and for individuals to adopt a proactive posture for constant learning and for governments to create an enabling environment to help these efforts.

In a study released in 2017, McKinsey warned that AI was already threatening 50% of jobs in the United States and Europe, and concluded that in emerging markets these figures could put 70% of job positions at risk. In Brazil, according to a survey carried out by Fundação Getúlio Vargas (FGV) in partnership with *Microsoft* , artificial intelligence (AI) may increase unemployment over the next fifteen years (ROMANI, 2019). The study used scenario prospecting to stipulate three possible scenarios about technology growth: a conservative one, in which the economy grows less than estimated for the coming years; an intermediary, with stable economic growth; and a more aggressive one, in a world where the economy would have an optimistic projection of growth, in which unemployment could increase by 3.87 percentage points. The person responsible for the research claims that artificial intelligence will increase inequality: in the most aggressive scenario, the most affected will be the least qualified workers, among whom unemployment may increase by 5.14 percentage points; on the other hand, the number of qualified vacancies could rise by up to 1.56 percentage points (ROMANI, 2019)

We estimate that AI transformation will take less time than digital transformation[6]

[6] This estimate is derived from a natural language processing analysis of investor calls from the world's top 2,000 companies (by market cap), from 2010 to 2021, that reference "AI" and "Digital" in conjunction with "business transformation" ", respectively. Data were taken from S&P earnings transcripts.



Source: Accenture Research.

It is important to consider that the notes on the future of professions are based on a neoliberal economic theory that describes social changes based on the idea of the Minimum State. In many aspects, this view is contradictory, or even in conflict with the community concept of a library, based on the common use of intelligence resources then in force for solidarity information equipment.[7]

In the scenario that was emerging at the time, countries that decided to invest strategically in education and innovation would be able to adapt and, therefore, would take advantage of the good effects of the phenomenon, on the other hand, countries with low investment in these areas, with a settled economy in low-skill jobs, they would lose competitive advantage and be left behind (GALINDO; LIMA, 2018). In the worst prognosis, those professions that do not adapt to the new configurations of the world of work and do not prove to be useful to the new demands of society will be replaced. In this context, what will be the future of Librarianship?

The worst enemy of innovation is corporatism.

Ortega y Gasset, still in 1935, showed deep concern with the informational explosion. Pointing to the book as a conflict, he stated that, among its most serious attributes that were beginning to be perceived, was the large and growing number of publications, overflowing the limits of time and the capacity for human assimilation (ORTEGA Y GASSET, 2005). At the time of the author, the cause of what he called " *jungle selvaggia* of books" was the cheapening of typographic printing. Today, the massive production of unorganized digital data is largely the result of easy access to the internet and other digital technologies.

Although much of the world's population is still not connected, the report " *Measuring the Information Society Report* " by *International Telecommunication Union* (ITU, 2018), showed that by the end of 2018, more than half of the world's population – 3.9 billion people – had access to the internet. Thus, the *wild jungle* is formed. of digital data, in which 16 million text messages, 156 million emails and more than one hundred million photos and videos are shared every minute (HEGGIE, 2019).

In Brazil, in 2017, 74.9% of households used the internet, with the highest percentage of these households being located in the urban area of the Southeast region (81.1%) and the lowest in the rural area of the North (27.3%). %) (IBGE, 2018). Internet access via mobile devices is increasingly prevalent. The number of these devices is already greater than the global population, however, this fact does not apply to all regions of the planet. Three quarters of the world's population owned a cell phone in 2017, however, in less developed countries the proportion drops to 56% (ITU, 2018).

[7] The idea of social information equipment refers to the systemic set of actions and instruments of education and management of bibliographic knowledge, through which it is intended to achieve a free, fair and solidary society, eradicate poverty and marginalization, reduce social inequalities and promote the good of all.

Brazil follows the world trend. Between 2016 and 2017, there was a decrease in the number of Brazilian households with conventional landlines, personal computers and *tablets* . Meanwhile, in 2017 there was a cell phone in 93.2% of households (IBGE, 2018). According to FGV (2018), in May 2018 Brazil had 220 million *smartphones* , there was then an upward trend in this number. Considering that the estimate of the Brazilian population is currently close to 212 million individuals (IBGE, 2020), there were, in theory, more *smartphones* than people in Brazil.

On the other hand, libraries are losing space as a provider of information sources while their potential users feel sufficiently served by search engines and other of the various resources available on the internet. Data gathered in the fourth edition of the survey "Portraits of Reading in Brazil" indicated that from a sample of 5,012 people – interviewed in 317 municipalities in various parts of the country –, 66% did not go to libraries and 14% rarely went to them (PRETRATOS..., 2016). The main reasons given by this average of 4,000 people for not going to libraries were: not having time (40%), not liking to read (19%), not having libraries nearby (18%) and not liking going to libraries (13%).

The scarcity of public and school libraries in Brazil contributes to this scenario. According to the survey carried out by the National System of Public Libraries (SNBP, 201-), in 2015 Brazil had 6,057 public libraries to serve a population that was then formed by 204 million inhabitants (BRASIL, 2015), that is, a library for more than 30,000 inhabitants. This number, instead of accompanying the growth of the Brazilian population, has decreased. The percentage of municipalities with public libraries increased from 97.1% in 2014 to 87.7% in 2018 (IBGE, 2019). It is important to highlight that, in addition to the quantity, it is essential to assess whether these libraries have the infrastructure, collections and services that are adequate for their purposes.

Research carried out by the Brazilian Institute of Geography and Statistics - IBGE, show that the number of municipalities with public libraries has been falling since 2014. These studies, together with those carried out by the National System of Public Libraries of the Special Secretariat for Culture, indicate that between 2015 and 2020 Brazil lost nearly 800 public libraries. The research also showed that the loss draws attention to the scarcity and devaluation of these spaces in the country,

The expectation of mitigating the problem of having few school libraries, generated with the enactment, in 2010, of Law 12,244 (BRASIL, 2010), was frustrated. The ten-year period for public and private educational institutions from all education systems in the country to create their libraries ended. Only 45.7% of public elementary schools have libraries or reading rooms (PAULA, 2020). It is also important to consider that this quantity can be problematized by the fact that the legislation in question considers that the school library is a "collection of books, videographic materials and documents registered in any medium intended for consultation, research, study or reading" (BRASIL, 2010).

The history of libraries in Brazil reflects attitudes and interests of the ruling class. Focusing on an elite considered cultured, the library distances itself from those who really need information to achieve some improvement in their quality of life (ALMEIDA JÚNIOR, 1997; SILVA; SILVA, 2010). In this way, "the vast majority of the population, for not seeing their daily desires translated in the library, do not view it as a socially useful institution" (SILVA; SILVA, 2010, p. 210).

Brayner 's (2018) perception, the library has become an expendable entity for most people, leaving professionals in the area to "recognize the mistake of the collective attack, in a bet on a retrograde paradigm, associating the library with the collection and the operations aimed at ordering it and keeping it as such" (BRAYNER, 2018, p. 130).

For Carvalho (2016) it is *the reductionist meaning of the library focused on the collection to the detriment of the human that the library has been devalued or underused throughout its history.* And he concludes: " *it takes time and mentality reconstruction for pragmatic modification of the concept of library* ." Carvalho (2016, p. 37)

Even when agreeing that valuing the library depends on changing the mentality of librarians and other related actors, it is necessary to consider: how long will it take for this change to become effective? Will there be time for the library to prove its usefulness to society?

III. THE NECESSARY REINVENTION OF LIBRARY BUSINESS

According to the Brazilian Classification of Occupations (CBO), the librarian is an information professional. Thus, Librarianship should be considered a promising career in the context of the fourth revolution, since it fits into the privileged environment of asset management and strategic stocks of information and technology [8]. However, in practice this is not what is observed.

> A recent survey on emerging professions in 2020, conducted by the professional social network *LinkedIn* (2019), pointed out that nine of the 15 professions that lead the *ranking* are linked to the area of Information Technology. Among them is the data scientist, a professional trained to "capture, process, analyze, represent and interpret large volumes of data" (LINKEDIN, 2019, p. 10). These activities resemble some of the traditional librarian roles, however, the report exemplifies that it is an area for graduates in computer science, computer engineering and applied mathematics.
>
> In 1995 Eloy Rodrigues, librarian at the University of Minho explained:
>
> "The evolution and "vulgarization" of the Internet (more than 30 million users today and, predictably, several hundred million by the end of the century) and of the future " information superhighways " will remove the technological obstacles in accessing information, allowing end users to directly access electronic documents, regardless of their location, without intermediaries and without leaving their homes or offices." Rodrigues (1995)

In this context, the author questioned: "*are libraries and librarians condemned to disappear or be marginalized? Will we be the dinosaurs of the 21st century?* " And he concluded by warning, "*it seems inevitable that they (digital libraries) will be created. If we don't do it, and right away, others will. The question, therefore, is whether the digital library will be created with us , or if we want to run the risk of seeing it created on our margins, or even against us* ." Rodrigues (1995)

Jesus and Cunha (2019b, p. 312) warned in 2019: " *discovering and studying which of these new technologies can be better used in libraries can be the difference between evolving or suffering* ". However, librarians often failed to take advantage of these opportunities in the best way, due to lack of strategic planning, because they were not trained for this purpose and, sometimes, due to an exacerbated resistance to changes, believing that the services and products offered already met to the community sufficiently.

Perhaps many opportunities continue to be missed. Assis (2018) identified that among these professionals, problems such as lack of motivation, self-indulgence, lack of definition of the area of activity, negative stereotypes of the librarian and low engagement in social issues persist. These circumstances act as inhibitors, hindering the diffusion and recognition of the activities carried out by the professional librarian in society.

For a long time, Librarianship was exclusively concerned with practical issues, especially with the training of professionals to work in information units. Currently, the area seeks to update itself, however, it is still markedly technical. The difficulty of adapting inhibits the necessary evolution of the professional field and its consequent inclusion in the universe of

[8] Understood as a set of organized information items (or not), according to a technical criterion, of information management instruments and with content that is of interest to a community of receivers (BARRETO, 2000)

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metamorphosed demands for knowledge. The lack of appropriation of emerging trends in the area and the lack of skills to use new technological tools is notorious, which, in turn, prevents the labor market from seeing librarians outside their traditional activities of guarding and preserving books. in libraries.

Librarianship is a science-based discipline, consolidated by its secular choices and principles, at the same time that "it is dynamic and flexible towards new approaches and capable of adapting to contemporary historical, cultural, epistemo logical and technological conditions" (ARAÚJO, 2013, p. 56). However, it is necessary to question whether the adaptability of Librarianship is being fully used in order to keep up with the transformations of the informational demands of today's society.

Since the enactment of Law no. 4,084, in 1962, the librarian's craft was reserved for the class, however, the fourth revolution shows a labor market with dynamic structures (BRASIL, 1962). Legislation is updated and follows the forms that society takes. If the librarian's craft is no longer seen as a social need, the legislation will adapt and in environments where librarians are required today, some other professional that already exists or will yet emerge will be able to take their place.

IC studies were formally introduced in Brazil and Latin America by the Brazilian Institute of Information in Science and Technology (IBICT) in 1955, on the occasion of the Scientific Documentation Course (CDC), and then, in 1970, with the master's course in CI. Under the effect of the severity of these initiatives, new postgraduate courses in Documentation and CI began to be offered in several universities throughout Brazil, initially associated with Librarianship and Archival Science courses.

This movement ended up consolidating IC in Brazil as a theoretical and interdisciplinary research field, initially accessory and adjuvant to Librarianship courses. Over the years, CI has established itself as a scientific research activity that studies information from its genesis to its conversion into knowledge. In this mandate, CI focused its main interest on studies and analyzes related to the collection, classification, manipulation, storage, retrieval and dissemination of information. Araújo (2013)

This evolution of the field of information in Brazil consolidated Librarianship as an area of knowledge, inter and multidisciplinary that is dedicated to the practical and methodological applications of representation; of information and knowledge management, in information environments, such as libraries, documentation and research centers.

In the first decade of the 19th century, there were many postgraduate courses in IC, and formed a considerable mass of research professionals, absorbed, mainly in universities, in courses in the area, especially those in Library Science, followed by those in Archival Science and Museology., spread across the country. In April 2007, the Federal Government of Brazil launched the Support Program for Plans for Restructuring and Expansion of Federal Universities (REUNI), which sought to expand access and permanence of graduates in higher education. The program's ten-year goal, starting in 2008, was to double the number of students in undergraduate courses, allowing an additional 680,000 students to enroll in undergraduate courses. In the wake of this process, Brazilian universities were forced to hire new professionals.

The field of information benefited proportionately, although the largest volume of graduates recruited were graduates from IC programs, and in smaller numbers from Librarianship, Archival Science and Museology courses. This circumstance is explained by the greater number of graduate courses in IC consolidated in Brazil, in relation to other areas. The reflections of this change have not yet been efficiently qualified, however, a set of ongoing changes that favor IC research over practical activities can be outlined. These changes will certainly cause an impact that is not yet measurable, but of great interest for the evolution of the area's profile.

According to Silva and Fujino (2018), the theoretical instruments of IC have evolved along with the advent of techno-scientific evolution , however, "the actions to train information professionals compatible with the new conjuncture, mediated by undergraduate teaching, walk in tandem. slower steps and become a challenge" (SILVA; FUJINO, 2018, p. 3978). Thus, in order to keep up with the pace imposed by the fourth revolution, it is necessary to rethink the training of librarians.

Analyzing the 30 face-to-face bachelor's courses in Librarianship at Brazilian public universities, Arabelly Lima (2020) shows that 37% of the pedagogical projects of these courses were updated between 2015 and 2019; 33.3% were updated between 2010 and 2014; and the remaining 29.6% were updated between 2004 and 2009. Furthermore, the study (LIMA, 2020) shows that five of these courses, in addition to the term " Library Science", contain the terms "Information Management" or "Information Science". " in their names.

These data show that, in general, there is a concern to update curricula so that they follow the demands of society. However, criticisms of the training and technicality of the courses remain, indicating the importance of studies to analyze whether these updates are concerned with current demands of society or just change outdated nomenclatures.

This scenario shows that there is still a disconnect between the training offered and the current and potential demands of the job market for librarians. For Targino (2010), managerial vision, capacity for analysis, creativity and updating are basic requirements for the information professional. The author points out that more flexible curricular structures are urgently needed, which include a greater number of optional and interdisciplinary subjects. There is an urgent need for more integrating curricula, which favor and encourage a broad view of the world, in which techniques, as essential elements, act, in fact, as mere instruments for disseminating information to different social segments (TARGINO, 2010, p. 45).

In the same sense, Galindo and Lima (2018, p. 85) consider that there is "a disconnection between the reality of the market and the contents and practices offered in the classroom. The result is the formation of librarians unprepared for the professional pragmatic reality".

Silva and Silva (2010) point out that despite the recent reformulation in its discourse, trying not to limit itself to technicalities, Librarianship still presents a curricular formation in which there is the "valuation of administrative and technical issues to the detriment of social potentialities, which indicates a depoliticized Librarianship in its formation process" (SILVA; SILVA, 2010, p. 212).

Barros, Cunha and Café (2018, p. 305) state that those responsible for creating and maintaining Librarianship courses must be aware of the demands of society, which are increasingly diversified, seeking to meet the identified needs through the supply of conscientious professionals, critical and open to change.

In addition to graduation, it is essential that librarians seek, through continuous learning, to improve and acquire new skills, especially skills in information and technology. As information skills, or *information literacy* [9], it is important that librarians are aware of changes in the field of information and seek to constantly update themselves so that they can keep up with changes in the processes of creation, organization and use of information.

Technological skills are closely related to *information literacy*, because the evolution of digital technologies are the main promoters of transformations in the field of information. Thus, it is essential that librarians are familiar with new technologies so that they can make the best use of their potential for the development and innovation of library services and products.

[9] Understood from the definition in Dudziak (2003, P. 28), as "the continuous process of internalizing conceptual, attitudinal , and skill foundations necessary for understanding and interacting with the informational universe and its dynamics, in order to provide learning to the lifetime".

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Actions to update training and develop skills must be charged to the representative bodies of the class, in the sense that they establish partnerships with IC departments and related areas, and also with other institutions linked to information management. Distance learning platforms can be used to reduce costs and increase the number of librarians benefited.

Librarianship needs to reinvent itself to keep up with the speed of the fourth revolution, since the social need that Librarianship meets "is essentially variable, migratory, evolutionary" (ORTEGA Y GASSET, p. 24) and the function of the library must change according to the needs of society and serve it in all its potentialities (ARAÚJO, 2015).

IV. FINAL CONSIDERATIONS

The current moment of technological revolution, the fourth revolution, is marked by the deep connection between information and technology that drive transformations in all aspects of society. In this sense, librarians, as information professionals, should be occupying central positions in debates and decisions in the institutions they are part of, however, this is not what is happening.

The role of the librarian, as Ortega y Gasset (2005) reminds us, has always been linked to the meaning of the book as a social need and also to the custody and care of the book as an object. At a time when people autonomously produce and seek information in virtual environments, the librarian's work distances itself from society, which no longer sees relevance in this professional's activity.

The current context fosters discussions about the end of the book, as a physical support on paper, and consequently about the end of libraries and the librarian profession. However, the reality of libraries and many publications indicate that, at least for the next few decades, the library will remain hybrid. In the midst of this impasse, it seems wrong to waste so much energy worrying about the end of the paper book. More productive is to seek skills to manage information in whatever its support.

There is a constant indication that, throughout history, libraries have been "forced, compelled, pressured" to evolve in order to continue existing, indicating a passive or reactive attitude on the part of librarians. Change needs to stop being seen as an obligation, but understood as a natural and necessary movement that accompanies the demands of society, after all, the library is a cultural equipment that is part and is a product of society.

Considering that activities of a purely technical nature will be increasingly carried out by machines. The differential of librarians should be the development of a creative, critical and proactive posture, of a professional who acts to create the desired changes in his work environment, considering the challenges and opportunities that surround him. If librarians fail to react, their work, so often threatened, could run the risk of disappearing "not so much because of the invasion of their reserved area, but because of their own inability to adapt to the new demands for knowledge required by contemporary society" (GALINDO ; LIMA, 2018, p. 85).

For this change in the professional profile, the development and updating of skills must be promoted through continuing education. It is also necessary to rethink the teaching of Library Science. The updating of contents, creation and modification of disciplines, carried out in recent years, are necessary and important actions, however, they are not guarantees that recent graduates are acquiring a different profile from those who graduated in previous times. Perhaps the most important thing is that each discipline, even if focused on technical issues, is taught in an integrated way to the reality of the world of work, to the perspectives of IC and to the inescapable social, political and economic context in which it is inserted.

Librarianship in the fourth revolution needs professionals who are less concerned with rigid classification systems and who are more capable of performing dynamic managerial functions, adopting creative, innovative and proactive postures, focusing on the needs of a society in constant transformation.

In addition, it is necessary to understand the processes of preservation, organization, recovery and dissemination of information in a way that is connected to digital information environments. It is also important to know the emerging trends in the field of Librarianship and IC so that Brazilian libraries can strategically plan in order not only to survive, but, in fact, to accompany the transformations driven by digital technologies, occupying a relevant place in the society of the future.

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